Docket No. RP22-___-000
Exhibit No. ANR-0026
Page 1 of 1

**Excerpt of 2020-ATB-Data-Summary File Provided by NREL (Link Below)**

| UniqueID | atb_year | core_metric_key | core_metric_parameter | core_metric_case | crpyears | technology | techdetail | Alias | Default | scenario | core_metric_variable | units | value | Converted to $/KWh |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 308249 | 2020 | RM3CoKansasy | LCOE | R&D | 30 | CommPV | KansasCity | Commercial PV Kansas City | 1 | Moderate | 2050 | $/MWh | 26.17684387 | $ 0.026 |
| 345077 | 2020 | RM3ReKansasy | LCOE | R&D | 30 | ResPV | KansasCity | Residential PV Kansas City | 1 | Moderate | 2050 | $/MWh | 29.95991477 | $ 0.030 |
| 347849 | 2020 | RM3UtKansasy | LCOE | R&D | 30 | UtilityPV | KansasCity | Utility PV Kansas City | 1 | Moderate | 2050 | $/MWh | 13.89383424 | $ 0.014 |

Source: https://atb.nrel.gov/electricity/2020/files/2020-ATB-Data-Summary.zip
Note: NREL uses Kansas City for its Default baseline values.

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# Wind Energy Technology Data Update: 2020 Edition

Ryan Wiser[1], Mark Bolinger[1], Ben Hoen, Dev Millstein, Joe Rand, Galen Barbose, Naïm Darghouth, Will Gorman, Seongeun Jeong, Andrew Mills, Ben Paulos

Lawrence Berkeley National Laboratory

[1] Corresponding authors

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Photo source: National Renewable Energy Laboratory

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# Wind Energy Technology Data Update: 2020 Edition

Purpose and Scope:

- Summarize publicly available data on key trends in U.S. wind power sector
- Focus on land-based wind turbines over 100 kW in size
  - Separate DOE-funded data collection efforts on distributed and offshore wind
- Focus on historical data, with some emphasis on the previous year

Data and Methods:

- See summary at end of PowerPoint deck

Funding:

- U.S. Department of Energy’s Wind Energy Technologies Office

Products and Availability:

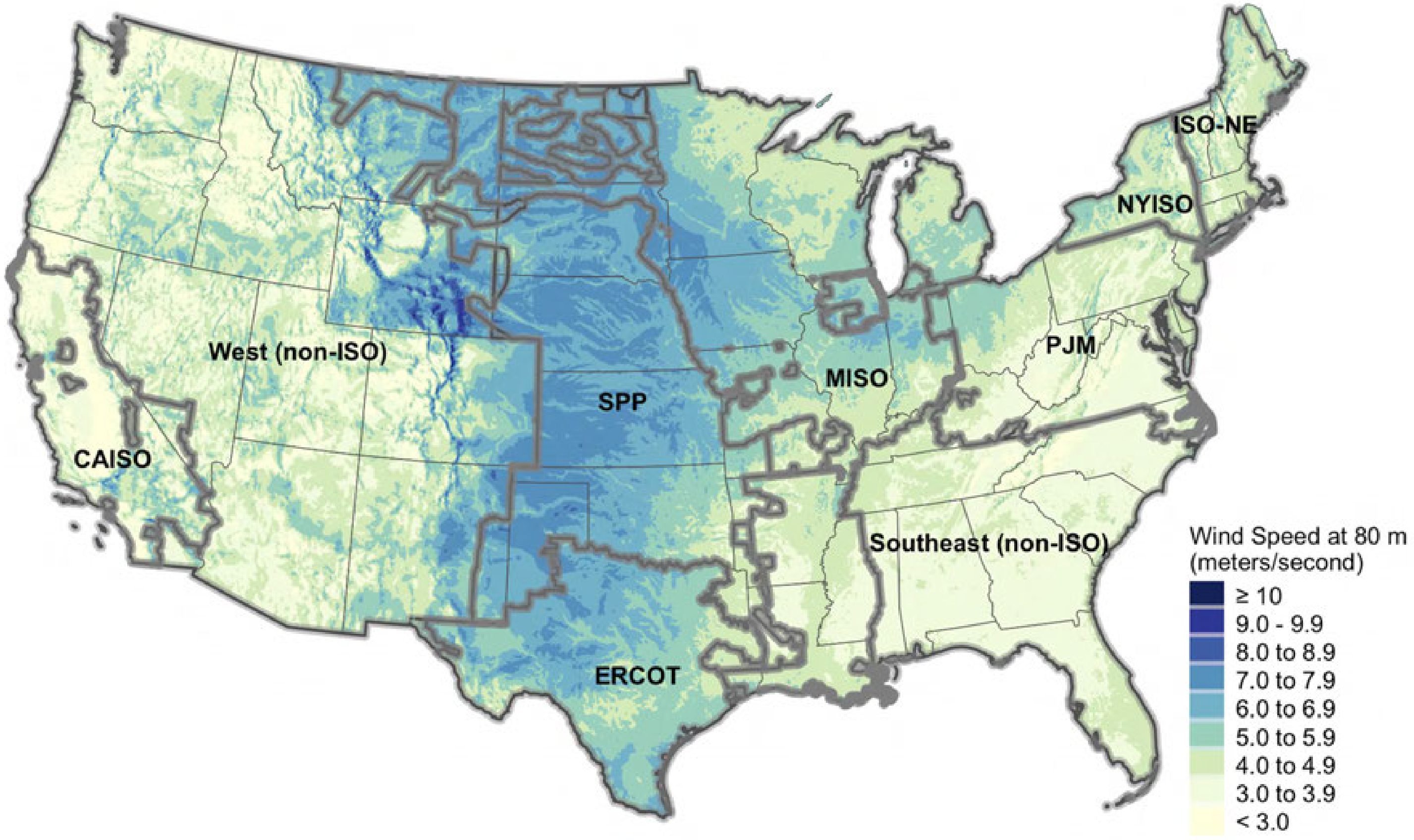
- This briefing deck is complemented with data file and visualizations
- All products available at: windreport.lbl.gov

# Presentation Contents

# What’s New this Year in the Online Data Set?

- Consistent use of new regional boundaries in presentation
- Additional data for online and planned hybrid projects
- Inclusion of Level10 Energy wind power sales price data
- Further presentation of trends in levelized energy costs
- Refinements and additions to market value assessment
- Reorganization and refinement of content and figures

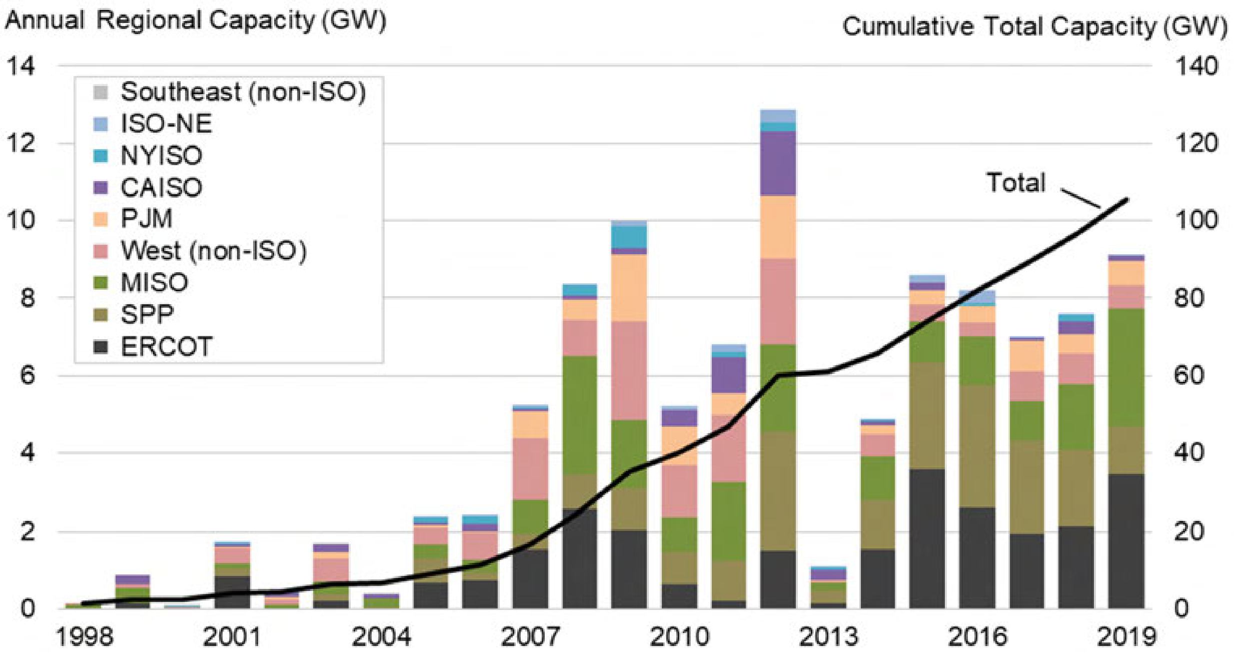
# Regional boundaries applied in this analysis include the seven independent system operators (ISO) and two non-ISO regions



*Sources: AWS Truepower, NREL [For more information on data sources, see pages 85-86]*

# Installation Data and Trends

# Annual and cumulative growth in U.S. wind power capacity



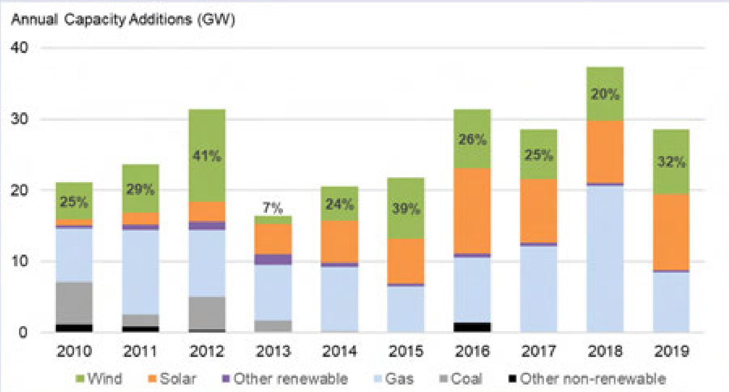
*Source: AWEA WindIQ*

- $13 billion invested in wind power project additions in 2019
- Most new 2019 capacity located in interior of country: ERCOT, MISO, SPP
- Partial repowering: 2,864 MW of turbines retrofitted in 2019

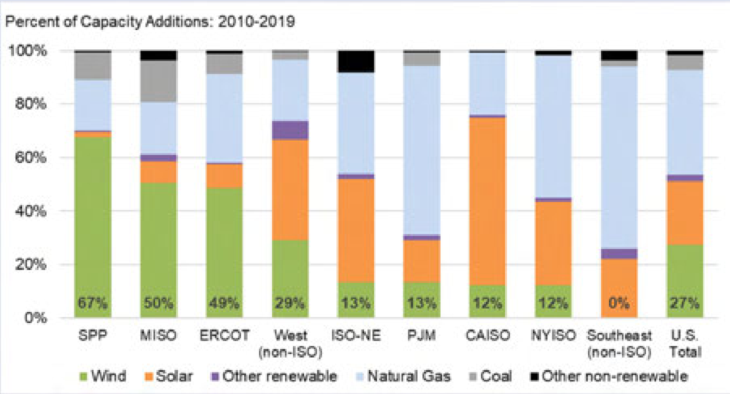
Interactive data visualization: https://emp.lbl.gov/wind-energy-growth

# Relative contribution of generation types in capacity additions

## Relative contribution of generation types in annual capacity additions



## Generation capacity additions by region: 2010-2019



*Sources: ABB, AWEA WindIQ, Wood Mackenzie, Berkeley Lab*

Over the last decade, wind has comprised 27% of total capacity additions, and a higher proportion in SPP, MISO, ERCOT, and non-ISO West

# International comparisons of wind power capacity: land-based and offshore

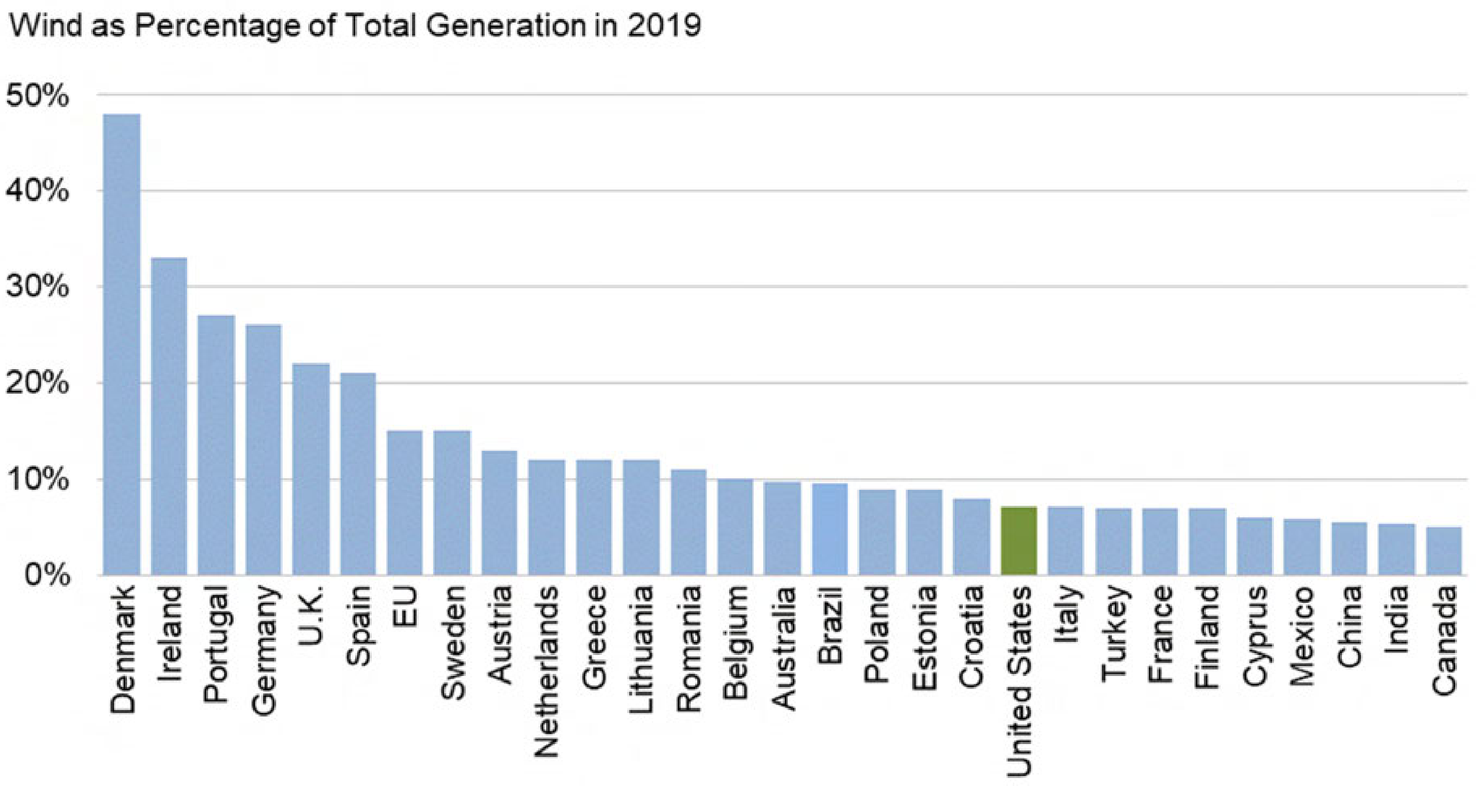
| Annual Capacity (2019, MW) | |
|---|---|
| China | 26,155 |
| **United States** | **9,137** |
| United Kingdom | 2,393 |
| India | 2,377 |
| Spain | 2,319 |
| Germany | 2,189 |
| Sweden | 1,588 |
| France | 1,336 |
| Mexico | 1,281 |
| Argentina | 931 |
| *Rest of World* | 10,639 |
| **TOTAL** | **60,345** |

| Cumulative Capacity (end of 2019, MW) | |
|---|---|
| China | 236,402 |
| **United States** | **105,591** |
| Germany | 61,406 |
| India | 37,506 |
| Spain | 25,850 |
| United Kingdom | 23,340 |
| France | 16,645 |
| Brazil | 15,452 |
| Canada | 13,413 |
| Italy | 10,406 |
| *Rest of World* | 104,671 |
| **TOTAL** | **650,682** |

*Sources: GWEC, AWEA WindIQ*

- U.S. remains second to China in annual and cumulative capacity
- Global wind additions in 2019 exceeded the 50,000 MW added in 2018, but were below the record level of 63,800 MW added in 2015

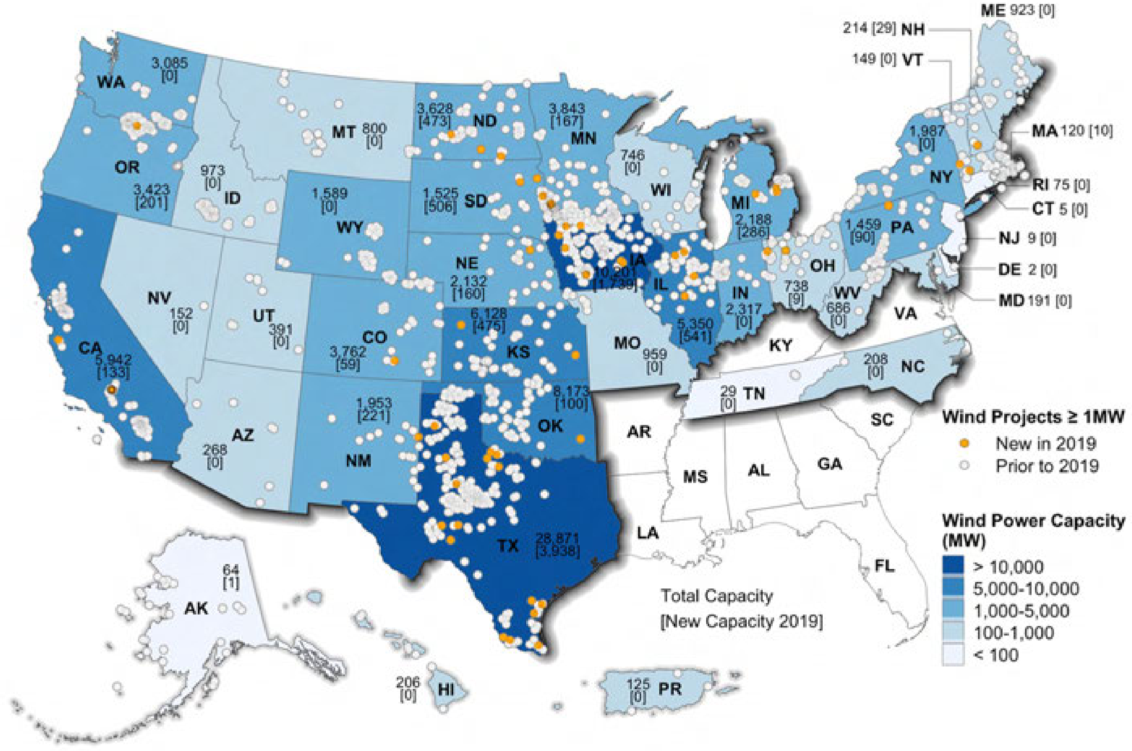
# Wind energy penetration in subset of top global wind markets



*Source: AWEA*

*Note: Figure includes a subset of the top global wind markets*

# U.S. wind power installations, end of 2019



*Note: Numbers within states represent MegaWatts of cumulative installed wind capacity and, in brackets, annual additions in 2019.*

*Source: AWEA WindIQ, Berkeley Lab*

Interactive data visualization: https://emp.lbl.gov/wind-energy-growth

# U.S. wind power by state and independent system operator

| Installed Capacity (MW) | | | | 2019 Wind Generation as a Percentage of: | | | |
|---|---|---|---|---|---|---|---|
| Annual (2019) | | Cumulative (end of 2019) | | In-State Generation | | In-State Sales | |
| Texas | 3,938 | Texas | 28,871 | Iowa | 41.9% | Kansas | 53.5% |
| Iowa | 1,739 | Iowa | 10,201 | Kansas | 41.4% | Iowa | 53.1% |
| Illinois | 541 | Oklahoma | 8,173 | Oklahoma | 34.6% | North Dakota | 51.1% |
| South Dakota | 506 | Kansas | 6,128 | North Dakota | 26.8% | Oklahoma | 45.3% |
| Kansas | 475 | California | 5,942 | South Dakota | 23.9% | New Mexico | 27.4% |
| North Dakota | 473 | Illinois | 5,350 | Maine | 23.6% | Nebraska | 24.7% |
| Michigan | 286 | Minnesota | 3,843 | Nebraska | 19.9% | Wyoming | 24.1% |
| New Mexico | 221 | Colorado | 3,762 | New Mexico | 19.4% | South Dakota | 23.8% |
| Oregon | 201 | North Dakota | 3,628 | Colorado | 19.2% | Texas | 20.6% |
| Minnesota | 167 | Oregon | 3,423 | Minnesota | 19.0% | Maine | 20.4% |
| Nebraska | 160 | Washington | 3,085 | Texas | 17.5% | Colorado | 19.4% |
| California | 133 | Indiana | 2,317 | Vermont | 16.4% | Minnesota | 17.0% |
| Oklahoma | 100 | Michigan | 2,188 | Idaho | 16.1% | Montana | 15.4% |
| Pennsylvania | 90 | Nebraska | 2,132 | Oregon | 11.5% | Oregon | 15.0% |
| Colorado | 59 | New York | 1,987 | Wyoming | 9.8% | Idaho | 11.2% |
| New Hampshire | 29 | New Mexico | 1,953 | Montana | 8.5% | Illinois | 10.1% |
| Massachusetts | 10 | Wyoming | 1,589 | Illinois | 7.6% | Washington | 8.6% |
| Ohio | 9 | South Dakota | 1,525 | Washington | 7.3% | Vermont | 7.1% |
| Alaska | 1 | Pennsylvania | 1,459 | California | 6.8% | Indiana | 6.4% |
| | | Idaho | 973 | Indiana | 6.0% | Hawaii | 6.3% |
| *Rest of U.S.* | *0* | *Rest of U.S.* | *7,062* | *Rest of U.S.* | *1.1%* | *Rest of U.S.* | *1.6%* |
| **Total** | **9,137** | **Total** | **105,591** | **Total** | **7.2%** | **Total** | **8.0%** |

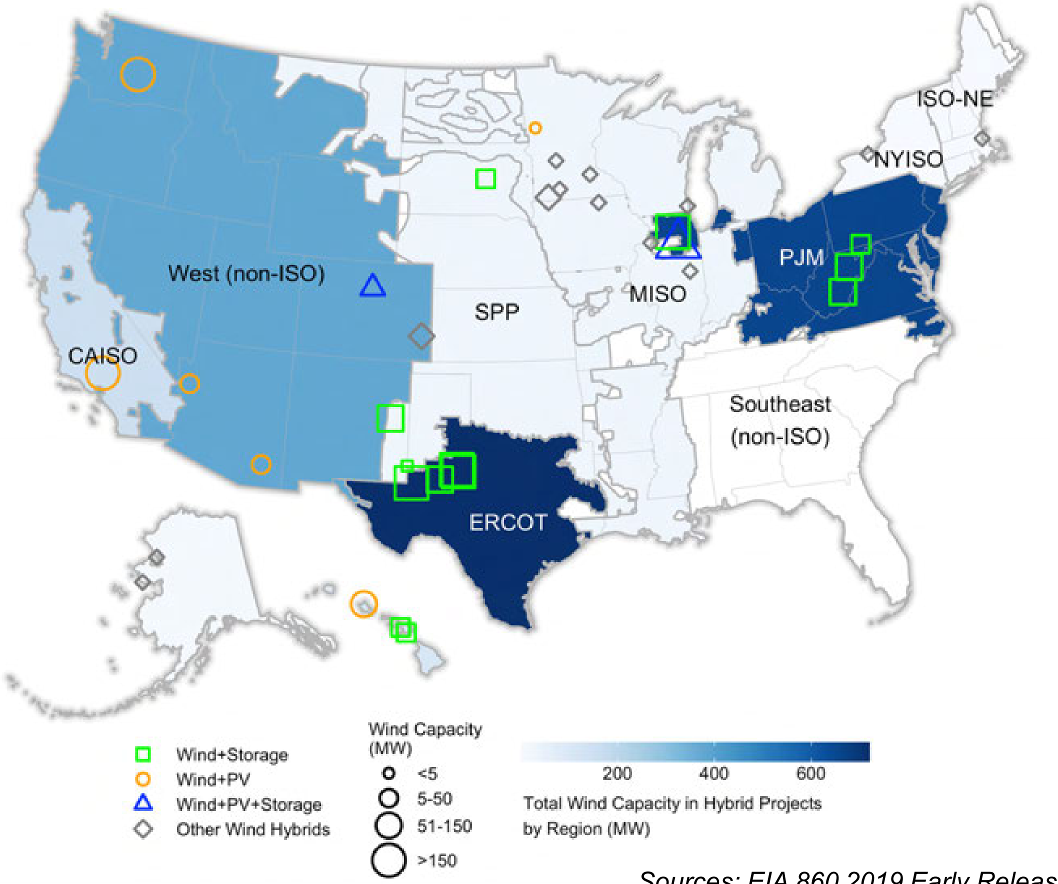
*Source: AWEA WindIQ, EIA*

**<u>2019 Wind Penetration by ISO/RTO:</u>** SPP: 27.5%; ERCOT: 19.9%; MISO: 8.5%; CAISO: 6.9%; PJM: 3.0%; ISO-NE: 2.9%; NYISO: 2.8%

Interactive data visualization: https://emp.lbl.gov/wind-energy-growth

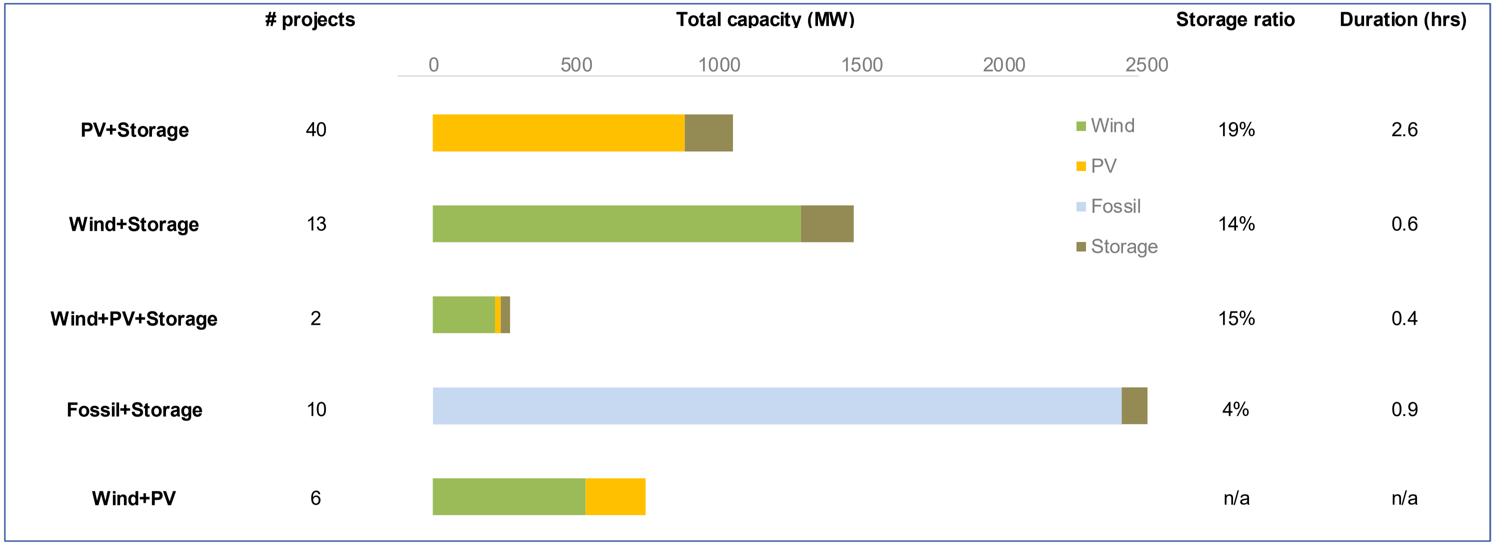
# Online wind hybrid / co-located projects of various configurations

## Online Wind Hybrid / Co-located Projects



*Sources: EIA 860 2019 Early Release, Berkeley Lab*

# Data on subset of the hybrid / co-located project configurations: end of 2019



| | # projects | Storage ratio | Duration (hrs) |
|---|---|---|---|
| **PV+Storage** | 40 | 19% | 2.6 |
| **Wind+Storage** | 13 | 14% | 0.6 |
| **Wind+PV+Storage** | 2 | 15% | 0.4 |
| **Fossil+Storage** | 10 | 4% | 0.9 |
| **Wind+PV** | 6 | n/a | n/a |

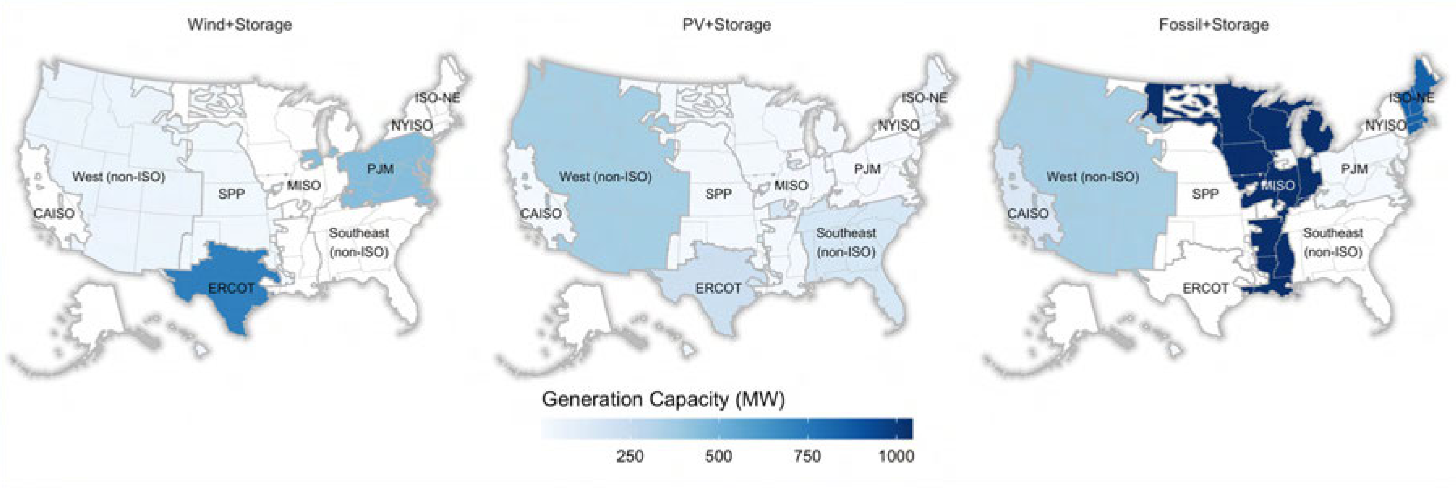
*Note: Not included in figure are 54 other hybrid / co-located projects with other configurations; details on those projects are provided in the underlying data file.* ***Storage ratio*** *defined as total storage capacity divided by total generation capacity within a type.* ***Duration*** *defined as total MWh of storage divided by total MW of storage within a type.*

*Sources: EIA 860 2019 Early Release, Berkeley Lab*

- Most wind hybrid / co-located projects are Wind+Storage (located in PJM and ERCOT), with storage having limited duration to serve ancillary services markets
- There are far fewer other wind hybrid / co-located configurations of significant size

Interactive data visualization: https://emp.lbl.gov/online-hybrid-and-energy-storage-projects

# Generator + storage hybrid / co-located projects at end of 2019: wind+storage, PV+storage, fossil+storage



*Sources: EIA 860 2019 Early Release, Berkeley Lab*

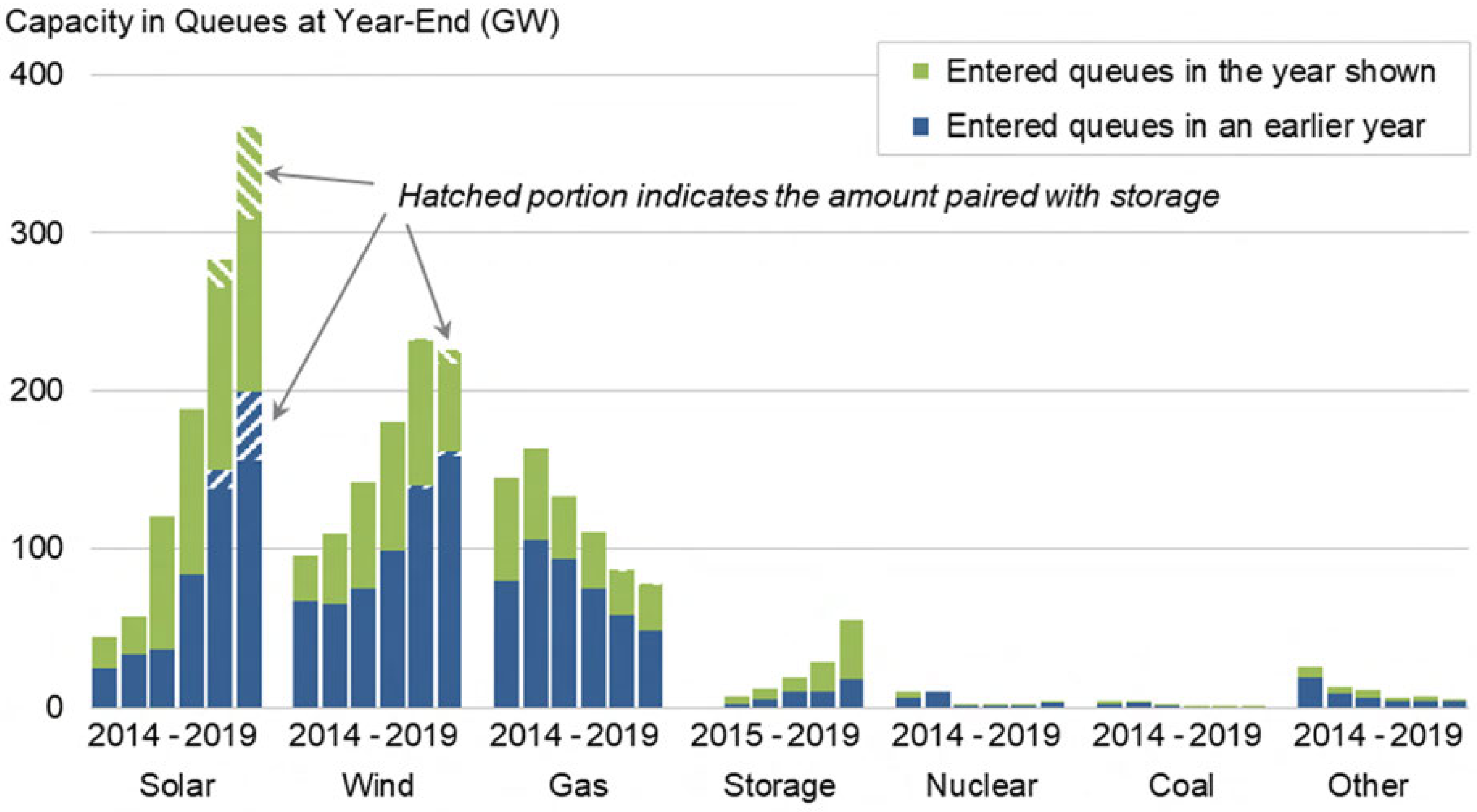
- Wind+storage plants located primarily in ERCOT and PJM
- PV+storage plants located primarily in non-ISO West, ERCOT, and Southeast
- Fossil+storage plants located primarily in MISO and ISO-NE

Interactive data visualization: https://emp.lbl.gov/online-hybrid-and-energy-storage-projects

# Scope of transmission interconnection queue data

- Data compiled from **interconnection queues** for 7 ISOs and 30 utilities, representing ~80% of all U.S. electricity load
  - Projects that connect to the bulk power system
  - Includes all projects in queues through the end of 2019
  - Filtered to include only “active” projects: removed those listed as “online,” “withdrawn,” or “suspended”
- Hybrid / co-located projects identified via either of these two methods:
  - “Generator Type” field includes **multiple types for a single queue entry** (row)
  - Two or more queue entries (of different gen. types) that share the **same point of interconnection** and sponsor, queue date, ID number, and/or COD
    - Emphasis was placed on identification of wind+storage and solar+storage
    - Other hybrid configurations are likely undercounted
- **Note that being in an interconnection queue does not guarantee ultimate construction: majority of plants are not subsequently built**

# Generation capacity in 37 selected interconnection queues from 2014 to 2019, by resource type

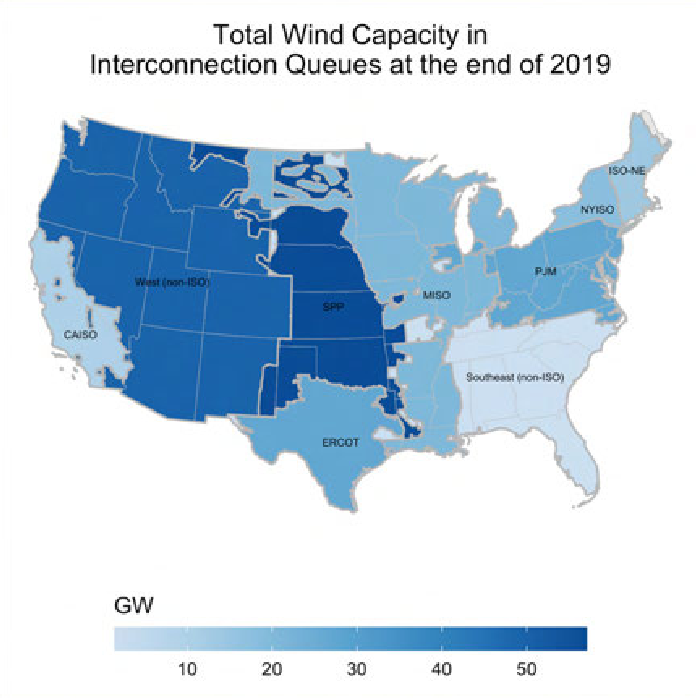


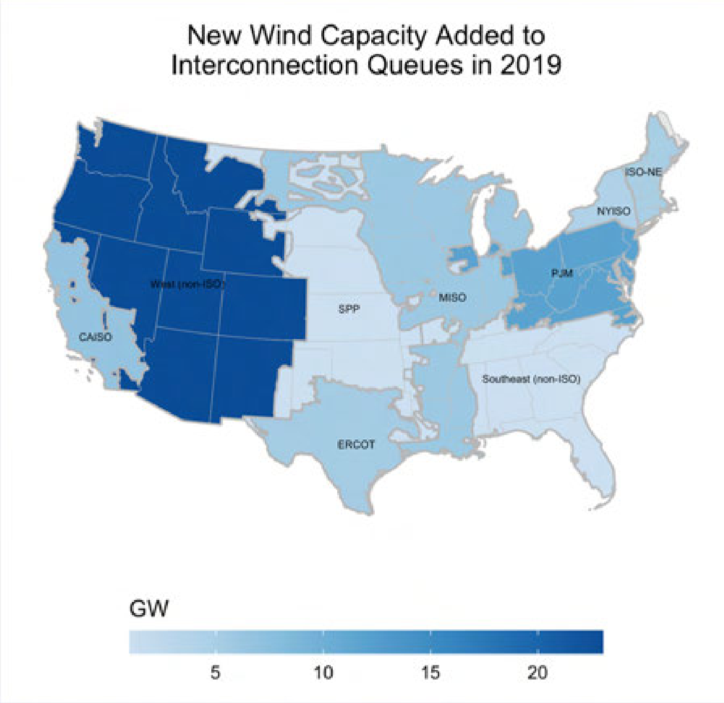
*Source: Berkeley Lab review of interconnection queues*

***Note: Not all of this capacity will be built***

Interactive data visualization: https://emp.lbl.gov/generation-storage-and-hybrid-capacity

# Wind power capacity within selected interconnection queues by region: cumulative total and 2019 additions


Total Wind Capacity in Interconnection Queues at the end of 2019

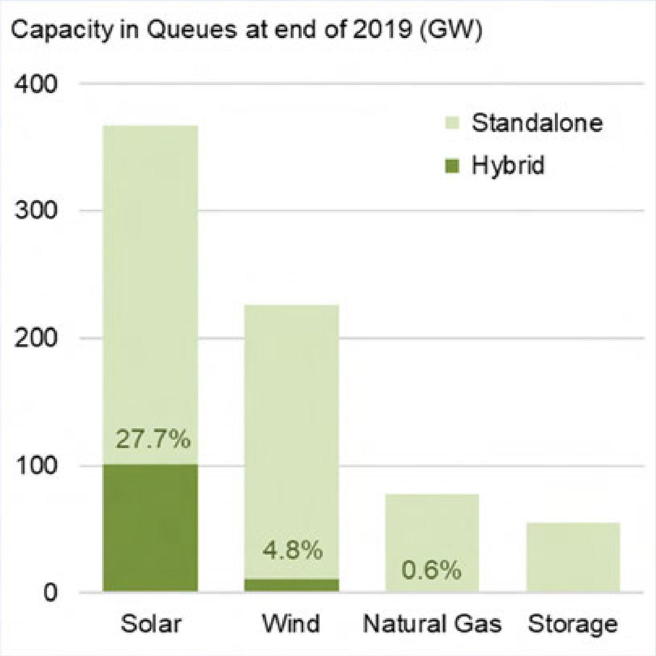

New Wind Capacity Added to Interconnection Queues in 2019

*Source: Berkeley Lab review of interconnection queues*

*Note: Not all of this capacity will be built*

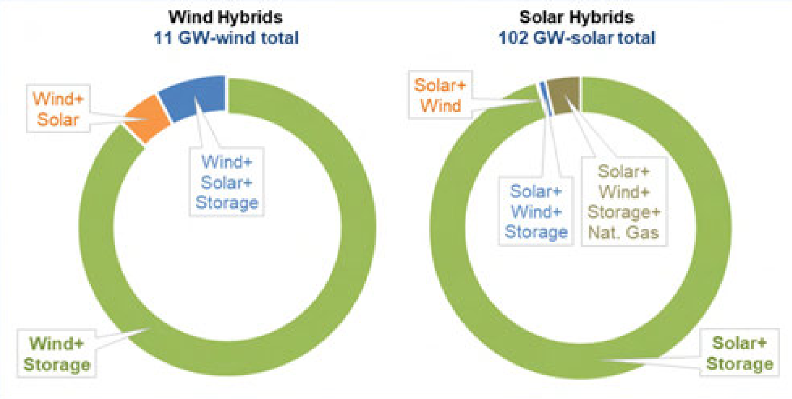
Interactive data visualization: https://emp.lbl.gov/generation-storage-and-hybrid-capacity

# Hybrid / co-located capacity within interconnection queues at end of 2019: 11 GW of wind proposed as hybrids, 102 GW of solar



Source: Berkeley Lab review of interconnection queues

Wind+Storage and Solar+Storage configurations are more common than other hybrid types[1]

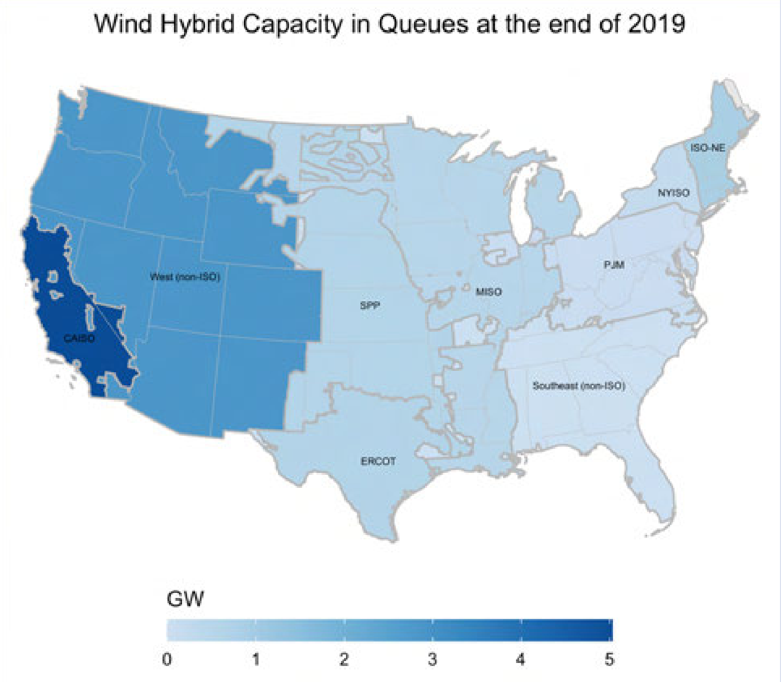


[1] Emphasis was placed on identification of wind+storage and solar+storage: other hybrid configurations are likely undercounted.

*Notes: (1) Not all of this capacity will be built; (2) Hybrid plants involving multiple generator types (e.g., wind+PV+ storage, wind+PV) show up in all generator categories, presuming the capacity is known for each type.*

Interactive data visualization: https://emp.lbl.gov/generation-storage-and-hybrid-capacity

# Location of hybrid / co-located capacity within interconnection queues at end of 2019



Source: Berkeley Lab review of interconnection queues

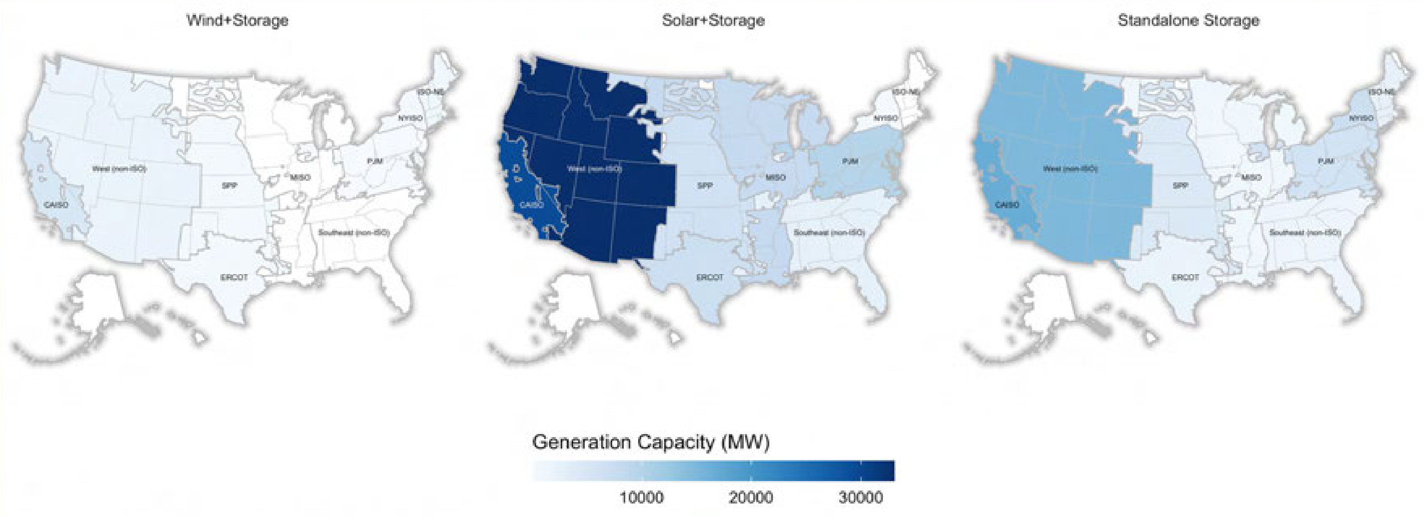
As a proportion of proposed wind, solar, and natural gas in regional queues, proposed wind hybrids are more prevalent in CAISO; solar somewhat more evenly distributed

| Region | Percentage of Proposed Generators Hybridizing in Each Region | | |
|---|---|---|---|
| | Wind | Solar | Nat. Gas |
| CAISO | 50% | 67% | 0% |
| ERCOT | 3% | 13% | 0% |
| SPP | 1% | 22% | 0% |
| MISO | 2% | 17% | 0% |
| PJM | 0% | 17% | 1% |
| NYISO | 1% | 5% | 4% |
| ISO-NE | 6% | 0% | 0% |
| West (non-ISO) | 6% | 50% | 0% |
| Southeast (non-ISO) | 0% | 6% | 0% |
| **TOTAL** | **4.8%** | **27.7%** | **0.6%** |

*Notes: (1) Not all of this capacity will be built; (2) Hybrid plants involving multiple generator types (e.g., wind+PV+ storage, wind+PV) show up in all generator categories, presuming the capacity is known for each type; (3) Emphasis was placed on identification of wind+storage and solar+storage in queues: other hybrid / co-located projects are likely undercounted.*

Interactive data visualization: https://emp.lbl.gov/generation-storage-and-hybrid-capacity

# Generator+storage hybrid / co-located projects and standalone storage in interconnection queues



For hybrid/co-located plants, the generation capacity is depicted. For standalone storage, the storage capacity is depicted.

Average storage:generation capacity ratio for solar+storage (66%) is higher than for wind+storage (27%), in subset of ISO queues shown here: solar hybrids likely to install more storage capacity relative to generation capacity than wind hybrids

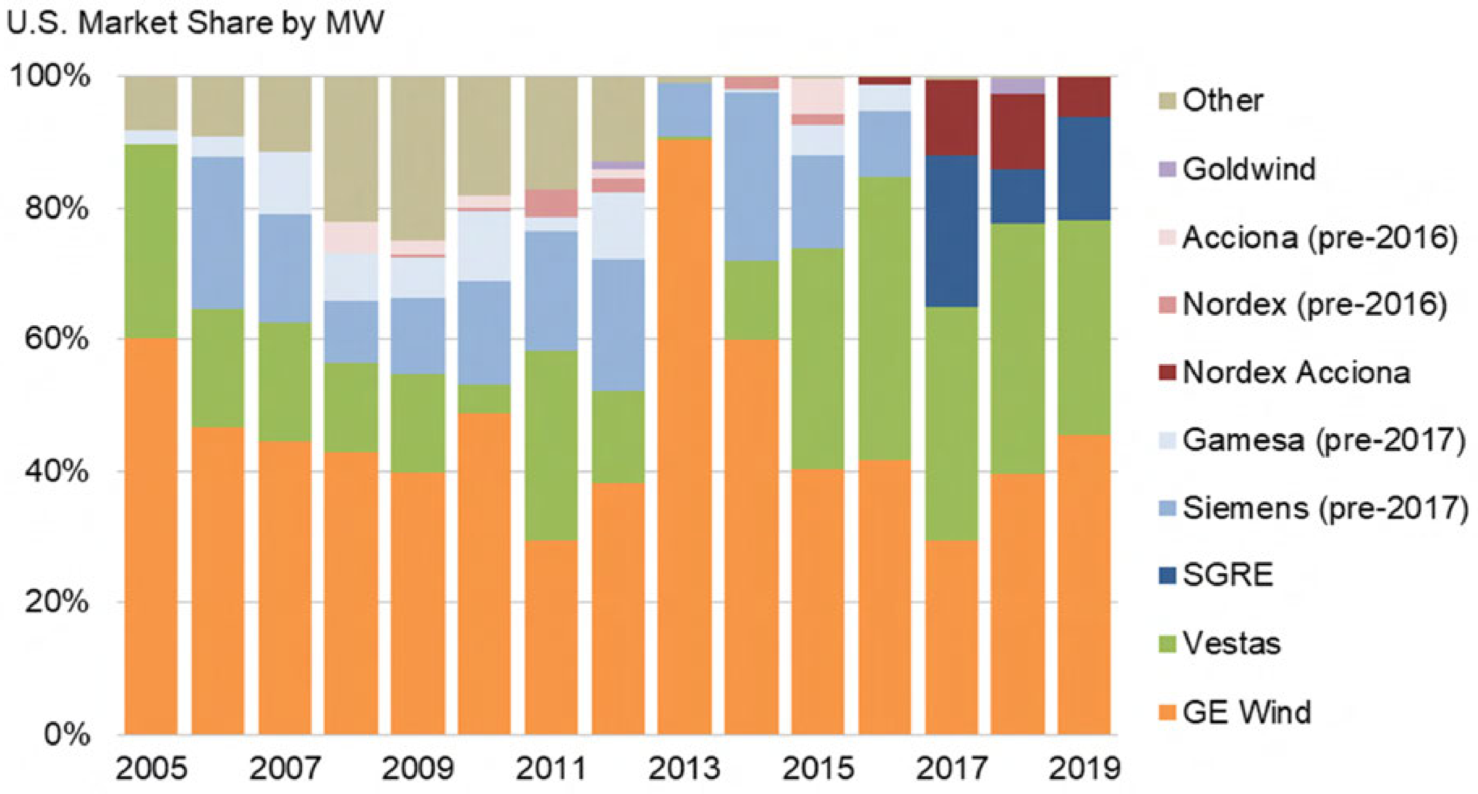
| | Storage:Generation Capacity Ratio | |
|---|---|---|
| **Region** | **Wind+Storage** | **Solar+Storage** |
| CAISO | 25% | 78% |
| ERCOT | 54% | 38% |
| SPP | 23% | 38% |
| NYISO | 7% | 49% |
| **Combined** | **27%** | **66%** |

*Source: Berkeley Lab review of interconnection queues*

*Note: Not all of this capacity will be built*

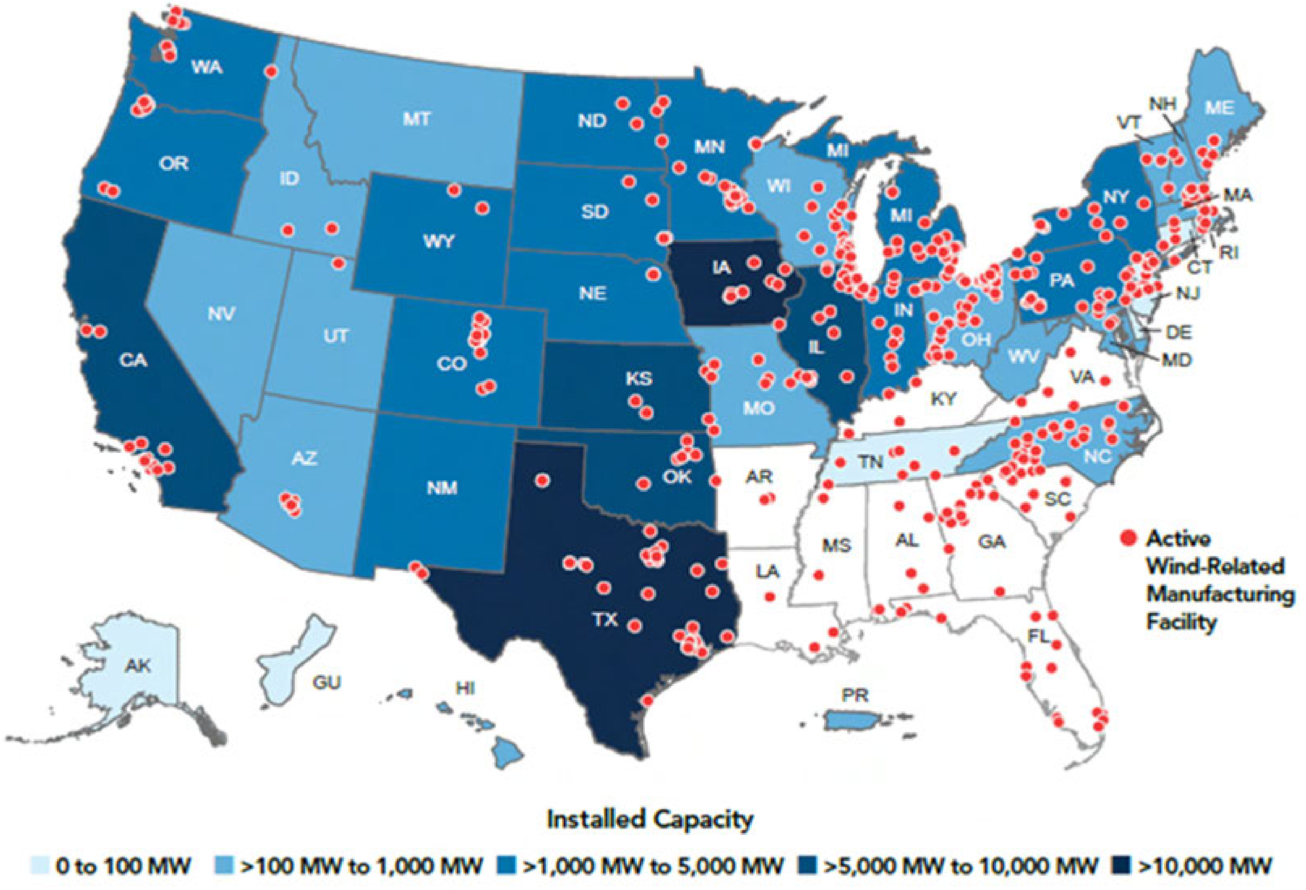
# Industry Data and Trends

# Annual U.S. market share of wind turbine manufacturers



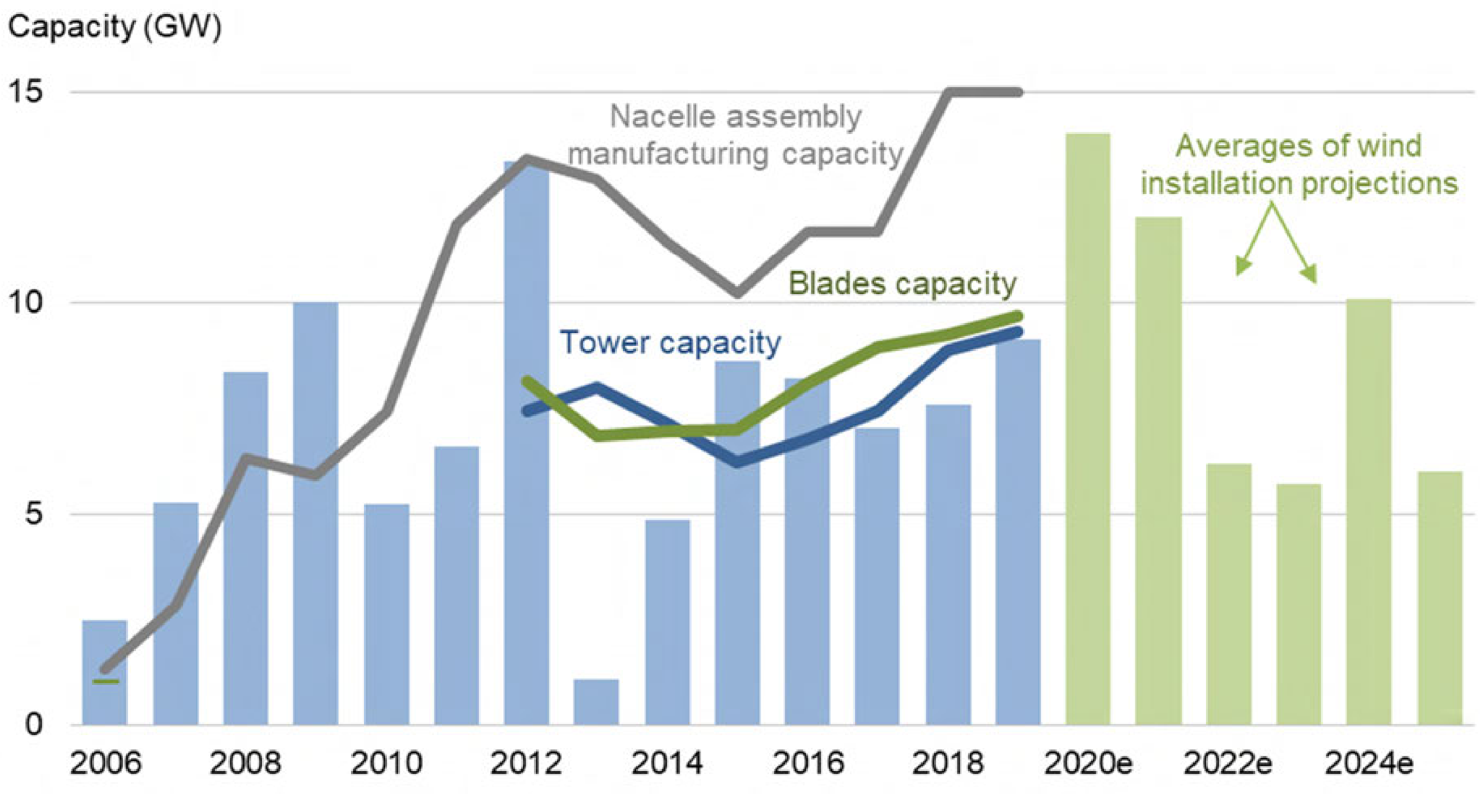
*Source: AWEA WindIQ*

# Location of wind turbine and component manufacturing facilities, end of 2019



Source: AWEA

# Domestic wind manufacturing capability vs. U.S. wind power capacity installations

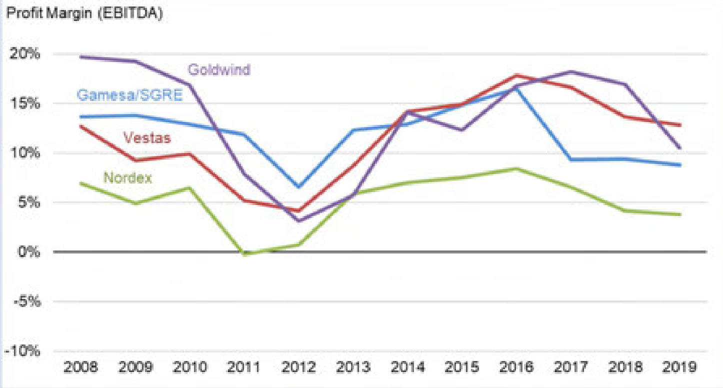


Sources: AWEA Wind IQ, independent analyst projections, Berkeley Lab

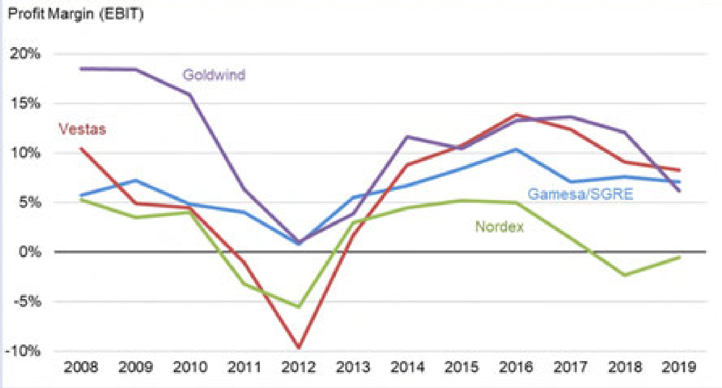
*Note: Actual nacelle assembly, tower production, and blades production would be expected to be below maximum production capacity.*

# Earnings of global wind turbine manufacturers over time

## Earnings before interest, taxes, depreciation, amortization (EBITDA)

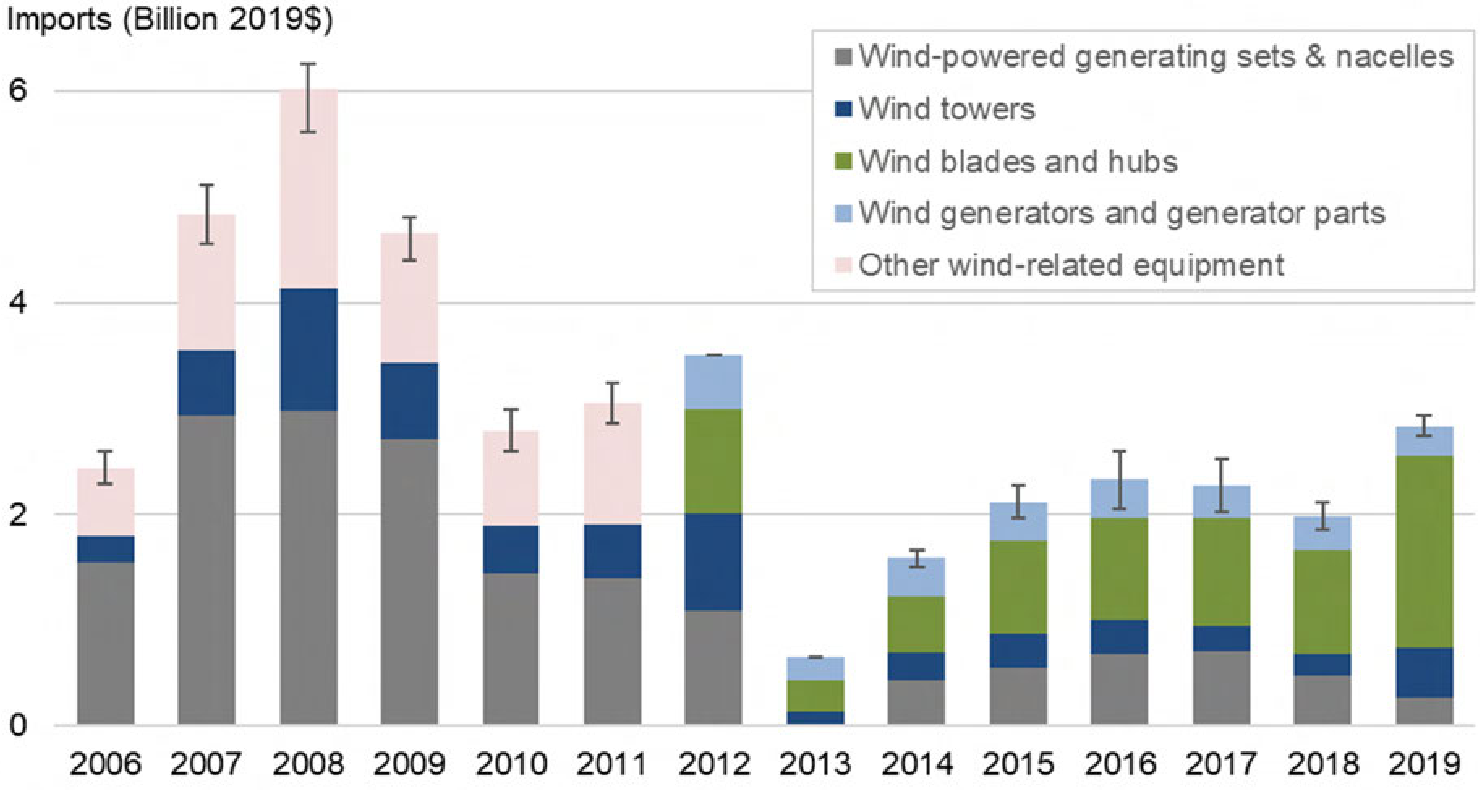


## Earnings before interest and taxes (EBIT)



*Sources: OEM annual reports and financial statements*

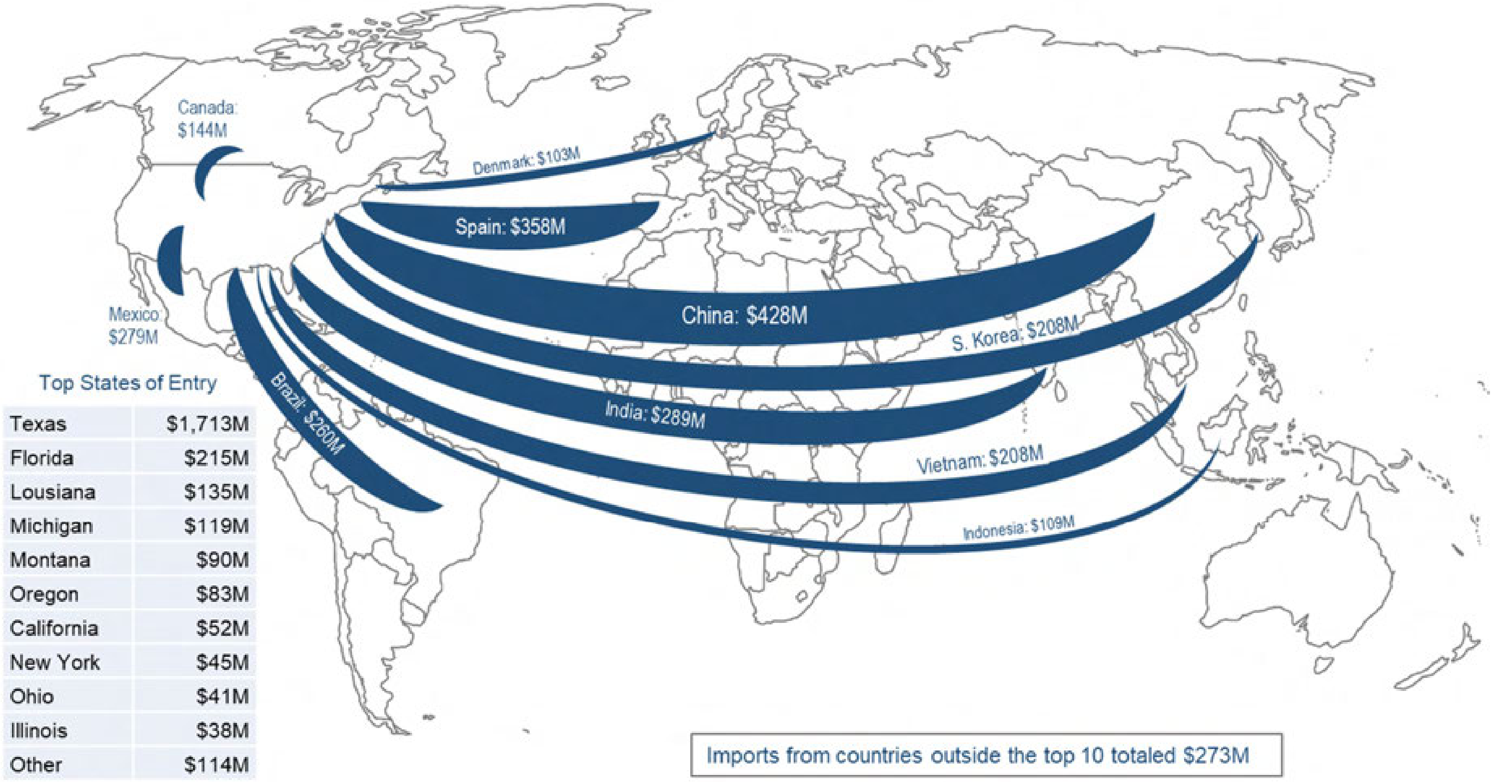
# Estimated imports of wind-powered generating sets, nacelles, towers, generators and generator parts, and blades and hubs



*Source: Berkeley Lab analysis of data from USITC DataWeb: http://dataweb.usitc.gov*

*Notes: Figure only includes tracked trade categories, misses other wind-related imports; see full report for the assumptions used to generate the figure.*

# Tracked wind equipment imports into the United States in 2019, by region



Top States of Entry

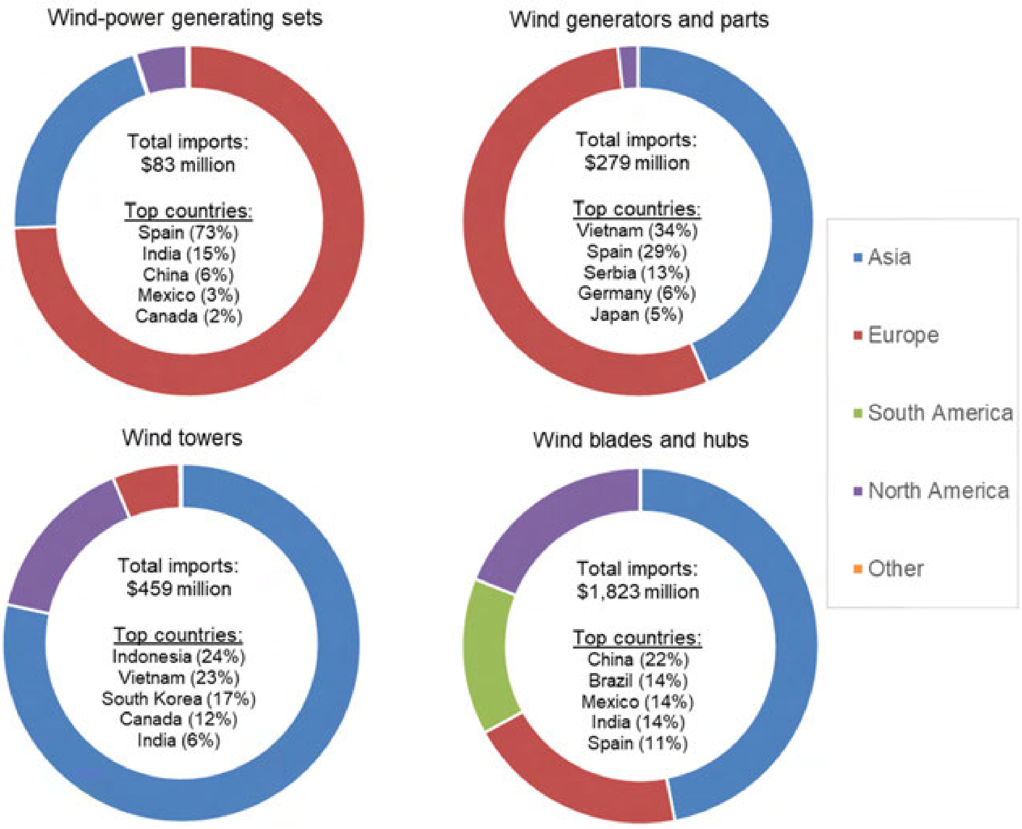
| | |
|---|---|
| Texas | $1,713M |
| Florida | $215M |
| Lousiana | $135M |
| Michigan | $119M |
| Montana | $90M |
| Oregon | $83M |
| California | $52M |
| New York | $45M |
| Ohio | $41M |
| Illinois | $38M |
| Other | $114M |

Imports from countries outside the top 10 totaled $273M

*Source: Berkeley Lab analysis of data from USITC DataWeb: http://dataweb.usitc.gov*

*Note: Tracked wind-specific equipment includes: wind-powered generating sets, towers, hubs and blades, wind generators and parts*

# Origins of U.S. imports of selected wind turbine equipment in 2019

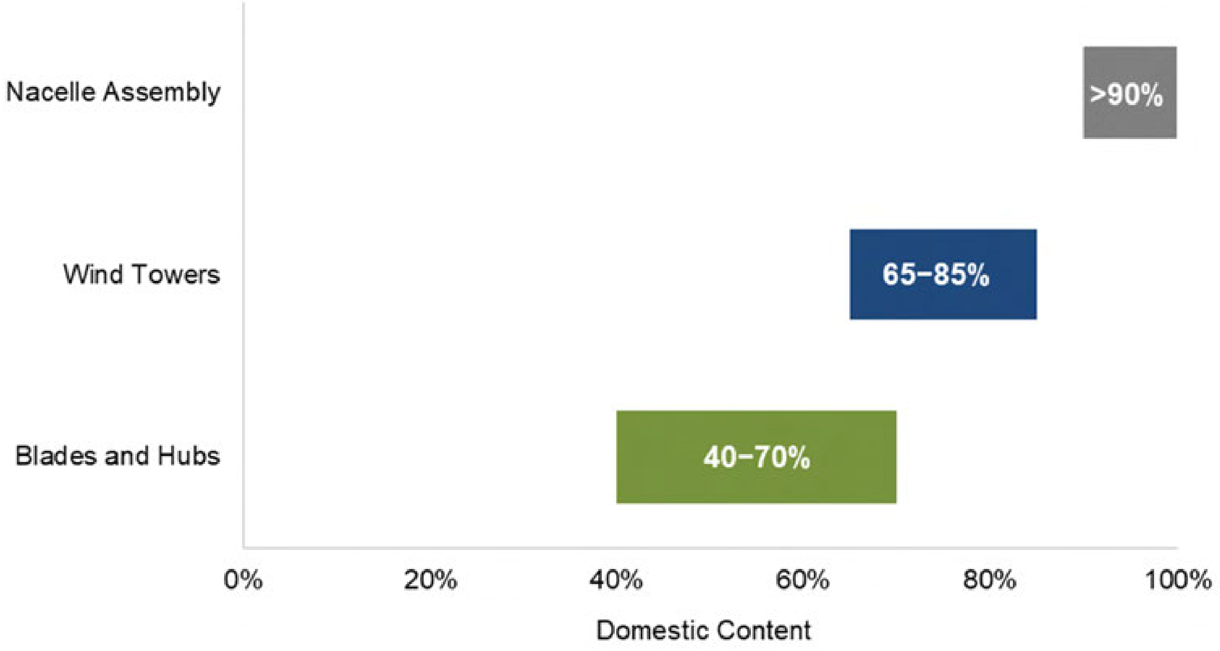


- Majority of imports of wind-powered generating sets come from Spain
- Generators and parts come from Europe and Asia
- Towers largely come from Asia, but also Canada
- Blades and hubs come from all four world regions

*Source: Berkeley Lab analysis of data from USITC DataWeb: http://dataweb.usitc.gov*

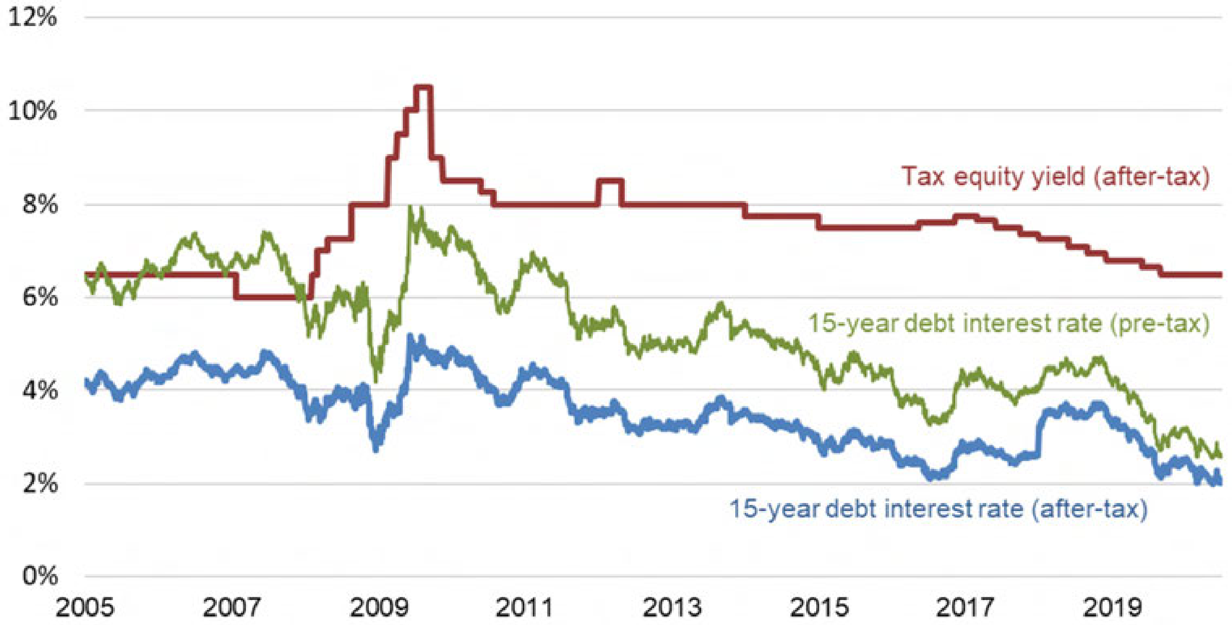
# Approximate domestic content of major components in 2019

- Figure reflects percentage of blades, towers, and nacelles that were installed in the U.S. in 2019 that were also manufactured / assembled domestically
- Imports occur in untracked trade categories not included below, including many nacelle internals; nacelle internals generally have lower domestic content of < 20%



*Source: Berkeley Lab*

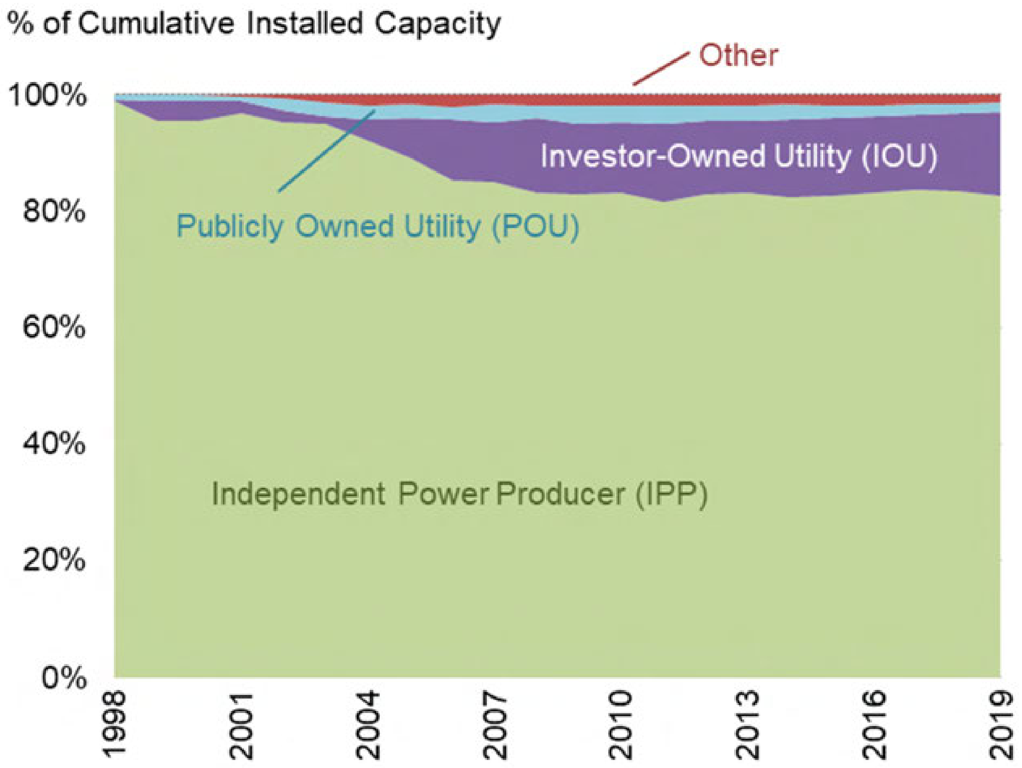
# Cost of 15-year debt and tax equity for utility-scale wind projects over time

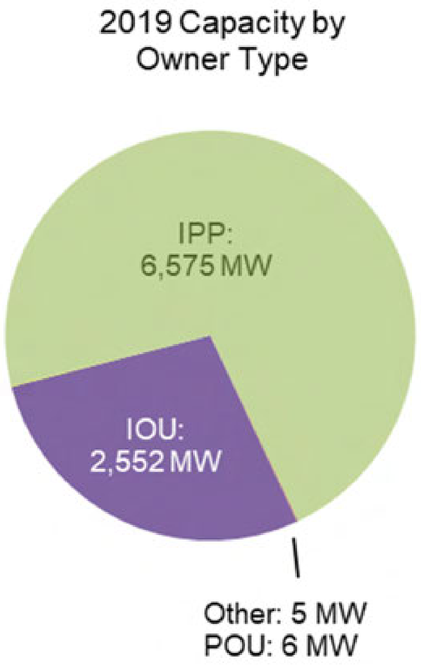


*Sources: Intercontinental Exchange Benchmark Administration, BNEF, Norton Rose Fulbright, Berkeley Lab*

- Both the base rate (3-mo LIBOR) and 15-yr swap rate declined by ~100 basis points in 2019, and by even more than that through the first half of 2020
- A portion of these reductions have been offset by an increase in the margins that banks charge (in response to uncertainty surrounding COVID-19)
- Even so, cost of capital (debt & tax equity) remains at or near historical lows

# Cumulative and 2019 wind power capacity categorized by owner type

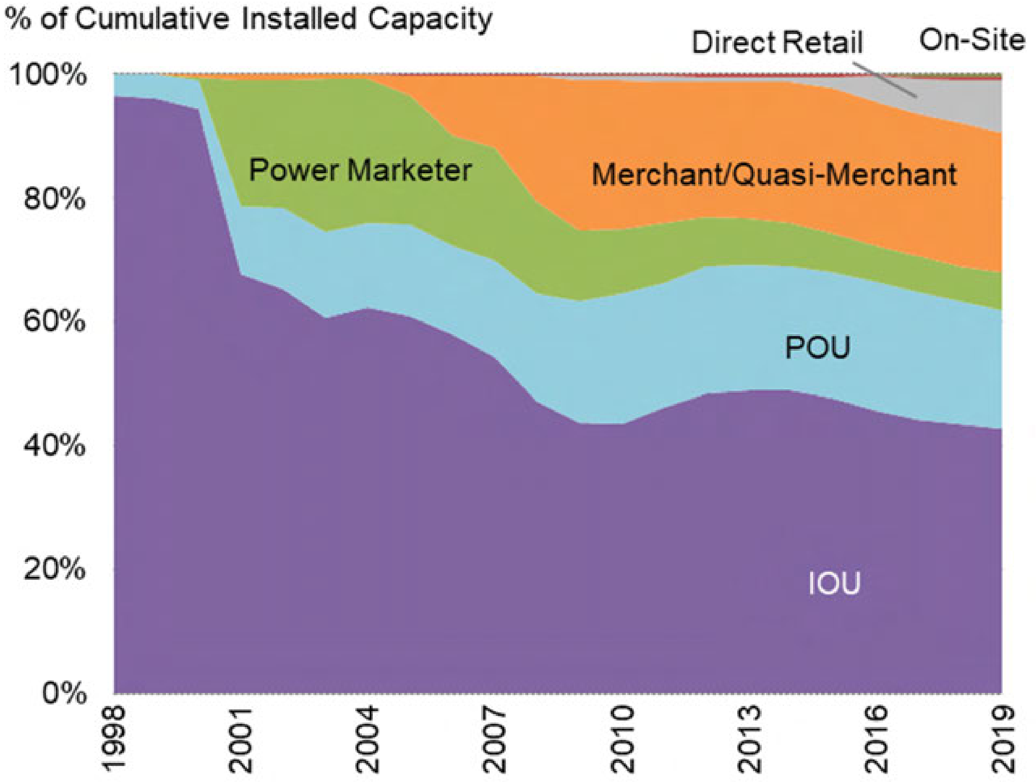


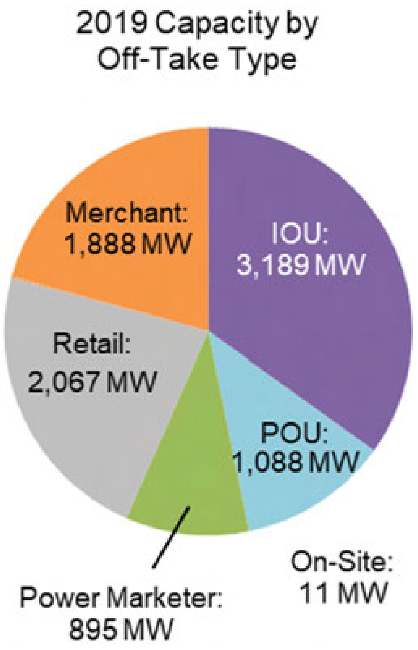


Source: Berkeley Lab estimates based on AWEA WindIQ

*Note: Graphic on left shows distribution among the growing cumulative fleet of wind projects installed in the U.S. Pie chart shows distribution only among those new projects built in 2019.*

# Cumulative and 2019 wind power capacity categorized by power off-take arrangement





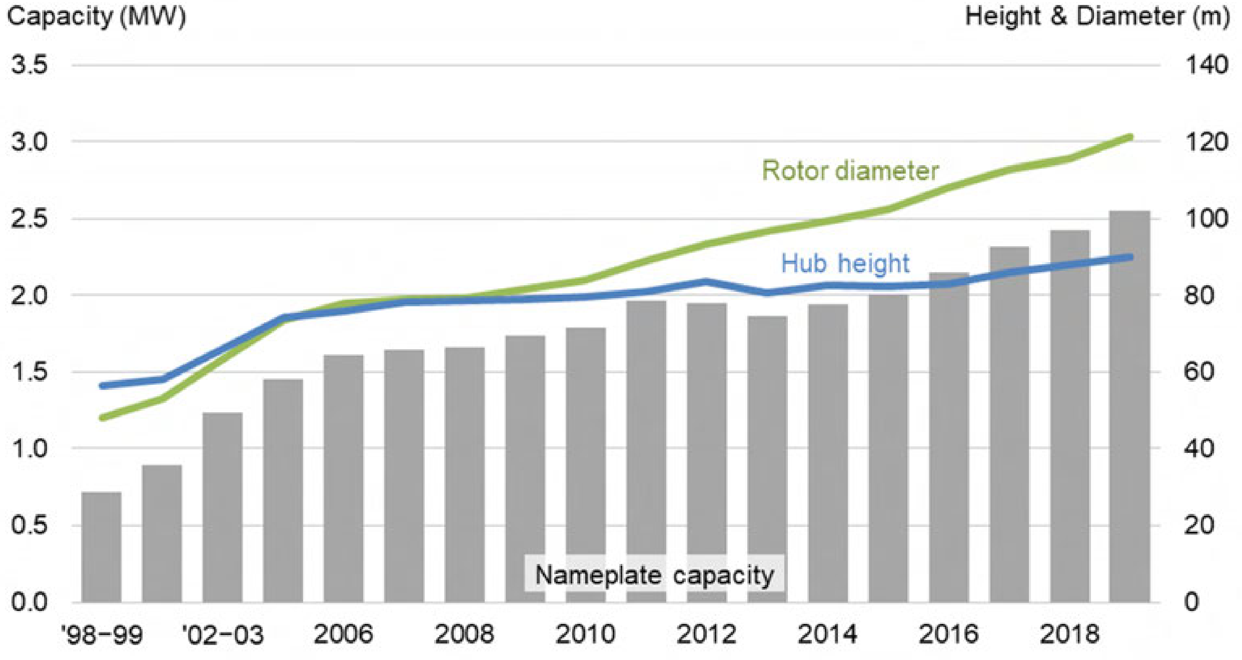
Source: Berkeley Lab estimates based on AWEA WindIQ

*Notes: Graphic on left shows distribution among the growing cumulative fleet of wind projects installed in the U.S. Pie chart shows distribution only among those new projects built in 2019. Merchant/quasi-merchant plants often execute electricity or natural gas hedges to reduce merchant risk exposure.*

# Technology Data and Trends

# Average turbine nameplate capacity, hub height, and rotor diameter for land-based wind over time

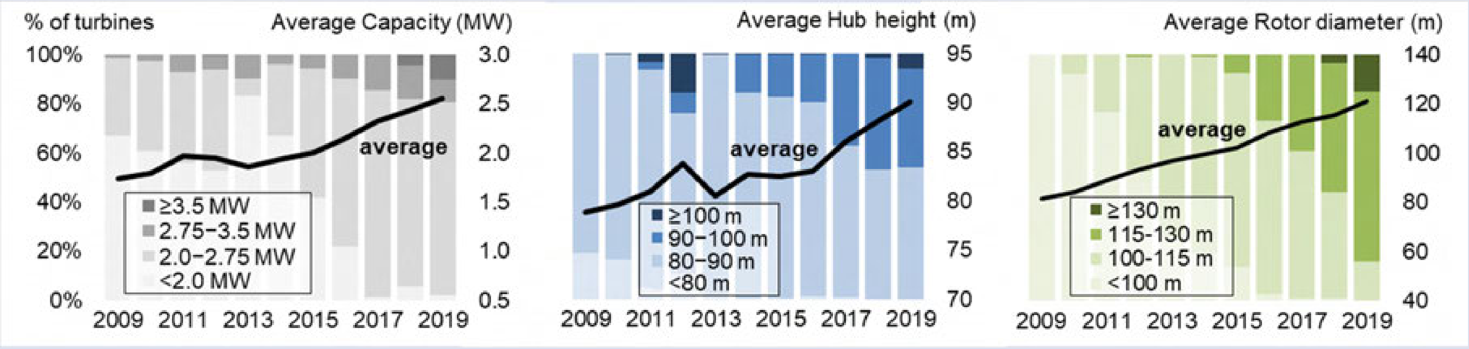
Growth in rotor diameter and nameplate capacity have outpaced growth in hub height over the last two decades; 2019 averages = 2.55 MW capacity, 121 m rotor diameter, 90 m hub height



*Sources: AWEA Wind IQ, Berkeley Lab*

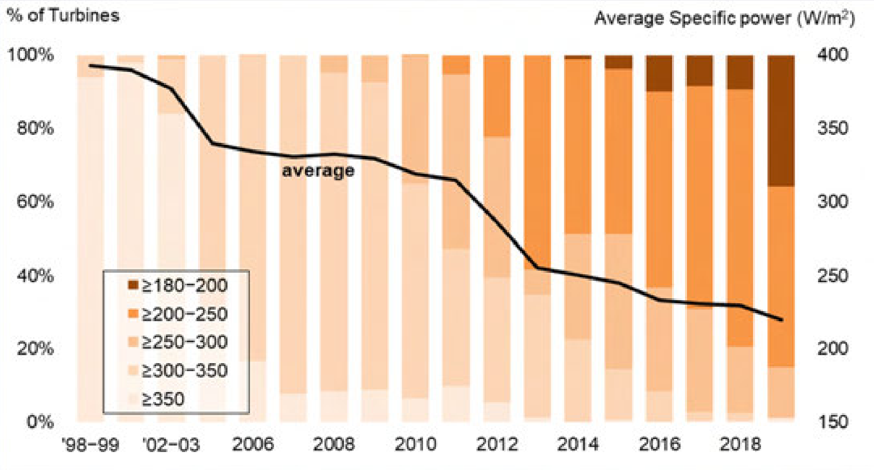
Interactive data visualization: https://emp.lbl.gov/wind-power-technology-trends

# Trends in turbine nameplate capacity, hub height, rotor diameter, and specific power



**Specific power:** turbine capacity divided by swept rotor area; lower specific power leads to higher capacity factors, as shown later

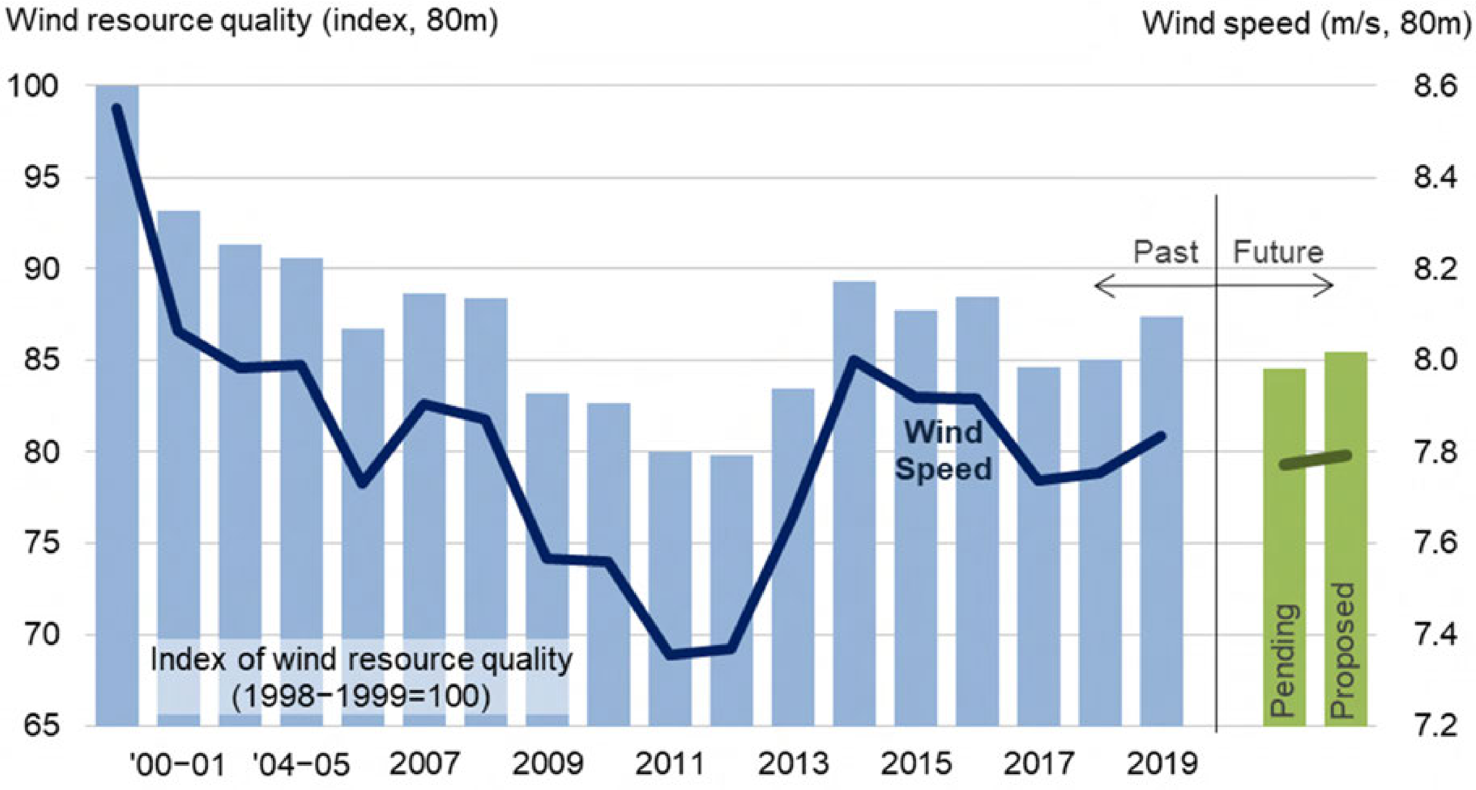
2019 average = 220 W/m$^2$



Interactive data visualization: https://emp.lbl.gov/specific-power

*Sources: AWEA Wind IQ, Berkeley Lab*

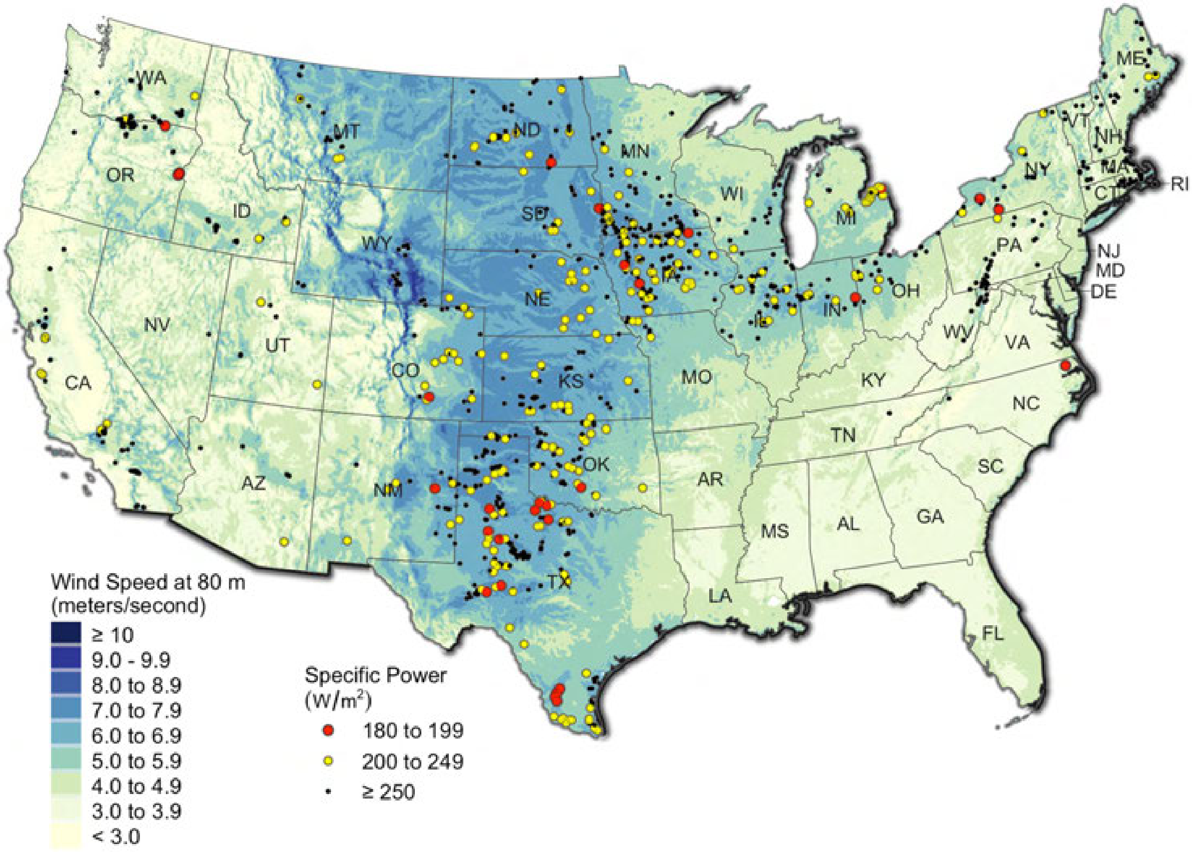
# Wind resource quality by year of installation



*Sources: AWEA Wind IQ, Berkeley Lab, AWS Truepower, FAA OE/AAA files*

*Note: The wind resource quality index is based on site estimates of gross capacity factor at 80 meters by AWS Truepower. A single, common wind-turbine power curve is used across all sites and timeframes, and no losses are assumed. Values are indexed to those projects built in 1998—1999.*

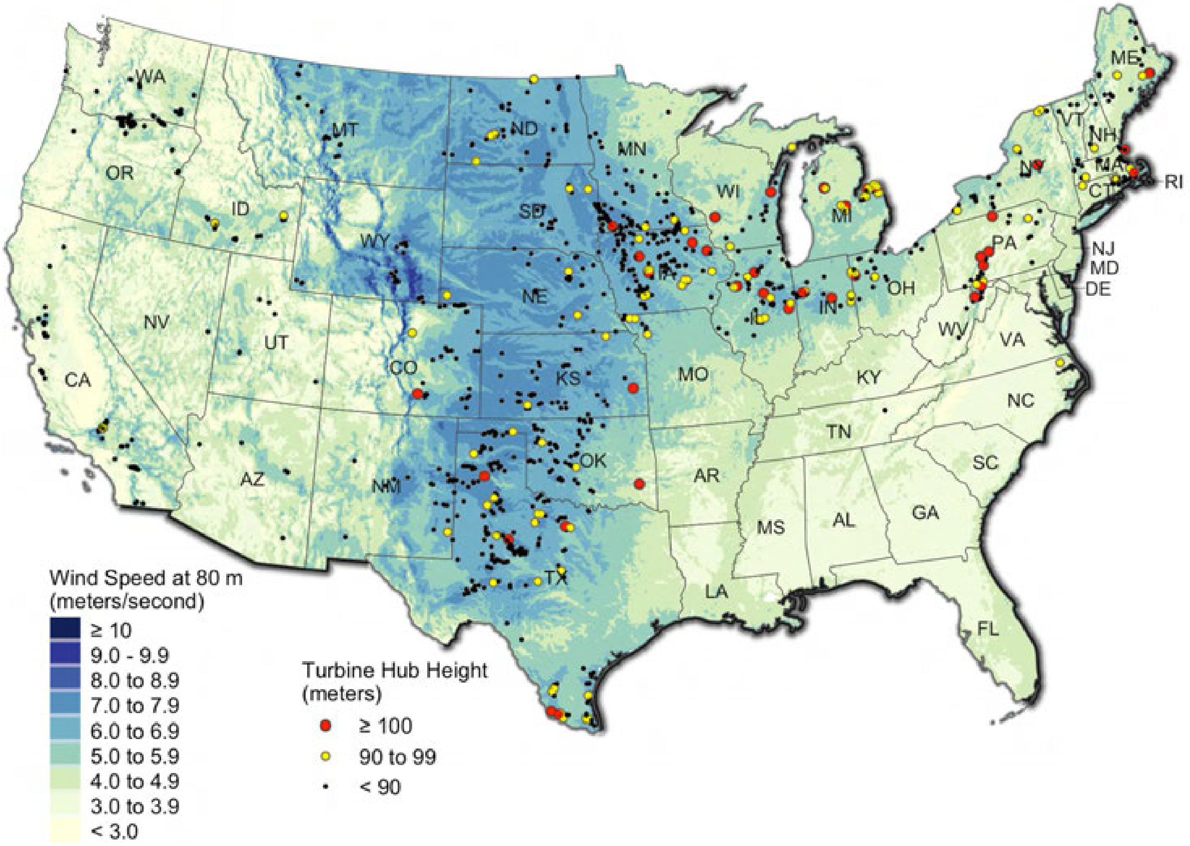
# Locations low specific power installations at end of 2019



*Sources: AWEA WindIQ, USWTDB, AWS Truepower, Berkeley Lab*

Interactive data visualization: https://emp.lbl.gov/wind-power-technology-trends

# Locations tall tower installations at end of 2019

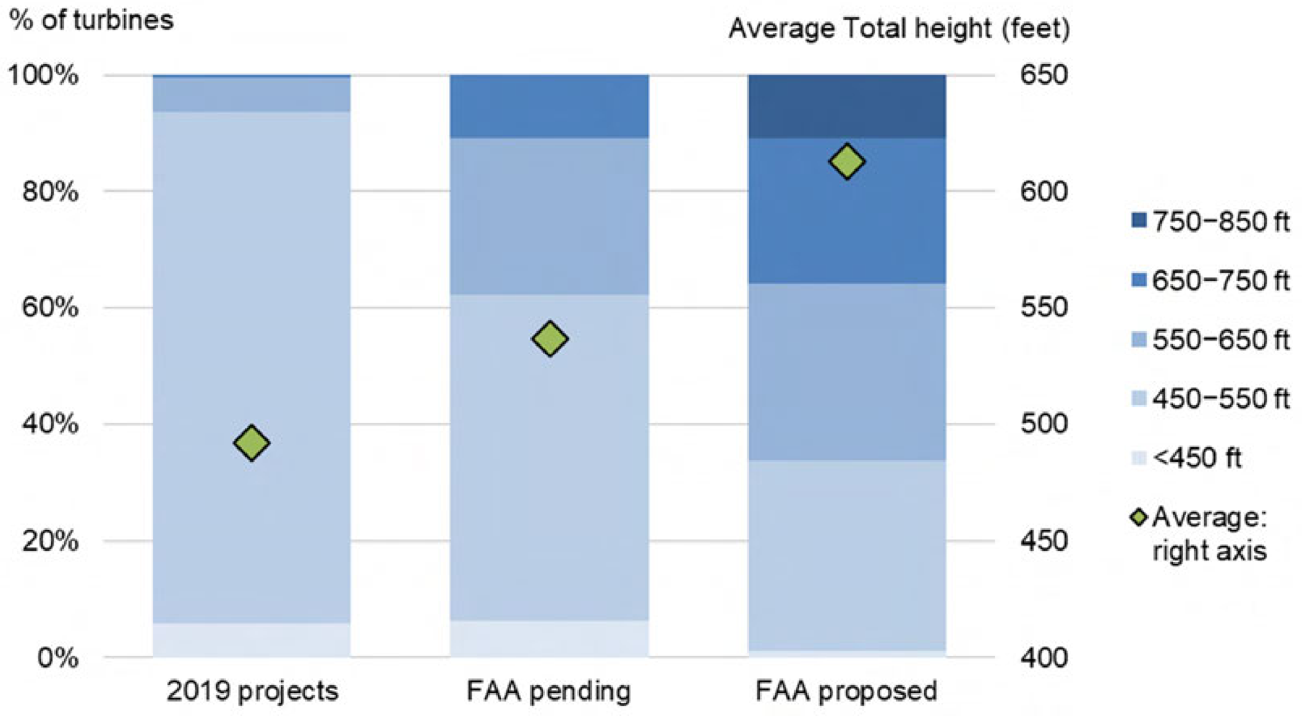


*Sources: AWEA WindIQ, USWTDB, AWS Truepower, Berkeley Lab*

Interactive data visualization: https://emp.lbl.gov/wind-power-technology-trends

# Distribution of total turbine height based on proposed projects via FAA applications, and compared to 2019 installations

FAA pending and proposed turbines show significant growth in total turbine height, compared to 2019 wind projects

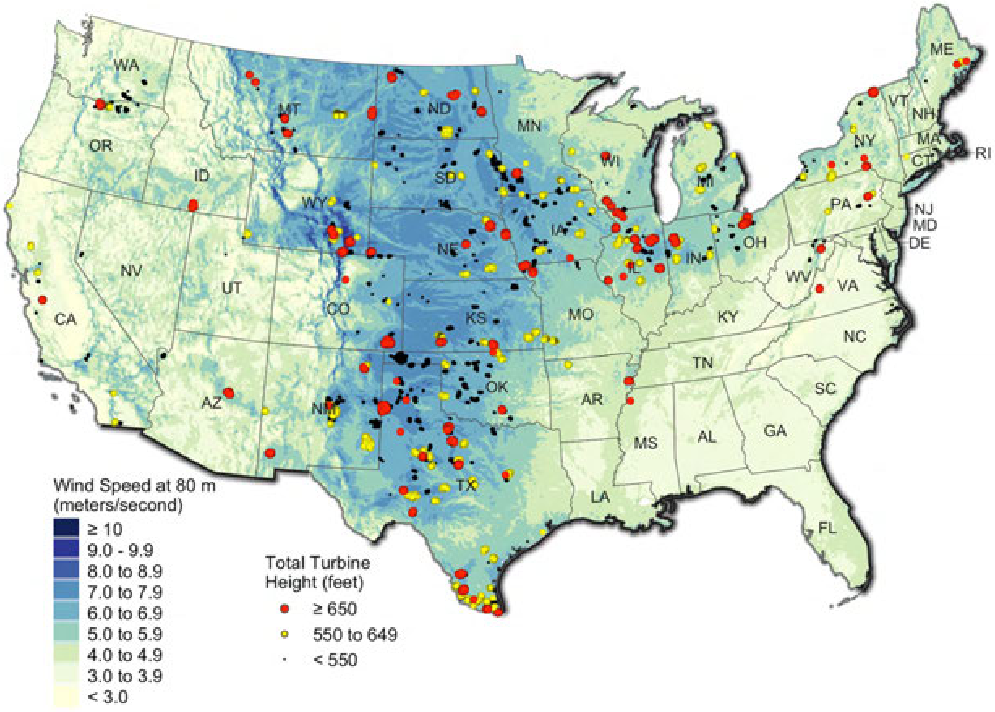


FAA = Federal Aviation Administration

*Sources: AWEA Wind IQ, FAA OE/AAA files, AWS Truepower, Berkeley Lab*

# Geographic distribution of total turbine height based on proposed projects via FAA applications

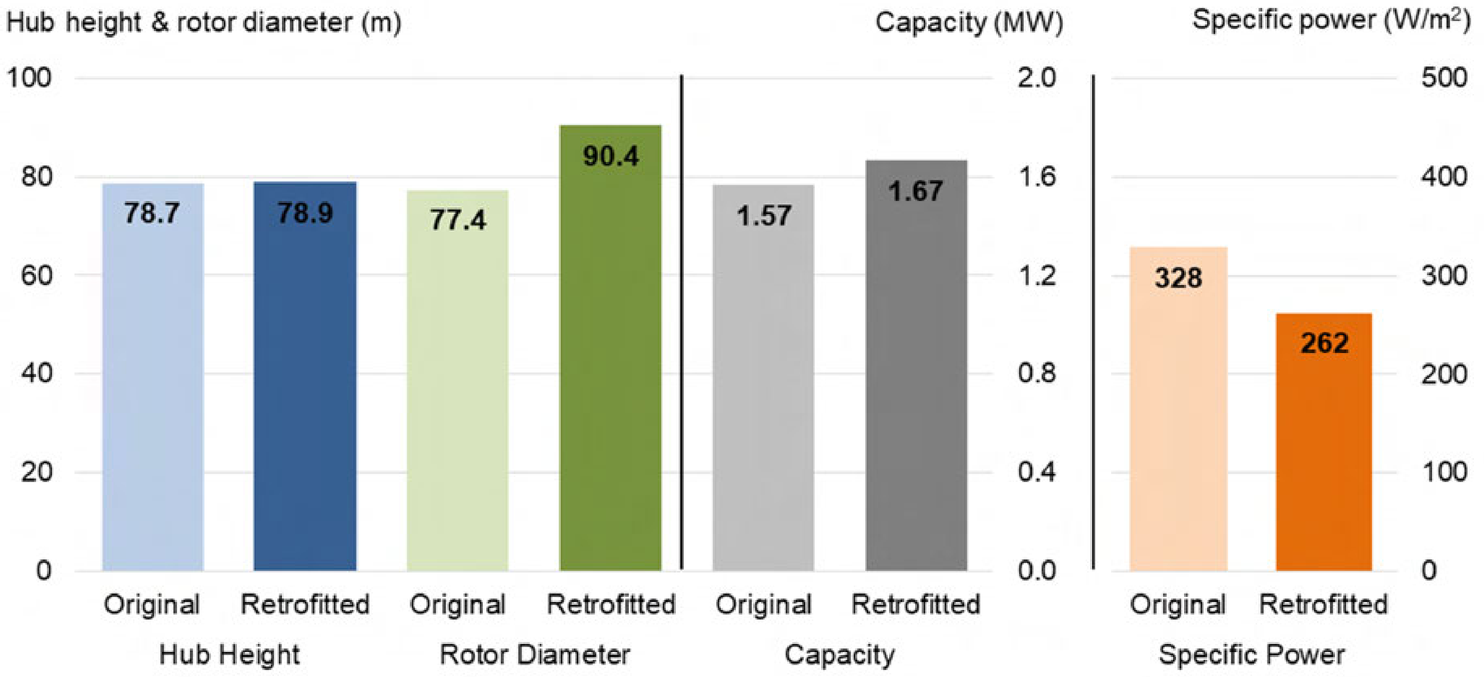
Tall turbines (via FAA pending and proposed) have been proposed in all regions and wind resource regimes, to varying degrees



FAA = Federal Aviation Administration

*Sources: AWEA Wind IQ, FAA OE/AAA files, AWS Truepower, Berkeley Lab*

# Retrofitted turbines in 2019: changes in average hub height, rotor diameter, capacity, and specific power

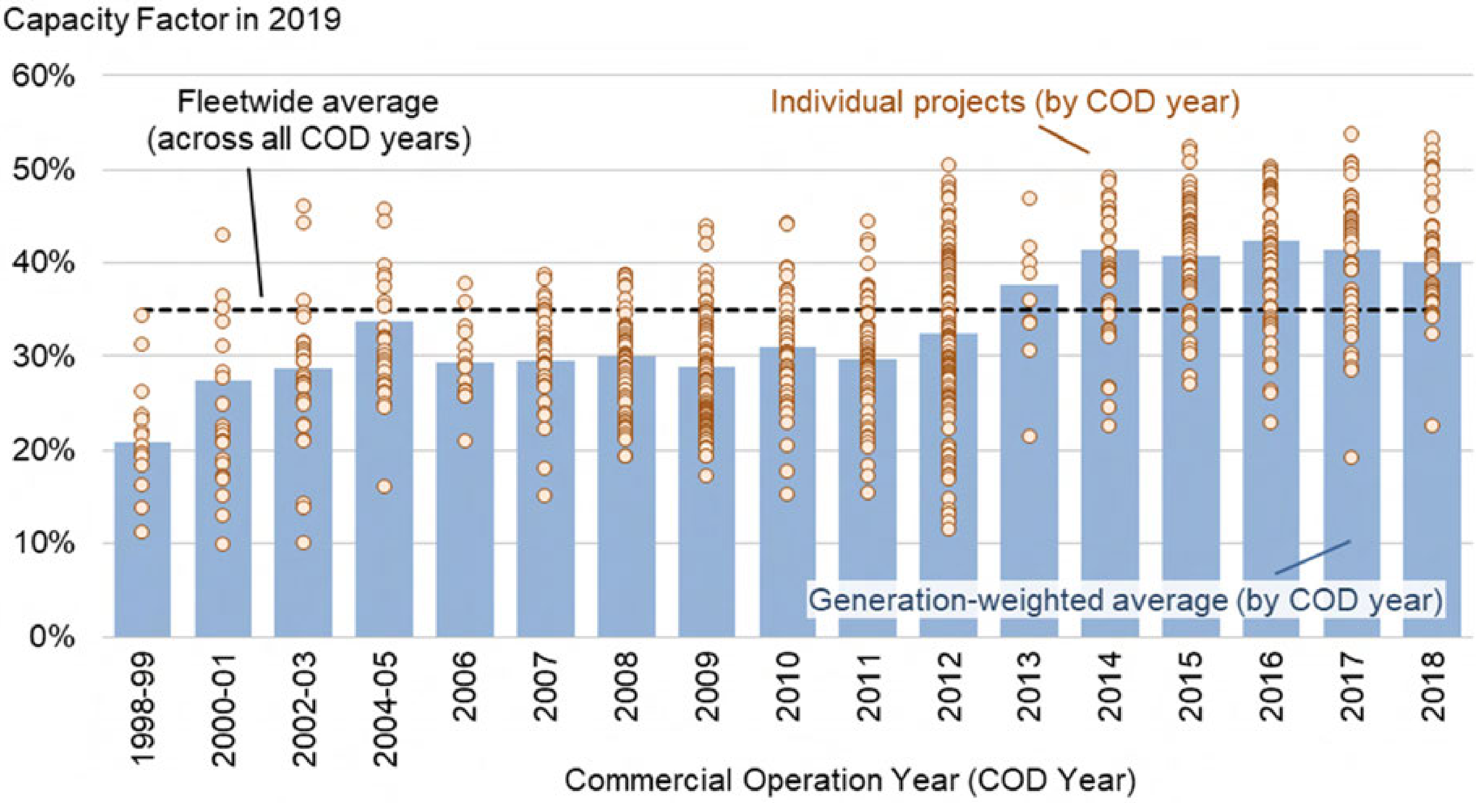


*Sources: AWEA Wind IQ, Berkeley Lab, OEMs*

- 1,828 turbines (2,864 MW) were retrofitted in 2019 via partial repowering
- Partial repowering most-often led to changes in rotor diameter and modest changes to nameplate capacity; tower height was rarely changed
- The mean age of turbines retrofitted in 2019 was just 11 years

# Performance Data and Trends

# Calendar year 2019 wind project capacity factors by commercial operation date

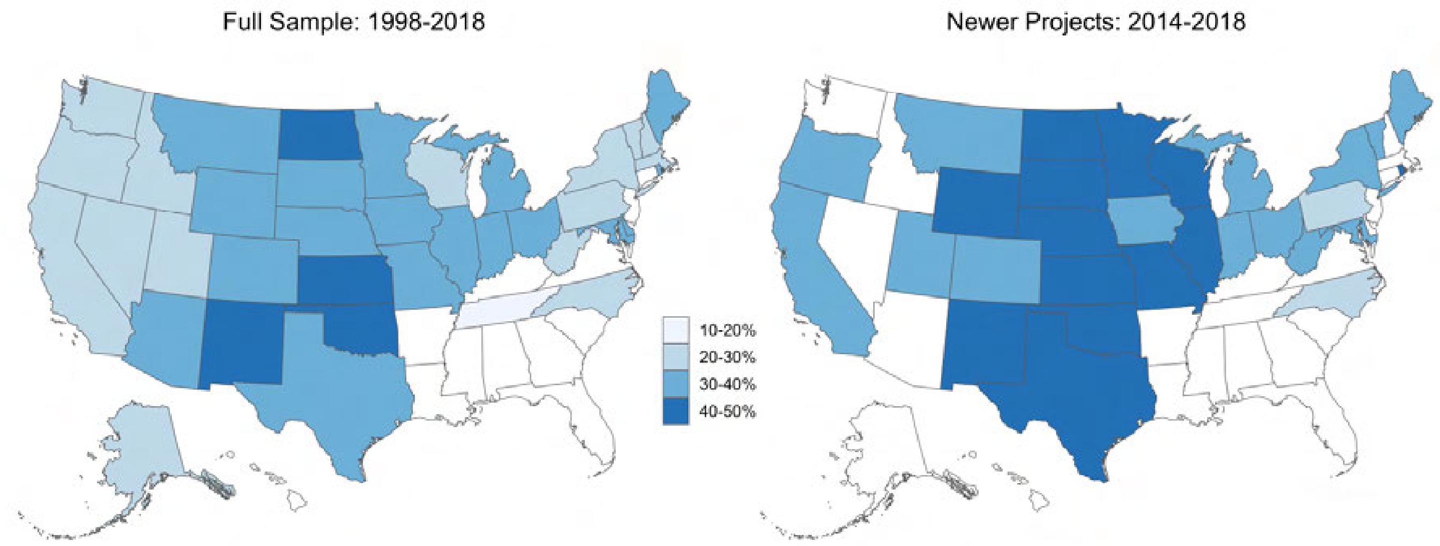


*Source: EIA, FERC, Berkeley Lab*

Interactive data visualization: https://emp.lbl.gov/wind-power-performance

# Average calendar year 2019 capacity factors by state: full sample of wind projects vs. more-recent projects

Newer projects (right figure) have considerably higher capacity factors than the full sample of 1998—2018 projects (left figure)

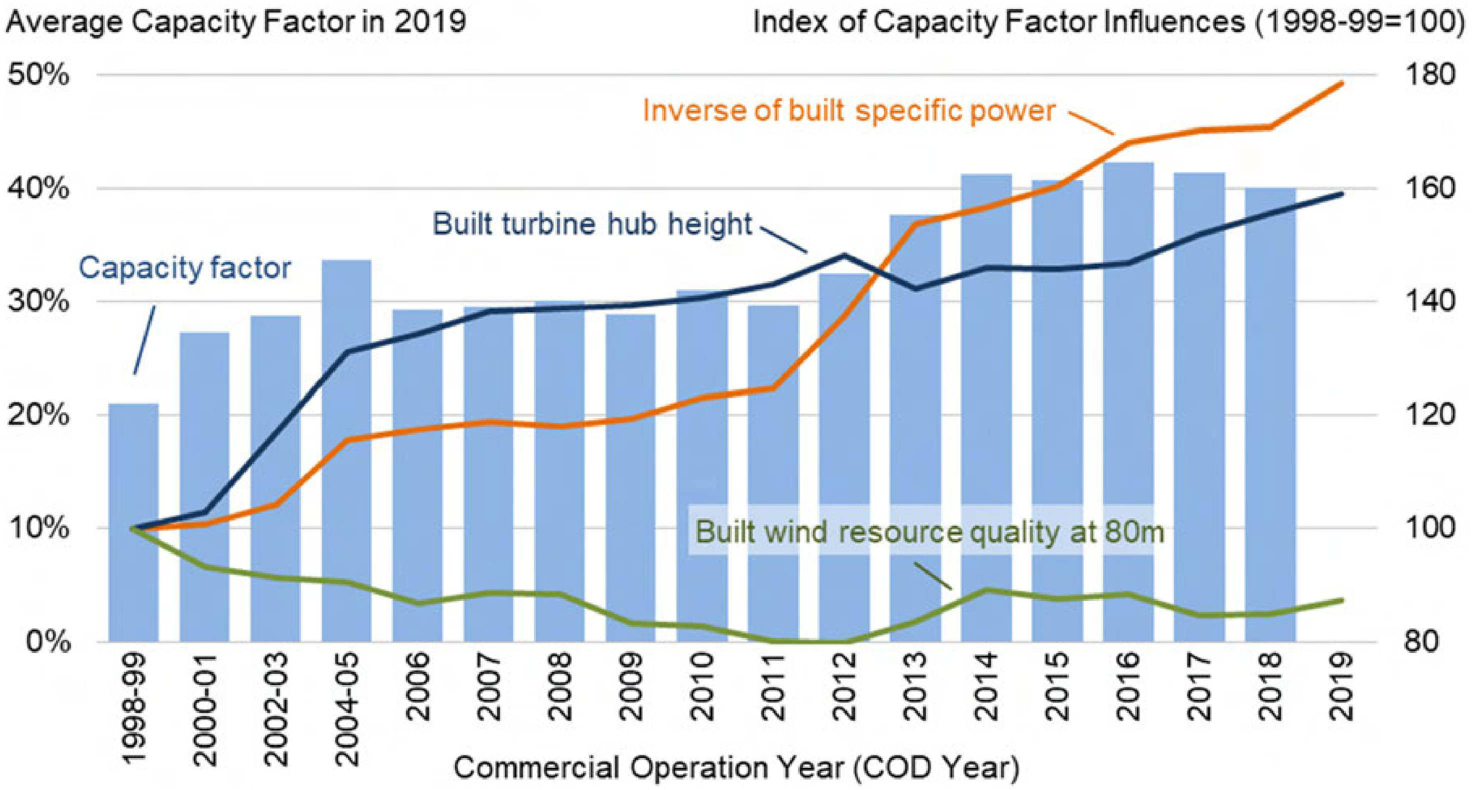


*Source: EIA, FERC, Berkeley Lab*

*Note: States shaded in white have no projects in full sample (left) or in newer sample (right)*

Interactive data visualization: [https://emp.lbl.gov/wind-power-performance](https://emp.lbl.gov/wind-power-performance)

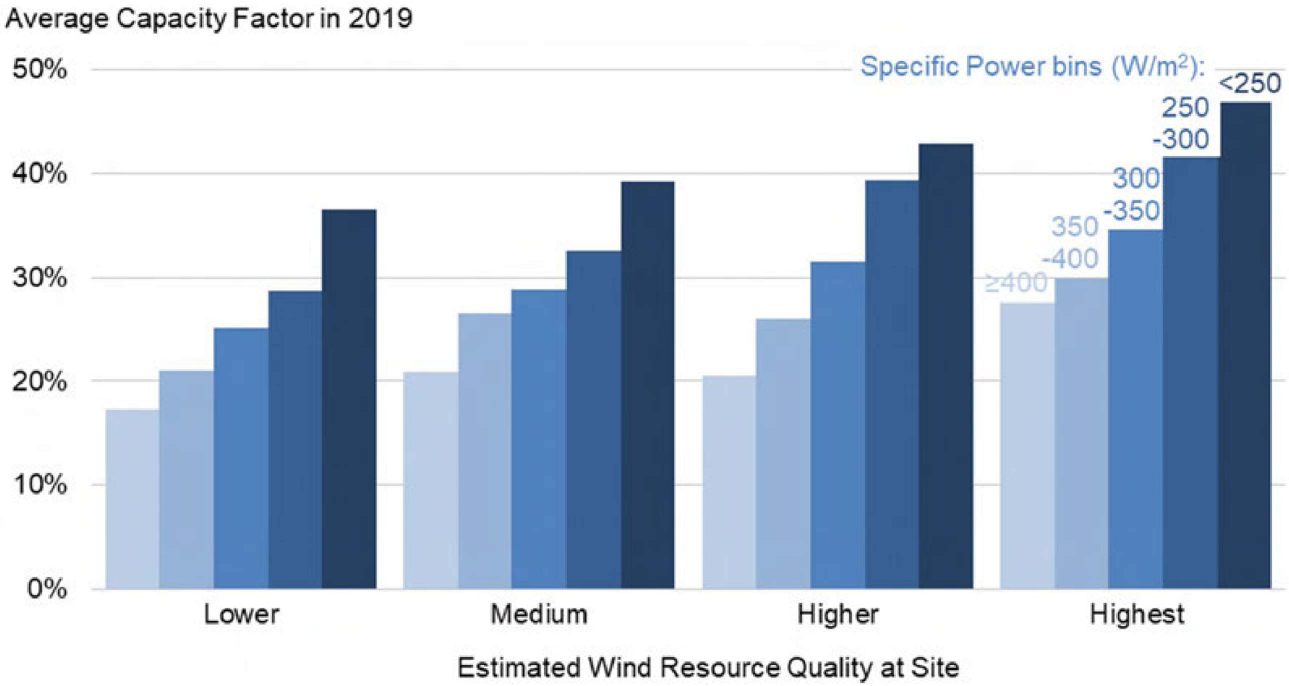
# 2019 capacity factors and various drivers by commercial operation date



Source: EIA, FERC, Berkeley Lab

# Calendar year 2019 capacity factors by wind resource quality and specific power: 1998-2018 projects

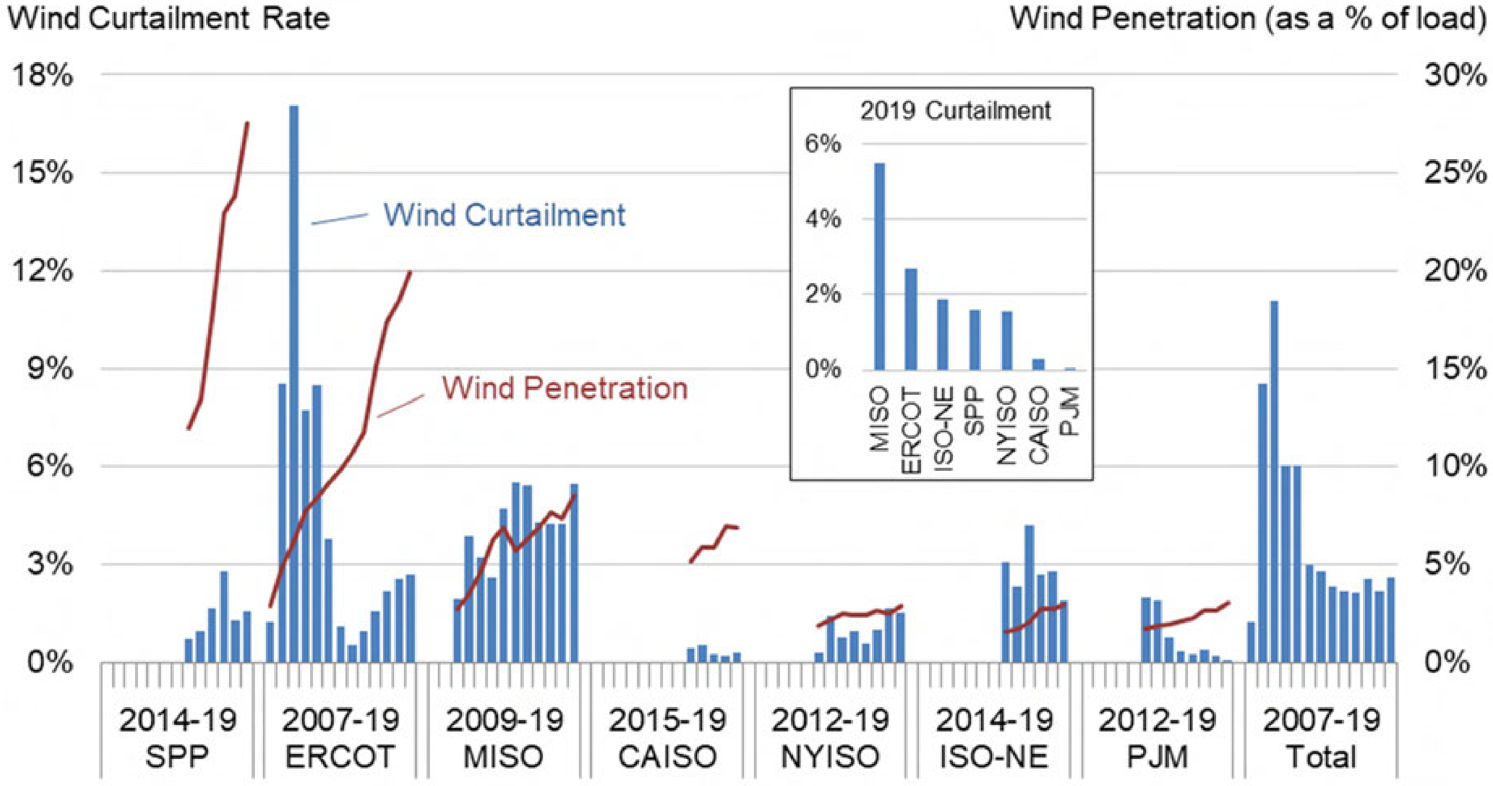
Low specific power turbines are driving capacity factors higher for projects located in given wind resource regimes



Source: EIA, FERC, Berkeley Lab

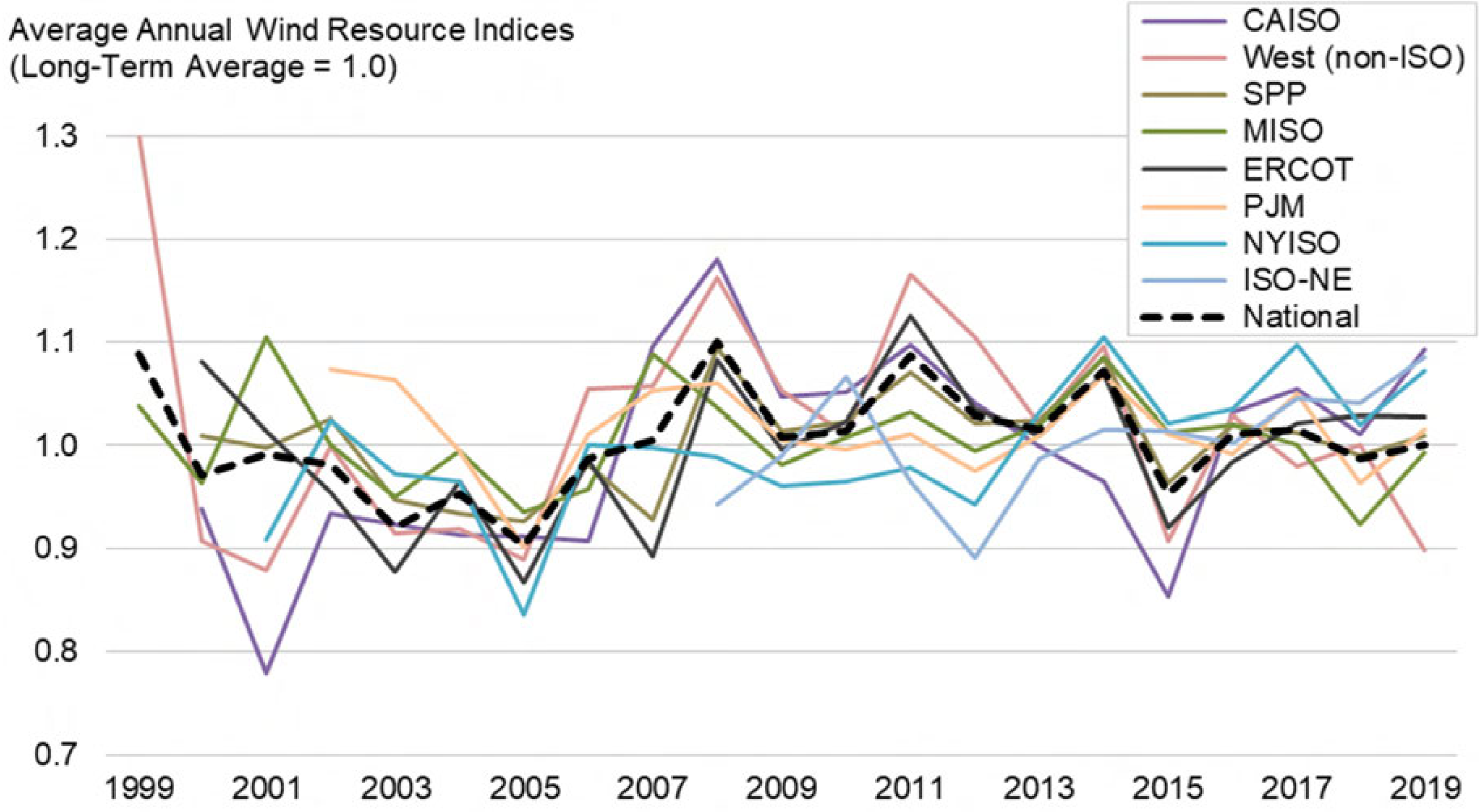
*Note: Wind resource quality is based on site estimates of gross capacity factor at 80 meters by AWS Truepower, using a single, common wind-turbine power curve. The "lower" category includes all projects with an estimated gross capacity factor of less than 40%; "medium" corresponds to ≥40%–45%; "higher" ≥45%–50%; and "highest" ≥50%.*

# Wind curtailment and penetration rates by ISO



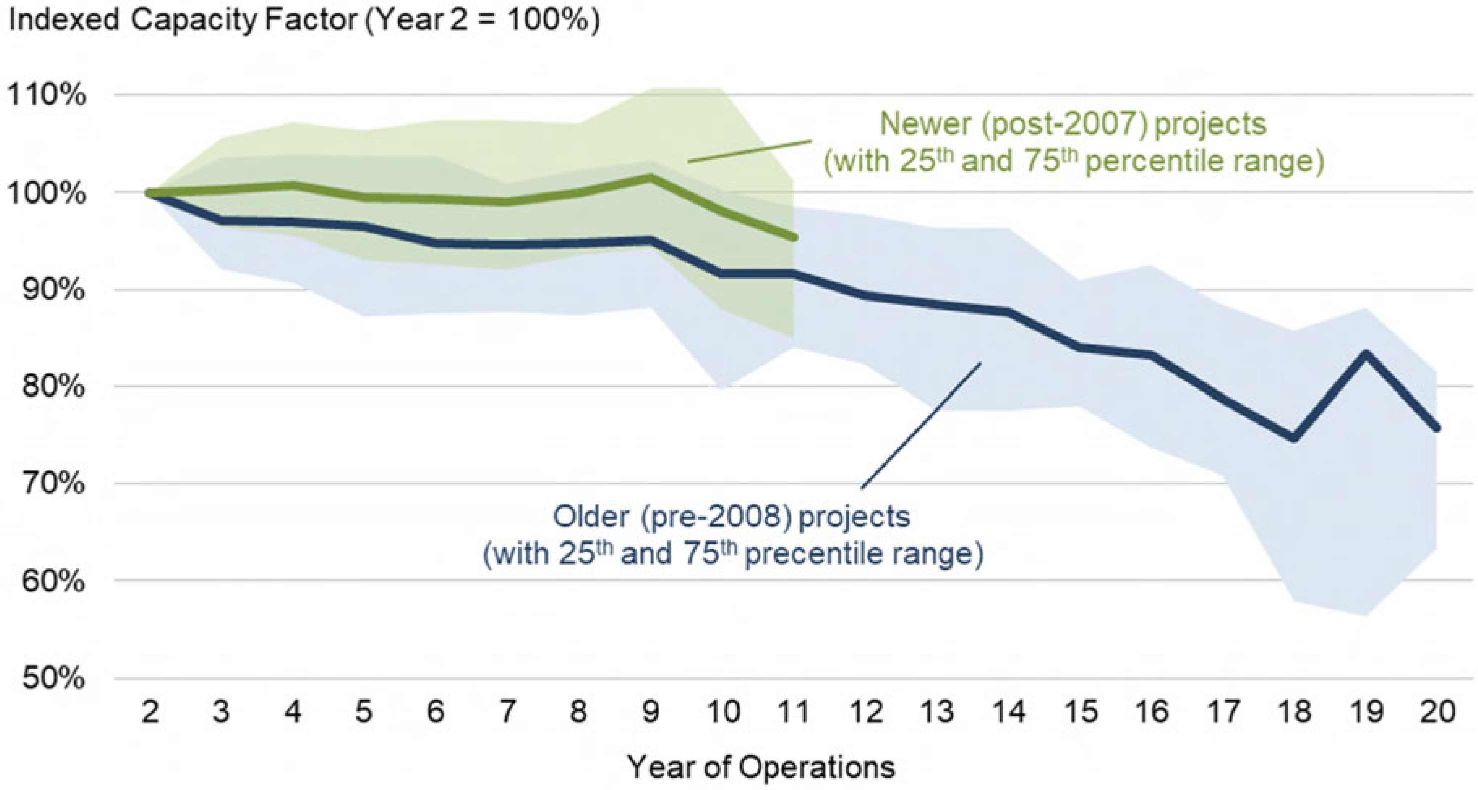
*Sources: ERCOT, MISO, CAISO, NYISO, PJM, ISO-NE, SPP*

# Inter-annual variability in the wind resource by region and nationally



*Source: ERA, Berkeley Lab; methodology behind the index of inter-annual variability is explained in report appendix*

# Changes in project-level capacity factors as projects age: newer projects vs. older projects

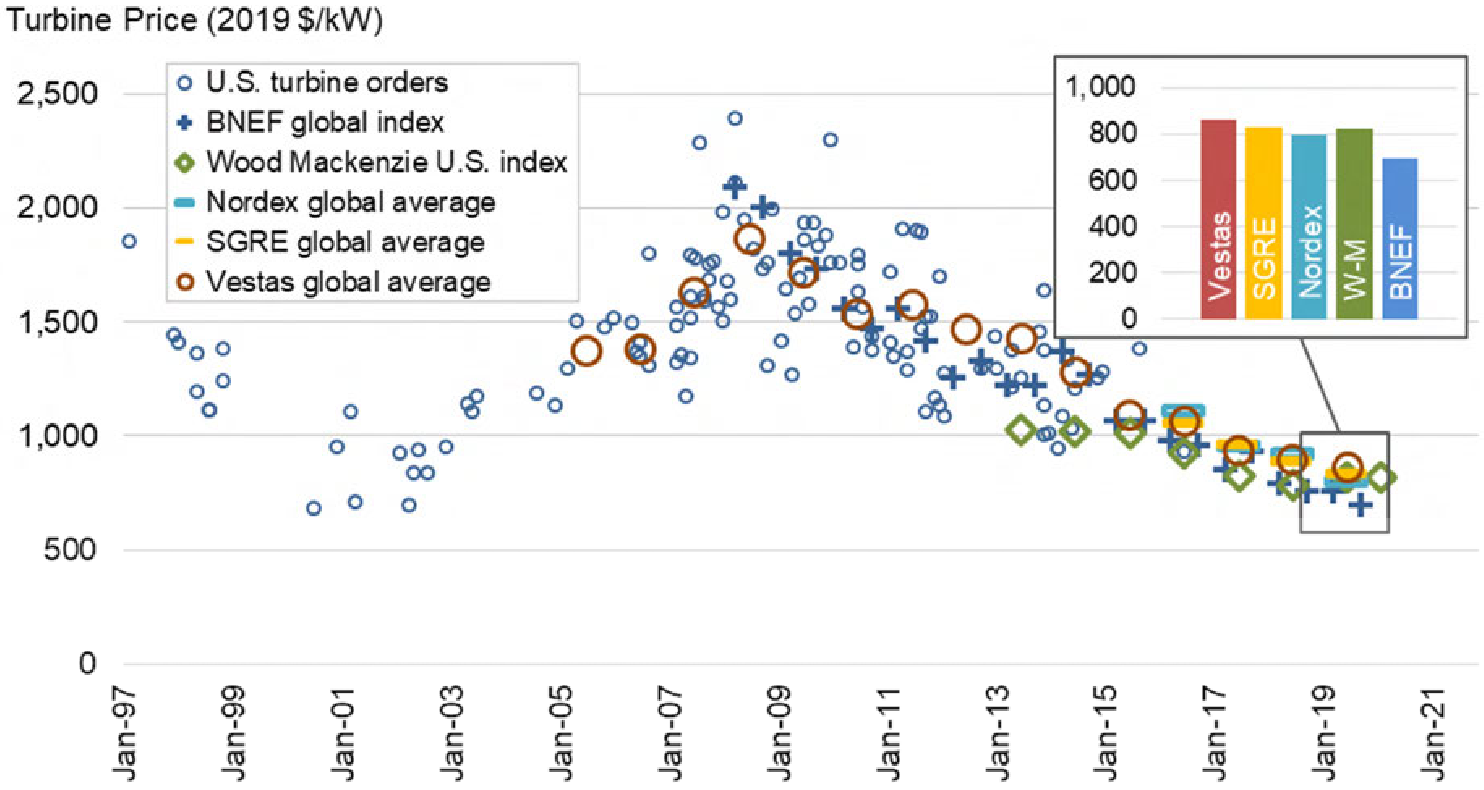


*Source: EIA, FERC, Berkeley Lab*

For more analysis on wind project performance with plant age, see:
https://emp.lbl.gov/publications/how-does-wind-project-performance

# Cost Data and Trends

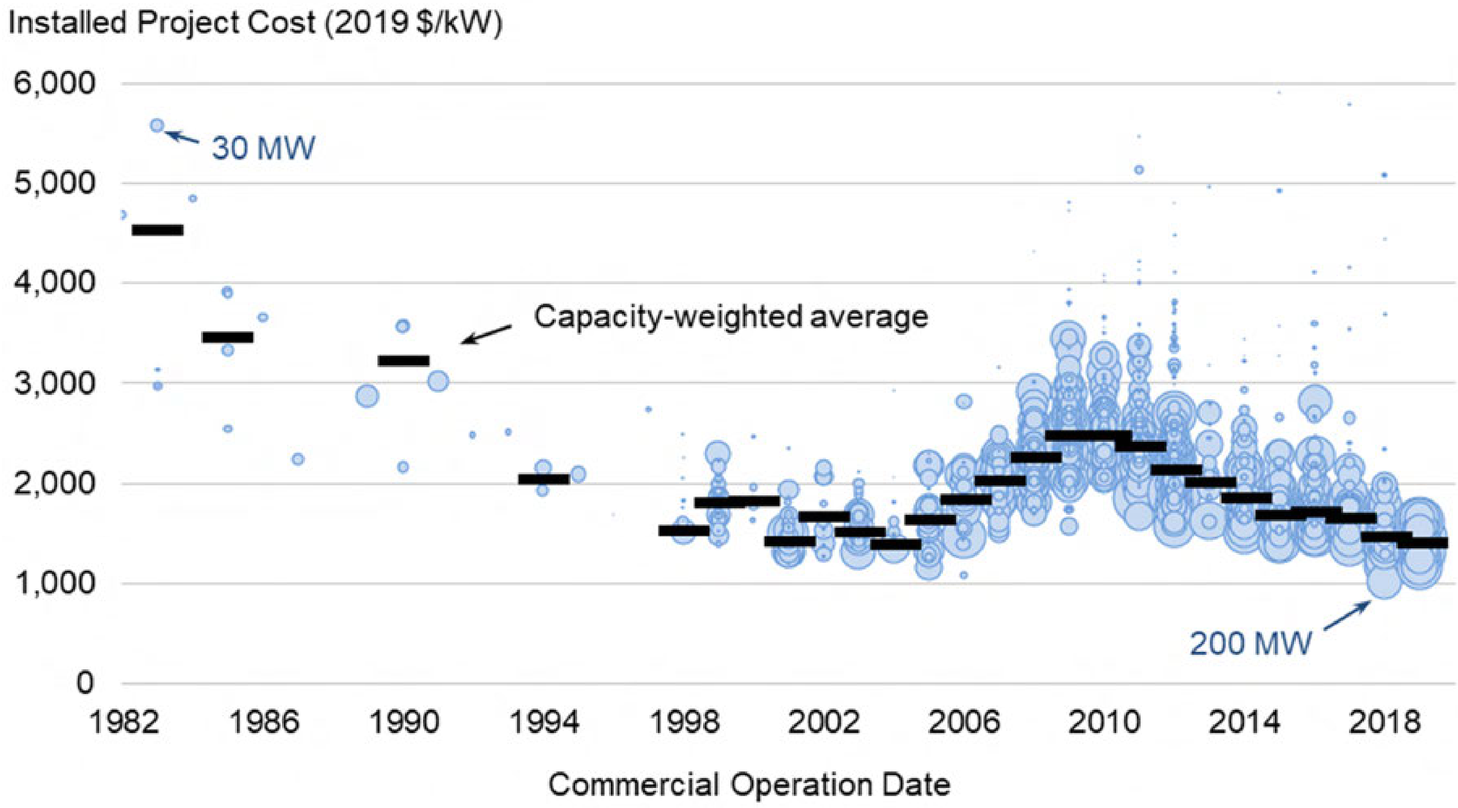
# Reported wind turbine transaction prices per unit of capacity, over time



*Sources: Berkeley Lab, annual financial reports, forecast providers*

Turbine price = tower, nacelle, blades, delivery to site

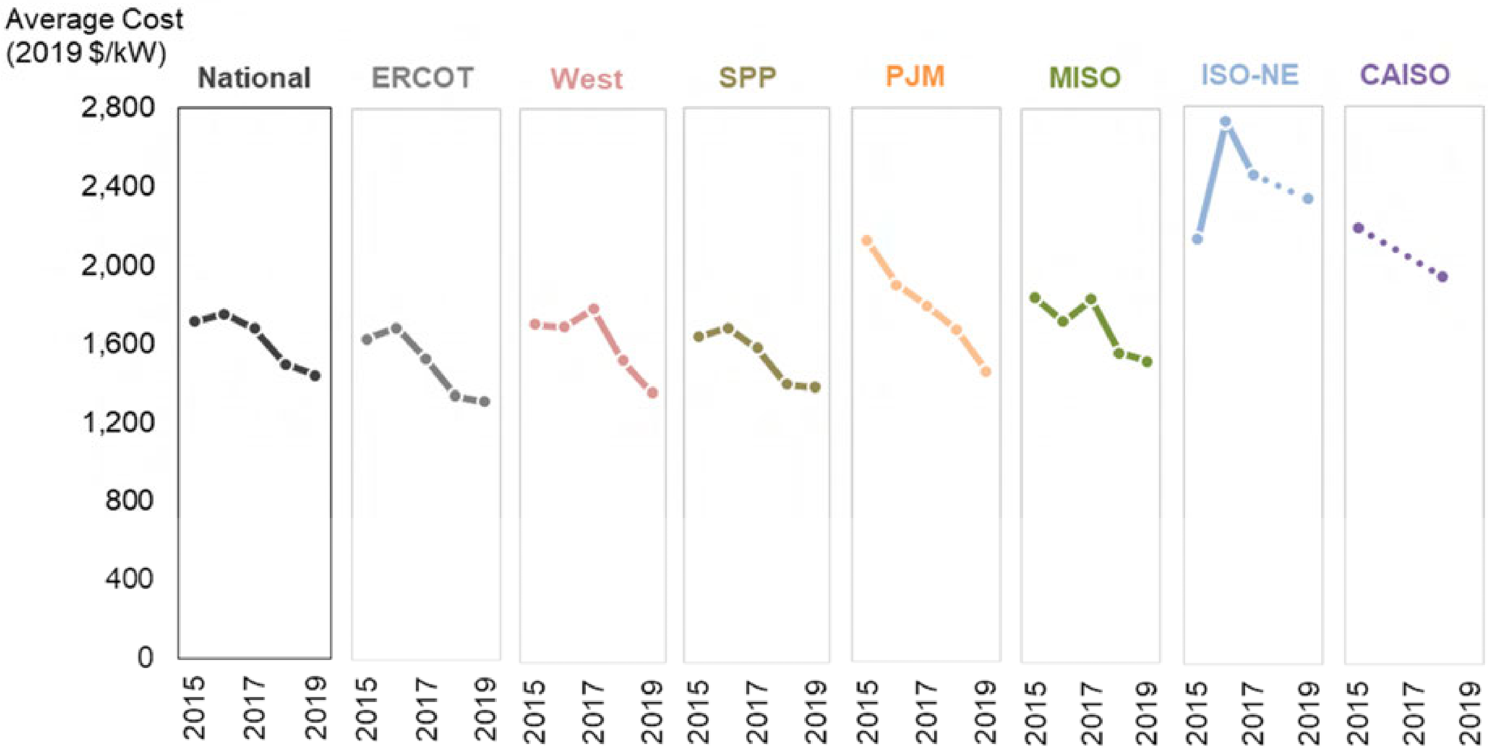
# Installed wind power project costs per unit of capacity, over time



*Sources: Berkeley Lab (some data points suppressed to protect confidentiality), Energy Information Administration*

Interactive data visualization: https://emp.lbl.gov/wind-energy-capital-expenditures-capex

# Installed wind power project costs per unit of capacity, by region and over time

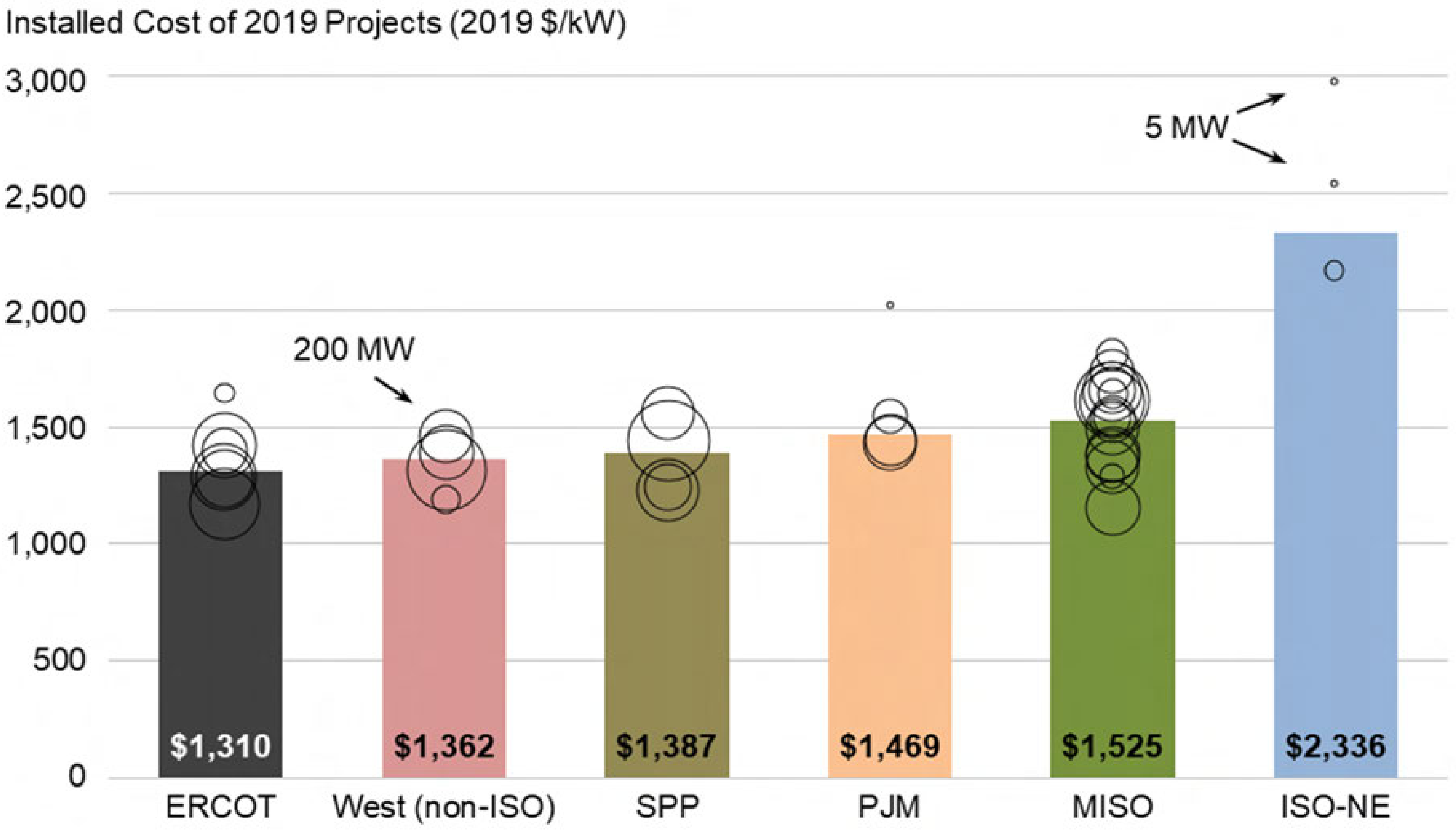


*Sources: Berkeley Lab (some data points suppressed to protect confidentiality), Energy Information Administration*

*Note: Total sample presented here includes 34 GW of installed wind capacity, but regional sample is especially small in ISO-NE (569 MW) and CAISO (319 MW, no data in 2019).*

Interactive data visualization: https://emp.lbl.gov/wind-energy-capital-expenditures-capex

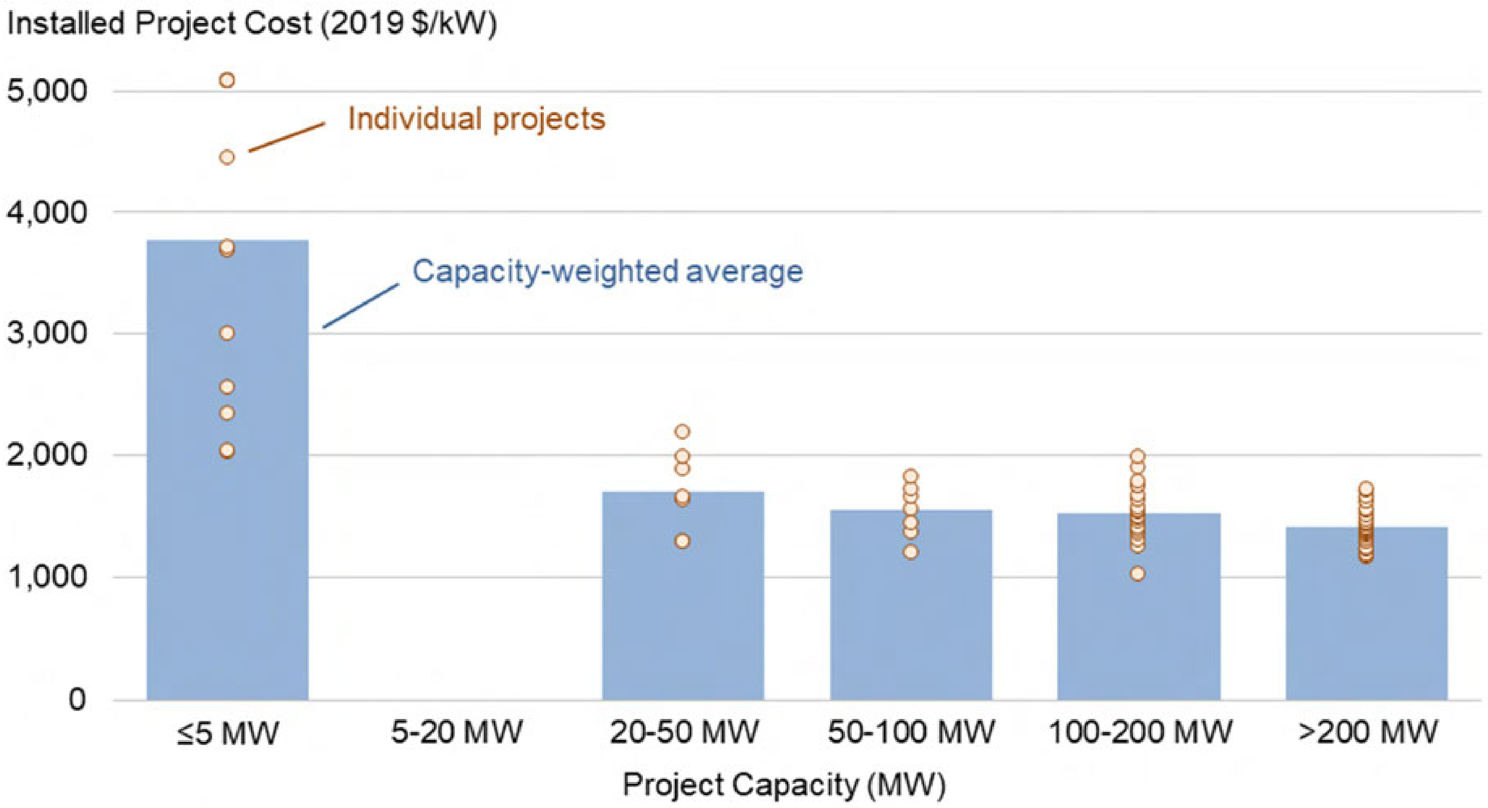
# Installed wind power project costs per unit of capacity, by region in 2019



*Sources: Berkeley Lab, Energy Information Administration*

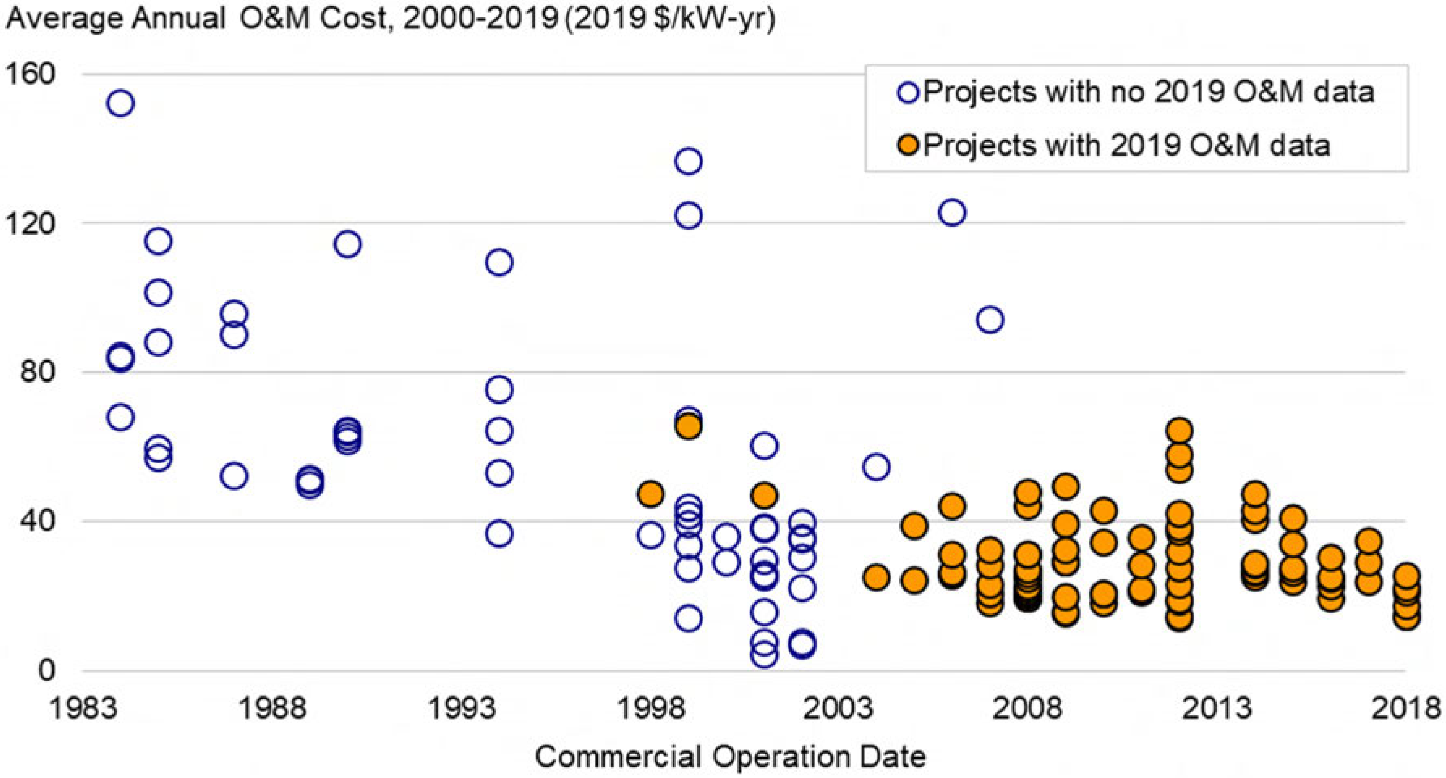
Interactive data visualization: https://emp.lbl.gov/wind-energy-capital-expenditures-capex

# Installed wind power project costs by project size: 2018 and 2019 projects



*Source: Berkeley Lab*

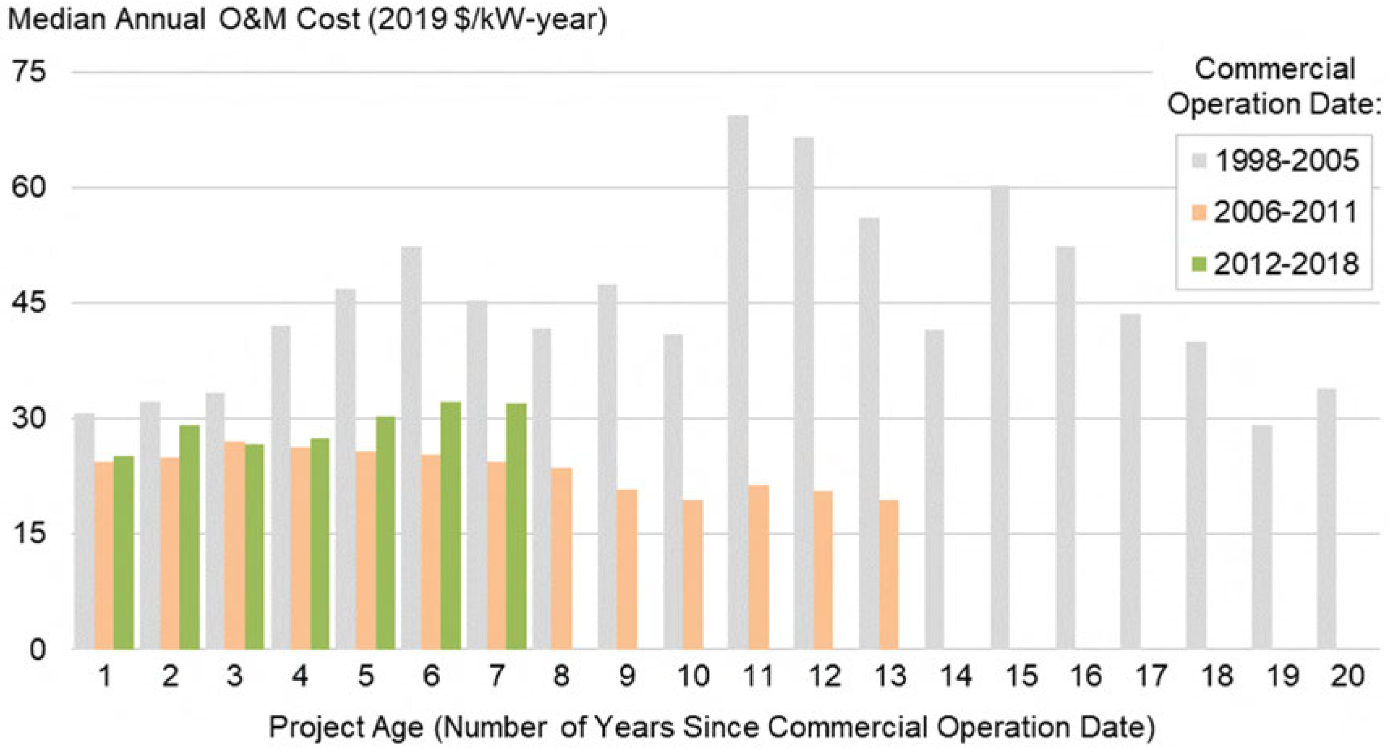
# Average operations and maintenance (O&M) costs per unit of capacity, for available data years from 2000 to 2019, by COD



*Source: Berkeley Lab, EIA, FERC; some data points suppressed to protect confidentiality*

*Note: Sample is limited; few projects in sample have complete records of O&M costs from 2000-19; O&M costs reported here do not include all operating costs.*

# Median annual O&M costs by project age and commercial operation date



*Source: Berkeley Lab; EIA, FERC; medians shown only for groups of two or more projects, and only projects >5 MW are included.*

*Note: Sample size is limited, especially in years 15-20*

O&M reported here does not include all operating costs: all-in operating costs for the most recent wind projects average ~$43/kW-year

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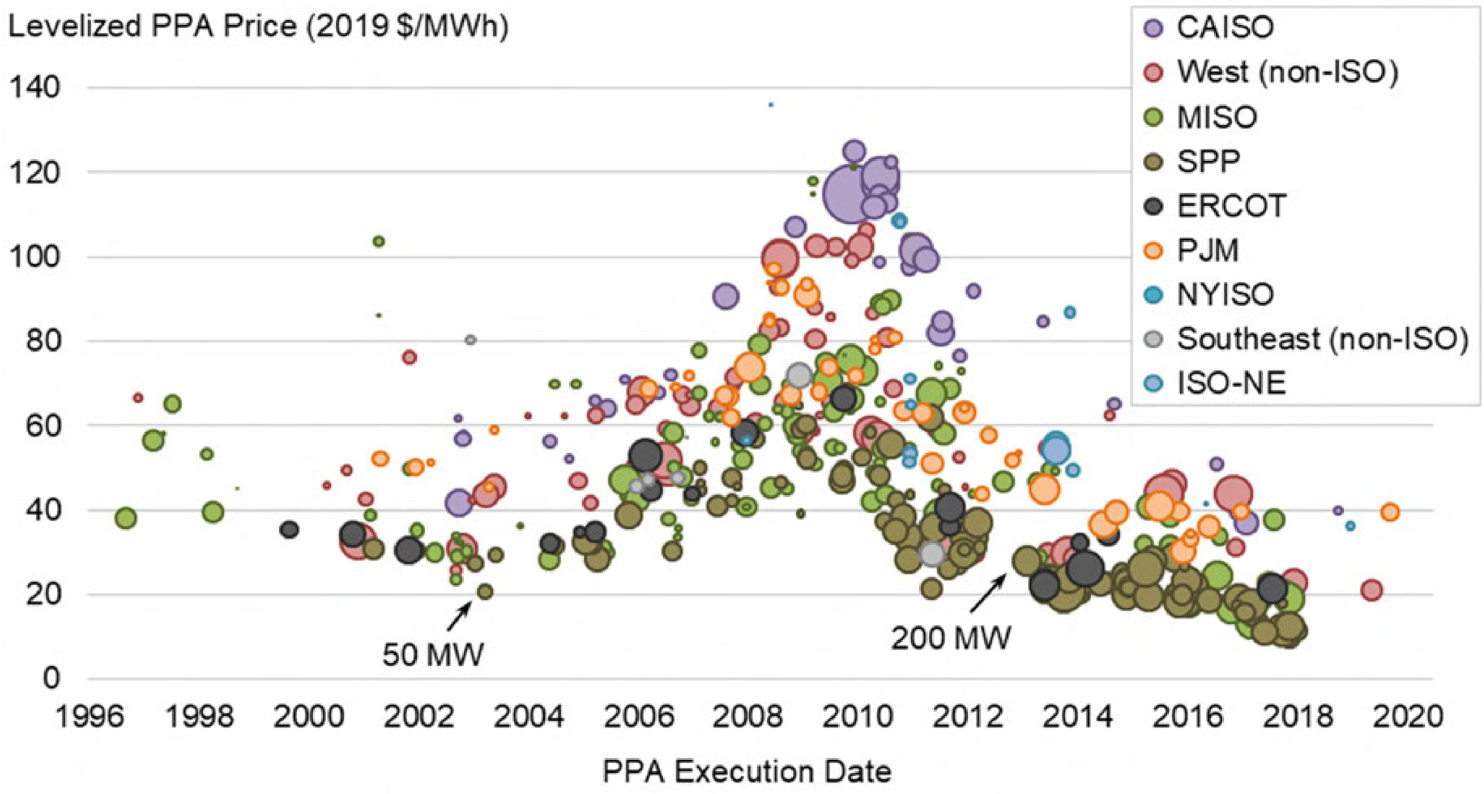
# Power Sales Price and Levelized Cost Data and Trends

ENERGY TECHNOLOGIES AREA | ENERGY ANALYSIS AND ENVIRONMENTAL IMPACTS DIVISION | ELECTRICITY MARKETS & POLICY

# Wind power sales price and LCOE analysis: data sets and methodology

- Berkeley Lab collects data on long-term power purchase agreement (PPA) prices for wind energy
- Sample includes 465 contracts totaling 44,026 MW from projects built from 1998 to the present, or planned for future installation
- Prices reflect the bundled price of electricity and RECs as sold by the project owner under a PPA
  - Dataset excludes merchant plants, projects that sell renewable energy certificates (RECs) separately, and most direct retail sales
  - Prices reflect receipt of state and federal incentives (e.g., the PTC), and various market influences; as a result, prices do not reflect wind generation costs
- Also presented are Level10 Energy data on PPA offers; these are often for shorter contract durations, and levelization details are unclear
- Levelized cost of energy is calculated based on following assumptions
  - Project-level CapEx and capacity factor data presented elsewhere in this deck
  - Levelized OpEx declines from $83/kW-yr in 1998 to $43/kW-yr in 2019 (2019$); project life increases from 20 years in 1998 to 29.6 years in 2019 (from previous LBNL research)
  - Weighted average cost of capital (WACC) based on 10% equity return over time; debt interest rate varies over time as shown earlier in deck; constant 65%/35% debt/equity ratio
  - Combined income tax of 40% pre-2018 and 27% post-2017; 5-yr MACRS; no PTC; 2% inflation

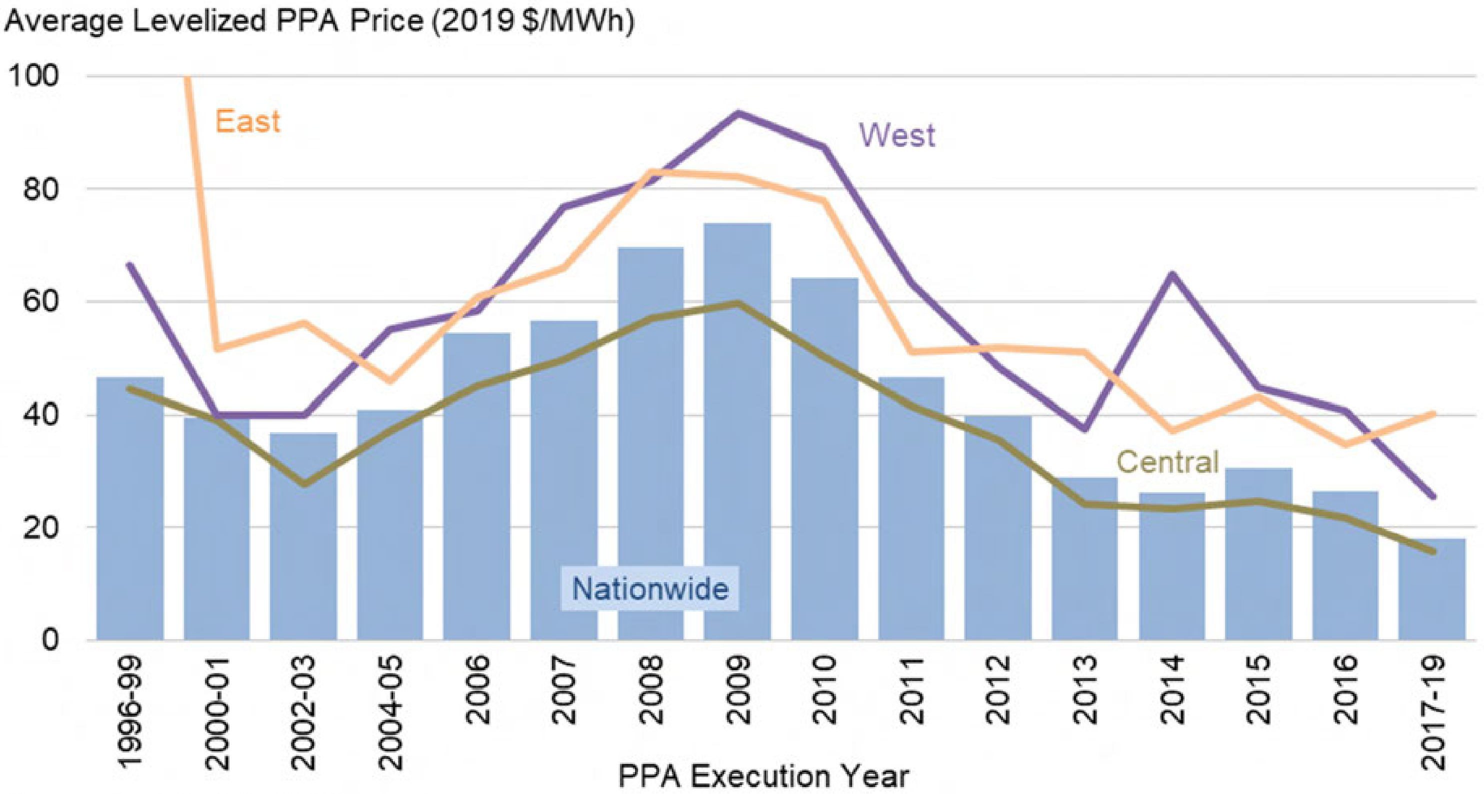
# Levelized wind PPA prices by PPA execution date and region (full sample)



*Source: Berkeley Lab, FERC*

Interactive data visualization: https://emp.lbl.gov/wind-power-purchase-agreement-ppa-prices

# Generation-weighted average levelized wind PPA prices by PPA execution date: national and region averages

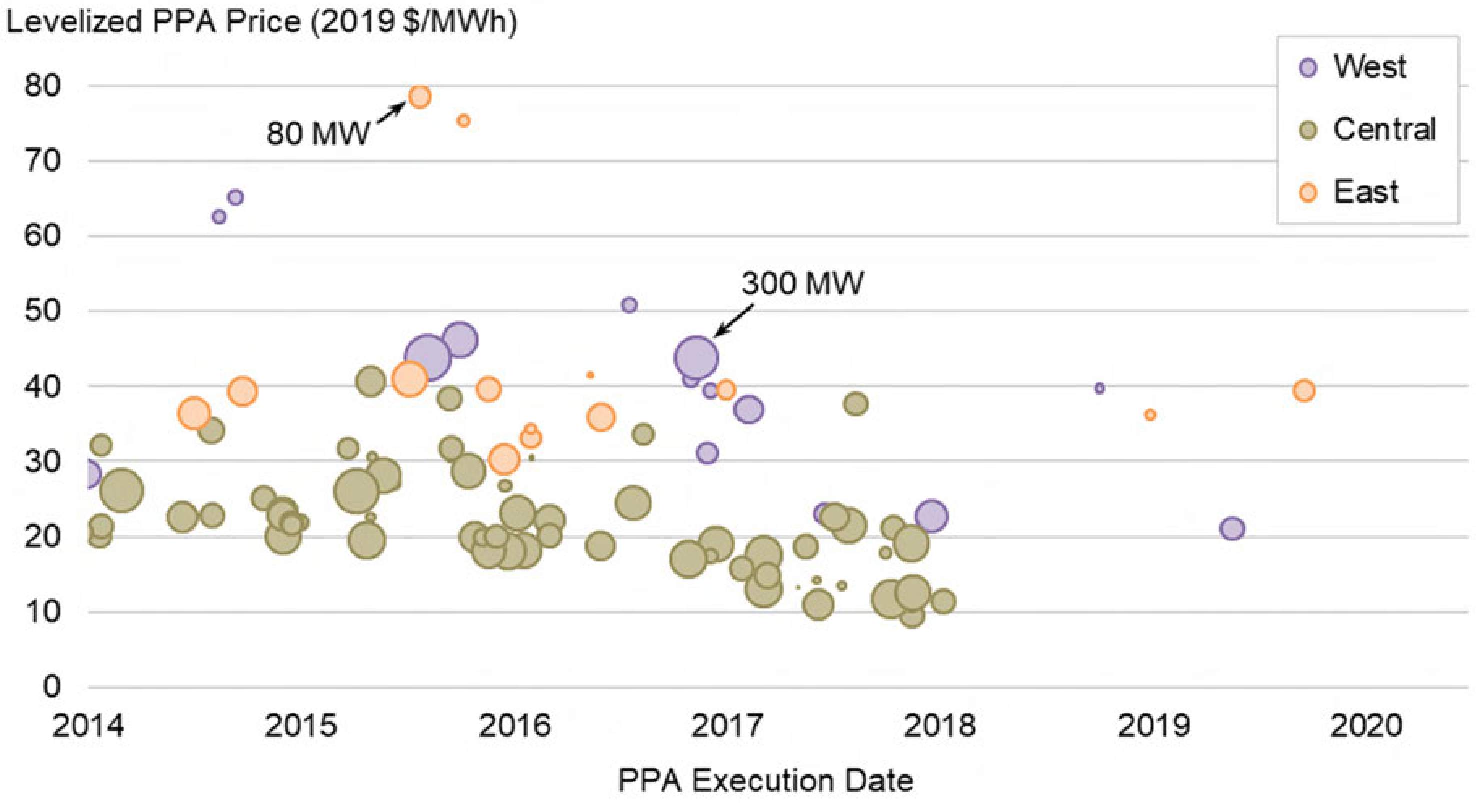


*Source: Berkeley Lab, FERC*

*Note: West = CAISO, West (non-ISO); Central = MISO, SPP, ERCOT; East = PJM, NYISO, ISO-NE, Southeast (non-ISO)*

Interactive data visualization: https://emp.lbl.gov/wind-power-purchase-agreement-ppa-prices

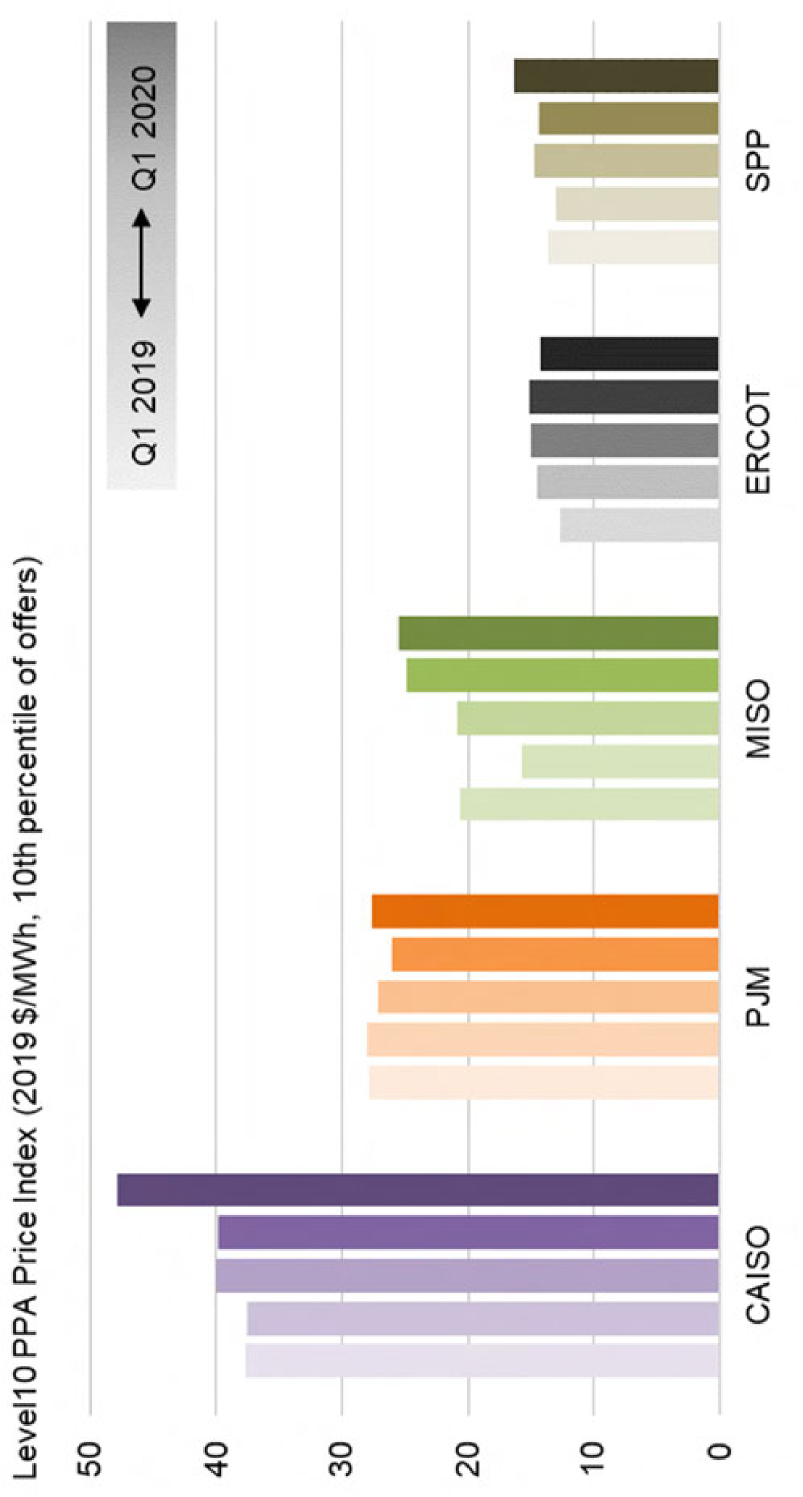
# Levelized wind PPA prices by PPA execution date and region (recent sample)



Source: Berkeley Lab, FERC

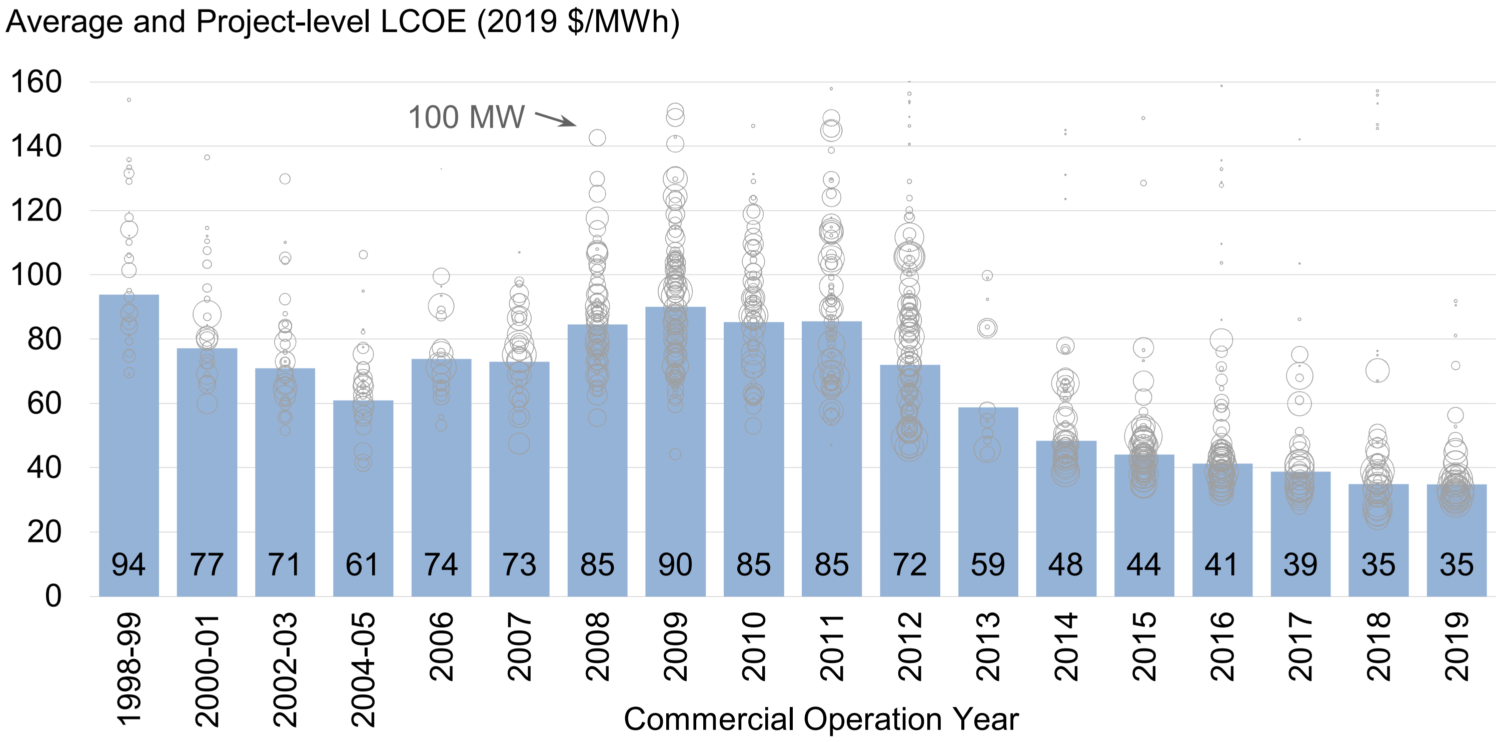
Interactive data visualization: https://emp.lbl.gov/wind-power-purchase-agreement-ppa-prices

# Level10 Energy wind PPA price indices



*Source: Level10 Energy*

# Levelized cost of wind energy by commercial operation date

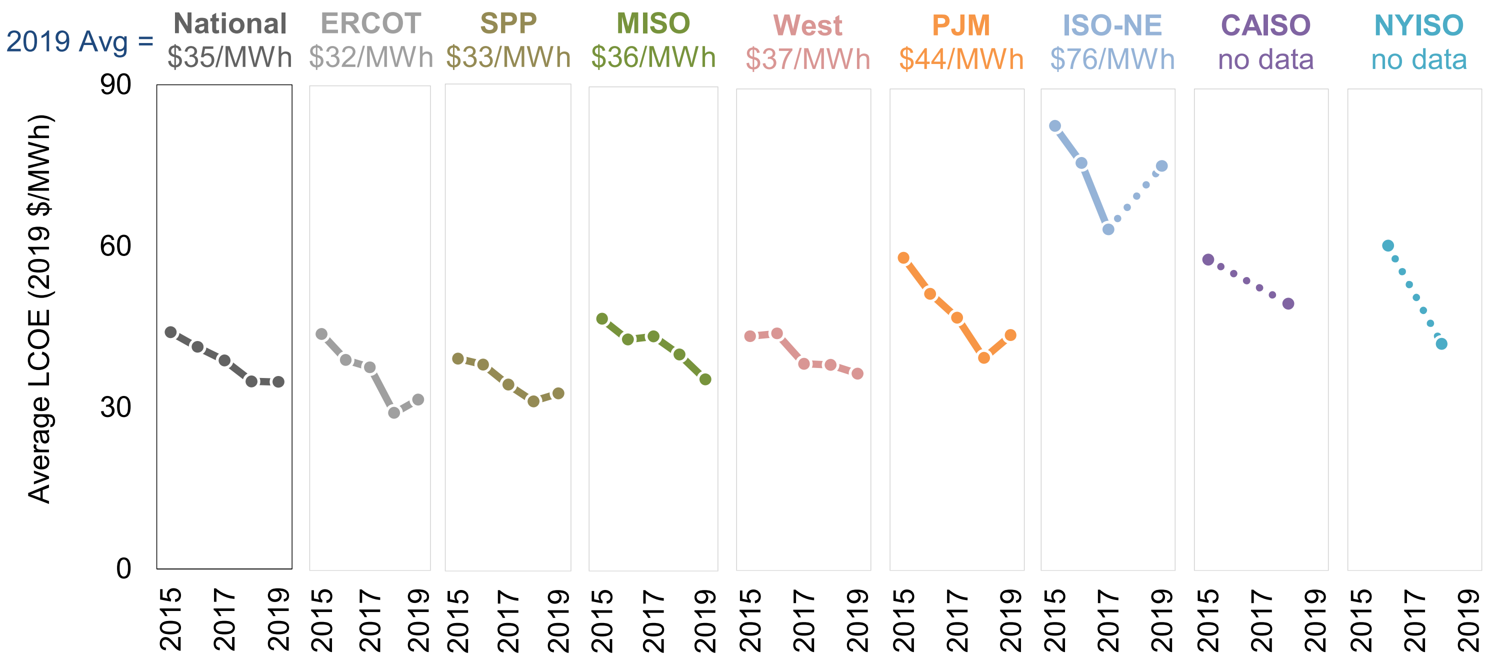


*Source: Berkeley Lab*

*Note: Yearly estimates reflect variations in installed cost, capacity factors, operational costs, cost of financing, and project life; includes accelerated depreciation but exclude PTC. See full report for details.*

Interactive data visualization: https://emp.lbl.gov/levelized-cost-wind-energy

# Levelized cost of wind energy by region, over last five years

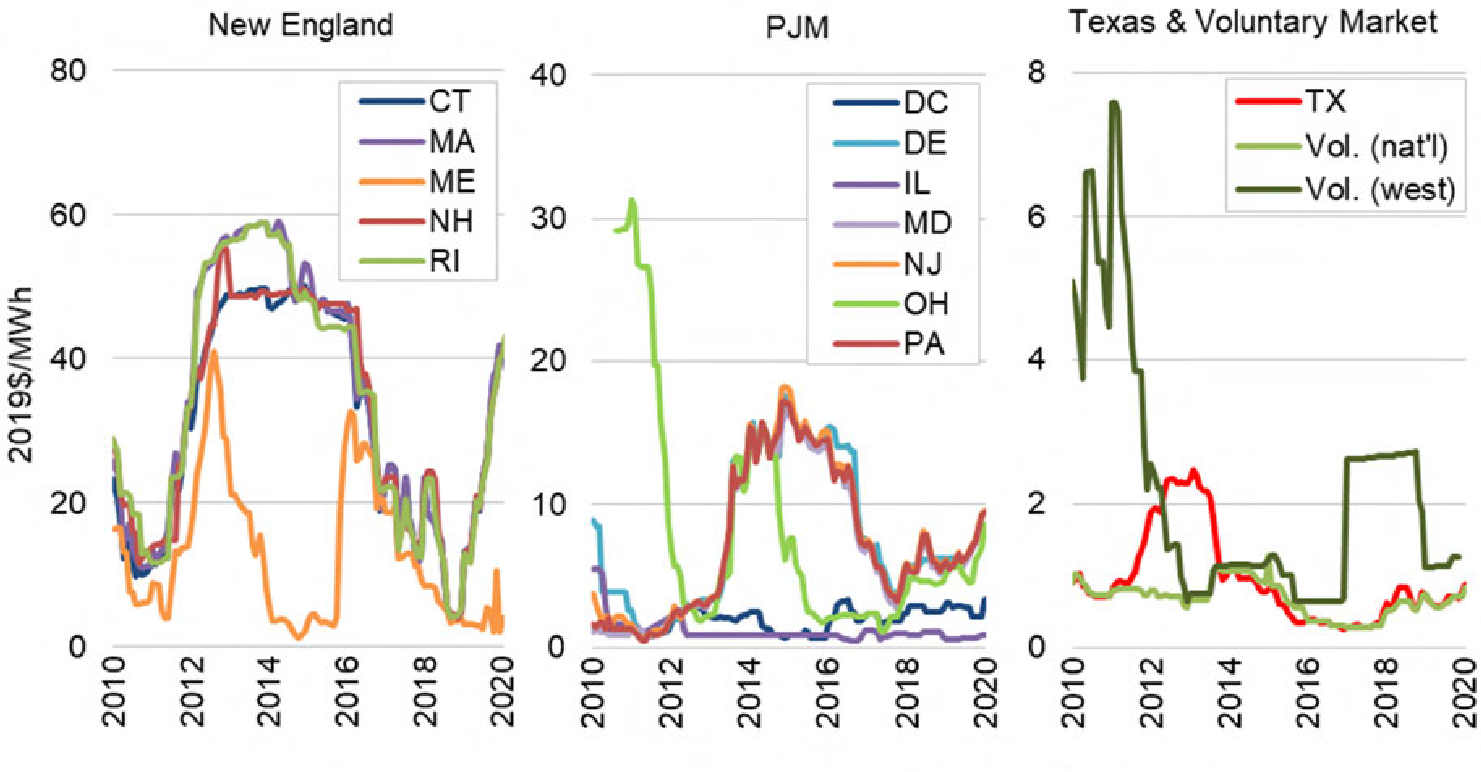


*Source: Berkeley Lab*

*Note: Total sample presented here includes 34 GW of installed wind capacity, but regional sample is especially small in ISO-NE (569 MW), CAISO (319 MW, no data in 2019), and NYISO (156 MW, no data in 2019)*

Interactive data visualization: https://emp.lbl.gov/levelized-cost-wind-energy

# Historical renewable energy certificate (REC) prices

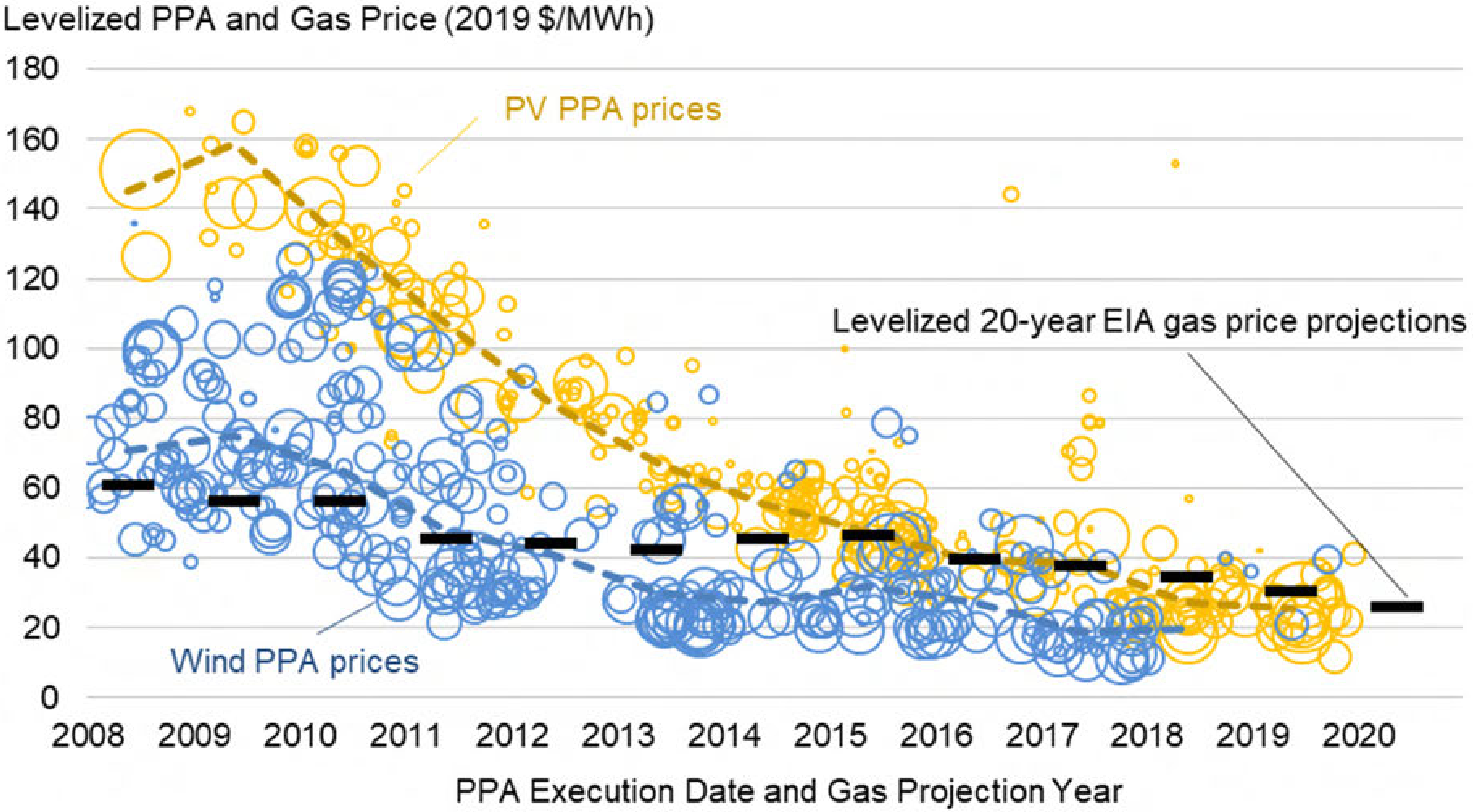


*Source: Marex Spectron*

REC prices vary by: market type (compliance vs. voluntary); geographic region; specific design of state RPS policies.

# Price and Value Comparisons

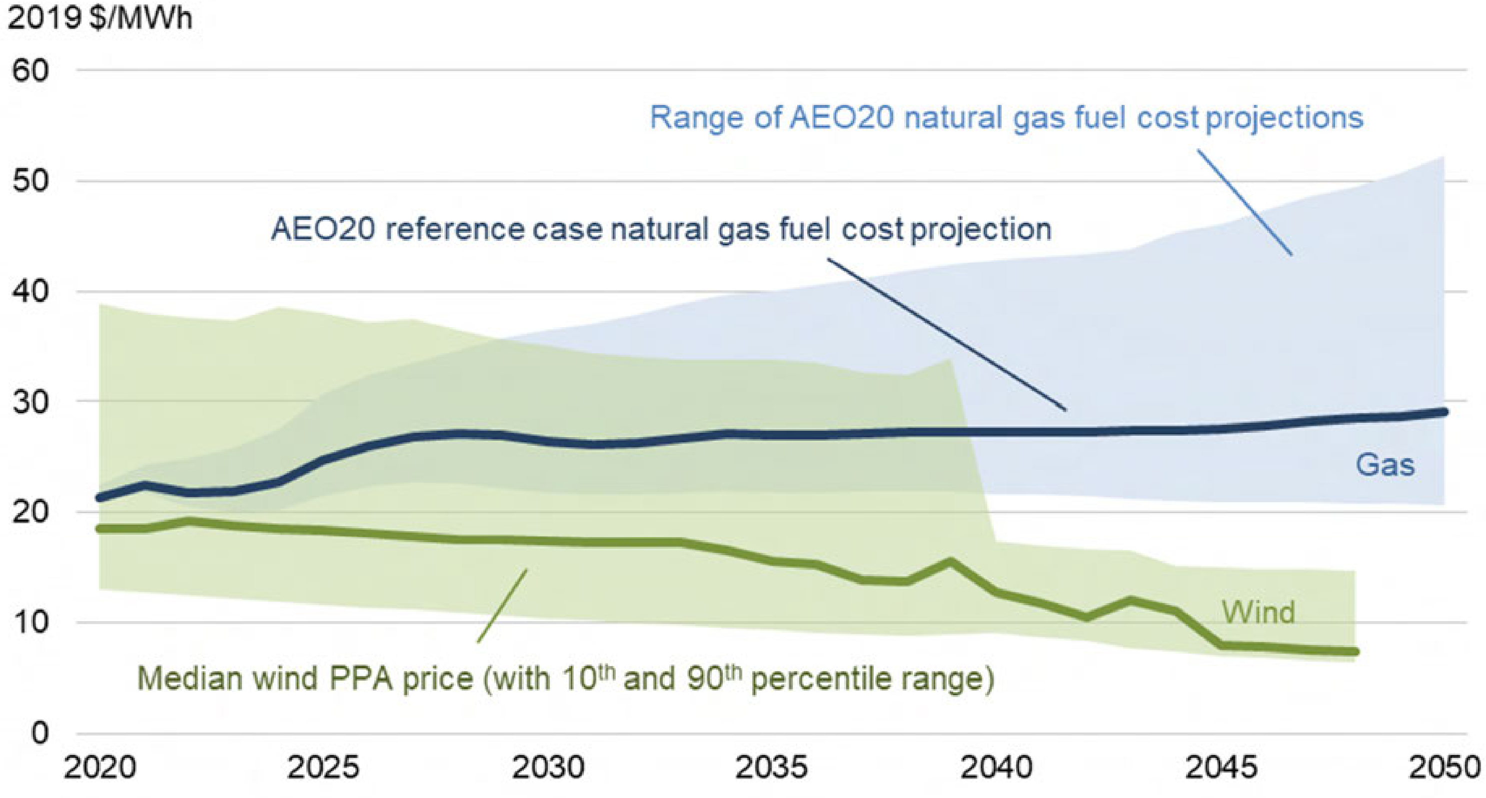
# Levelized wind and solar PPA prices and levelized gas prices



*Source: Berkeley Lab, FERC, Energy Information Administration*

*Note: Smallest bubble sizes reflect smallest-volume PPAs (<5 MW), whereas largest reflect largest-volume PPAs (>500 MW).*

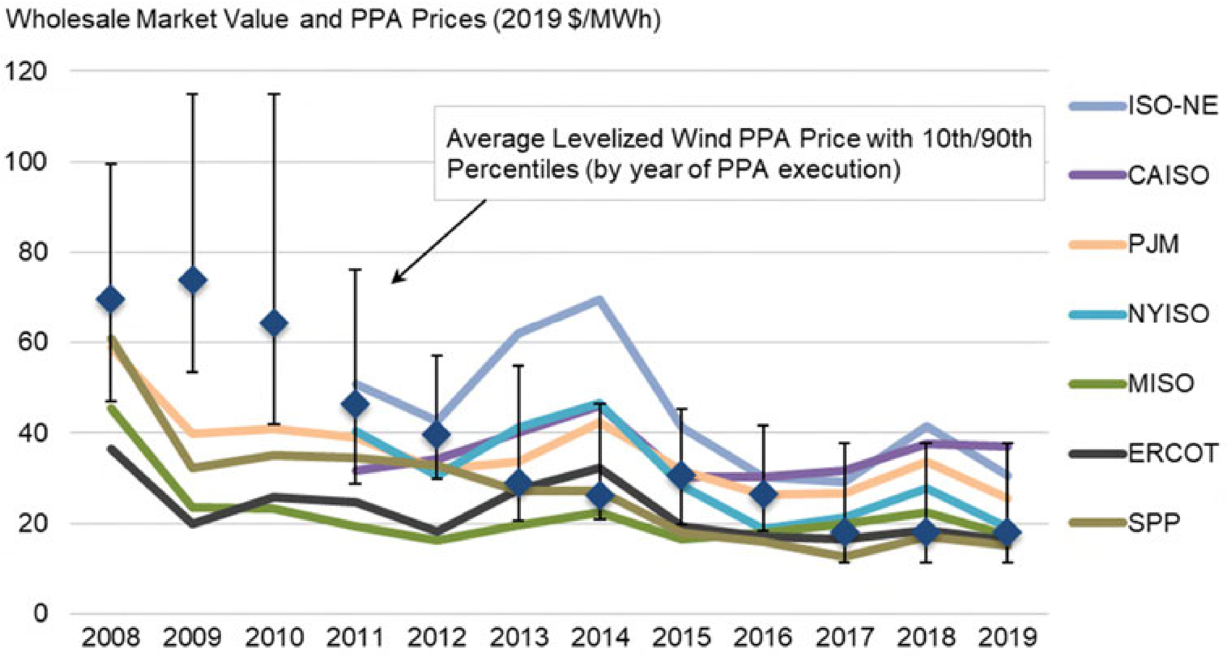
# Wind PPA prices and natural gas fuel costs by calendar year over time



*Source: Berkeley Lab, FERC, Energy Information Administration*

*Notes: Price comparisons shown are far from perfect—see earlier 2019 report for details. Large drop in upper range of wind prices in 2040 reflects a smaller sample of generally-lower-priced projects.*

# Regional wholesale market value of wind and average levelized long-term wind PPA prices over time



*Sources: Berkeley Lab, ABB, ISOs*

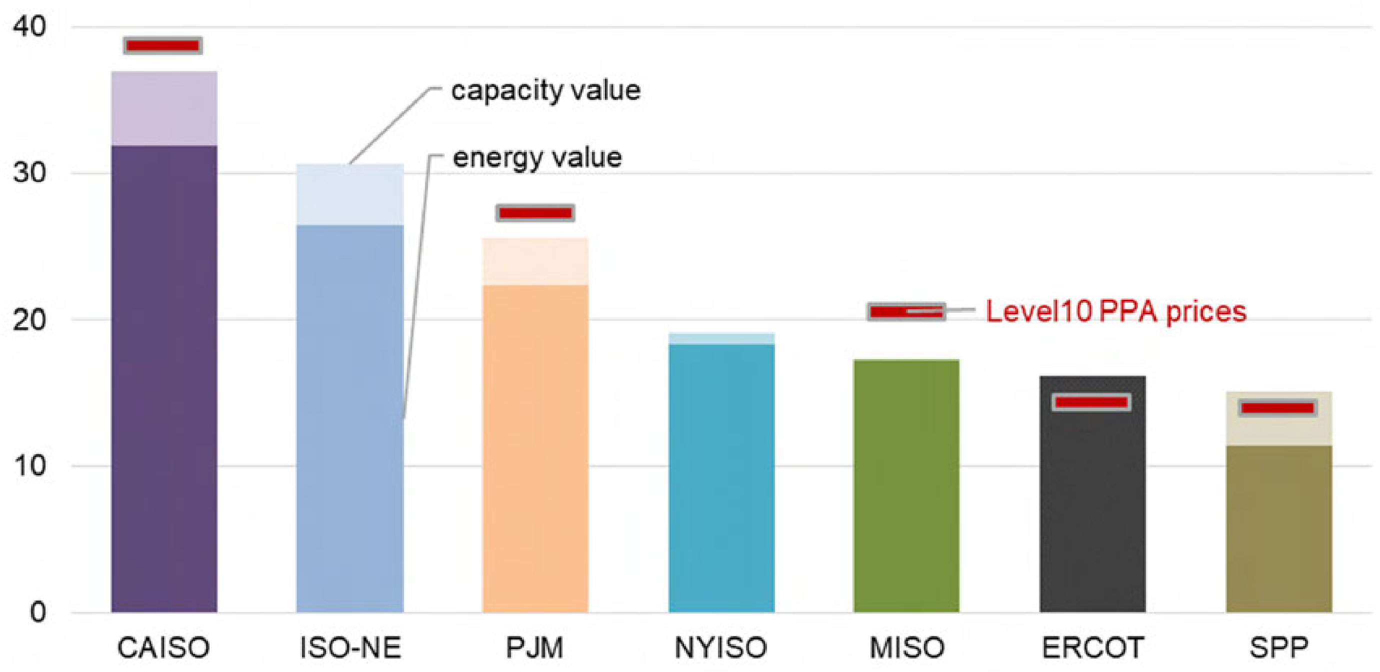
- Wholesale market value considers hourly local wholesale energy price and hourly wind output, along with capacity value where available
- Wholesale market value has declined over last decade, but recent wind PPAs are comparable to grid-system market value

Interactive data visualization: [https://emp.lbl.gov/wind-energy-market-value](https://emp.lbl.gov/wind-energy-market-value)

# Wholesale market value of wind in 2019 by region, and compared to Level10 wind PPA prices

Recent wind PPA prices are comparable to 2019 grid-system market value in many regions: sometimes slightly higher, sometimes lower

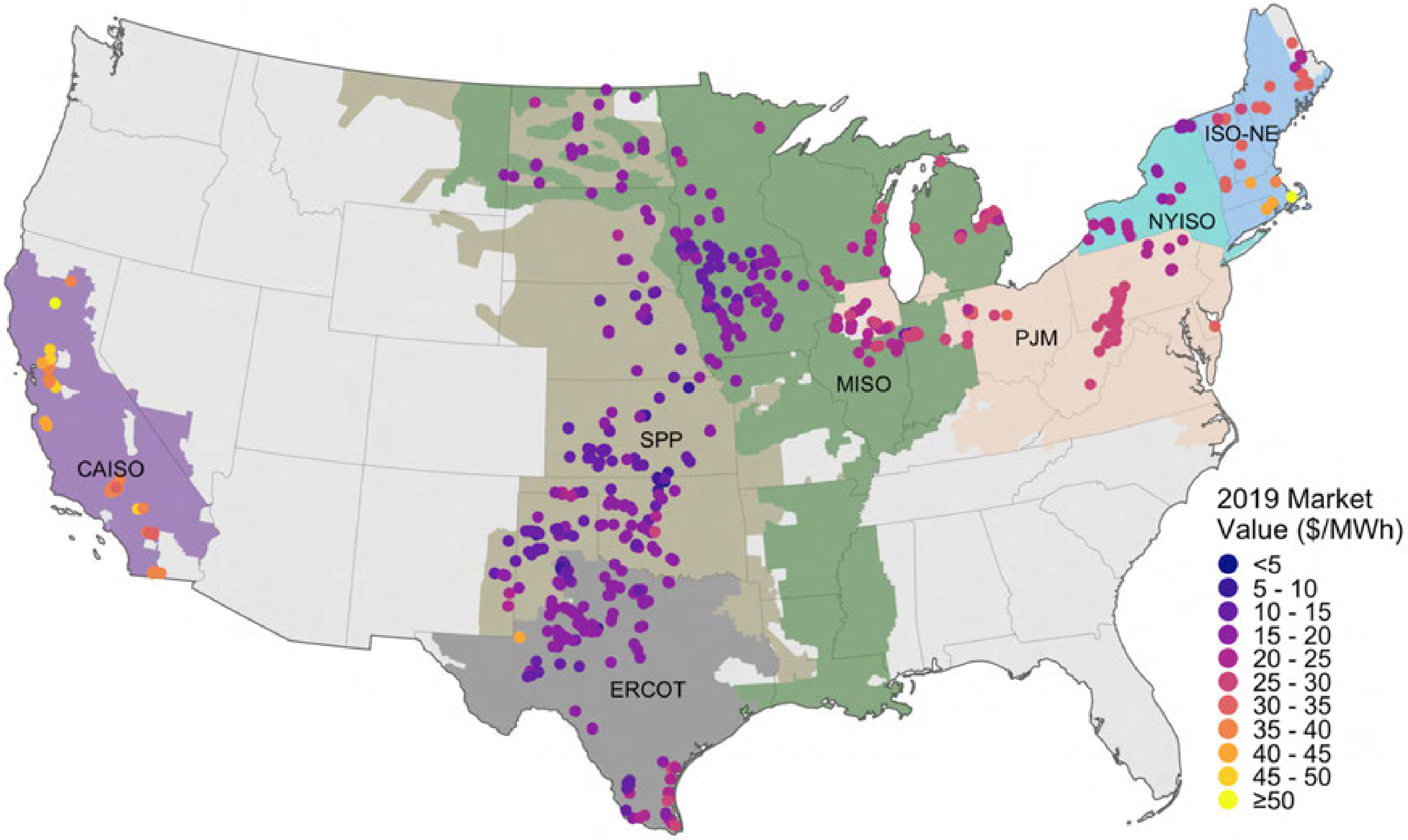
Wholesale Market Value & Level10 PPA Prices in 2019 (2019 $/MWh)



*Sources: Berkeley Lab, ABB, ISOs*

Interactive data visualization: https://emp.lbl.gov/wind-energy-market-value

# Wholesale market value of wind in 2019, by plant

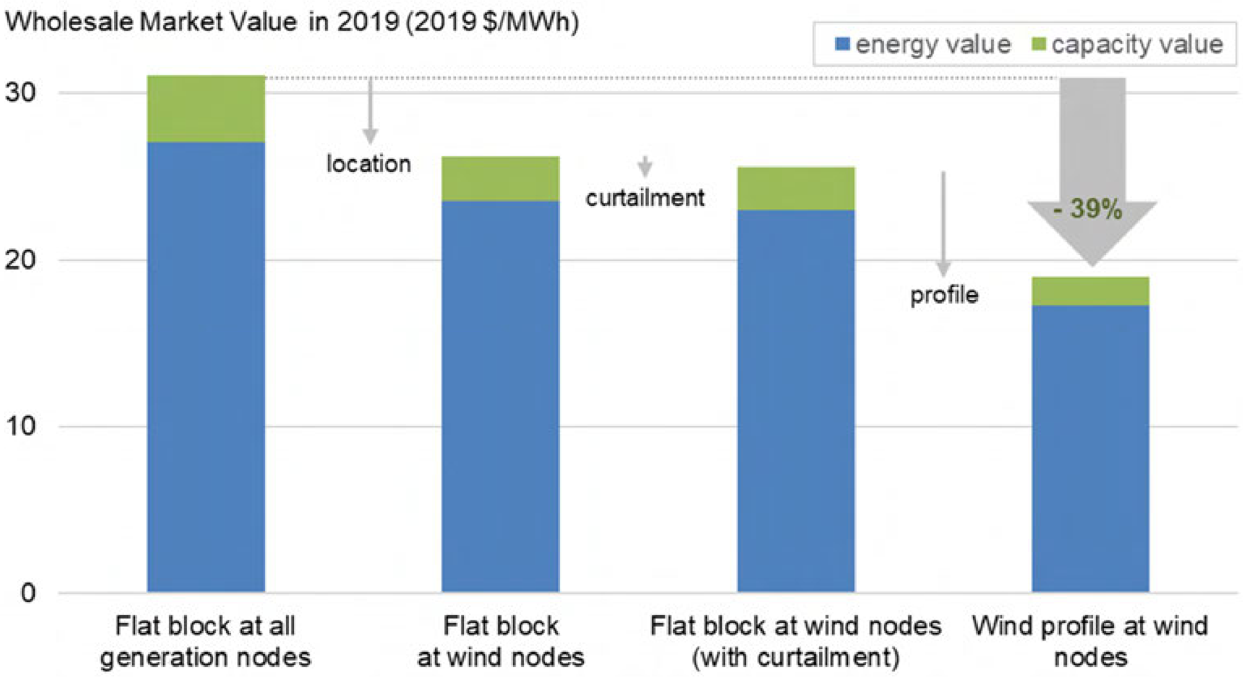


*Sources: Berkeley Lab, ABB, ISOs*

Interactive data visualization: https://emp.lbl.gov/wind-energy-market-value

# Market value of wind relative to a ‘flat block’ of power (i.e., average price across all pricing nodes)

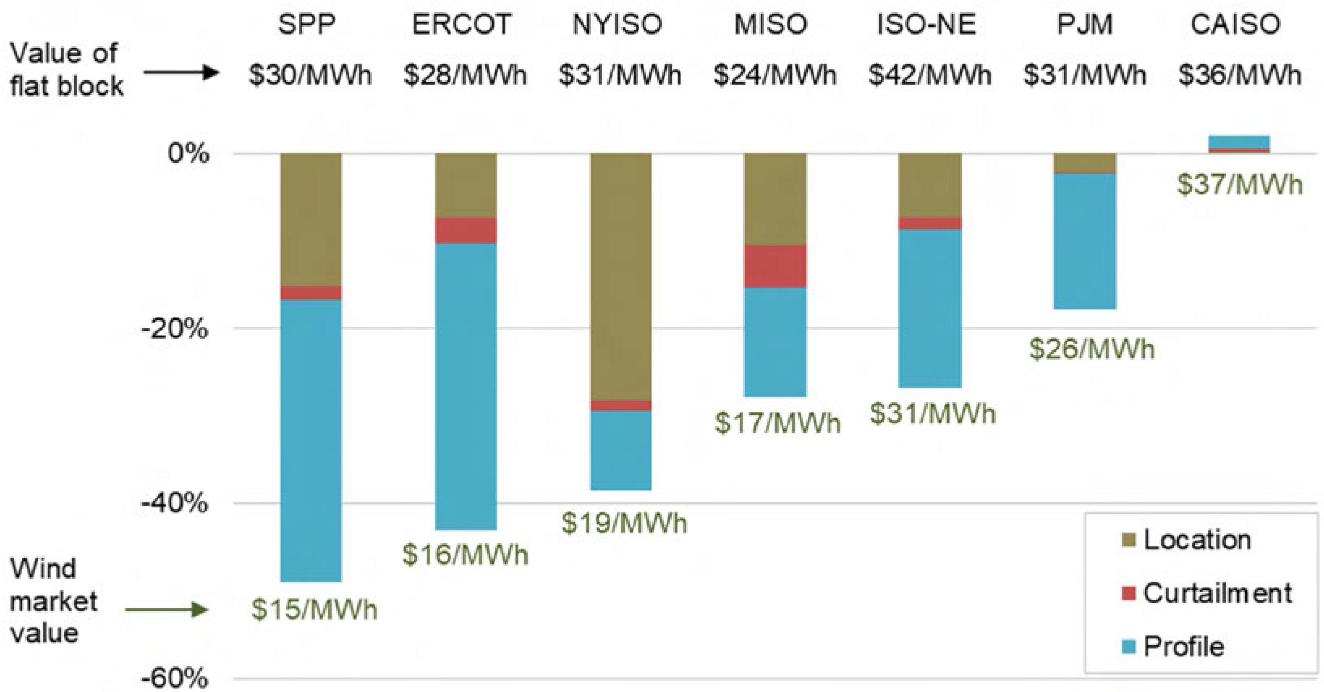
National average wholesale market value of wind in 2019 was 39% less than that of a generalized flat block of power—driven down by wind’s location (transmission congestion) and temporal output profile, with curtailment generally being a comparatively minor influence



*Sources: Berkeley Lab, ABB, ISOs*

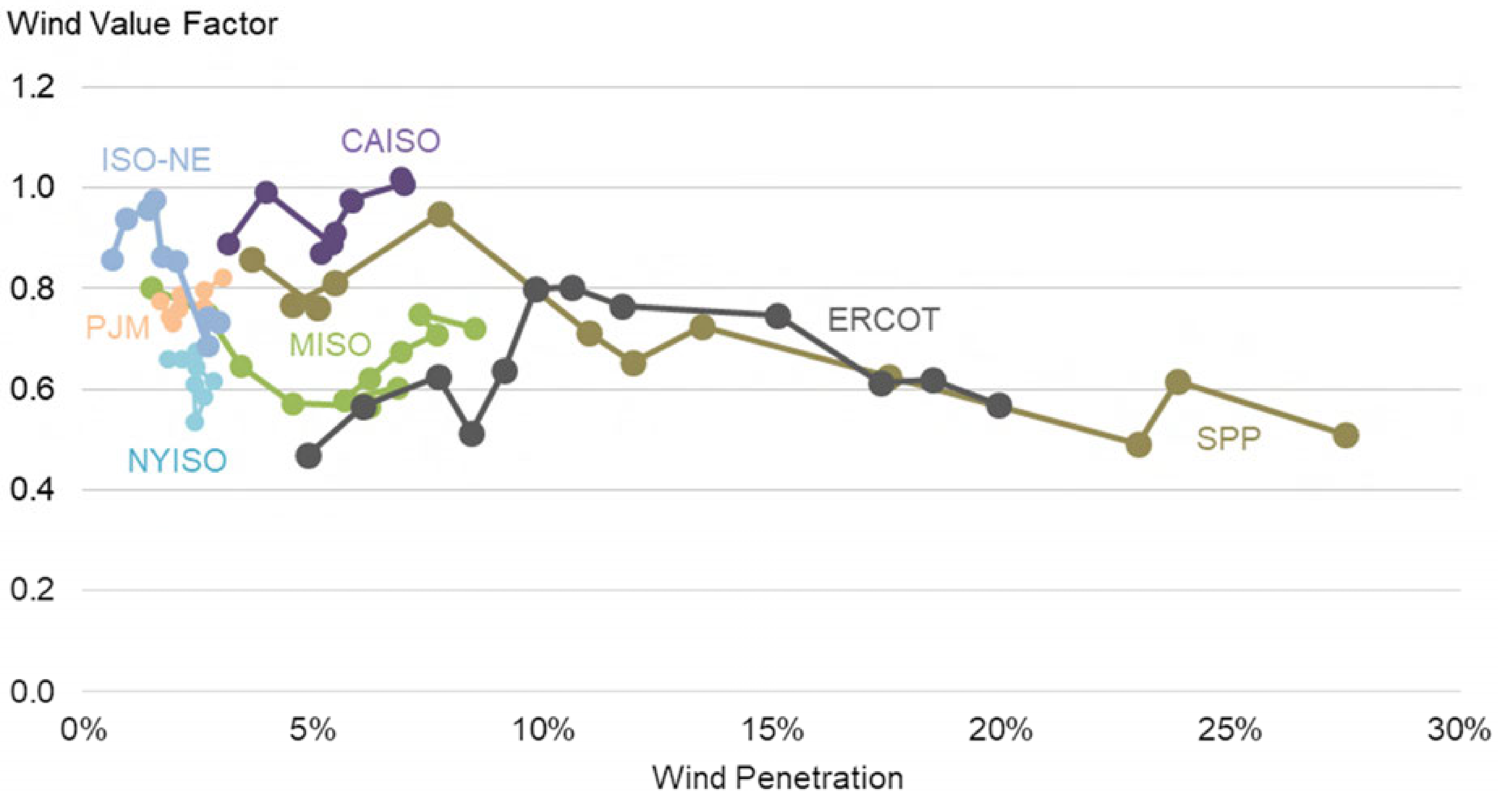
# Market value of wind relative to a 'flat block' of power, by region

Average market value de-rate of wind in 2019 relative to a flat block varied by region: dominated by wind's output profile in some regions (SPP, ERCOT, ISO-NE, PJM), and location in others (NYISO)



*Sources: Berkeley Lab, ABB, ISOs*

# Average "value factor" of wind (value relative to flat block) by region and with wind penetration

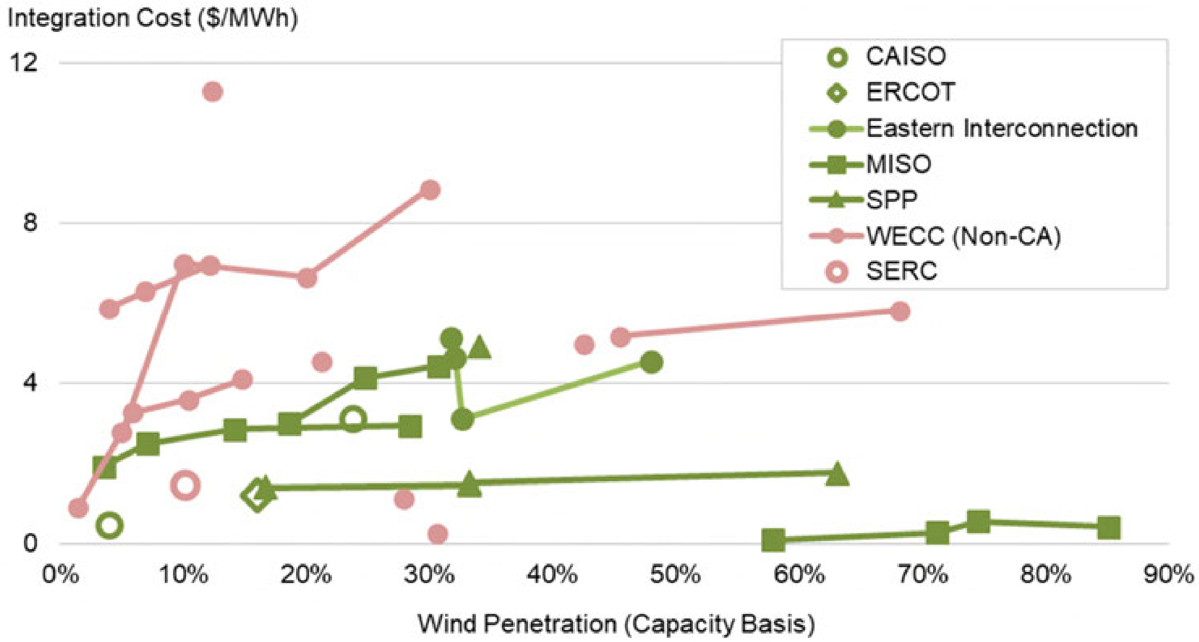


*Sources: Berkeley Lab, ABB, ISOs*

Value factor = wholesale market value of wind relative to generalized flat block of power in region; generalized flat block is 24x7 average price across all pricing nodes in region

# Estimates of wind power integration costs, by region and wind penetration level

Integrating wind energy into power systems is manageable, but not free of additional costs

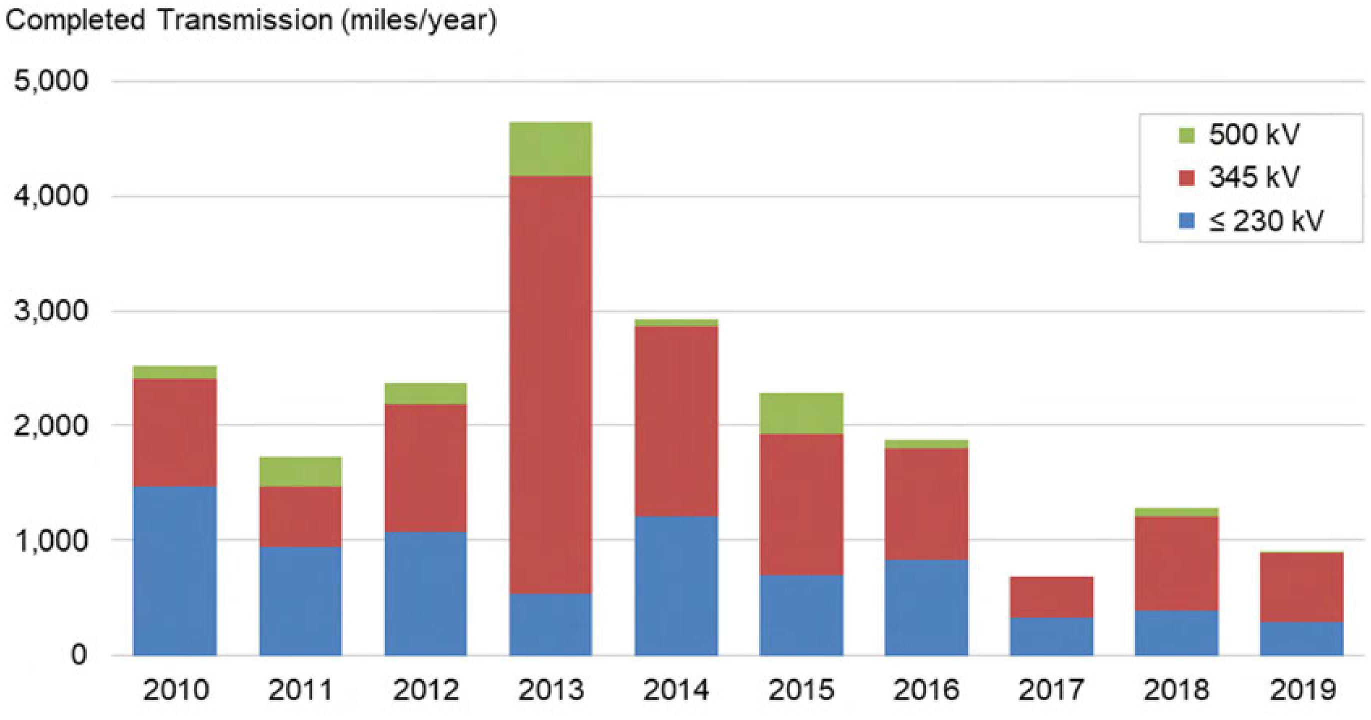


*Sources: see data file for details*

*Note: Because methods vary and a consistent set of operational impacts has not been included in each study, results from the different analyses presented here are not fully comparable. Nonetheless, in general, the balancing costs included in the above graphic are often additional to the market value and value factor results presented in previous slides.*

# Miles of transmission projects completed, by year and voltage

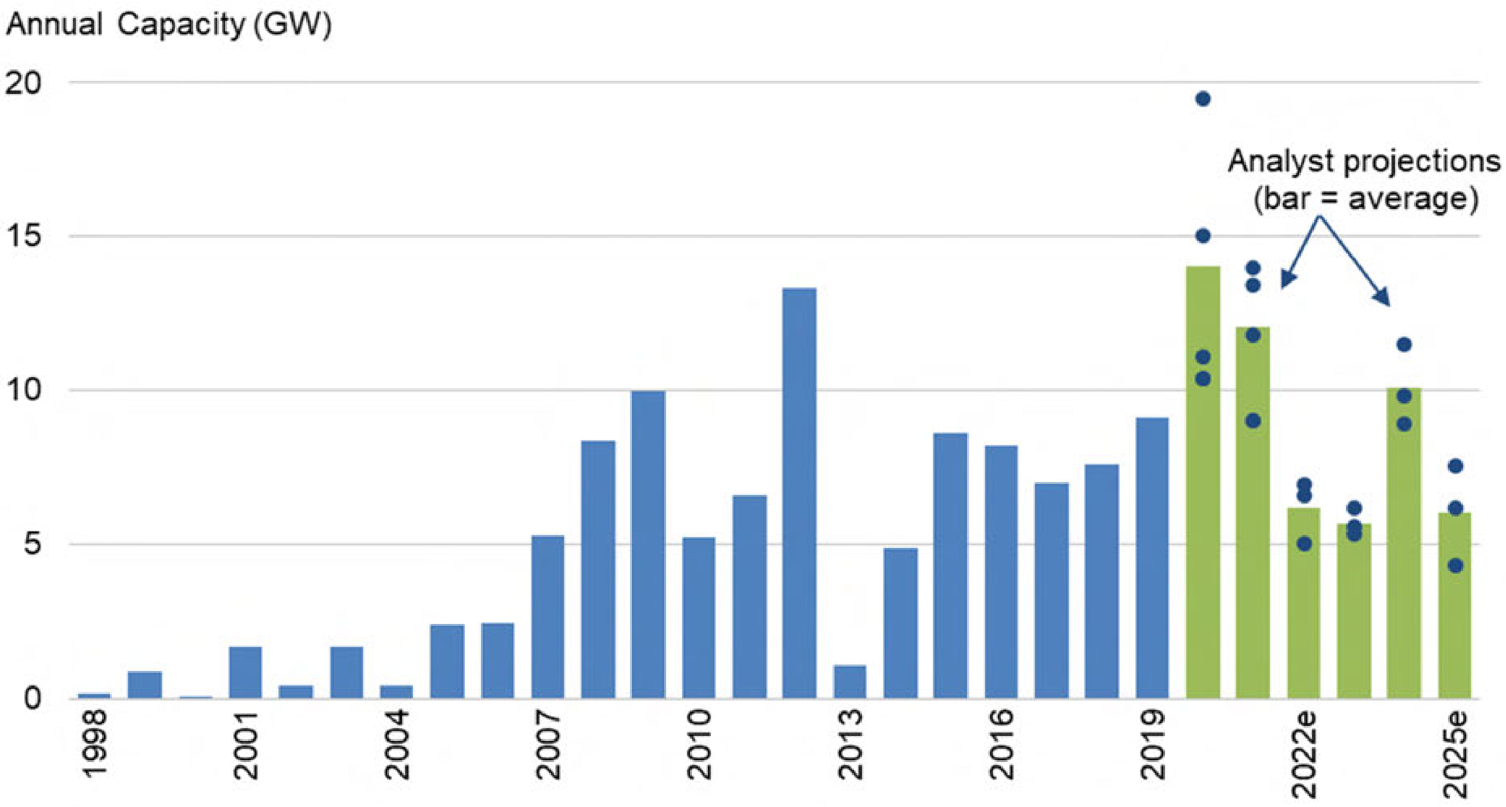
New transmission build has been relatively modest in recent years



*Source: FERC*

# Summary of Data

# Wind power capacity additions: historical installations and projected growth by various independent analysts



Sources: AWEA Wind IQ, independent analyst projections

# Factors potentially affecting wind power outlook

- Degree of continued wind technology cost reductions
- Demand by corporate and other retail customers
- Phase-out of federal tax incentives
- Natural gas and wholesale electricity prices
- Cost of solar energy
- Potential decline in market value if wind penetration increases
- Electricity demand growth
- Demand from state RPS/CES policies
- Transmission infrastructure build-out

# Data Summary

- Wind additions continued in 2019, with most analysts anticipating significant new builds in the near-term, due in part to continued incentives provided by the Production Tax Credit
- Wind energy has proven to be a significant source of new electric generation, and exceeded 7% of U.S. power production in 2019, with double-digit shares in many States
- The wind energy supply chain is geographically dispersed across the U.S., with strong shares of domestic content for towers, blades, and assembly of nacelles
- Turbine generator size, rotor swept area and tower heights have all increased, boosting wind project performance and lowering installed costs
- Wind power sales prices and the levelized cost of energy continued to decline, enabling wind energy to compete economically (with the PTC) with low natural gas power prices
- The outlook for land-based wind energy, beyond the PTC, remains uncertain, with influencing factors that include electricity demand, competing technologies, uncertain state and national policy environments, and the anticipated continued advancement of wind energy technology

# Data and Methods

# Summary of Data and Methods

## Installation Trends

Data on U.S. wind installations and wind as a percentage of load and generation come from the Energy Information Administration (https://www.eia.gov/electricity/), AWEA Annual Report (https://www.awea.org/resources/publications-and-reports/market-reports), AWEA WindIQ Database (https://windiq.awea.org/), and USGS U.S. Wind Turbine Database (https://eerscmap.usgs.gov/uswtdb/). Data related to other generation additions come from ABB's Velocity database and Wood Mackenzie. Wind power capacity globally comes from GWEC (https://gwec.net/global-wind-report-2019/), and data on wind as a percentage of total generation by country is compiled in the AWEA Annual Report. Data on existing hybrid plants largely come from EIA Form 860 (https://www.eia.gov/electricity/data/eia860/), with some data cleaning by Berkeley Lab. Data from interconnection queues is collected and synthesized by Berkeley Lab.

## Industry Trends

Data on manufacturer market share, facilities, and manufacturing capability, as well as wind plant ownership and offtake, come from the AWEA WindIQ Database and Annual Report. Data on turbine manufacturer profitability is collected from corporate annual financial reports. Data on imports of wind equipment and estimated domestic content come from Berkeley Lab analysis of the USITC's DataWeb (http://dataweb.usitc.gov). The cost of debt and tax equity are compiled from the Intercontinental Exchange Benchmark Administration, Bloomberg New Energy Finance, and Norton Rose Fulbright.

## Technology Trends

Data on turbine nameplate capacity, hub height, and rotor diameter come largely from the AWEA WindIQ database and USGS U.S. Wind Turbine Database. The location and characteristics of possible future plants come from Federal Aviation Aadministration data files (https://oeaaa.faa.gov/oeaaa/external/portal.jsp). Wind resource quality is assessed based on site estimates of gross capacity factor at 80 meters by AWS Truepower (under license to NREL).

## Performance Trends

Data on U.S. wind plant performance primarily comes from EIA Form 923 (https://www.eia.gov/electricity/data/eia923), FERC Electronic Quarterly Reports (https://www.ferc.gov/industries-data/electric/power-sales-and-markets/electric-quarterly-reports-eqr), and FERC Form 1 (https://www.ferc.gov/industries-data/electric/general-information/electric-industry-forms/form-1-electric-utility-annual). Curtailment data come from each of the seven independent system operators. Data on yearly variations in annual wind speed come from the ERA5 reanalysis data product (https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5).

# Summary of Data and Methods, Continued

## Cost Trends

Wind turbine transaction prices were, in part, compiled by Berkeley Lab. Additional data come from annual financial reports from Vestas, SGRE and Nordex, and from consultancies BNEF and Wood Mackenzie. Berkeley Lab uses a variety of public and some private sources of data to compile capital cost data for a large number of U.S. wind projects. For 2009–2012 projects, data from the Section 1603 Treasury Grant program were used extensively; for projects installed from 2013 through 2017, confidential EIA Form 860 data were used extensively. Wind project O&M costs come primarily from two sources: EIA Form 412 data from 2001 to 2003 for private power projects and projects owned by publicly-owned utilities, and FERC Form 1 data for investor-owned utility projects.

## Power Sales Price and Levelized Cost Trends

Wind power purchase agreement (PPA) price data come from multiple sources, including prices reported in FERC's Electronic Quarterly Reports, FERC Form 1, avoided-cost data filed by utilities, pre-offering research conducted by bond rating agencies, and a Berkeley Lab collection of PPAs. Additional data come from Level10 Energy (https://leveltenenergy.com/). The levelized cost of wind energy estimated based on assumptions described on a later slide. REC prices come from Marex Spectron (https://www.marexspectron.com/).

## Price and Value Comparisons

Data on solar PPA prices are based on the same sources as wind prices. Gas price projections come from EIA's Annual Energy Outlook (https://www.eia.gov/outlooks/aeo/). Details on the calculation of energy and capacity value are available in Wiser and Bolinger (2019): https://emp.lbl.gov/sites/default/files/wtmr_final_for_posting_8-9-19.pdf. In brief, estimated hourly wind generation profiles are matched to hourly nodal real-time wholesale prices from ABB's Velocity database. The capacity value of each plant is estimated based on the modeled wind profiles and ISO-specific rules for wind's capacity credit and ISO-zone-specific capacity prices. Integration cost estimates derive from a Berkeley Lab review of the available published literature: see data-file for the full list of citations. Data on completed transmission lines come from FERC Infrastructure reports (https://www.ferc.gov/industries-data/resources/staff-reports-and-papers).

## Conclusions

Independent analyst projections for wind additions in 2020-2025 come from BNEF, Wood Mackenzie, IHS, and IEA.

For additional details, see appendix of Wiser and Bolinger (2019):
https://emp.lbl.gov/sites/default/files/wtmr_final_for_posting_8-9-19.pdf

BERKELEY LAB
LAWRENCE BERKELEY NATIONAL LABORATORY

An accessible data file and multiple visualizations can be found at windreport.lbl.gov

To contact the primary authors:

- Ryan Wiser, Lawrence Berkeley National Laboratory
  510-486-5474, RHWiser@lbl.gov
- Mark Bolinger, Lawrence Berkeley National Laboratory
  603-795-4937, MABolinger@lbl.gov

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# Battery Pack Prices Cited Below $100/kWh for the First Time in 2020, While Market Average Sits at $137/kWh | BloombergNEF

*BloombergNEF's annual battery price survey finds prices fell 13% from 2019*

*Hong Kong and London, December 16, 2020* – Lithium-ion battery pack prices, which were above $1,100 per kilowatt-hour in 2010, have fallen 89% in real terms to $137/kWh in 2020. By 2023, average prices will be close to $100/kWh, according to the latest forecast from research company BloombergNEF (BNEF).

For the first time, battery pack prices of less than $100/kWh have been reported. These were for batteries in e-buses in China. While these were the lowest reported price, the volume-weighted average price for e-buses in China was slightly higher, $105/kWh.

Battery electric vehicle (BEV) pack prices are $126/kWh on a volume-weighted average basis. At the cell level, average BEV prices were just $100/kWh. This indicates that on average, the battery pack portion of the total price accounts for 21%.

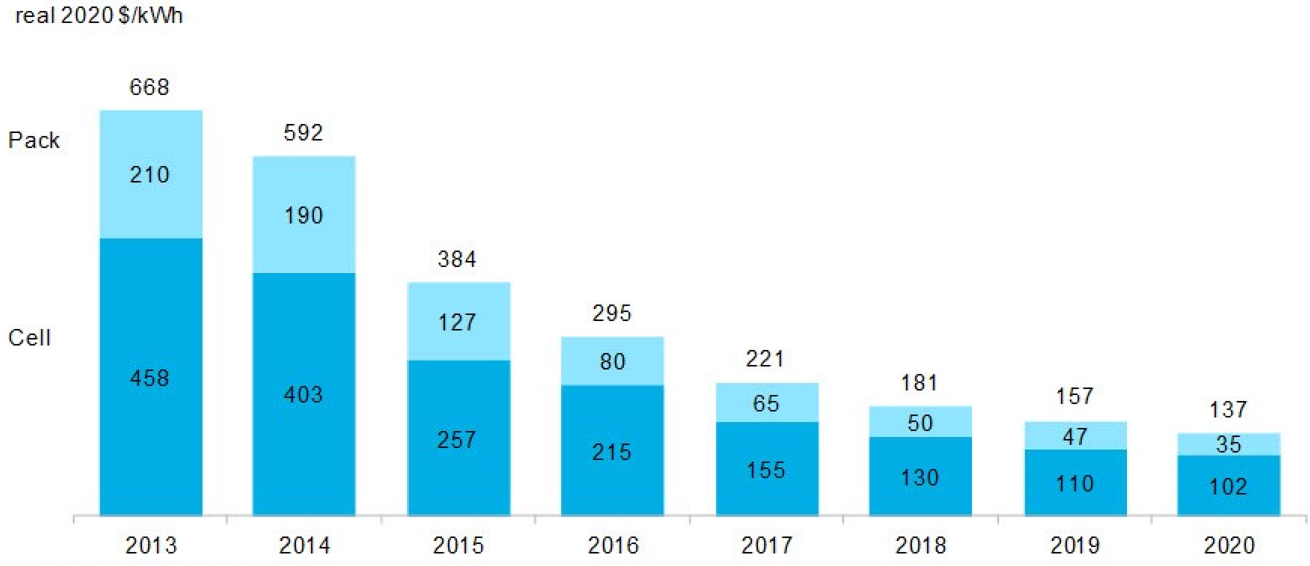
BNEF's *2020 Battery Price Survey,* which considers passenger EVs, e-buses, commercial EVs and stationary storage, predicts that by 2023 average pack prices will be $101/kWh. It is at around this price point that automakers should be able to produce and sell mass market EVs at the same price (and with the same margin) as comparable internal combustion vehicles in some markets. This assumes no subsidies are available, but actual pricing strategies will vary by automaker and geography.

Price reductions in 2020 are thanks to increasing order sizes, growth in BEV sales and the introduction of new pack designs. New cathode chemistries and falling manufacturing costs will drive prices down in the near term. The prices of cathode materials have fallen since reaching a high in spring 2018, finding a more stable level during 2020.

James Frith, BNEF's head of energy storage research and lead author of the report, said: "It is a historic milestone to see pack prices of less than $100/kWh reported. Within just a few years we will see the average price in the industry pass this point. What's more, our analysis shows that even if prices for raw materials were to return to the highs seen in 2018, it would only delay average prices reaching $100/kWh by two years – rather than completely derailing the industry. The industry is becoming increasingly resilient to changing raw material prices, with leading battery manufacturers moving up the value chain and investing in cathode production or even mines."

Leading battery manufacturers are now enjoying gross margins of up to 20% and their plants are operating at utilization rates over 85%. Maintaining high utilization rates is key to reducing cell and pack prices. If utilization rates are low, then equipment and building depreciation costs are spread over fewer kilowatt-hours of manufactured cells.

**Figure 1: Volume-weighted average pack and cell price split**



*Source: BloombergNEF*

Daixin Li, a senior energy storage associate at BNEF, added: "The increasingly diversified chemistries used in the market result in a wide range of prices. Battery manufacturers are racing to mass-produce higher energy-density batteries with some new chemistries such as lithium nickel manganese cobalt oxide – NMC (9.5.5) – and lithium nickel manganese cobalt aluminum oxide – NMCA – set to be mass-produced as early as 2021. Lithium iron phosphate – LFP – however plays as a cost-competitive alternative, contributing to the lowest reported cell prices of $80/kWh."

The path to achieving $101/kWh by 2023 looks clear, even if there will undoubtedly be hiccups, such as commodity price increases, along the way. There is much less certainty on how the industry will reduce prices even further from $100/kWh down to our expectation of $58/kWh by 2030. This is not because it is impossible but rather that there are several options and paths that could be taken.

One possible route to achieving these lower prices is the adoption of solid-state batteries. BloombergNEF expects that these cells could be manufactured at 40% of the cost of current lithium-ion batteries, when produced at scale. These reductions would come from savings in the bill of materials and in the cost of production, equipment, and the adoption of new high-energy density cathodes. In order to realize these reduced prices, the supply chain for key materials, such as solid electrolytes, not used in lithium-ion batteries today, needs to be established.

**Contact**
Veronika Henze
BloombergNEF
+1-646-324-1596
vhenze@bloomberg.net

*Independent Statistics & Analysis*
U.S. Energy Information Administration

# Battery Storage in the United States: An Update on Market Trends

August 2021

*Independent Statistics & Analysis*
www.eia.gov

U.S. Department of Energy
Washington, DC 20585

This report was prepared by the U.S. Energy Information Administration (EIA), the statistical and analytical agency within the U.S. Department of Energy. By law, EIA's data, analyses, and forecasts are independent of approval by any other officer or employee of the United States Government. The views in this report therefore should not be construed as representing those of the U.S. Department of Energy or other federal agencies.

# List of Acronyms

| | |
|---|---|
| AEO | *Annual Energy Outlook* |
| AK/HI | Alaska and Hawaii |
| CAES | Compressed-air energy storage |
| CAISO | California Independent System Operator |
| CPUC | California Public Utility Commission |
| CSP | Concentrated solar power |
| DOE | U.S. Department of Energy |
| EIA | U.S. Energy Information Administration |
| ERCOT | Electric Reliability Council of Texas |
| FERC | Federal Energy Regulatory Commission |
| GW | Gigawatt |
| IOU | Investor-owned utilities |
| ITC | Investment Tax Credit |
| IPP | Independent power producer |
| IRP | Integrated resource plan |
| ISO | Independent System Operator |
| ISO-NE | Independent System Operator of New England |
| kW | Kilowatt |
| kWh | Kilowatthour |
| LADWP | Los Angeles Department of Water and Power |
| MISO | Midcontinent Independent System Operator |
| MW | Megawatt |
| MWh | Megawatthour |
| NEMS | National Energy Modeling System |
| NYISO | New York Independent System Operator |
| PGE | Pacific Gas and Electric |
| PJM | PJM Interconnection |
| PPA | Power purchase agreement |
| RTO | Regional Transmission Organization |
| SCE | Southern California Edison |
| SDGE | San Diego Gas and Electric |
| SGIP | Self-Generation Incentive Program |
| SMUD | Sacramento Municipal Utility District |
| SPP | Southwest Power Pool |

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# Executive Summary

Electric power markets in the United States are undergoing significant structural change that we believe, based on planning data we collect, will result in the installation of the ability of large-scale battery storage to contribute 10,000 megawatts to the grid between 2021 and 2023—10 times the capacity in 2019.

Energy storage plays a pivotal role in enabling power grids to function with more flexibility and resilience. In this report, we provide data on trends in battery storage capacity installations in the United States through 2019, including information on installation size, type, location, applications, costs, and market and policy drivers. The report then briefly describes other types of energy storage.

This report focuses on data from EIA survey respondents and does not attempt to provide rigorous economic or scenario analysis of the reasons for, or impacts of, the growth in large-scale battery storage.

## Growth across U.S. electric power market regions

The number and total capacity of large-scale battery storage systems continue to grow in the United States, and regional patterns strongly influence the nation-wide market structure:

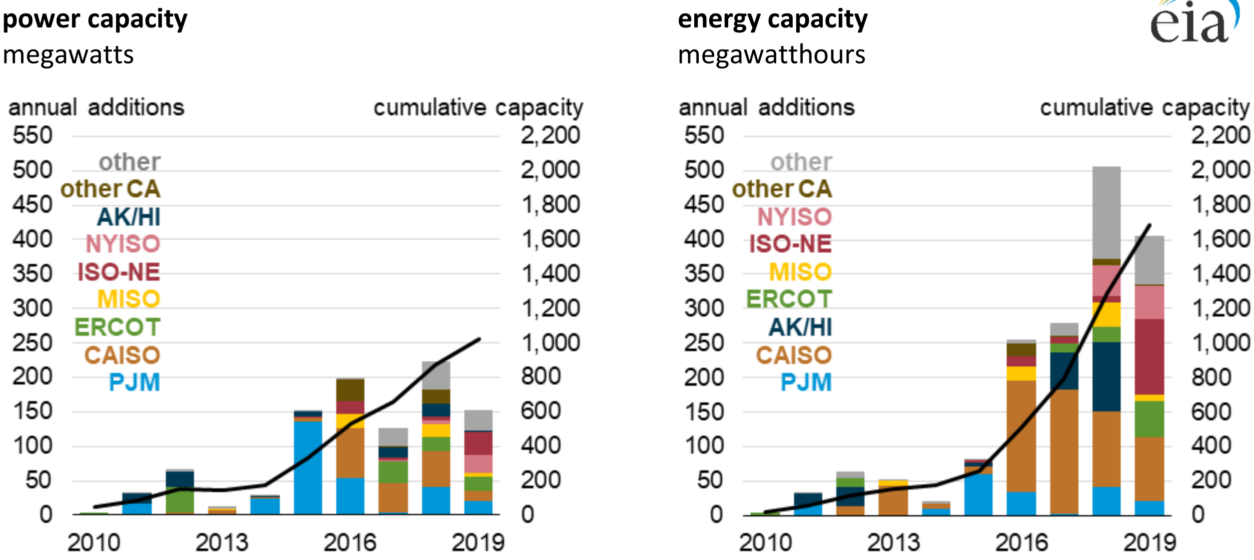
- At the end of 2019, 163 large-scale battery storage systems were operating in the United States, a 28% increase from 2018. The maximum energy that could be stored at these sites (energy capacity) was 1,688 megawatthours (MWh), and the maximum power that could be provided to the grid from these sites at any given moment (power capacity) was 1,022 megawatts (MW).

- As of the end of 2019, more than 60% of the large-scale battery system capacity to store energy or provide power to the grid in the United States was located in areas covered by regional grid operators PJM Interconnection (PJM) and California Independent System Operator (CAISO). Historically, these areas attracted capacity additions because of favorable market rules promoting energy storage.

- Starting in 2017, regions outside of PJM and CAISO have also seen installations of large-scale battery energy storage systems, in part as a result of declining costs.

- A breakout of installed power and energy capacity of large-scale battery by state is attached as Appendix C.

**Figure ES1. Large-scale battery storage capacity by region (2010–2019)**



Source: U.S. Energy Information Administration, 2019 Form EIA-860, *Annual Electric Generator Report*

## Small-scale battery storage

Small-scale battery storage also continues to grow, especially in California, but also in other regions of the United States:

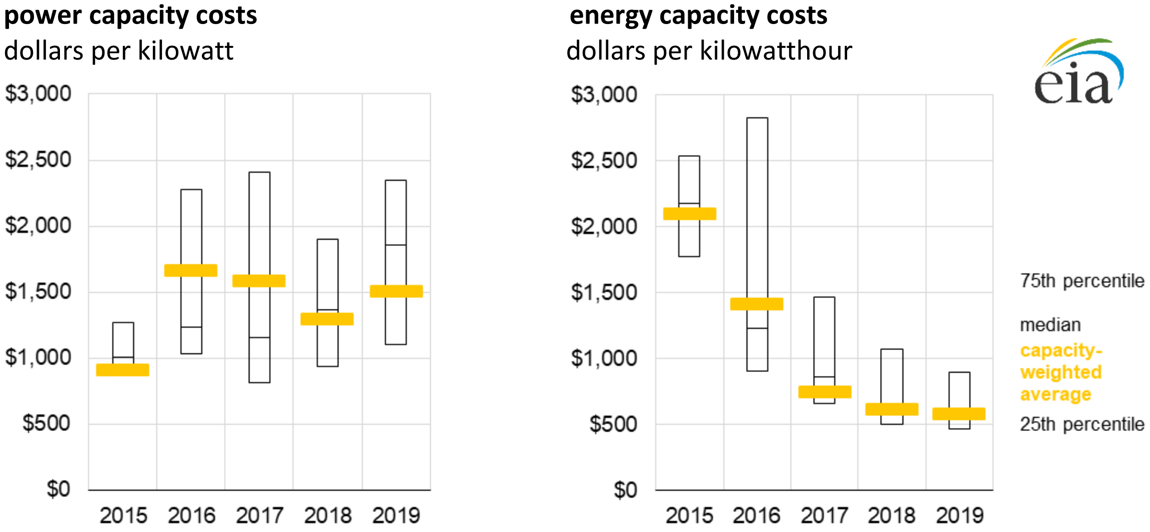
- In 2019, 402 MW of small-scale total battery storage power capacity existed in the United States.
- California accounts for 83% of all small-scale battery storage power capacity.
- The states with the most small-scale power capacity outside of California include Hawaii, Vermont, and Texas.

## Lower installed costs

The costs of installing and operating large-scale battery storage systems in the United States have declined in recent years.

- Average battery energy storage capital costs in 2019 were $589 per kilowatthour (kWh), and battery storage costs fell by 72% between 2015 and 2019, a 27% per year rate of decline.
- These lower costs support more capacity to store energy at each storage facility, which can increase the duration that each battery system can last when operating at its maximum power.

**Figure ES2. Total installed cost of large-scale battery storage systems by year**



Source: U.S. Energy Information Administration, 2019 Form EIA-860, *Annual Electric Generator Report*

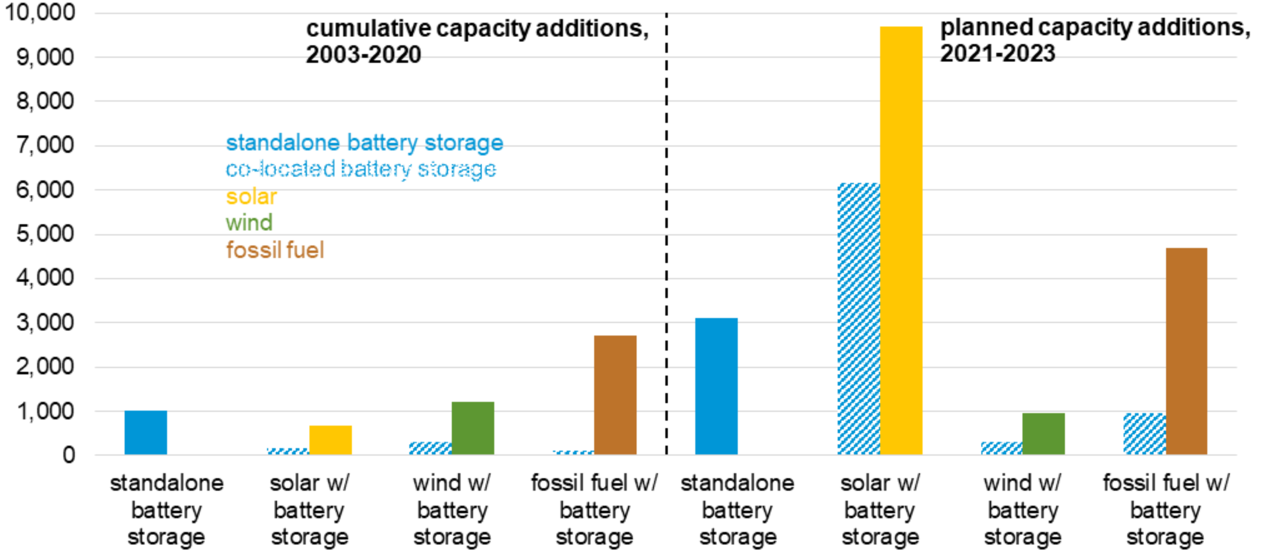
## More direct support from solar power

Most large-scale battery energy storage systems we expect to come online in the United States over the next three years are to be built at power plants that also produce electricity from solar photovoltaics, a change in trend from recent years.

- As of December 2020, the majority of U.S. large-scale battery storage systems were built as standalone facilities, meaning they were not located at sites that generate power from natural resources. Only 38% of the total capacity to generate power from large-scale battery storage sites was co-located with other generators: 30% was co-located specifically with generation from renewable resources, such as wind or solar PV, and 8% was co-located with fossil fuel generators.

- We expect the relationship between solar energy and battery storage to change in the United States over the next three years because most planned upcoming projects will be co-located with generation, in particular with solar facilities. If all currently announced projects from 2021 to 2023 become operational, then the share of U.S. battery storage that is co-located with generation would increase from 30% to 60%.

**Figure ES3. U.S. large-scale battery storage power capacity additions, standalone and co-located**
megawatts



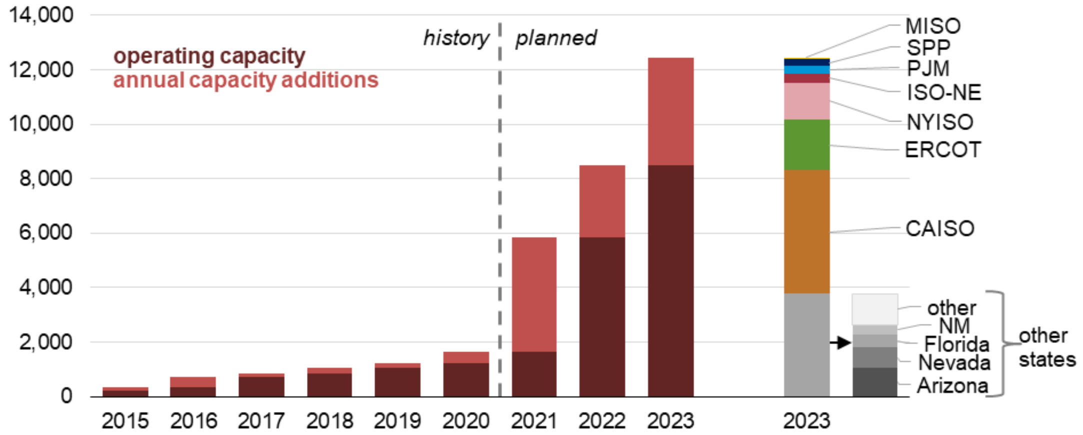
Source: U.S. Energy Information Administration, Dec 2020 Form EIA-860M, *Preliminary Monthly Electric Generator Inventory*
Note: Solid yellow, green, and brown bars indicate generating total capacity of solar, wind, and fossil fuels that have battery storage on-site.

## Additional accelerated growth

Based on planning data we collect, an additional 10,000 megawatts of large-scale battery storage's ability to contribute electricity to the grid is likely to be installed between 2021 and 2023 in the United States—10 times the total amount of maximum generation capacity by all systems in 2019.

Almost one-third of U.S. large-scale battery storage additions will come from states outside of regional grid operators PJM and CAISO, which led in initial development of large-scale battery capacity.

**Figure ES4. Large-scale battery storage cumulative power capacity, 2015–2023**
**power capacity**
megawatts



Source: U.S. Energy Information Administration, Dec 2020 Form EIA-860M, *Preliminary Monthly Electric Generator Inventory*

# Large-Scale Battery Storage Trends

The first large-scale[1] battery storage installation reported to us in the United States that was still in operation in 2019 entered service in 2003. Only 50 MW of power capacity from large-scale battery storage systems was installed between 2003 and 2010. However, the prevalence of these systems has grown in recent years. Between 2010 and 2019, power capacity from large-scale battery storage increased by a net of 972 MW, and 1,022 MW of battery storage power capacity was operational by the end of 2019.

Before last year, the largest annual battery power capacity addition in the United States occurred in 2018, when a record 222 MW of large-scale battery storage was added. In 2019, 152 MW of battery power capacity was installed, 32% less than in 2018. Preliminary data for 2020 show a 458 MW increase in battery power capacity, more than double the previous record and 66% more than total power capacity additions for 2019.

Independent power producers (IPPs) installed most of the U.S. battery storage power capacity that was operational in 2019 in the PJM Interconnection (PJM), which coordinates the movement of electricity through all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia. Investor-owned utilities (IOUs) in the California Independent System Operator (CAISO) territory have procured significant amounts of storage capacity as well.

Although Alaska and Hawaii represent a significant share of current U.S. battery storage capacity, their utilization patterns are unique in that batteries need to provide a wider range of additional services and engineering support than is commonly used in the Lower 48 states; therefore, these two states are grouped together in this report.

## Regional trends

About 74% of large-scale battery storage power capacity and 72% of energy capacity in the United States is installed in areas covered by independent system operators (ISOs) or regional transmission organizations (RTOs) (Figure 1).[2] The ISOs and RTOs account for 58% of total grid capacity in the United States and have the largest shares of storage power capacity relative to their shares of installed grid capacity (Figure 2). The disproportionate share of battery storage across ISOs and RTOs may result from differences in market design and policies compared to the utilities that integrate generation and distribution themselves which prevail elsewhere (Market and Policy Drivers).

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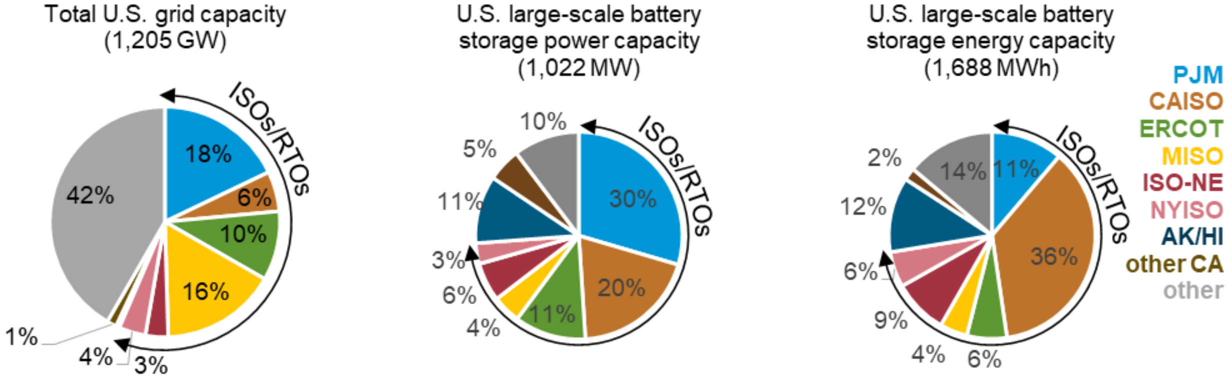
[1] Large-scale refers to systems that are grid connected and have a nameplate power capacity greater than 1 MW.

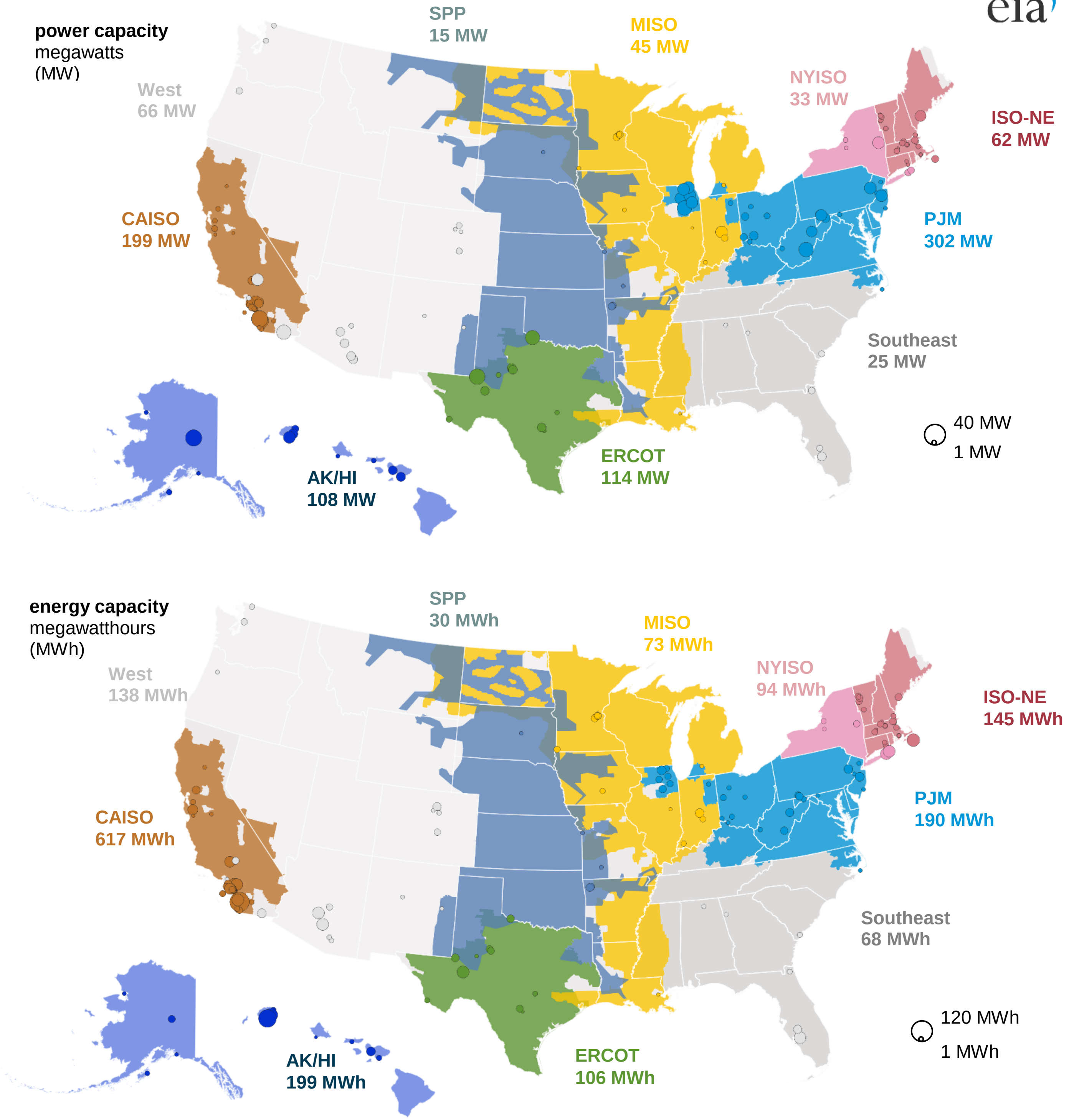
[2] ISOs and RTOs are independent, federally regulated non-profit organizations that ensure reliability and optimize supply and demand bids for wholesale electric power.

**Figure 1. Large-scale power and energy capacity by region (2019)**



Source: U.S. Energy Information Administration, 2019 Form EIA-860, *Annual Electric Generator Report*

**Figure 2. Large-scale battery storage installations by region (2019)**

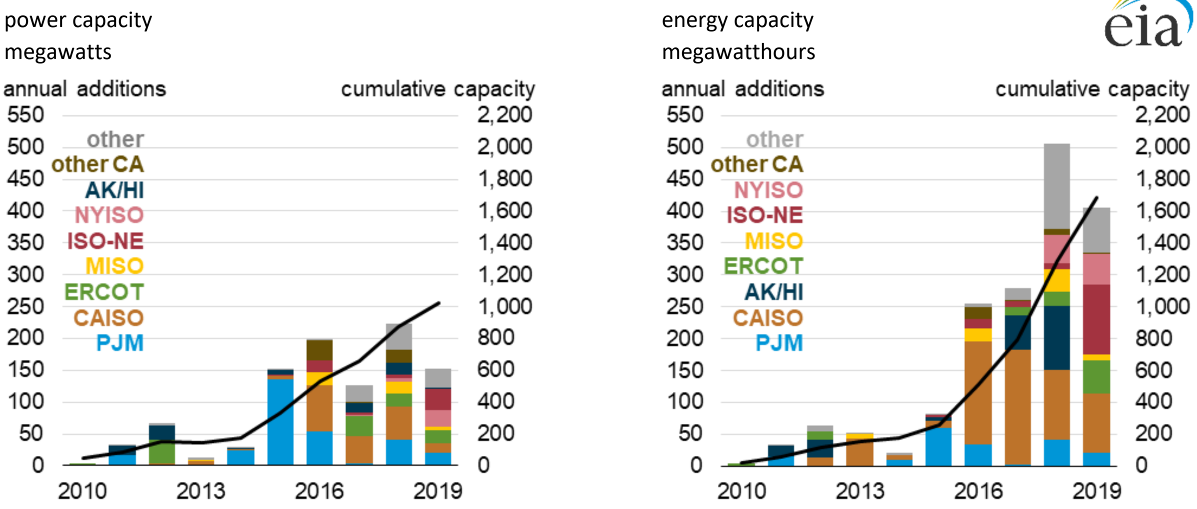


Source: U.S. Energy Information Administration, 2019 Form EIA-860, *Annual Electric Generator Report*
Note: Energy capacity data for large-scale battery storage installed in 2019. Gray regions are not covered by RTO/ISO's.

Between 2003 and 2019, 1,044 MW (22 MW of which is now retired) of large-scale battery storage power capacity (as part of 168 individual projects) was installed in the United States, 82% of which was installed between 2015 and 2019. The region with the most power capacity, PJM Interconnection (Figure 3), makes up 30% of existing large-scale battery storage power capacity, most of which was built from 2014 to 2016. This period of growth in large-scale battery storage power capacity in PJM most likely resulted from changes in PJM's market for frequency regulation (a grid service that helps balance momentary differences between electricity demand and supply within the transmission grid) in 2012, which created a specific requirement for fast-response resources, such as batteries. In 2015, PJM capped the market share for fast-responding resources as a result of grid reliability concerns,[3] and PJM has had relatively less storage growth since these changes occurred.

Existing installations in PJM tend to be power-oriented with larger capacities but shorter durations to serve frequency regulation applications. In 2019, large-scale battery storage installations in PJM had an average power capacity of 10.8 MW, an average energy capacity of 6.8 MWh, and an average duration of 45 minutes. This average duration is the same as the average duration was in 2017 and 2018 for PJM.

**Figure 3. Large-scale battery storage capacity by region (2010–2019)**



Source: U.S. Energy Information Administration, 2019 Form EIA-860, *Annual Electric Generator Report*

In 2019, installations in CAISO accounted for 20% of existing large-scale battery storage power capacity in the United States, but they accounted for 36% of existing energy capacity. California uses battery storage for reliability purposes, so large-scale battery storage installations tend to be energy-oriented with small power capacities and long durations.

In 2019, operating large-scale battery storage systems in CAISO had an average power capacity of 4.7 MW, an average energy capacity of 14.4 MWh, and an average duration of 4.0 hours. This duration is longer than the 2018 average of 3.5 hours for battery systems in CAISO and the 2019 national average of

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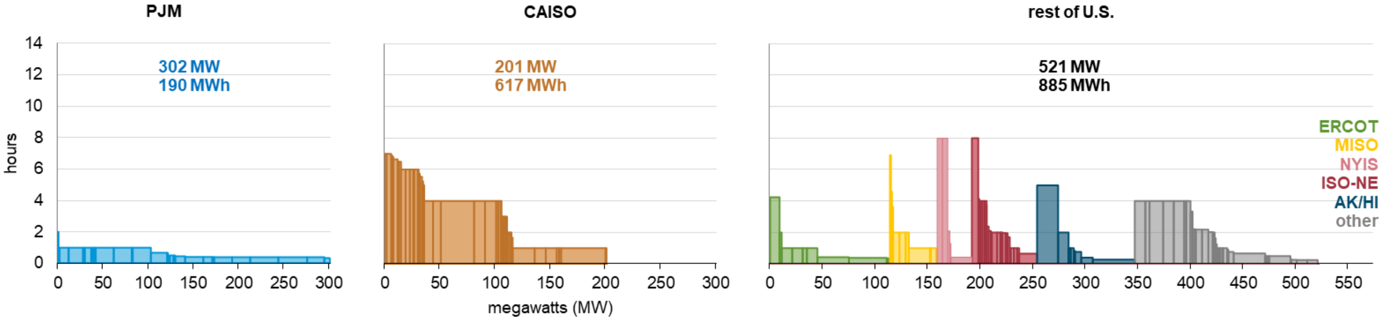
[3] FERC Docket No. ER19-1651-000, PJM Interconnection ORDER ON CONTESTED SETTLEMENT, https://www.pjm.com/-/media/documents/ferc/orders/2020/20200326-er19-1651-000.ashx

2.3 hours for all operating large-scale batteries. Other markets show a mix of power- and energy-oriented battery installations (Figure 4). The California Public Utilities Commission (CPUC) requires generation resources to provide at least four hours of output to contribute to reliability reserves. As a result, large-scale battery storage installations in California tend to need larger energy capacities to qualify as reliability resources. The Market and Policy Drivers section provides more information on California's activities related to energy storage.

**Figure 4. Power capacity and duration of large-scale battery storage by region (2019)**



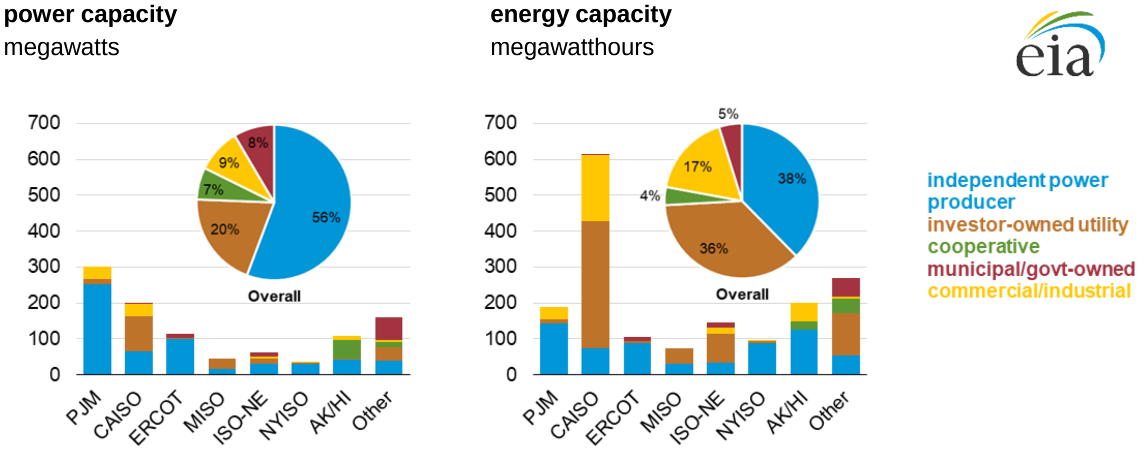
Source: U.S. Energy Information Administration, 2019 Form EIA-860, *Annual Electric Generator Report*
Note: We calculate duration by dividing nameplate energy capacity (in megawatthours [MWh]) by nameplate power capacity (in megawatts [MW]).

## Ownership trends

At the end of 2019, IPPs owned slightly more than half (56%) of the existing power capacity of large-scale battery storage in the United States, and IOUs owned only 20% (Figure 5). In terms of large-scale battery storage energy capacity, IPPs owned 38%, and IOUs owned 36%. This ownership structure reflects the dominance of IPPs in PJM and PJM's power-oriented storage applications. It also reflects the prevalence of IOU ownership of energy-oriented reliability assets in CAISO.

The differences in ownership resulted from market and state policy incentives pursued in both areas. Initially, PJM had rules that compensated batteries that participated in its market region, but later redacted these rules. California passed state laws that required utilities to accept project bids and install a certain amount of batteries on their systems. These requirements led to more battery ownership in CAISO by IOUs and not IPPs. PJM took a market approach, while CAISO reflected the policy of the state in which it operates.

**Figure 5. Large-scale battery storage capacity by region and ownership type (2019)**



Source: U.S. Energy Information Administration, 2019 Form EIA-860, *Annual Electric Generator Report*

Although half of all large-scale battery storage power capacity operates inside of PJM and CAISO, some noteworthy points emerge in other regions. IPPs own more than 87% of the power capacity in the Electric Reliability Council of Texas (ERCOT), which is regulated by the Public Utility Commission of Texas. Of the 45 MW of battery storage power capacity in Midcontinent Independent System Operator (MISO), IOUs own 67%. In Alaska, IPPs own most large-scale battery storage energy capacity, but the power capacity is split between cooperatives and IPPs. State-owned utilities in the United States own 8.5% of large-scale battery storage power capacity, led by two large installations in Southern California that are owned by the Imperial Irrigation District (30 MW power capacity/20 MWh energy capacity) and the Los Angeles Department of Water and Power (LADWP) (20 MW power capacity/10 MWh energy capacity).

## Chemistry Trends

### *Chemistry descriptions*

Battery storage technologies use several different battery chemistries. The most common with large-scale deployment[4,5,6] in the United States include:

- **Lithium-ion** technology was used in more than 90% of the installed power and energy capacity of large-scale battery storage operating in the United States at the end of 2019. Lithium-ion batteries have high-cycle efficiency (they don't lose much energy between recharge and discharge) and fast response times. In addition, their high energy density (stored energy per unit of weight) makes them the current battery of choice for most portable electronic and electric vehicle applications.
- **Nickel-based** batteries were used in some of the earliest large-scale battery storage installations in the United States, including a 2003 system added in Fairbanks, Alaska. Since then, the deployment of this battery chemistry has been limited. Nickel-based batteries typically have

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[4] Akhil, Abbas A., et al. *DOE/EPRI Electricity Storage Handbook in Collaboration with NRECA*. January 2015. http://www.sandia.gov/ess/publications/SAND2015-1002.pdf

[5] Chen, Haisheng, et al. *Progress in electrical energy storage system: A critical review*. Progress in Natural Science, March 2009.

[6] Luo, Xing, et al. Overview of current development in electrical energy storage technologies and the application potential in power system operation. Applied Energy, January 2015.

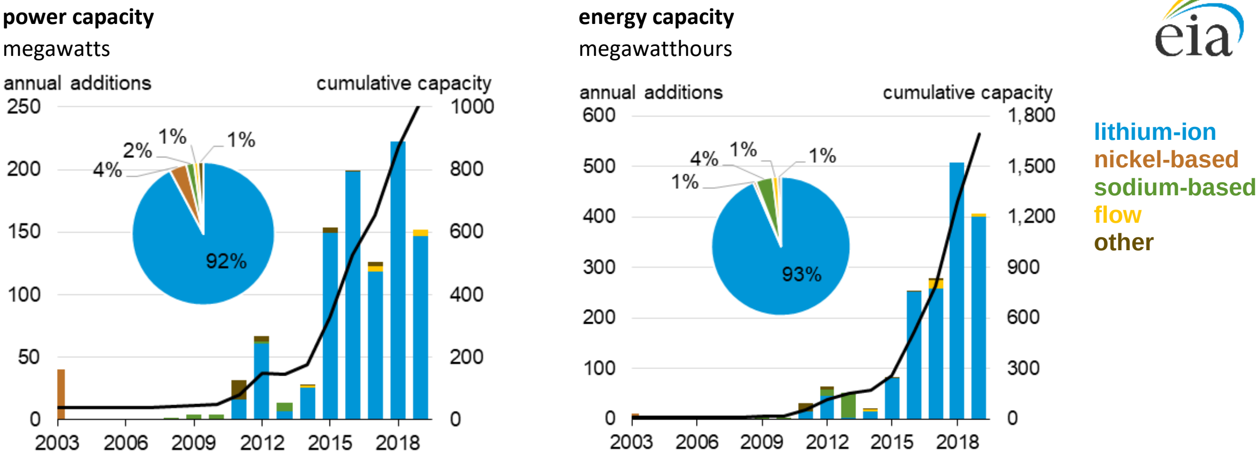
high energy density and reliability but a relatively short cycle life (fewer recharge and discharge cycles before performance degrades below useful levels).

- **Sodium-based** battery storage was used in 2% of the installed large-scale power capacity and 4% of the installed large-scale energy capacity in the United States at the end of 2019. Sodium-based battery storage is an established technology based on abundant materials with a long cycle life suitable for long-discharge applications. These systems require high operating temperatures (about 300°C) because they use molten sodium to operate.
- **Lead acid** is one of the oldest forms of battery storage and was developed in the mid-1800s. It is widely used as a starter battery in vehicles. Lead acid accounted for less than 1% of large-scale battery storage power capacity installed at the end of 2019 in the United States and has seen limited large-scale deployment because of relatively low energy density and a short cycle life.
- **Flow battery** systems have one or more chemical components that dissolve in a liquid solution. The chemical solutions are typically stored in tanks and separated by a membrane. Tank size determines the overall battery capacity, and these systems can be expanded to meet different applications. They have a long cycle life and a long operational lifetime. At the end of 2019, flow batteries were used in 1% of the installed power and energy capacity of large-scale battery storage in the United States.

### *Chemistry trends*

The earliest large-scale battery storage installations in the United States used nickel-based and sodium-based chemistries (Figure 6). However, since 2011, most installations have opted for lithium-ion batteries, including retrofits of older systems that initially relied on different chemistries. For example, in 2012, Duke Energy added 36 MW of lead-acid battery storage to its Notrees wind power facility in West Texas. When the lead-acid batteries were first installed, the battery system participated in the region’s frequency regulation market, which required rapid charging and discharging that significantly degraded the batteries. In 2016, Duke Energy replaced the original lead-acid batteries with better-performing lithium-ion batteries.[7]

**Figure 6. Large-scale battery storage capacity by chemistry (2003–2019)**


**power capacity**
megawatts

**energy capacity**
megawatthours

Source: U.S. Energy Information Administration, 2019 Form EIA-860, *Annual Electric Generator Report*

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[7] Duke Energy, *Duke Energy to upgrade its Notrees Energy Storage System*, June 2015, https://news.duke-energy.com/releases/duke-energy-to-upgrade-its-notrees-energy-storage-system

Flow batteries are an emerging energy storage technology. In 2016, Avista Utilities installed the first large-scale flow battery storage system in the United States, which is located in Washington State. Electric utilities in Washington and California each installed flow battery projects in 2017. The vanadium-based electrolyte used in these flow battery systems is stored in large tanks and pumped through a connected but separate electrode system. This configuration provides greater energy capacity at a lower price, but it lowers the round-trip efficiency[8] of the stored electricity as a result of the energy consumed to operate the pumps.[9] Other battery storage chemistries and technologies are in different phases of development but have yet to have significant deployment in large-scale grid applications in the United States.

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[8] Round-trip efficiency is the battery system efficiency over one cycle, measured as the amount of energy discharged to a specified depth over the amount of energy consumed to bring the system back up to its specified initial state of charge.

[9] Amerseco, Inc., *Demonstrating the Benefits of Long-Duration, Low-Cost Flow Battery Storage in a Renewable Microgrid*, December 2019, https://www.serdp-estcp.org/Program-Areas/Installation-Energy-and-Water/Energy/Microgrids-and-Storage/EW19-5312

# Current Applications

Batteries have both physical and operational constraints, such as power output and discharge duration. These constraints affect individual battery technology choices that are often made to optimize the delivery of certain types of services or provide specific applications to the electricity grid. In some cases, different applications can, or sometimes must, be combined to maximize the value of the system. For a more complete discussion, refer to DNV-GL's *Recommended Practices: Safety, operation and performance of grid-connected energy storage systems*.

## Application descriptions

The various types of battery applications[10] include:

- **Frequency regulation** helps balance momentary differences between electricity demand and supply within the transmission grid, often in order to help maintain interconnection frequencies close to 60 hertz.
- **Spinning reserve** is the unused but dispatchable generating capacity of online assets that provides grid frequency management and may be available to use during a significant frequency disturbance, such as during an unexpected loss of generation capacity. This reserve ensures undisrupted system operation and power availability. Dispatchable generators are those that can be turned on or off to meet immediate needs of the system.
- **Voltage or reactive power support** ensures the quality of delivered power by maintaining the local voltage within specified limits by serving as a source, or sink, of reactive power (the portion of electricity that establishes and sustains the electric and magnetic fields of alternating-current equipment).
- **Load following** supplies (discharges) or absorbs (charges) power to compensate for load variations—this application is a power balancing application, also known as a form of ramp rate control.
- **System peak shaving** reduces or defers the need to build new central generation capacity or purchase capacity in the wholesale electricity market, often during times of peak demand.
- **Arbitrage** occurs when batteries charge during periods when electrical energy is less expensive and discharge when prices for electricity are high, also referred to as electrical energy time-shift.
- **Load management** provides a demand-side customer-related service. Load management services include managing power quality, power reliability (grid-connected or microgrid operation), retail electrical energy time-shift, demand charge management, and renewable power consumption maximization. Renewable power consumption maximization refers to charging the battery storage system during periods when renewable energy is greatest to consume the maximum renewable energy from the battery system, or in other words, charging with solar during the day or charging with wind during high wind periods.
- **Storing excess wind and solar generation** reduces the rate of change for power output from a non-dispatchable generator to maintain compliance with local grid requirements related to grid stability or to prevent over production or over-production penalties. Non-dispatchable generators cannot be turned on or off to meet immediate needs and are often intermittent

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[10] DNV-GL, *Recommended Practices: Safety, operation and performance of grid-connected energy storage systems*, September 2017, https://rules.dnvgl.com/docs/pdf/DNVGL/RP/2017-09/DNVGL-RP-0043.pdf?_ga=2.80787476.2095102769.1516371272-888917498.1516371272

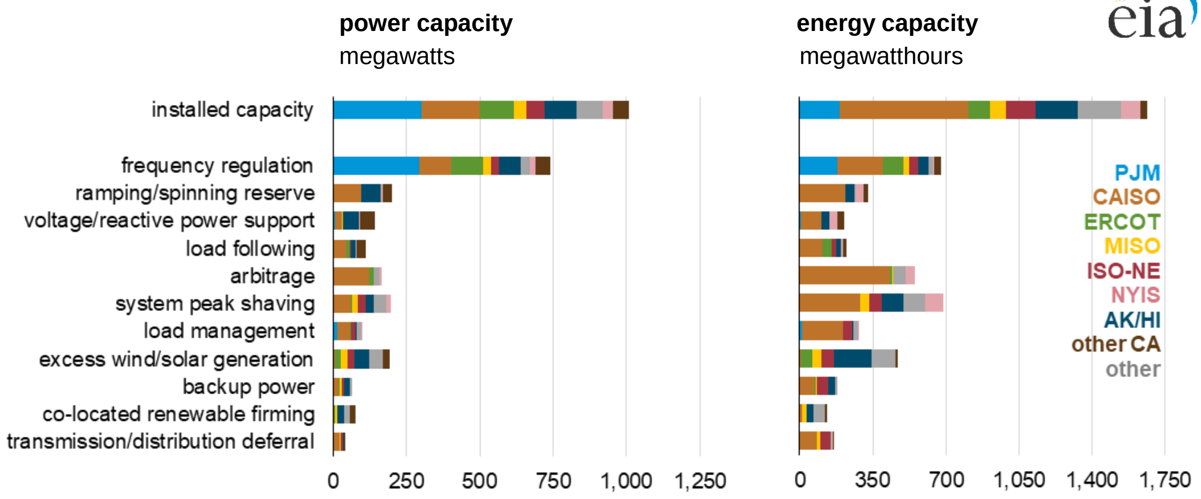
resources (generators with output controlled by the natural variability of the energy source, for example, wind and solar).

- **Backup power**, following a catastrophic failure of a grid, provides an active reserve of power and energy that can energize transmission and distribution lines, provide start-up power for generators, or provide a reference frequency.
- **Transmission and distribution deferral** keeps the loading of the transmission or distribution system equipment below a specified maximum. This application allows for delays in transmission upgrades, avoids the need to upgrade a transmission system completely, or avoids congestion-related costs and charges.
- **Co-located generator firming** provides constant output power over a certain period of time for a combined generator and energy storage system. Often the generator in this case is for non-dispatchable renewable generation (for example, wind or solar).

## Applications by region

Each year, operators report on Form EIA-860 all use case applications that their batteries can serve. A battery's number and types of uses varies significantly across regions (Figure 7). For example, battery storage in PJM is primarily for one application (frequency regulation). In contrast, batteries installed in CAISO are used for several reasons (2.5 applications on average) but primarily provide system peak shaving and load management. MISO has a widely dispersed set of use cases, and almost the same number of batteries provide peak shaving as do frequency regulation. Batteries in ISO New England (ISO-NE), like those in CAISO, primarily provide peak shaving and store excess wind and solar generation, but New England batteries also significantly support frequency regulation.

**Figure 7. Applications served by large-scale battery storage (2019)**



Source: U.S. Energy Information Administration, 2019 Form EIA-860, *Annual Electric Generator Report*
Note: This figure is based on information provided by Form EIA-860 survey respondents regarding their market region and the applications that battery storage systems provided in 2019. Survey respondents could select more than one application for each battery system.

Different factors affect battery storage investment decisions in different regions. These factors depend on state policies and both existing and future market characteristics and needs. Batteries that are intended primarily to serve frequency response have different design characteristics than those intended to serve peak shaving. However, because most batteries serve more than one function, most of the RTO markets and regions have batteries that serve all the use case applications despite regional or market bias.

Batteries installed in Alaska and Hawaii are used more diversely (4.3 applications on average). Because these states lack interconnected operating systems, batteries need to provide a wider range of additional services and engineering support than commonly needed in the Lower 48 states.

Figure 7 illustrates the total amount of power and energy capacity that was available for each application in the United States in 2019. Nearly 73% of large-scale battery storage power capacity provided frequency regulation, which helps electrical grids quickly balance unexpected differences in electricity supply and demand. Installations in PJM are driven by the need for fast-ramping frequency regulation, a need that has led many independent power producers to rapidly deploy large-scale battery storage. As of 2019, CAISO installations served a wider array of applications than PJM applications because regulated utilities in CAISO systems served multiple applications without necessarily being directly compensated for each application through market mechanisms.

# Battery Storage Costs

Costs for battery storage technologies depend on technical characteristics such as the power capacity and energy capacity of the battery system.

## Cost background

This discussion of costs is divided into three main categories based on the nameplate duration of the battery storage system, which is the ratio of nameplate energy capacity to nameplate power capacity:

- The short-duration battery storage category includes systems with less than 0.5 hours of nameplate duration.
- The medium-duration battery storage category includes systems with nameplate durations ranging between 0.5 hours and 2.0 hours.
- The long-duration battery storage category includes all systems with more than 2.0 hours of nameplate duration.

Table 1 summarizes the average characteristics of the categorized sample data. Battery duration is a key determinant of system characteristics such as cost. Even when using the same cells and inverters, a system intended to provide long duration discharge will optimize its design to minimize energy cost (in dollars per kilowatthour), whereas a system intended to provide a short-duration injection of power into the grid will minimize power cost (dollars per kilowatt).

For costs reported between 2013 and 2019, short-duration battery storage systems had an average power capacity of 12.4 MW, medium-duration systems had 6.4 MW, and long-duration battery storage systems had 4.7 MW. The average energy capacity for the short- and medium-duration battery storage systems were 4.7 MWh and 6.6 MWh, respectively. The average for the long-duration battery storage systems was 21.2 MWh, between three and five times more than the average energy capacity of short- and medium-duration battery storage systems.

**Table 1. Sample characteristics of capital cost estimates for large-scale battery storage by duration (2013–2019)**

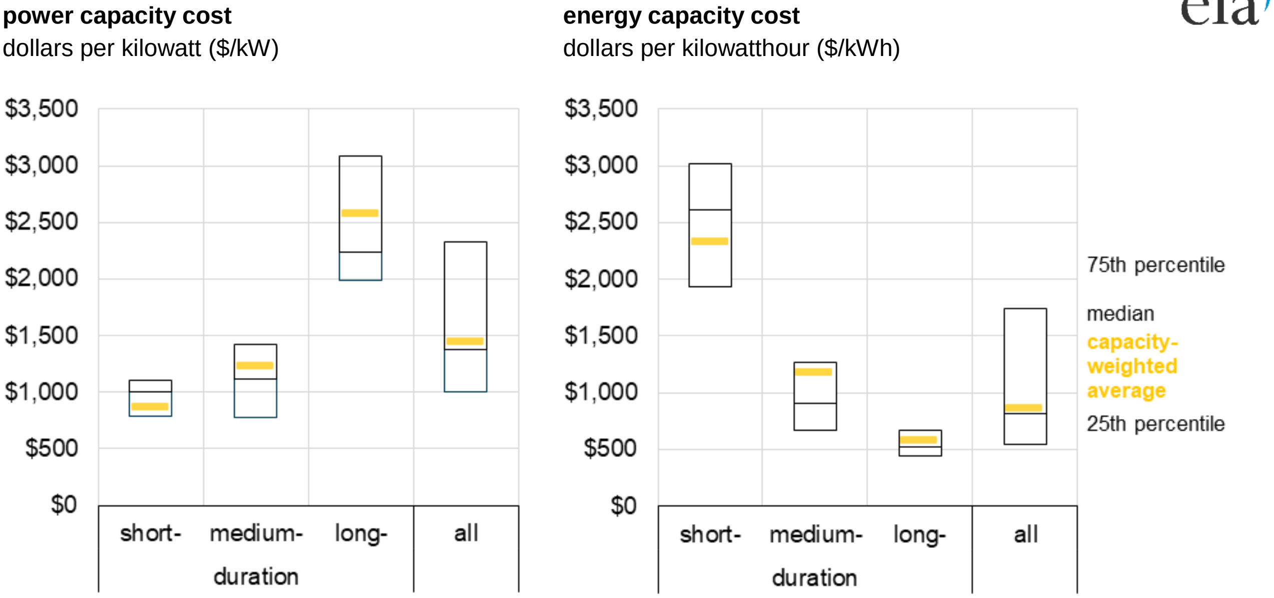
| | **Short-duration** | **Medium-duration** | **Long-duration** |
|---|---|---|---|
| | **<0.5 hours** | **0.5–2 hours** | **>2 hours** |
| Number of battery systems with reported costs available | 24 | 52 | 45 |
| Average of nameplate power capacity, megawatts | 12.4 | 6.4 | 4.7 |
| Average of nameplate energy capacity, megawatthours | 4.7 | 6.6 | 21.2 |
| Average of nameplate duration, hours | 0.4 | 1.2 | 4.6 |
| Capacity-weighted cost per unit power capacity, dollars per kilowatts | 872 | 1,224 | 2,575 |
| Capacity-weighted cost per unit energy capacity, dollars per kilowatthour | 2,329 | 1,178 | 575 |

Source: U.S. Energy Information Administration, 2019 Form EIA-860, *Annual Electric Generator Report*
Note: The reported capital cost values are from large-scale battery storage systems installed across the United States between 2013 and 2019 and include multiple reported battery chemistries.

## Cost results

Based on costs reported between 2013 and 2019, battery systems with shorter durations typically had lower normalized power capacity costs measured in dollars per kilowatt ($/kW) than batteries with longer nameplate durations (Figure 8). The opposite was generally true when examining normalized energy capacity costs measured in dollars per kilowatthour ($/kWh) because total system costs for longer-duration systems are spread out over more stored energy. Technological and site-specific requirements also contribute to the range of normalized cost values, especially within a given duration category.

**Figure 8. Total installed cost of large-scale battery storage systems by duration (2013–2019)**



Source: U.S. Energy Information Administration, 2019 Form EIA-860, *Annual Electric Generator Report*

Normalized energy capacity costs (in dollars per kilowatthour) have decreased over time (Table 2 and Figure 9). The energy capacity-weighted average installed cost fell by 72% between 2015 and 2019 for an average five-year annual decrease of 27%. The capacity-weighted average installed cost of large-scale batteries fell by 33% from $2,102/kWh in 2015 to $1,417/kWh in 2016. This trend continued into 2017 when installed costs decreased by 47% to $755/kWh. This fall in energy capacity costs carried through 2017 and 2019, but at a slower rate, when the capacity-weighted average installed cost fell by 17% to $625/kWh in 2018 and by 5.7% to $589/kWh in 2019.

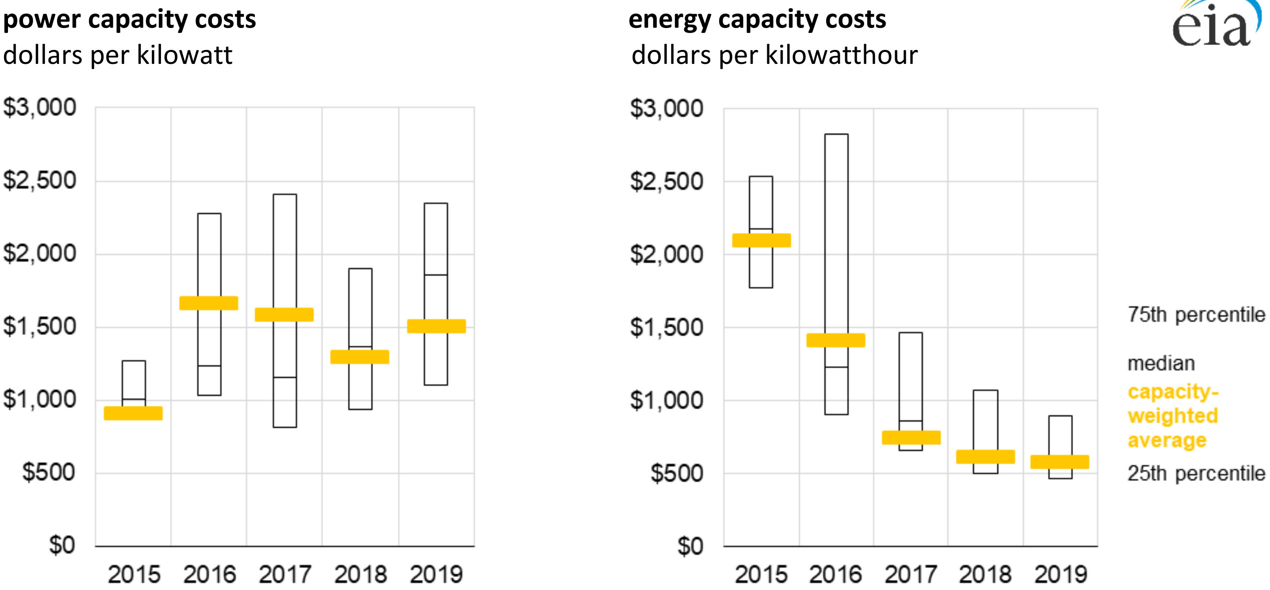
From 2015 to 2019, power capacity costs have remained relatively stable and within an average cost range of $913/kW and $1,664/kW. The trends of declining costs in terms of energy capacity and of relatively stable costs in terms of power capacity result from the increasing durations and larger energy capacities over time. The average nameplate energy capacity of the batteries in these cost samples increased at an average annual rate of 16% between 2015 and 2019, while duration increased at an annual rate of 56% for that same time period. In contrast, the average nameplate power capacity decreased at an average annual rate of 26% between 2015 and 2019.

## Table 2. Sample characteristics of capital cost estimates for large-scale battery storage by year

| | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|
| Number of battery systems with reported costs available | 10 | 21 | 22 | 26 | 37 |
| Average of nameplate power capacity, megawatts | 12.7 | 10.4 | 5.6 | 7.8 | 3.8 |
| Average of nameplate energy capacity, megawatthours | 5.5 | 12.2 | 11.7 | 16.1 | 9.8 |
| Average of nameplate duration, hours | 0.5 | 1.5 | 1.8 | 2.4 | 3.2 |
| Capacity-weighted cost per unit power capacity, dollars per kilowatt | 913 | 1,664 | 1,587 | 1,300 | 1,511 |
| Capacity-weighted cost per unit energy capacity, dollars per kilowatthour | 2,102 | 1,417 | 755 | 625 | 589 |

Source: U.S. Energy Information Administration, 2019 Form EIA-860, *Annual Electric Generator Report*

## Figure 9. Total installed cost of large-scale battery storage systems by year



Source: U.S. Energy Information Administration, 2019 Form EIA-860, *Annual Electric Generator Report*
Note: Cost observations for installation years 2013 and 2014 are not in this figure because the sample sizes for those years are too small.

Unlike other energy sources, battery storage can supply and consume energy at different times of the day, creating a combination of cost and revenue streams that makes it challenging to directly compare storage with generation-only technologies. Batteries are not standalone generation sources and must procure electricity supplied by generators to recharge and cover the round-trip efficiency losses they have during cycles of charging and discharging.

Two major challenges exist in determining the profitability and cost of battery storage systems. First, we must consider the individual markets in which the storage technology will be used and what revenue opportunities exist for the technology. Second, we must consider degradation of the system over time, which is the lasting and continuous decrease in either a battery's power or energy performance, or both, which is linked to use or age of a battery component or system.

A battery's power or energy performance can be characterized by the full-cycle power input and output at an agreed-on charge and discharge rate. Two general options can ensure reliable performance during a storage system's lifetime:

- **Overbuilding**: adding more storage or discharge capacity behind the inverter than is needed so that as the system ages, it will maintain a capacity at or above the contracted capacity required of the system.
- **Continual upgrades**: replacing some portion of the storage system to maintain the agreed-on performance during its lifetime.

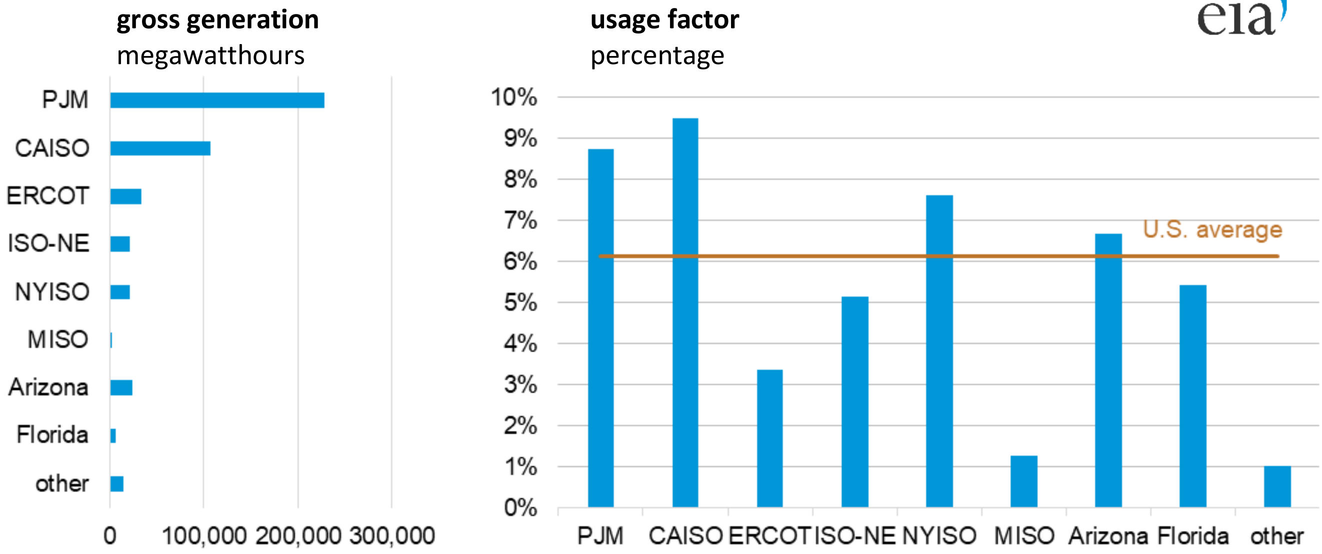
The two approaches to meet performance requirements affect the installed capital costs of the system. Overbuilding storage capacity leads to a higher initial installed capital cost, and continual upgrades lead to higher operation and maintenance costs throughout the lifetime of the storage facility. Therefore, comparing only the normalized capital cost of various battery systems does not capture the variation in the lifetime costs (Figure 8). Full understanding of this trade-off between capital and operating costs requires additional data collection and analysis as the industry continues to mature and as the operating batteries age through their expected long-term maintenance cycles.

# Battery Utilization Trends

In addition to generator capacity data collected from Form EIA-860, we also collect power discharge and charging data from respondents at the power plant level on Form EIA-923, *Power Plant Operations Report*. Battery storage sites absorb electricity from the power grid while charging, and they supply electricity to the grid when discharging. Power absorbed by charging a battery can either be a system cost or system value (a revenue stream in a power market or simply a value recognized by the system operator in a vertically integrated balancing authority). In most cases, value or revenue is always produced when supplying electricity from stored energy to the grid.

Because of the efficiency loss between charging and discharging a battery, batteries are a net consumer of electricity. Of the 150 plants (1,022 MW) that reported operating battery storage capacity on Form EIA-860 in 2019, 109 plants (850 MW) also reported electricity generation and consumption data on Form EIA-923 in 2019. These 109 plants reported a total of 458,169 MWh of gross discharge and 553,705 MWh of gross charge in 2019 (an average round-trip efficiency of 85%). About half of the reported gross discharge was PJM serving its frequency regulation market (Figure 10).

**Figure 10. Large-scale battery storage gross generation and usage factor by region (2019)**



Source: U.S. Energy Information Administration, 2019 Form EIA-923, *Power Plant Operations Report*
Note: Not all plants with battery storage systems reported generation to EIA in 2019.

For most electric generators, the capacity factor measures the actual useful output (net generation) of the plant (or resource) divided by the maximum potential output of the plant if it were operating at its full notional capability (normally the full rated power capacity for 24 hours per day, 365 days a year). Energy storage systems can generate revenue, or system value, through both discharging and charging of electricity; however, at this time our data do not distinguish between battery charging that generates system value or revenue and energy consumption that is simply part of the cost of operating the battery. Therefore, the usage factor detailed in Figure 10 is calculated using solely gross discharge. However, because of the strong relationship between charge and discharge, in cases where the storage unit provides system value or revenue from both charge and discharge, its bi-directional system value would be linearly related to its usage factor.[11]

Usage factors using only discharge cannot, however, be directly compared to usage factors for generation because batteries can provide value to the grid both when charging and discharging, unlike generating units which only provide recognized value when generating.

In 2019, the average usage factor of the 109 U.S. plants reporting generation to EIA in 2019 was 6%. Battery systems in PJM and CAISO were nearly 9%, well above the national average, while systems in ERCOT were well below the average at 3%. Systems outside the regions specified in Figure 10, including Hawaii, Alaska, and the parts of California not included in CAISO, had an average usage factor of under 1%.

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[11] Specifically, a battery over any extended period will need to recharge (consume) as much energy as it discharged (generated), plus additional recharge to compensate for losses. If the usage factor of an 85% efficiency battery is 10%, then its average consumption would be 12% of its total capacity over a period of time, and its bi-directional energy flow would be about 22% of its total capacity over a period of time. Because a battery must recharge a bit more than it is discharged, its maximum annual usage factor is limited to about 43% (for an 85% efficient unit); that is, it can only generate 43% of the electricity that a unit of that size could were it able to generate 24 hours per day for 365 day a year.

# Small-Scale Energy Storage Trends

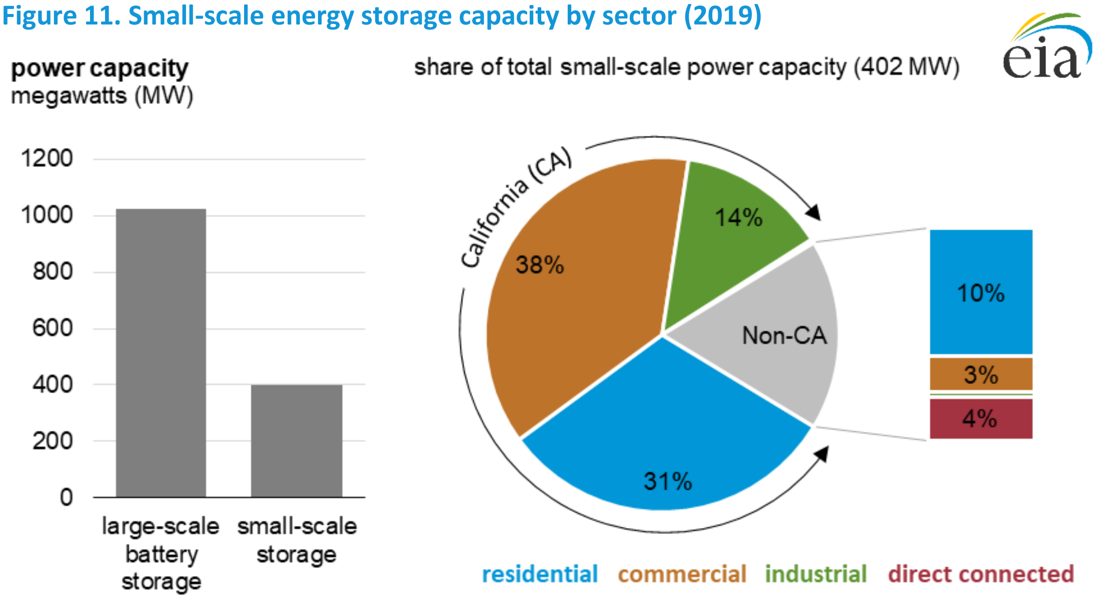
Small-scale battery storage is a significant part of developing energy storage in the United States. Small-scale battery storage refers to storage at facilities that have less than 1 MW of generating capacity. Electric utilities connected to these units report the small-scale storage data to us through Form EIA-861. Small-scale storage data differs from the detailed large-scale storage data that battery operators report. Utilities, through their interconnection data, provide summaries of the total capacity of small-scale storage connected to their systems but do not report detailed performance and design data.

In 2019, utilities reported 402 MW of existing small-scale storage power capacity in the United States. About 41% of this capacity was installed in the commercial sector, 41% was installed in the residential sector, and 14% was installed in the industrial sector. The remaining 4% was directly connected to the distribution grid, such as a utility at its own distribution substation.

## Small-scale storage trends in California

As shown in Figure 11, in 2019, 83% of reported small-scale storage power capacity in the United States was in California. Of the small-scale storage power capacity in California, 97% was installed in three electric utility service territories: Southern California Edison (SCE), Pacific Gas and Electric (PGE), and San Diego Gas and Electric (SDGE). In 2019, most installations of small-scale storage in the commercial sector in California were in SCE's territory (68% of such capacity) and SDGE's territory (23%). Most installations (94%) of small-scale storage in the industrial sector in California were in PGE's territory.

Figure 11. Small-scale energy storage capacity by sector (2019)



Source: U.S. Energy Information Administration, Form EIA-861, *Annual Electric Power Industry Report*
Note: Data collected on small-scale storage may include forms of energy storage other than batteries. Direct-connected storage may not be located at an ultimate customer's site but is in front of the meter or connected directly to a distribution system or both. Direct-connected storage in California and industrial storage outside of California account for less than 1% of the total and are therefore not depicted in the figure.

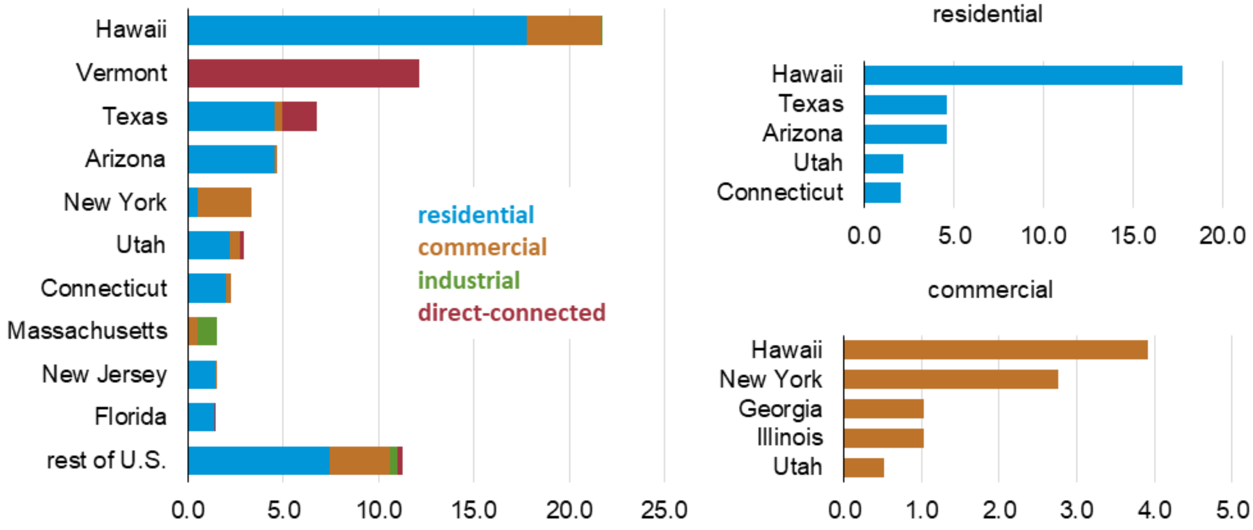
California's large share of small-scale energy storage power capacity can be attributed to the state's Self-Generation Incentive Program (SGIP), which provides financial incentives for installing customer-sited distributed generation. Installations receiving rebates through SGIP contribute to California's 2013 energy storage regulation (Assembly Bill 2514), which requires 200 MW of customer-sited energy storage to be installed by 2024. In May 2017, the CPUC implemented Assembly Bill 2868 and ordered SCE, PGE, and SDGE to procure up to an additional 500 MW of distributed energy storage, including no more than 125 MW of customer-sited energy storage.

## Small-scale energy storage trends in the rest of the United States

After California, the states with the most reported small-scale storage power capacity in 2019 were Hawaii, Vermont, and Texas, and much of this capacity was installed in the residential sector (Figure 12). Only minimal small-scale storage power capacity in the industrial sector existed outside of California. In the commercial sector, small-scale storage was mostly reported in Hawaii and New York, as well as other states, notably in Georgia, Illinois, and Utah.

**Figure 12. Small-scale energy storage capacity outside of California by sector (2019)**

**power capacity**
megawatts



Source: U.S. Energy Information Administration, 2019 Form EIA-861, *Annual Electric Power Industry Report*

End users typically own small-scale energy storage systems. Direct-connected storage systems are installations not located at an ultimate customer's site but rather in front of the meter[12] or connected directly to a distribution system, or both. In Vermont, Green Mountain Power Corporation reported the largest amount of direct-connected battery storage power capacity. Green Mountain operated front-of-the-meter battery storage systems for customers, which totaled 12.1 MW of power capacity in 2019. The second-largest reported direct-connected battery storage power capacity was in Texas, operated by the Farmers Electric Cooperative, which totaled 1.85 MW.

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[12] Front of the meter describes systems that provide power from an offsite location where the electricity must travel from the system through a meter to reach the home or business.

# Market and Policy Drivers

As discussed earlier in this report, battery storage is technologically capable of serving many applications, each with benefits for one or more participants in the electricity system, including transmission and distribution system operators, power producers, and consumers. However, the functional ability of storage to serve these applications can be limited if regional policies or market rules do not acknowledge the value added. Still, market operators and policy makers can be hesitant to draft new legislation or market rules for relatively new technologies, such as storage, that may not have enough historical data to easily show value added to the system. This situation has begun to change as deployment of battery storage has increased and as industry stakeholders in some regions have gained experience financing, procuring, and operating storage installations.

## Wholesale market rules

ISOs and RTOs are independent, federally regulated, non-profit organizations that ensure reliability and optimize supply and demand bids for wholesale electric power. They are currently regulated to be technology neutral and must ensure market rules do not unfairly preclude any resources from participating (in other words, ensure markets don't favor existing technologies and preclude new technologies from fairly competing for power generation market share), as enforced by the Federal Energy Regulatory Commission (FERC). Many existing market rules may not take into account the unique operating parameters and physical constraints of battery storage as both a consumer and a producer of electricity. However, recent actions by FERC, as well as by ISOs and RTOs, have begun to carve a path for storage to participate in individual markets.

A notable example of this trend is FERC Order 755, issued in 2011, which requires ISO and RTO markets to compensate for resources that can provide faster-ramping frequency regulation. As a result of Order 755, PJM split its frequency regulation market into a fast-ramping service and a slower-ramping service. By the end of 2015, more than 180 MW of large-scale battery storage power capacity had come online in the PJM territory.

However, in 2015, PJM began observing operational issues, including over cycling of large power generation units such as hydro plants and combustion turbines, which resulted from overdependence on the duration limitations of the fast-ramping regulation service. The fast-ramping service mainly consists of resources with duration restrictions, such as batteries, as opposed to the slower-ramping service, which generally consists of resources that could operate much longer, but take longer to come online.[13] Therefore, PJM changed its frequency regulation signals to decrease its ratio of fast-ramping to slow-ramping resources, delaying installations of large-scale battery storage in the region.

Other system operators have also implemented relevant changes to market rules. Some have developed unique asset classes for storage that allow them to be treated differently than other generating technologies. System operators then can specify participation models for these new asset classes, allowing one facility to serve and generate revenue from several markets. Some operators have lowered the minimum size requirements, allowing relatively smaller energy storage facilities to generate revenue

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[13] PJM, *Fast Response Regulation (RegD) Resources Operational Impact*, July 1, 2017.

in markets usually reserved for bigger power plants. Some operators have defined duration requirements for assets to provide different grid services, allowing energy storage investors to plan accordingly. Although these rules spurred energy storage deployment to varying levels in these regions, energy storage participation has been inconsistent in each market.

In February 2018, FERC issued Order No. 841, which required system operators to remove barriers for electric storage resources to participate in the capacity, energy, and ancillary services markets. Each ISO and RTO under FERC jurisdiction was required to revise its tariff to include market rules that recognize the physical and operational characteristics of electric storage resources and to implement the revisions after FERC approves them. As of March 2021, FERC had approved the changes made by all ISOs and RTOs, but several RTOs, including MISO, ISO-NE, and SPP, are still working on implementing the approved changes.

In November 2020, FERC approved Order No. 2222, which requires RTOs and ISOs to create financial mechanisms for distributed energy resources (DERs) to compete to provide services normally reserved for large-scale systems. DERs are small-scale systems located close to the power load. They are usually connected to the distribution network and help to decrease the load on the transmission grid. This requirement could allow more economic deployment of small-scale battery storage systems, which could potentially be connected through virtual power plants. Grid operators must file compliance filings by late 2021, and the resulting rules may take effect in early 2022 or later.

## Federal-level policy actions

Other than the FERC activities described in the previous section, federal policies involving energy storage have been limited. One exception is the Investment Tax Credit (ITC), which is a credit to income tax liability proportional to the capital expenditures originally intended for certain renewable energy technologies, including solar and wind. Energy storage installed at a solar or wind facility can be considered part of the energy property of the facility and can receive a portion of the tax credit, given that at least 75% of the power used to charge the battery comes from the co-located renewable asset.

## State-level policy actions

Most policy actions involving energy storage have been at the state level and include setting procurement requirements, establishing incentives, and requiring that storage is incorporated into long-term planning mechanisms.

### *Policy actions in California*

California has introduced several measures related to energy storage. In 2013, the California Public Utility Commission (CPUC) implemented Assembly Bill 2514, which requires its investor-owned utilities (IOUs) to procure 1,325 MW of differing levels of large-scale and small-scale energy storage by 2020 and to have the energy storage operational by 2024. As of December 2020, California had 520 MW of operational large-scale battery storage.

In May 2017, CPUC implemented Assembly Bill 2868, which requires IOUs to procure up to an additional 500 MW of distributed energy storage, including no more than 125 MW of customer-sited energy storage. The Self-Generation Incentive Program, which provides financial incentives for installing customer-sited distributed generation, has designated $48.5 million in rebates for residential storage systems of 10 kW or smaller and $329.5 million for storage systems larger than 10 kW.

Press reports in 2017 indicated that 100 MW, or about 19%, of existing battery storage power capacity in California was installed in response to a leak at the Aliso Canyon natural gas storage facility outside of Los Angeles in October 2015.[14] According to these reports, in May 2016, to help address reliability risks resulting from constraints on natural gas supply, the CPUC authorized the SCE electric utility to hold an expedited solicitation for energy storage. As a result, 62 MW of battery storage power capacity was added to the system in December 2016. In addition, the CPUC expedited SDGE's ongoing procurement of 38 MW of battery storage, which was installed in early 2017.

### *Policy actions in the rest of the United States*

As of May 2021, five states besides California have also set energy storage requirements or targets:

- **Oregon**: Passed House Bill 2193 in 2015, allowing the two largest utilities in the state, Portland General Electric and Pacific Power, to each procure 5 MWh of storage energy capacity by January 2020. Although neither utility had achieved the 5 MWh of operational battery storage as of December 2020, both announced projects that are scheduled to come online in upcoming years, such as the Wheatridge Renewable Energy Facility.
- **Massachusetts**: Enacted House Bill 4857 (An Act to Advance Clean Energy) in August 2018, directing the Massachusetts Department of Energy Resources to set an energy storage target of 1,000 MWh by 2025.
- **New York**: In October 2018, New York announced a target of 3,000 MW of energy storage by 2030.
- **New Jersey:** In May 2018, New Jersey enacted the Clean Energy Act, P.L. 2018, which set a target of 2,000 MW of energy storage by 2030.
- **Virginia**: In February 2020, Virginia passed House Bill 1526, which set a 3,100 MW energy storage goal by 2035.

In addition, some states, such as Nevada, allow storage systems to be included in state-level renewable portfolio standards. Aside from targets, some states have provided financial incentives for energy storage installations, including grants, support for pilot projects, and tax incentives. For example, in 2018, Maryland passed Senate Bill 758, offering a tax credit of 30% on the installed costs for residential and commercial storage systems.

Many states require utilities to produce integrated resource plans (IRPs) that demonstrate each utility's ability to meet long-term demand projections using a combination of generation, transmission, and energy efficiency investments, while minimizing costs. Incorporating storage into IRPs can be a challenge because storage is different from conventional electricity generators and demand-side resources. For example, storage:

- Has unique operational constraints

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[14] Green Tech Media, "Tesla, Greensmith, AES Deploy Aliso Canyon Battery Storage in Record Time," January 31, 2017, https://www.greentechmedia.com/articles/read/aliso-canyon-emergency-batteries-officially-up-and-running-from-tesla-green#gs.bvJdDKY

- Can be interconnected at various points throughout the system
- Can serve a variety of applications
- Has policy and regulatory uncertainty that may affect system profitability

Nonetheless, some states have begun requiring utilities to include storage in integrated resource plans, including:

- Arizona
- California
- Connecticut
- Colorado
- Florida
- Indiana
- Kentucky
- Massachusetts
- New Mexico
- North Carolina
- Oregon
- Utah
- Virginia
- Washington

New York and Vermont already include storage in their state energy plans.[15]

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[15] PV Magazine, "Utilities are increasingly planning for energy storage," December 7, 2017, https://pv-magazine-usa.com/2017/12/07/utilities-are-increasingly-planning-for-energy-storage-w-charts/

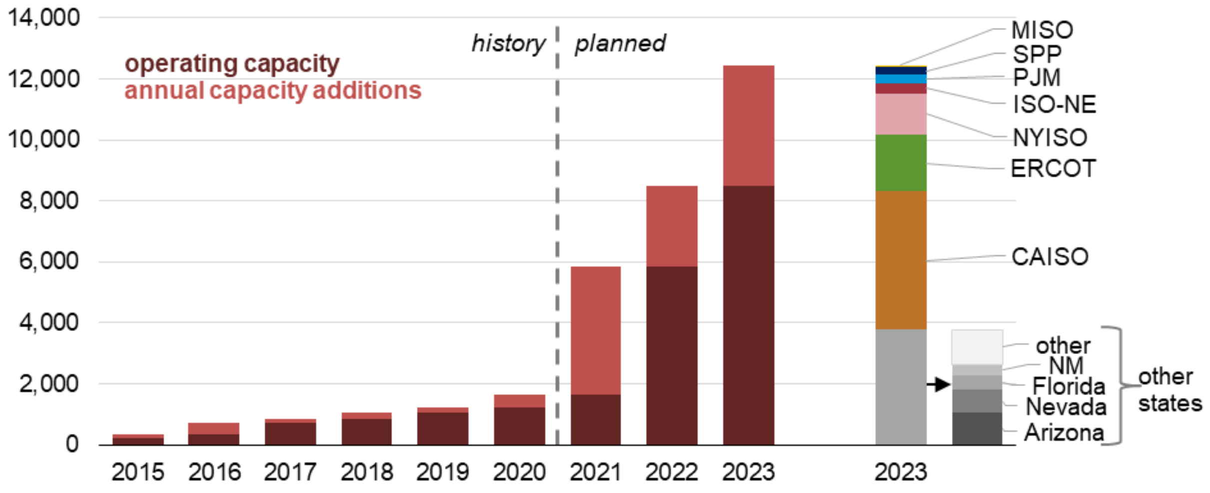
# Ongoing Trends

In the near term, we assess future battery capacity installation trends using planned additions reported by project developers, both for standalone battery storage systems and for those co-located with other electricity generating technologies such as solar or wind. For the long term, we provide projections on future battery capacity installations in our *Annual Energy Outlook*.

## Near-term planned capacity additions (2020–2023)

As of December 2020, project developers reported to us that they planned to install over 10 gigawatts (GW) of large-scale battery storage power capacity in the United States between 2021 and 2023, which would represent more than a 1000% increase from the 1 GW of operating storage power capacity in 2019. Given the short planning period required to install a storage facility, the reported planned capacity does not necessarily reflect all the possible builds during this period, but it can be used to indicate trends.

**Figure 13. Large-scale battery storage cumulative power capacity, 2015–2023**
megawatts



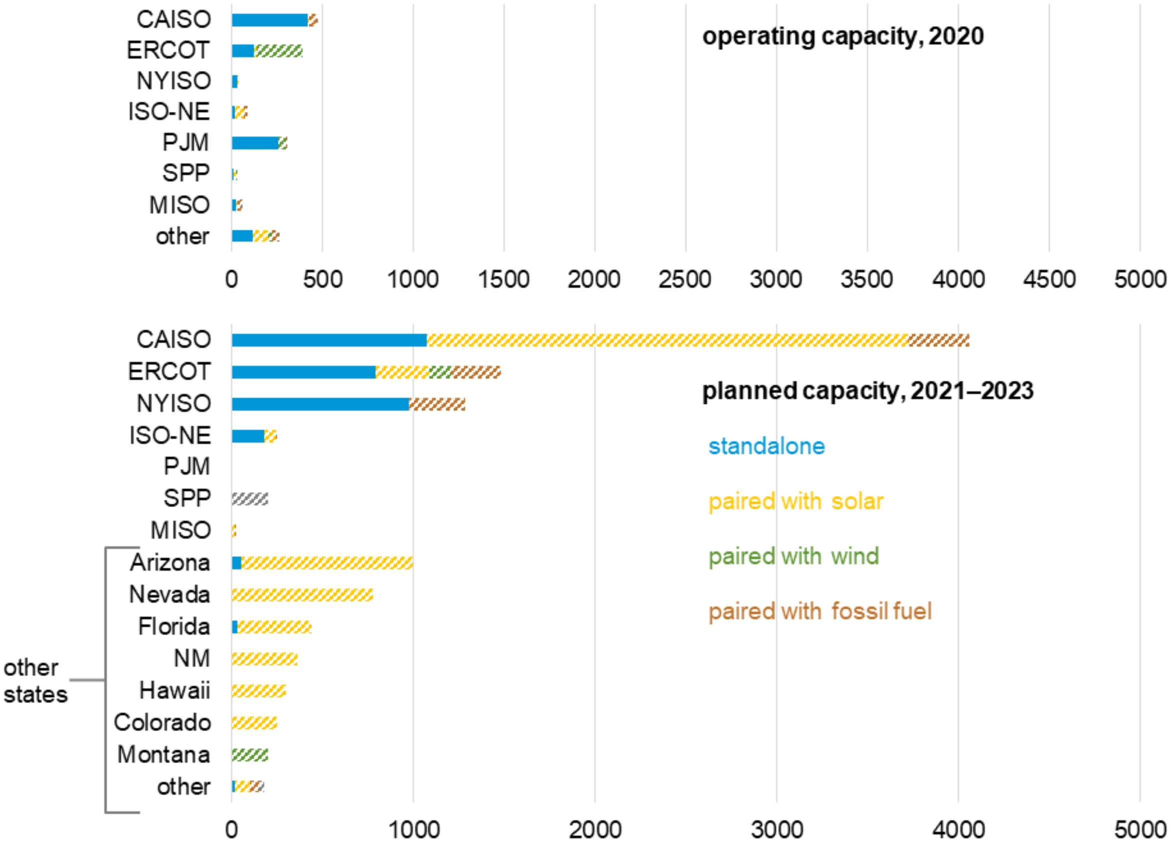
Source: U.S. Energy Information Administration, December 2020 Form EIA-860M, *Preliminary Monthly Electric Generator Inventory*

California accounted for 40% of battery storage power capacity planned for installation between 2021 and 2023 and reported as of December 2020. These planned additions put California in line to meet its energy storage requirement (Assembly Bill 2514), which is that IOUs install 1,325 MW of energy storage by 2024. New York and Massachusetts also have state requirements for energy storage and companies have planned battery storage projects in the upcoming years. Virginia and New Jersey have requirements, but no companies have reported any planned energy storage builds to us. The Market and Policy Drivers section has information on this topic.

Several states without policy requirements show relatively strong growth in large-scale battery storage in the upcoming years, including Texas, Arizona, Nevada, New Mexico, Florida, Hawaii, Colorado, and Montana. Strong forecasted growth in the Southwest highlights an increase in battery storage in states outside of RTO and ISO regions as well. Lower battery costs, in addition to lessons learned from previous storage deployment in regions with market rules or state requirements, may have led to increased investment of battery storage in the regions new to battery storage.

**Figure 14. Large-scale battery storage power capacity by region and co-located generator, operating and planned**

megawatts



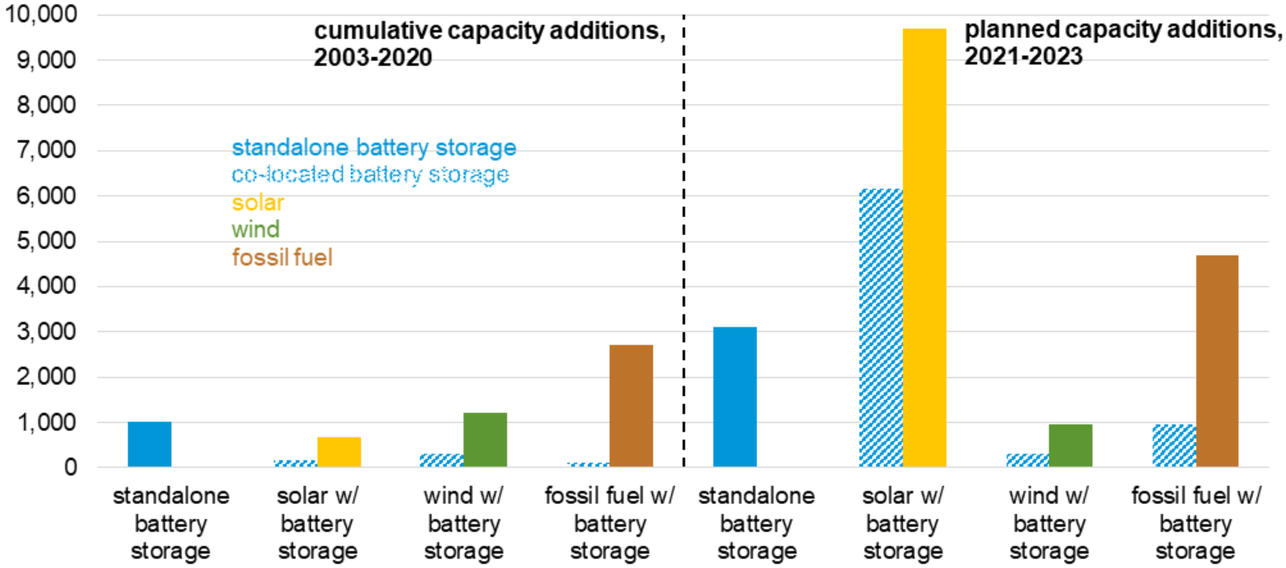
Source: U.S. Energy Information Administration, Dec 2020 Form EIA-860M, *Preliminary Monthly Electric Generator Inventory*

The four RTO and ISO regions of CAISO, ERCOT, NYISO, and ISO-NE will host 97% of the 3,315 MW of standalone battery storage power capacity (not located at a power plant with another generating resource such as solar or wind) planned to come online between 2021 and 2023. During the same period, 2,508 MW of battery storage power capacity outside of the RTO and ISO regions plan to come online, the majority of which will be co-located at plants with solar power generators (Figure 14).

## Co-located battery storage projects

Pairing power generating technologies, especially solar, with on-site battery energy storage will be the most common trend over the next few years for deploying energy storage, according to projects announced to come online from 2021 to 2023. Between 2011 and 2020, 92 power plants with co-located battery storage systems came online with a combined power capacity of 628 MW. Data reported for proposed projects show an additional 7,689 MW (100 plants) with co-located battery storage systems are planned to come online between 2021 and 2023, compared with 3,115 MW of standalone storage (59 plants).

**Figure 15. U.S. large-scale battery storage power capacity, standalone and co-located**
megawatts



Source: U.S. Energy Information Administration, Dec 2020 Form EIA-860M, *Preliminary Monthly Electric Generator Inventory*
Note: Solid yellow, green, and brown bars indicate total generating capacity of solar, wind, and fossil fuels that have battery storage co-located on-site.

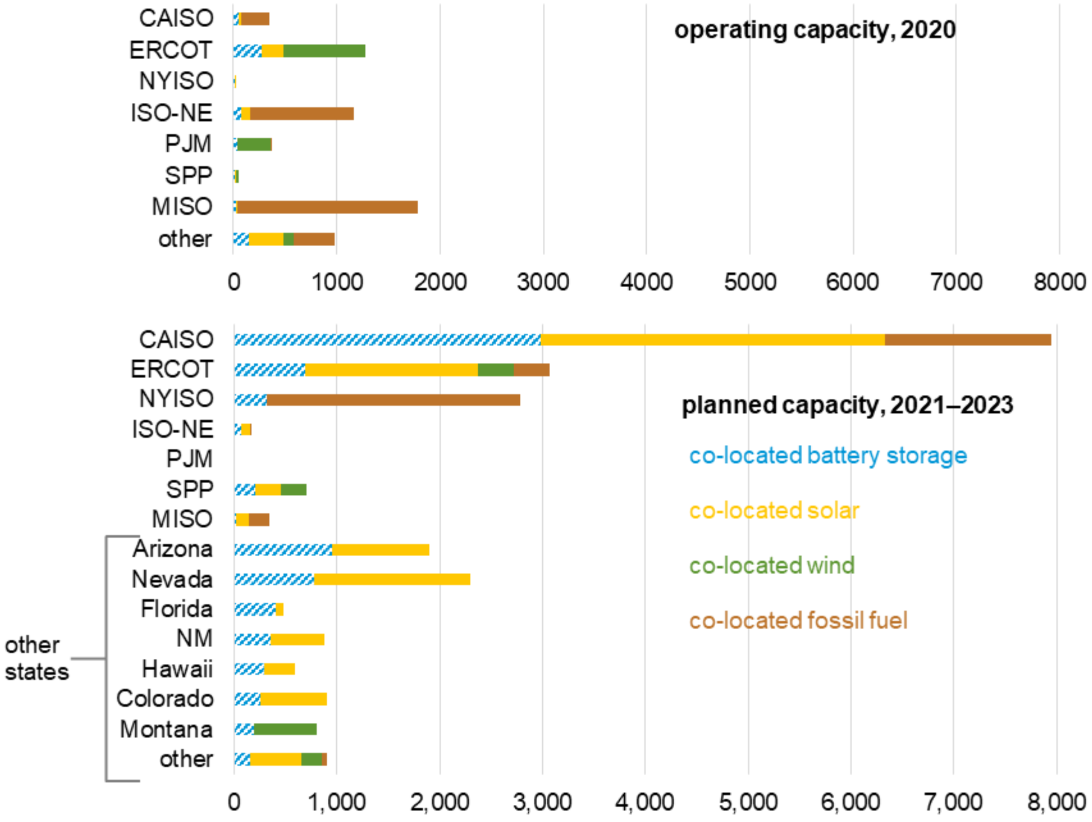
These co-located projects offer an arbitrage application, which allows common on-site infrastructure to store renewable-generated energy produced during periods of low electricity prices and low demand. The infrastructure later supplies stored energy to the grid when both demand and electricity prices are higher. Solar generators can particularly benefit from battery storage because of their relatively predictable generation patterns.

The benefits of pairing battery storage with any generator can also be realized even after the power plant has initially begun operating. As of December 2020, more than 25 power plants had added battery storage systems after their original operation date. Another key advantage of pairing batteries with renewable generators is the ability to take advantage of tax incentives such as the Investment Tax Credit (ITC), which is common in solar projects.

As of December 2020, about 50% of operating co-located battery storage power capacity was paired with wind turbines, and the rest was split between solar and fossil fuel generation (Figure 15). This trend is set to change significantly; 80% of co-located battery storage power capacity that is planned to come online between 2021 and 2023 will be paired with solar. Over 75% of this planned battery storage power capacity co-located with solar comes from the CAISO and the Southwest (Arizona, New Mexico, and Nevada) regions. Nearly 25% of all planned solar photovoltaic (PV) capacity will include co-located storage, compared with under 2% of existing solar PV capacity as of December 2020.

The ratio of battery storage to co-located resource power capacity is scheduled to significantly increase over the next few years. On average, existing co-located projects have a 1:10 battery storage power capacity to co-located generator capacity on a power rating basis, while planned projects have a ratio of 1:2. Projects paired with fossil fuel on-site, such as those in NYISO, MISO, and ISO-NE, have a smaller ratio than those paired with solar, such as those in CAISO, ERCOT, Arizona, and Nevada (Figure 16).

**Figure 16. Large-scale co-located battery storage and generator power capacity by region**
megawatts



Source: U.S. Energy Information Administration, Dec 2020 Form EIA-860M, *Preliminary Monthly Electric Generator Inventory*

## Long-term projected capacity additions (2020–2050)

In the *Annual Energy Outlook 2021* (AEO2021), we provide projections to 2050 on the supply and demand needs for energy markets in the United States. The AEO2021 Reference case, which assumes implementation of current U.S. laws and policies, projects large-scale battery storage energy capacity to grow to 235 GWh (59 GW power capacity of four-hour duration systems) in 2050 (Figure 17), including 82 GWh (21 GW) of standalone storage and 153 GWh (38 GW) of storage paired with solar PV.[16]

AEO2021 includes alternative scenarios (cases) that examine the sensitivity of results to changes in the costs of renewables and the availability of oil and natural gas resources. All cases have a projected baseline total of 64 GWh of battery storage from historical builds, announced projects, and state policy

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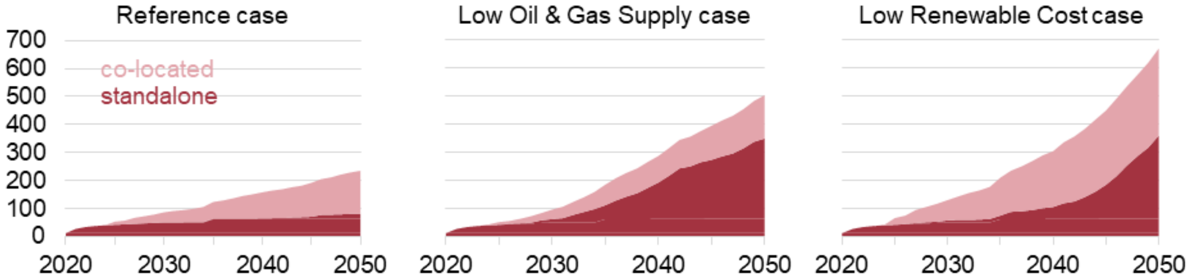
[16] AEO projections assume all battery storage capacity defined as co-located with PV will charge solely from its on-site PV generation through a DC coupled system.

requirements. Our National Energy Modeling System (NEMS) determines how much additional storage to add to a case, based on the input assumptions for each case in order to minimize costs of meeting U.S. power demand through 2050.

In our AEO2021 forecast, co-located storage was added to the model for the first time. Figure 17 shows the distribution of standalone storage versus co-located storage across different AEO2021 cases. When renewable and storage costs were lowered, the model preferred to add additional co-located storage compared with the Reference case. When natural gas prices were raised, the model preferred to add standalone storage.

**Figure 17. AEO2021 diurnal energy storage capacity by case**

**energy capacity**
gigawatthours

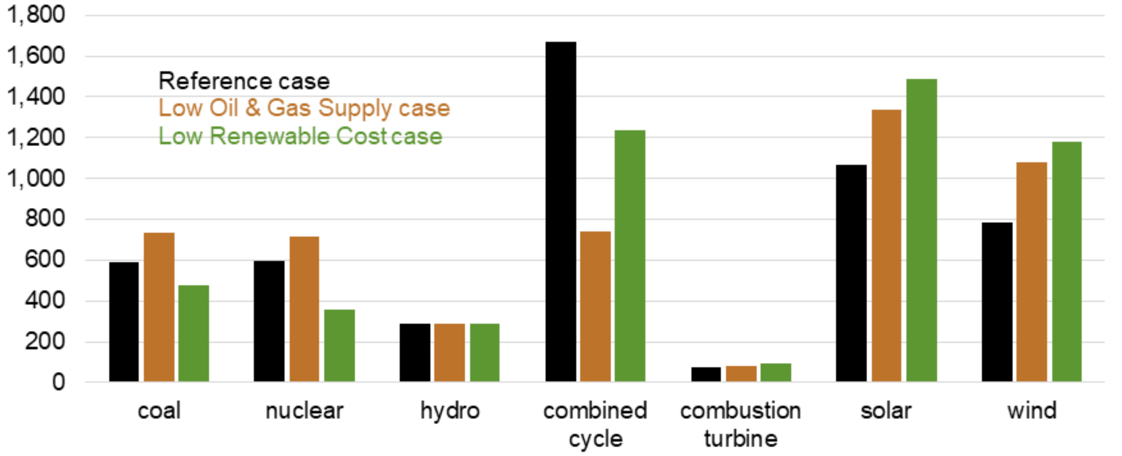


Source: U.S. Energy Information Administration, *Annual Energy Outlook 2021*

In the AEO2021 Low Oil and Gas Supply case, which has higher natural gas prices compared with the Reference case, natural gas combined-cycle generation declines more than in the Reference case and is replaced by coal, nuclear, solar, and wind generation (Figure 18). To support this generation mix, an additional 270 GWh of standalone storage is built compared with the Reference case. Co-located storage deployment is the same as the Reference case, adding to the 504 GWh of battery storage operating in 2050.

In the AEO2021 Low Renewables Cost case, our added assumption of a 40% reduction in renewables and energy storage costs compared with the Reference case results in solar and wind generation replacing coal, nuclear, and natural gas combined-cycle generation in the Low Renewables Cost case. Similar to in the Low Oil and Gas Supply case, about 270 GWh of standalone storage is added in the Low Renewables Cost case compared with the Reference case; however, over 150 GWh of co-located energy storage energy capacity is also added for a total of 670 GWh diurnal storage operating in 2050.

**Figure 18. AEO2021 power generation by technology and case, 2050**
billion kilowatthours



Source: U.S. Energy Information Administration, *Annual Energy Outlook 2021*

Modeling diurnal (daily cycling) energy storage systems requires high fidelity models that use high temporal and geographic resolution to capture the value of these systems. Because long-term planning models are designed to deliver multi-decade results with many complex interactions, modelers often have to simplify their modeling of energy storage technologies to avoid excessive processing times. One simplification we made that had significant consequences for energy storage technologies in AEO2021 is the temporal resolution of the NEMS model. Our AEO2021 included energy storage as a four-hour battery system that can avoid curtailments of excess solar- and wind-generated electricity, shift energy within a day, and help meet regional reliability requirements. However, modeling sub-hourly markets, such as battery systems participating in frequency response, remains a challenge. As a result, our AEO projections, as shown, do not represent all of the available storage technology options nor the full suite of applications that storage can serve. The list of possible applications for storage is outlined in the Current Applications section of this report.

We have been collaborating with other modeling entities on a multi-model comparison[17] to enhance the representation of technologies that challenge conventional long-term planning model design, such as wind, solar, and energy storage. Battery storage in the AEO will continue to develop as the markets and applications for energy storage evolve.

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[17] Cole, Wesley, et al, *Variable Renewable Energy in Long-Term Planning Models: A Multi-Model Perspective*, November 2017, https://www.energy.gov/eere/analysis/downloads/variable-renewable-energy-long-term-planning-models-multi-model-perspective.

# Appendix A: Data Concepts

Electrical, thermal, mechanical, and electrochemical technologies can store energy. This report focuses on electrochemical battery storage technologies, but Appendix B: Other Storage Technologies addresses other energy storage technologies.

We measure the capacity of battery storage in two ways: *power capacity* and *energy capacity*. Electrical generating technologies are often characterized in terms of power capacity, which is the maximum amount of power output possible at any instant, measured in this report in standard units of electrical power such as kilowatts (kW), megawatts (MW), or gigawatts (GW). However, batteries can sustain power output for only so long before they need to recharge. The *duration* of a battery is the length of time that a battery storage system can sustain power output at its maximum discharge rate, typically expressed in hours. The energy capacity of the battery storage system is defined as the total amount of energy that can be stored or discharged by the battery storage system and is measured in this report in standard units of electrical energy such as kilowatthours (kWh), megawatthours (MWh), or gigawatthours (GWh).

This report explores trends in both large-scale and small-scale battery storage systems. We define large-scale systems as those synchronized to the grid that have a nameplate power capacity (the maximum rated output, usually indicated on a nameplate physically attached to the unit) of 1 MW or greater. Small-scale refers to systems that have less than 1 MW in power capacity and are typically connected to a distribution network (the portion of the electrical system that delivers electricity to end users).[18]

Although we release monthly updates of newly operating and planned large-scale battery storage generators *power capacity* on Form EIA-860M, we only report operational large-scale battery storage energy capacity data on our annual release of Form EIA-860. At the time of writing this report, we had only released energy capacity data through 2019 (the latest release of Form EIA-860). Therefore, any section of this report showing battery storage energy capacity data (the majority of the report) will only include information through the end of 2019. A notable exception is the Ongoing Trends section, which uses data through December 2020 from Form EIA-860M to display information of near-term planned builds power capacity.

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[18] Large-scale and small-scale reporting conventions are derived from the reporting requirements of our *Electric Generators Report* (Form EIA-860) survey and our *Electric Power Industry Report* (Form EIA-861) survey. The reporting cut-offs for these surveys are based entirely on the power capacity of the facility.

# Appendix B: Other Storage Technologies

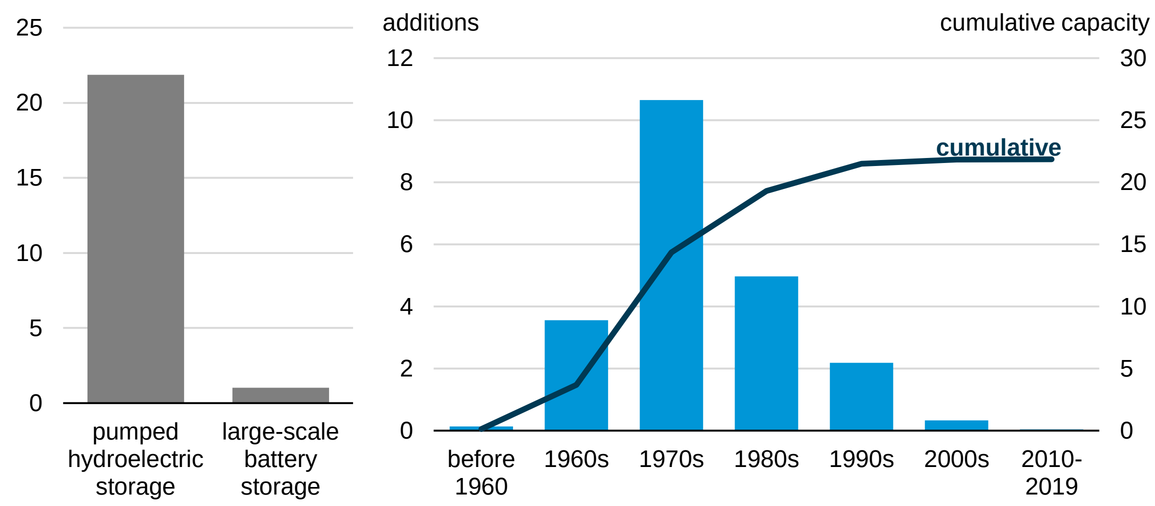
This report has focused primarily on electrochemical energy (or battery) storage; however, energy storage can use electrical, thermal, and mechanical technologies. Electrical energy storage includes capacitors and superconductors. Thermal storage includes water, ice, molten salts, and ceramics. Mechanical storage includes technologies such as hydroelectric pumped storage, flywheels, and compressed-air energy storage (CAES).

Hydroelectric pumped storage uses electricity to pump water into an elevated reservoir so it can be used to drive a hydroelectric turbine when electricity is needed. Although the United States has significantly more operating hydroelectric pumped storage capacity than battery storage capacity, most pumped storage was installed in the 1970s and early 1980s (Figure 19). California, Virginia, and South Carolina account for most of the existing hydroelectric pumped storage capacity. The largest single facility in the United States was installed in 1985 in Bath County, Virginia, and has a capacity of 3 GW.

**Figure 19. Hydroelectric pumped storage capacity (1960–2019)**

**power capacity**

gigawatts



Source: U.S. Energy Information Administration, 2019 Form EIA-860, *Annual Electric Generator Report*

Flywheels store energy by using an electric motor to speed up a spinning mass, which can be used later to spin a turbine to produce electricity. To reduce losses, the mass is spinning in a nearly frictionless enclosure. Flywheels are well suited to provide power-oriented applications that require many charge and discharge cycles. Three large-scale flywheel systems are currently operating in the United States: a 20 MW system in New York, a 20 MW system in Pennsylvania, and a 2 MW system in Alaska. One 5 MW standby flywheel system is in Texas.

CAES uses electricity to compress air and store it in an underground cavern. The air is then expanded through a turbine when electricity is needed. The only operable large-scale CAES system in the United States is a 110 MW system that was installed in Alabama in 1991 by PowerSouth Energy Cooperative.

The Apex Bethel Energy Center is a 317 MW CAES system in Texas that is expected to enter operation in late 2023.

Thermal storage systems take excess energy produced during the day to heat salt or other materials that can power a steam turbine. Thermal storage can also be used as a distributed energy resource, for example, by chilling water overnight to use for space cooling during summer days. All existing large-scale thermal energy storage in the United States uses concentrated solar power (CSP) technology. CSP reflects rays from the sun to a receiver to produce steam directly or to heat up alternative fluids, which are used to generate steam through a heat exchanger. The steam is run through a turbine to generate electricity. Some of these alternative heat transfer or storage fluids can store energy for long durations, and they can be used to generate steam and electricity at night using thermal solar energy gathered during the day. Of the eight CSP projects currently operating with a total capacity of 1,775 MW, only Arizona Solar One LLC’s 295 MW Solana Generating Station plant in Arizona and Tonopah Solar Energy LLC’s 110 MW Crescent Dunes Solar Energy plant in Nevada employ thermal storage systems.

Other energy storage technologies are in different phases of development but have yet to have significant deployment in large-scale grid applications.

# Appendix C: Installed Power and Energy Capacity of Large-Scale Batteries by State

| | 2019 | | 2020 | |
|---|---|---|---|---|
| **State** | **Power capacity (MW)** | **Energy capacity (MWh)** | **Power capacity (MW)** | **Energy capacity (MWh)** |
| AK | 45 | 16 | 45 | 16 |
| AL | 1 | 2 | 1 | 2 |
| AR | 12 | 26 | 12 | 26 |
| AZ | 42 | 93 | 42 | 101 |
| CA | 253 | 646 | 536 | 930 |
| CO | 11 | 28 | 9 | 27 |
| CT | 2 | 6 | 2 | 6 |
| FL | 19 | 60 | 29 | 100 |
| GA | 1 | 2 | 2 | 6 |
| HI | 63 | 183 | 63 | 183 |
| IA | 1 | 4 | 1 | 5 |
| IL | 133 | 66 | 133 | 66 |
| IN | 28 | 32 | 38 | 42 |
| LA | 1 | 1 | 1 | 1 |
| MA | 33 | 95 | 71 | 170 |
| MD | 13 | 6 | 11 | 5 |
| ME | 17 | 11 | 37 | 31 |
| MI | 1 | 1 | 1 | 1 |
| MN | 16 | 38 | 16 | 38 |
| MO | 2 | 3 | 2 | 3 |
| NC | 1 | 1 | 10 | 10 |
| NJ | 43 | 44 | 43 | 44 |
| NM | 2 | 2 | 2 | 2 |
| NY | 33 | 94 | 48 | 131 |
| OH | 33 | 19 | 33 | 19 |
| OK | - | - | 10 | 20 |
| OR | 5 | 1 | 5 | 1 |
| PA | 28 | 23 | 28 | 23 |
| SC | 4 | 4 | 4 | 4 |
| SD | 1 | 1 | 1 | 1 |
| TX | 114 | 106 | 223 | 232 |
| VT | 11 | 33 | 11 | 33 |
| WA | 6 | 13 | 5 | 9 |
| WV | 50 | 31 | 50 | 31 |

Source: U.S. Energy Information Administration, 2019 and early release of the 2020 Form EIA-860, *Annual Electric Generator Report*

Note: The data for year 2020 in this table are from the early release of the 2020 Form EIA-860, *Annual Electric Generator Report.* The 2019 data from this table use data from the final release of the 2019 Form EIA-860, *Annual Electric Generator Report*. MW = megawatts; MWh = megawatthours.

## Lower 48 States Non-Speculative Resources and Production

| Line | Description | Amount | Unit | Source |
|---|---|---|---|---|
| 1 | Lower 48 States Proved Reserves (2019) (Wet After Lease Separation) /1 | 485,531 | Bcf | https://www.eia.gov/dnav/ng/ng_enr_wals_a_EPG0_R21_Bcf_a.htm |
| 2 | Total Lower 48 States Traditional Probable Resources (2020) | 1,088,750 | Bcf | Potential Gas Committee, "Potential Supply of Natural Gas in the United States", (2021). |
| 3 | Total Lower 48 States Traditional Possible Resources (2020) | 1,309,650 | Bcf | Potential Gas Committee, "Potential Supply of Natural Gas in the United States", (2021). |
| 4 | Total Lower 48 Coalbed Probable Resources (2020) | 14,620 | Bcf | Potential Gas Committee, "Potential Supply of Natural Gas in the United States", (2021). |
| 5 | Total Lower 48 Coalbed Possible Resources (2020) | 46,570 | Bcf | Potential Gas Committee, "Potential Supply of Natural Gas in the United States", (2021). |
| 6 | Total Lower 48 Probable and Possible Resources (2020) | 2,459,590 | Bcf | Sum Lines 2 to 5 |
| 7 | Total Lower 48 Non-Speculative Resources | 2,945,121 | Bcf | Line 1 + Line 6 |
| 8 | Total 2020 United States Wet Gas Production 1/ | 40,613,767 | MMcf/year | https://www.eia.gov/dnav/ng/ng_prod_sum_a_EPG0_FGW_mmcf_a.htm |
| 9 | Total 2020 Alaska Wet Gas Production 1/ | 3,429,315 | MMcf/year | https://www.eia.gov/dnav/ng/ng_prod_sum_a_EPG0_FGW_mmcf_a.htm |
| 10 | Total Lower 48 States Wet Gas Production 1/ | 37,184,452 | MMcf/year | Line 8 + Line 9 |
| 11 | Total Lower 48 States Wet Gas Production | 37,184 | Bcf/year | Line 10/1000 |

1/ PGC Report at 17 states "wet gas from EIA is … similar to the total gas assessed by the PGC."

Docket No. RP22-___-000
Exhibit No. ANR-0031

# UNITED STATES OF AMERICA
# BEFORE THE
# FEDERAL ENERGY REGULATORY COMMISSION

| | | |
|---|---|---|
| ANR Pipeline Company | ) | Docket No. RP22-___-000 |

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# PREPARED DIRECT TESTIMONY OF STEVEN R. FALL ON BEHALF OF ANR PIPELINE COMPANY

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**January 28, 2022**

Docket No. RP22-___-000
Exhibit No. ANR-0031

UNITED STATES OF AMERICA

BEFORE THE

FEDERAL ENERGY REGULATORY COMMISSION

ANR Pipeline Company ) Docket No. RP22-___-000

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# SUMMARY OF PREPARED DIRECT TESTIMONY OF STEVEN R. FALL ON BEHALF OF ANR PIPELINE COMPANY

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Mr. Steven R. Fall, who is employed by Brown, Williams, Moorhead and Quinn, Inc., as Vice President, presents Prepared Direct Testimony on behalf of ANR Pipeline Company ("ANR") to provide an assessment of the terminal decommissioning cost ("TDC") and salvage value for the abandonment and removal of the ANR system. Specifically, the TDC estimate that Mr. Fall provides is an assessment of the cost for ANR to cease system operations, remove, as appropriate, plant in service, and restore the rights of way to preconstruction condition at the end of the system's useful life. His TDC estimate also includes an estimate of the salvage value of ANR's equipment and facilities as an offset against decommissioning and associated costs. Mr. Fall's testimony details the underlying data and preconditions he uses in his analysis, including an explanation of the applicable laws, regulations, policies, and existing agreements which govern the various steps involved with terminal decommissioning.

Mr. Fall's total decommissioning costs for ANR's Transmission, Storage, and Production plant consist of three elements which make up the major sections of his testimony: decommissioning costs, contingency costs, and salvage value of ANR's plant at the time of final abandonment.

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Docket No. RP22-___-000
Exhibit No. ANR-0031

# GLOSSARY OF TERMS

| | |
|---|---|
| CM | Construction Management |
| ACC | Anchor Construction Corporation |
| BWMQ | Brown, Williams, Moorhead & Quinn, Inc. |
| Commission or FERC | Federal Energy Regulatory Commission |
| Crossing | A location at which a pipeline encounters a road, railroad, or water body and, to continue service, must cross underneath or above the asset. |
| ANR | ANR Pipeline Company |
| DOE | U.S. Department of Energy |
| DOT | U.S. Department of Transportation |
| Dth | Dekatherms |
| FEMA | Federal Emergency Management Agency |
| FERC | Federal Energy Regulatory Commission |
| Interim Retirement | The replacement of facilities required to maintain the system during the system’s useful life. |
| LNG | Liquefied Natural Gas |
| M&R | Measuring and Regulating |
| Mcf | Thousand Cubic Feet |
| MTO | Material Take Off |
| O&P | Overhead and Profit |
| ROW | Right-of-way |
| TDC | Terminal Decommissioning Cost |

| | |
|---|---|
| Terminal Decommissioning | The dismantlement and removal of the entire network at the end of its useful life. |
| WSSC | Washington Suburban Sanitary Commission |

**UNITED STATES OF AMERICA**
**BEFORE THE**
**FEDERAL ENERGY REGULATORY COMMISSION**

| | | |
|---|---|---|
| **ANR Pipeline Company** | )<br>)<br>) | **Docket No. RP22-___-000** |

# Prepared Direct Testimony of Steven R. Fall

## I. INTRODUCTION

**Q. Please state your name, occupation, and business address.**

A. My name is Steven R. Fall. I am a Vice President employed with the firm of Brown, Williams, Moorhead & Quinn, Inc. ("BWMQ"), a nationally recognized energy consulting firm providing thorough analytical expertise and litigation support on behalf of clients across a wide range of energy issues.

**Q. What is the nature of the work performed by your firm?**

A. We offer technical, economic, and policy assistance to the various segments of the natural gas pipeline industry, oil pipeline industry, and electric utility industry on business and regulatory matters.

**Q. Briefly describe the purpose of your testimony in this proceeding.**

A. My prepared direct testimony details the estimated terminal decommissioning cost ("TDC") and salvage value in 2021 dollars for abandonment and removal of ANR Pipeline Company's ("ANR") facilities. I provided my TDC estimates to ANR witness Crowley for his use in this proceeding.

**Q. Please briefly state your professional experience and qualifications.**

A. Before joining BWMQ, I was a Project Manager at the D.C. Department of Consumer and Regulatory Affairs, where I handled high-impact projects regarding regulatory compliance. I coordinated between council members, property owners, private contractors, and city construction inspectors to bring on-going construction projects into compliance with building regulations and codes. Before that, from 2014 to 2017, I was Project Engineer for Anchor Construction Corporation ("ACC") of Washington, D.C., which specializes in major underground utility construction projects.

**Q. As Project Engineer for ACC, what was your experience concerning the construction of major gas, water and sewer pipeline, and electric project activities?**

A. As Project Engineer for three years at ACC, I coordinated activities concerning the construction of underground utilities operated by the District of Columbia's Department of Transportation, Washington Gas Light Company, Potomac Electric Power Company, Washington Suburban Sanitary Commission ("WSSC"), and the National Park Service. I coordinated compliance activities consistent with construction site restoration requirements. My project management responsibilities included phasing and crew assignments, calculating timing sequences for equipment requirements, establishing performance standards, monitoring project progress, negotiating change order pricing, and inspecting project designs, activities, and completion of performance. This included my work with WSSC in a variety of environmentally sensitive areas, as well as on the Klingle Valley Trail restoration project, which incorporated the latest technologies and procedures related to bio-swales, bio-retention structures, and permeable pavements, which won the 2017 Washington Building Congress Craftsmanship Award. For a more complete description of my expertise please refer to my *curriculum vitae*, attached to my testimony as Exhibit No. ANR-0032.

**Q. Have you previously provided testimony and/or reports before the Federal Energy Regulatory Commission ("Commission" or "FERC")?**

A. Yes, I have provided terminal decommissioning and depreciation testimony and/or reports in the following Docket Nos.:

- RP18-877-000, *MoGas Pipeline LLC*
- RP18-922-000, *Trailblazer Pipeline Company LLC*
- RP18-923-000, *Enable Mississippi River Transmission, LLC*
- RP18-940-000, *Empire Pipeline, Inc.*
- RP18-1115-000, *Saltville Gas Storage Company L.L.C.*
- RP18-1126-000, *Transcontinental Gas Pipeline Company, LLC*
- RP19-78-000, *Panhandle Eastern Pipe Line Company, LP*
- RP19-165-000, *WBI Energy Transmission, Inc.*
- RP19-343-000, *Texas Eastern Transmission, LP*
- RP19-352-000, *Sea Robin Pipeline Company, LLC*
- RP19-1426-000, *National Fuel Gas Supply Corporation*

- RP19-1523-000, *Panhandle Eastern Pipe Line Company, LP*
- RP21-131-000, *Enable Mississippi River Transmission, LLC*
- RP21-467-000, *Dominion Energy Cove Point LNG, LP*
- RP21-908-000, *Alliance Pipeline, LP*
- RP21-921-000, *Maritimes & Northeast Pipeline, L.L.C.*
- RP21-980-000, *East Tennessee Natural Gas, LLC*
- RP21-441-000, *Florida Gas Transmission, LLC*
- DO21-20-000, *Shell Pipeline Company, LP*
- RP21-1001-000, *Texas Eastern Transmission, LP*
- RP21-1187-000, *Eastern Gas Transmission and Storage, Inc.*
- RP22-18-000, *Texas Eastern Transmission, LP*

**Q. On whose behalf are you presenting testimony in this proceeding?**

A. I am submitting testimony on behalf of ANR.

**Q. Please identify the exhibits and schedules you are sponsoring in this proceeding.**

A. In addition to my testimony, I am sponsoring the following exhibits in this proceeding:

- Exhibit No. ANR-0032: Steven R. Fall CV
- Exhibit No. ANR-0033: TDC Workpapers
- Exhibit No. ANR-0034: TDC Supporting Documents

I will discuss and explain these exhibits in my testimony.

**Q. Were your testimony and exhibits prepared by you or under your supervision?**

A. Yes.

**Q. Please provide an overview of how your terminal decommissioning study estimate is organized.**

A. In Section II of my testimony, I describe an overview of the retirement process. In Section III, I describe the materials and resources I consulted in order to develop my TDC estimate. My TDC estimate, detailed in Exhibit No. ANR-0033, TDC Workpapers, is comprised of three main cost components: decommissioning; contingency; and salvage. In Section IV of my testimony, I detail estimated decommissioning costs by line-item of the required tasks to be performed during the terminal abandonment. In Section V, I discuss Construction Management ("CM") costs. In Section VI, I discuss contingency costs. In Section VII, I describe salvage value and estimate the gross salvage value of ANR plant at the time of final abandonment.

**Q. Please provide a brief description of ANR's Transmission system.**

A. ANR operates approximately 8,899 miles of interstate natural gas pipeline in seventeen states through which ANR transports and delivers natural gas to both investor-owned and municipal natural gas local distributions systems and others, as detailed in the ANR System Map, Statement O, Exhibit No. ANR-0132. ANR's transmission system includes pipeline varying from two inches to forty-two-inch diameter pipe in service, 55 compressor stations, 632 measuring and regulating

("M&R") sites, and numerous miscellaneous facilities required for operation of the system.

**Q. Please provide a brief description of ANR's Storage system.**

A. ANR's Storage system includes approximately 145 miles of pipeline, 4 compressor stations, 22 M&R sites, and 10 underground storage fields with 870 total wells. ANR's Storage facilities also include numerous miscellaneous facilities required for operation of the storage fields.

**Q. Please provide a brief description of ANR's Production system.**

A. ANR's Production system includes 5 M&R sites and miscellaneous tap facilities required for operation of the Production system.

**Q. Will you summarize your TDC estimate?**

A. Yes, the total cost to terminally abandon ANR facilities in 2021 U.S. dollars, including credits for abandonment, removal, and restoration of the right of way ("ROW") for Transmission plant is $1,298,147,990, for Storage plant is $113,225,388, and for Production plant is $1,855,449. The data that support these estimates are set forth and summarized in Exhibit No. ANR-0033, TDC Workpapers.

## II. OVERVIEW OF RETIREMENT PROCESS

**Q. Please explain what is encompassed within your TDC estimate.**

My TDC estimate is an assessment of the cost for ANR to cease system operations, remove, as appropriate, plant in service, and restore the rights of way to preconstruction condition at the end of the system's useful life. My TDC estimate includes an estimate of the salvage value of ANR's equipment and facilities as an offset against decommissioning and associated costs.

**Q. Please briefly discuss the major tasks that form the basis of a retirement cost analysis.**

A. A retirement cost analysis includes the cost of removal of all above-ground facilities and any costs associated with the restoration of the surface and sub-surface land. There are many steps involved with restoring land. For example, all underground transmission pipe would need to be cleaned and purged, with pipe left in place capped, and other pipe completely removed. All railroad crossings, highway, and road crossings, as well as all small stream and river crossings would be abandoned in place. Further, all remote valve sites, cathodic protection facilities, pipeline markers, measurement and regulation facilities, and compressor stations and other above-ground facilities would be removed, and site restored.

**Q. How can you estimate today the cost of an operation that will take place many years in the future?**

A. It is certain that, eventually, the services will be discontinued, the system will be dismantled and at least some facilities will be removed. The closest approximation to measuring those costs is to measure the cost to remove the existing plant in service.

**Q. Will today's plant and equipment still be around when the system is dismantled and removed?**

A. To the extent that today's specific plant in service components will no longer be in existence at the time of the system's suspension of operations and removal from service, those components that will be removed will most likely be replaced by newer plant that will continue to provide service until the terminal decommissioning day. The removal of facilities during the continued operation of the pipeline constitutes "interim retirements." Interim retirements refer to the replacement of facilities required to maintain the system through or until the terminal decommissioning date.

**Q. How does terminal decommissioning differ from interim retirement?**

A. Terminal decommissioning refers to the dismantlement and removal of the entire network at the end of its useful life. Terminal decommissioning is, by definition, happening at the end of the useful life so plant will not be replaced, and the full cost of retirement will be apparent and should be fully recovered. By contrast, interim retirement refers to the replacement of facilities required to maintain the system during the system's useful life.

**Q. Does your study include the costs of interim retirements?**

A. No. ANR witness Crowley addresses interim retirements. My testimony is concerned with terminal decommissioning of the facilities.

**Q. Are you familiar with regulatory requirements that set forth the general process that must be followed to accomplish the terminal retirement?**

A. Yes. Abandonment of ANR’s facilities from interstate service is subject to Commission approval. As part of the Commission’s review of a request for abandonment, the Commission conducts an environmental assessment of the pipeline’s plans for abandonment in place or removal of the assets. *See* 18 C.F.R. § 380.5(b) (2020). The Commission’s abandonment review process may result in attendant conditions imposed on ANR regarding how the facility retirement, removal and land restoration is to be conducted. In addition to the Commission’s requirements, ANR must comply with a host of other environmental rules, regulations, and policies. For example, additional federal, state, and local permits are typically required for construction/decommissioning projects. Compliance with these various statutory and regulatory requirements places a monetary burden on ANR, the costs of which are appropriately included as part of the total decommissioning cost.

## III. MATERIALS AND RESOURCES CONSULTED

**Q. What government materials and resources did you use or consult in developing your TDC estimate?**

A. I reviewed the following materials issued by the U.S. Department of Transportation (“DOT”): (1) minimum safety regulations for abandonment of facilities; (2) guidelines to purge pipelines; and (3) line pipe Class Location Guidelines. Secondly, I reviewed 33 C.F.R. § 322.3, regarding permits from the U.S. Army Corps of Engineers for work in and around navigable waters of the United States.

Third, I reviewed 49 C.F.R. Part 192, Section 727, abandonment or deactivation of facilities. Fourth, I reviewed Chapter 11, Contingency, of the U.S. Department of Energy's ("DOE") *Cost Estimating Guide*, as well as the U.S. Army Corps of Engineers' publication, *Engineering and Design: Civil Works Cost Engineering*, relating to contingency costs. Finally, I reviewed Army Corps of Engineers publications *Cost-Competitive Construction Management: A Review of Corps of Engineers Construction Management Costs*[1] and *U.S. Army Corps of Engineers Military Construction Management Cost*[2] regarding construction management cost data used to develop private-sector costs for providing construction management services. *See also* Exhibit No. ANR-0034, Supporting Documents.

**Q. Were you able to review any additional materials or resources for use in developing your TDC estimate?**

A. Yes. I reviewed ANR plant asset data. In addition, I reviewed current labor rates and construction cost information in engineering industry publications. I also reviewed the Federal Emergency Management Agency's ("FEMA") *Debris Estimating Field Guide*,[3] which provides debris measurement guidance and calculations. I utilized construction takeoff software to capture estimated material

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[1] USACE, *Cost-Competitive Construction Management: A Review of Corps of Engineers Construction Management Costs* (June 1990), https://apps.dtic.mil/dtic/tr/fulltext/u2/a227175.pdf.

[2] USACE, *U.S. Army Corps of Engineers Military Construction Management Costs* (May 1994), https://apps.dtic.mil/dtic/tr/fulltext/u2/a283018.pdf.

[3] FEMA, *Debris Estimating Field Guide* (Sept. 2010), https://www.fema.gov/media-library-data/1558616150217-8ff03e353e675b00c08a84b5916fa397/fema_329_debris_estimating_field_guide_9-1-2010.pdf.

takeoff ("MTO") quantities from plot plans into a quantifiable data set. MTO refers to a list of materials with quantities (such as building volume) and types (such as specific grades of steel) that are required to build a designed structure or item. This list is generated by analysis of a blueprint or other design documents. For the final step in developing the TDC estimate, I incorporated the quantities generated from the MTO estimate into a proprietary project management takeoff software to generate estimates for labor, material, and equipment costs.

**Q. How did you familiarize yourself with ANR to develop your estimates?**

A. I familiarized myself with ANR system maps, schematic drawings, and documentation describing and depicting ANR's physical plant in service. Additionally, I reviewed design drawings, standard details of ANR's facilities, and pipeline abandonment guidelines.

## IV. DECOMMISSIONING COSTS

**Q. What were the parameters upon which your ANR TDC estimates are based?**

A. I reviewed the ANR Standard Operating Procedures, Exhibit No. ANR-0034, Supporting Documents, as it includes a list of parameters utilized.

**Q. Please comment on how you developed the cost estimate model for your TDC estimates.**

A. My cost estimates are based on the removal or abandonment in place of physical property. The amount of physical material to be removed or abandoned is derived by an MTO list developed from company plot plans and profiles, design drawings, and utility details from throughout the ANR system, as shown in Exhibit No. ANR-0033, TDC Workpapers page 149, "Material Takeoff Packet".

**Q. How did you estimate the costs for each phase of removal or abandonment?**

A. I broke out work into its major components, such as demolition and removal of compressor station, meter station, and line pipe. Then, in the case of removal, I estimated the cost of removing subsets of each component, *e.g.*, surface and subsurface material. I broke out abandonment work into major components related to, for example, type of crossing—road, railroad line, stream—as well as separately analyzing transmission and storage-related abandonment activities, for purposes of deriving cost estimates. These cost estimates were based on my expertise regarding crew size, and required skill sets, equipment, and time.

## A. Labor, Material, and Equipment Cost Estimates

**Q. Would ANR handle all of the work associated with terminal retirement in-house, or hire outside contractors?**

A. No. Given the nature of the work and ANR's current workforce, ANR would need to hire outside contractors to perform tasks associated with terminal abandonment.

**Q. What type of contractors would ANR employ to terminally abandon its facilities?**

A. Due to the numerous rivers, streams, highways, railroads, and other infrastructure (such as communications lines, electrical lines, and other pipelines) which ANR's pipelines cross, ANR would hire contractors skilled in pipeline construction/demolition techniques suitable for terminal abandonment activities.

**Q. What type of skilled workers would be required to terminally abandon ANR's facilities?**

A. Skilled operators would be required to safely and efficiently operate heavy equipment necessary to perform specific tasks such as excavation, loading material, and backfill. Pipe fitters skilled at the disassembly of pipe systems, which include pipe and compressor station component removal, would also be required.

**Q. What pipeline contractor labor rates have you included in your TDC estimates?**

A. I conservatively used non-union labor rates in my estimates. Labor costs are based on working an eight-hour day in daylight hours in moderate temperatures and estimated based on 2021 average wage rates from forty-five locations in seventeen separate states in which ANR operates. *See* Exhibit No. ANR-0033, page 147-148. Labor costs and productivity are based on actual working conditions, material receiving and handling, mobilization at site, site movement, breaks and cleanup. Based on my experience, whether or not a contractor is a union labor shop, it will pay some union labor rates to skilled employees in the types of trades required to decommission a pipeline, thus my use of non-union labor rates is conservative.

**Q. What is labor burden and is it reflected in your estimates?**

A. Labor burden is the full cost to have an employee in a company, aside from the salary the employee earns. Labor burden costs may include, but are not limited to, benefits for employees included on their payroll, payroll taxes, pensions, and health and dental insurance. Similarly, company paid time off, such as paid sick, holiday or training time, are also considered part of the labor burden since they are also a cost to the company. It is assumed that the general contractor hired to perform the abandonment would incur these in-house costs, and thus include them in the cost estimate provided to ANR. My estimate includes costs associated with labor burden.

**Q. Did you include an allowance for subcontractor overhead and profit ("O&P") costs in your TDC cost estimate?**

A. Yes. Total Cost, including O&P for the subcontractor, is displayed on the current estimate in the last column on the right for each workpaper in ANR's TDC Workpapers, Exhibit No. ANR-0033. This figure is the sum of the bare material cost plus an industry standard ten percent for profit, the base labor cost plus appropriate labor burden, and the bare equipment cost plus ten percent for subcontractor overhead.

**Q. What equipment rates did you use in your TDC estimates?**

A. Equipment costs include not only rental, but also operating costs for equipment under normal use. The operating costs include parts and labor for routine servicing, such as repair and replacement of pumps, filters and worn lines. Equipment rental rates are obtained from industry sources throughout North America, including contractor, suppliers, dealers, manufacturers, and distributors. ANR equipment rates were averaged from the same forty-five applicable ANR market locations spread across seventeen states, available within the cost estimating software package.

**Q. What material cost did you use in your TDC estimates?**

A. I used direct material cost, which is the cost of the raw materials and components, such as soil and seed utilized in the restoration process, plus the transportation cost of getting materials to the site. A company may buy materials from suppliers, create them on-site, or buy them from its own subsidiaries. I based my estimate of these material costs on my first-hand construction experience, as well as utilizing 2021 ANR asset location specific rates previously mentioned, calculated within the project management model.

**Q. How did you develop the equipment and labor estimates, and estimate the time needed to carry out specific demolition activities in your TDC estimate?**

A. I relied on my experience as a project manager, in particular, as Project Engineer for three years recently at ACC where I directly oversaw every aspect of gas, water and sewer pipeline, and electric project activities. My experience, coupled with the applicable project management software, led to the development of activities outlined in the final TDC cost estimate.

**Q. Did you include environmental costs in your TDC?**

A. Yes. Environmental costs, such as monitoring during final abandonment activity, conducting tests for hazardous materials, and writing reports were incorporated into each cost estimate.

**Q. Similarly, did you include an allowance for pipeline company inspection in your TDC estimate?**

A. Yes. An inspector was included in each estimate to account for the supervision necessary to monitor the daily activities required to complete each estimated task. The inspection time required was calculated based on the longest projected production timeline for that estimate.

**Q. Did you include an allowance for per diem in your terminal decommissioning study estimate?**

A. Yes. Per diem was included in each estimate to account for food and lodging necessary to complete each estimated task. Estimated per diem costs were based on labor hours projected per cost estimate multiplied by FY 2021 General Services Administration ("GSA") average rate of $122/day generated from a GSA list of forty-five locations in seventeen states available that relate to ANR's market locations. *See* Exhibit No. ANR-0033, TDC Workpapers, page 147-148, "Per Diem Determination" spreadsheet.

**Q. Please explain how the labor, material, and equipment rates from the two locations were used in the TDC estimate.**

A. Labor, material, and equipment rates were adjusted to locations in the ANR operating footprint utilizing a City Cost Index Adjustment Factor ("CCI") developed within the project management cost estimating software package. For the TDC estimate, a City Cost Index Adjustment Factor of 0.9347 was utilized to take into consideration the same forty-five applicable ANR market locations spread across seventeen states available within the software package. *See* Exhibit No. ANR-0033, TDC Workpapers, page 145-146, "City Cost Index Factor Determination" spreadsheet.

**Q. Can you please explain the City Cost Index Adjustment Factor a bit further?**

A. The City Cost Index Adjustment Factor is a multiplier used to adjust the original estimated costs to reflect the market locations in which ANR operates. In this case, a City Cost Index Adjustment Factor of 0.9347 was utilized to take into consideration the same forty-five ANR market locations spread across seventeen states and was applied to each cost estimate to obtain a representative cost estimate dollar amount for the assets in that market, or location, where ANR facilities are owned and operated. *See* Ex. No. ANR-0033, TDC Workpapers, pages 3, 103, and 135, "Cost Estimate Summary" spreadsheets.

## V. ANR TRANSMISSION FACILITIES

**Q. What are the tasks included in your ANR transmission TDC estimate?**

A. I estimate that the work to retire ANR's transmission plant would include the following tasks:

i. Clean and purge system of hydrocarbons;
ii. Pipe abandonment;
iii. Road crossing abandonment;
iv. Remove meter stations;
v. Remove compressor stations;
vi. Remove cathodic protection facilities;
vii. Remove pipeline ROW markers;
viii. Remove remote towers;
ix. Remove taps; and,
x. Restore all sites.

These tasks are predicated on using the most economical method of retirement compatible with a sample of ANR's ROW agreements, environmental considerations, DOT minimum safety regulations, and Corps of Engineers' regulations pertaining to navigable waters and dredge and fill permits.

### B. Abandonment in Place of Pipeline Facilities

**Q. Please explain what steps ANR would take to clean and purge its Transmission pipelines.**

A. An abandoned pipeline is a pipeline that is permanently removed from service, physically separated from its supply source, and is no longer maintained. The abandonment of pipeline facilities includes the safe disconnection from an operating pipeline system, purging of combustibles, pigging, and sealing abandoned facilities left in place to minimize safety and environmental hazards. These costs and tasks are detailed in the TDC Workpapers, Exhibit No. ANR-0033, and ANR's Supporting Documents, Exhibit No. ANR-0034.

**Q. How did you estimate the cost to abandon ANR's Transmission pipelines?**

A. Based on my experience as well as referencing ANR's Supporting Documents, Exhibit No. ANR-0034, I developed estimates to purge, clean, cut, and cap approximately 8,899 miles of ANR Transmission pipeline. As further detailed in Exhibit No. ANR-0033, pages 4-5, I estimated that this will cost $38,608 and $43,688 per mile for pipe less than 24" and greater than 26" in diameter, respectively. It should be noted these costs are well within the industry expert quote per mile for a 24" pipe, as stated in the October 31, 2013 RBN Energy LLC article, *"WOO-PIG-SOOIE"-The Business of Pipeline Integrity II*, by Callie Mitchell.[4]

### C. Removal of Pipeline Facilities

**Q. How many miles of pipeline did you estimate would be removed entirely?**

A. Approximately 190 miles.

**Q. What is the basis in your TDC estimate for the complete removal of the 190 miles of ANR's transmission pipeline?**

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[4] Callie Mitchell, RBN Energy, Inc., *"Wooo–PIG–SOOIE!" – The Business of Pipeline Integrity* (Oct. 3, 2013), https://rbnenergy.com/woo-pig-sooie-the-business-of-pipeline-integrity. The article quotes $35,000 per mile for 24" pipe, or approximately $41,000 in 2021 dollars.

A. ANR personnel estimate that approximately 2.14 percent of ANR pipe would need to be removed upon abandonment based on its ROW agreements and permits. 2.14 percent of 8,899 miles of pipeline is approximately 190 miles.

**Q. How did you estimate the cost to remove ANR's Transmission pipelines?**

A. I estimated the cost to excavate and remove the pipeline on a per-mile basis at $96,769 and $201,427, respectively. I then estimated the cost per mile to backfill and restore the area disturbed to its original condition at $115,816 and $10,806 per mile respectively, as summarized on page 3, as well as detailed in TDC Workpapers, Exhibit No. ANR-0033, pages 6-9.

**Q. Does ANR share ownership of any transmission pipeline?**

A. Yes. Approximately 147 miles of transmission pipeline are jointly owned. I have assumed the joint ownership costs for abandonment, removal, and restoration of the transmission line pipe to be charged to the respective joint owners for an amount of $2,116,050 as calculated in Exhibit No. ANR-0033, page 145, "Jointly Owned Assets and Cost Distribution" spreadsheet. The final cost to decommission ANR's pipeline, less costs estimated through joint ownership, is $410,968,796, as shown in Exhibit No. ANR-0033, Workpapers, page 3, "Cost Estimate Summary" spreadsheet.

## D. Abandonment of Crossings

**Q. What is a "crossing"?**

A. A "crossing" is a location at which a pipeline encounters a road, railroad, or water body and, to continue service, must cross underneath or above the asset.

**Q. What steps are taken to abandon a crossing?**

A. First, the crossing pipeline has to be disconnected from all sources and supplies of gas. Second, the pipeline has to be purged of hydrocarbons and cleaned. Third, the crossing pipeline is cut and capped at the abandoned crossing. Finally, the site is restored to its original condition. For more details, *see* ANR Exhibit No. ANR-0034, Supporting Documents.

**Q. Will you summarize your estimate to abandon ANR's pipeline crossings?**

A. ANR has a total of 8,665 crossings throughout its transmission system, broken into five categories: road, highway, railroad, stream, and river. Based on the number and categories of crossings, the total cost to decommission ANR's pipeline crossings is estimated at $232,977,040, as shown in Exhibit No. ANR-0033, TDC Workpapers, pages 10-14, and summarized on page 3, "Cost Estimate Summary" spreadsheet.

### E. Meter Station Retirement

**Q. What is the order of operation underlying your meter station removal estimates?**

A. There are six steps that will be undertaken to remove meter stations and underlie my estimate. First, miscellaneous surface material and fencing would be removed to make the site ready for demolition work. Second, valves and yard piping would be removed. This work involves excavation down three feet, cutting and capping, lifting, and hauling. Third, station equipment would be disconnected, lifted, and stockpiled for transportation to a salvage yard. Fourth, buildings would be demolished, and material transported to a salvage yard. Fifth, pavement, gravel and unsuitable materials would be removed and hauled from the site, and the site would then be graded. Finally, the site would be restored by backfilling, grading, placing topsoil, seeding and fertilizing.

**Q. How did you develop ANR's meter station removal estimates?**

A. ANR has 632 meter stations throughout its transmission system. First, an MTO was performed to determine the estimated quantity of materials to be removed from the meter station plot plan and standard detail (*see* Exhibit No ANR-0033, "Material Takeoff Packet" section). Second, I estimated the tasks, crew, time, equipment, and labor necessary to retire each category of meter station material based on the quantities generated from the MTO. Third, I estimated the costs for the crew and equipment, as shown in Exhibit No. ANR-0033, TDC Workpapers, pages 15-23. In summary, the total cost to decommission ANR's small, medium, and large Transmission meter station facilities are estimated at $182,271,692, as shown in Exhibit No. ANR-0033, page 3, "Cost Estimate Summary" spreadsheet.

### F. Compressor Station Retirement

**Q. What is the order of operation underlying your transmission compressor station removal estimates?**

A. There are seven steps that will be undertaken to remove the compressor stations and underlie my estimate. First, miscellaneous surface material and fencing would be removed to make the site ready for demolition work. Second, valves, blowdowns and yard piping would be removed. This work involves excavation down three feet, cutting and capping, lifting, and hauling. Third, station equipment would be disconnected, lifted, and stockpiled for transportation to a salvage yard. Fourth, buildings would be demolished, and material transported to a salvage yard. Fifth, compressor blocks and concrete slabs would be broken up and removed to three feet below ground surface. This work also involves excavation, cutting, lifting, and hauling. Sixth, pavement, gravel, and unsuitable materials would be removed and hauled from the site, and the site would be graded. Seventh, and finally, the site would be restored by backfilling, grading, placing topsoil, seeding, and fertilizing.

**Q. How did you develop ANR's Transmission compressor station removal estimates?**

A. I utilized a three-phase cost estimating approach by grouping tasks into the following criteria: (1) surface material, (2) subsurface material, and (3) restoration. The quantity of material to be removed from compressor station locations were derived from each compressor station plot plan and standard detail MTOs (*see* Exhibit No. ANR-0033, "Material Takeoff Packet"). I then estimated the tasks, crew, time, equipment, and labor necessary to retire each category of compressor station material based on the quantities generated from the MTO. Finally, I estimated the costs for the crew and equipment, as shown in Exhibit No. ANR-0033, Workpapers. In summary, the total adjusted cost to decommission ANR's Transmission compressor station facilities along ANR's transmission line are estimated to be $317,918,828, as shown in Exhibit No. ANR-0033, pages 26-95, and summarized on page 3, "Cost Estimate Summary" spreadsheet.

## G. Cathodic Protection

**Q. Please describe the decommissioning costs related to cathodic protection.**

A. Cathodic protection is necessary throughout the pipeline system in order to preserve the pipe integrity by controlling the pipe corrosion through the use of a power source and sacrificial anode. Terminally retiring this equipment requires personnel experienced in electrical work to safely and efficiently decommission the electrical system. ANR has a total of 24,072 transmission cathodic protection rectifiers and test sites throughout the system to monitor the system integrity. The total cost to decommission ANR's cathodic protection Transmission facilities is estimated at $6,758,144, as shown in Exhibit No. ANR-0033, TDC Workpapers, pages 96-97, and summarized on page 3, "Cost Estimate Summary" spreadsheet.

## H. ROW Markers

**Q. Please describe the ROW marker decommissioning costs.**

A. To identify the location of buried pipelines within the ROWs, marker posts are placed in the ground at intervals above the centerline of the pipeline, or as close as possible. The ROW decommissioning process involves excavating down approximately three feet, removing the marker, backfilling, and seeding the disturbed site location. The ANR system has approximately 51,804 ROW markers estimated to cost $2,769,376, as shown in Exhibit No. ANR-0033, TDC Workpapers, page 98, and summarized on page 3, "Cost Estimate Summary" spreadsheet.

### I. Remote Communication Towers

**Q. Please describe the remote communication tower decommissioning costs.**

A. ANR has 80 remote communication towers used to communicate throughout the Transmission system. The tower decommissioning process involves cutting the guyed wires and disassembling the tower in sections, removal of the concrete foundation, backfill, and seeding the disturbed site. The estimated to cost to remove ANR's 80 remote communication towers is $6,030,989, as shown in Exhibit No. ANR-0033, TDC Workpapers, page 99, and summarized on page 3, "Cost Estimate Summary" spreadsheet.

### J. Tap Locations

**Q. Please describe the decommissioning costs associated with tap locations.**

A. Tap locations tie into, or connect to, the existing mainline system. The decommissioning process involves excavating down three feet, cutting and capping, lifting, hauling, and site restoration. The ANR Transmission system has 944 tap locations estimated to cost $5,671,927 to remove, as shown in Exhibit No. ANR-

0033, TDC Workpapers, page 100, and summarized on page 3, “Cost Estimate Summary” spreadsheet.

## VI. ANR UNDERGROUND STORAGE PLANT

**Q. What are the tasks included in your ANR Underground Storage estimate?**

A. I estimate that the work to retire ANR’s Underground Storage plant would include the following tasks:

i. Clean and purge system of hydrocarbons;
ii. Pipe abandonment;
iii. Road crossing abandonment;
iv. Remove meter stations;
v. Remove compressor stations;
vi. Remove cathodic protection;
vii. Remove pipeline ROW markers;
viii. Remove towers;
ix. Remove taps;
x. Well abandonment; and,
xi. Restore all sites.

These tasks are predicated on using the most economical method of retirement compatible with a sample of ANR’s ROW agreements, environmental considerations, DOT minimum safety regulations, and Corps of Engineers’ regulations pertaining to navigable waters and dredge and fill permits.

## A. Abandonment in Place of Pipeline Facilities

**Q. Please explain what steps ANR would take to clean and purge its Underground Storage pipelines.**

A. As previously mentioned, an abandoned pipeline is a pipeline that is permanently removed from service, physically separated from its supply source, and is no longer maintained. The abandonment of pipeline facilities includes the safe disconnection from an operating pipeline system, purging of combustibles, pigging, and sealing abandoned facilities left in place to minimize safety and environmental hazards. These tasks and costs are detailed in the TDC Workpapers, Exhibit No. ANR-0033, and ANR's Supporting Documents, Exhibit No. ANR-0034.

**Q. How did you estimate the cost to abandon ANR's Underground Storage pipelines?**

A. Based on my experience as well as referencing ANR's Supporting Documents, Exhibit No. ANR-0034, I developed estimates to purge, clean, cut and cap approximately 145 miles of ANR Underground Storage pipeline. As further detailed in Exhibit No. ANR-0033, page 104-105, I estimated that this will cost $36,281 per mile for pipe less than 24" in diameter, and summarized in page 103. Again, it should be noted these costs are well within the industry expert quote per mile for a

24” pipe, as stated in the October 31, 2013 RBN Energy LLC article, *“WOO-PIG-SOOIE”-The Business of Pipeline Integrity II*, by Callie Mitchell.[5]

### B. Removal of Pipeline Facilities

**Q. How many miles of pipeline did you estimate would be removed entirely?**

A. Approximately 3 miles.

**Q. What is the basis in your TDC estimate for the complete removal of the 3 miles of ANR’s Underground Storage pipeline?**

A. ANR personnel estimate that approximately 2.14 percent of ANR pipe would need to be removed upon abandonment based on its ROW agreements and permits. 2.14 percent of 145 miles of pipeline is approximately 3 miles.

**Q. How did you estimate the cost to remove ANR’s Underground Storage pipelines?**

A. I estimated the cost to excavate and remove the pipeline on a per-mile basis at $100,050 and $91,881, respectively. I then estimated the cost per mile to backfill and restore the area disturbed to its original condition at $96,572 and $10,806 per mile respectively, as detailed in TDC Workpapers, Exhibit No. ANR-0033, pages 105-108, and summarized on page 103.

**Q. Does ANR share ownership of any underground storage pipeline?**

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[5] Callie Mitchell, RBN Energy, Inc., *“Wooo–PIG–SOOIE!” – The Business of Pipeline Integrity* (Oct. 3, 2013), https://rbnenergy.com/woo-pig-sooie-the-business-of-pipeline-integrity. As noted previously, the article quotes $35,000 per mile for 24” pipe, or approximately $41,000 in 2021 dollars.

A. Yes. Approximately 3 miles of transmission pipeline are jointly owned. I have assumed the joint ownership costs for abandonment, removal, and restoration of the underground storage line pipe to be charged to the respective joint owners for an amount of $386,159 as calculated in Exhibit No. ANR-0033, page 145, "Jointly Owned Assets and Cost Distribution" spreadsheet. The final cost to decommission ANR's pipeline, less costs estimated through joint ownership, is $5,410,926, as shown in Exhibit No. ANR-0033, Workpapers, page 103, "Cost Estimate Summary" spreadsheet.

### C. Abandonment of Crossings

**Q. Will you summarize your estimate to abandon ANR's Storage pipeline crossings?**

A. ANR has a total of 8 road crossings throughout its Storage system. Based on the number and categories of crossings, the total cost to decommission ANR's pipeline crossings is estimated at $180,731, as shown in Exhibit No. ANR-0033, TDC Workpapers, page 109, and page 103, "Cost Estimate Summary" spreadsheet.

### D. Meter Station Retirement

**Q. What is the order of operation underlying your Underground Storage meter station removal estimates?**

A. As previously stated, there are six steps that will be undertaken to remove meter stations and underlie my estimate. First, miscellaneous surface material and fencing would be removed to make the site ready for demolition work. Second, valves and yard piping would be removed. This work involves excavation down three feet, cutting and capping, lifting, and hauling. Third, station equipment would be disconnected, lifted, and stockpiled for transportation to a salvage yard. Fourth, buildings would be demolished, and material transported to a salvage yard. Fifth, pavement, gravel and unsuitable materials would be removed and hauled from the site, and the site would then be graded. Finally, the site would be restored by backfilling, grading, placing topsoil, seeding and fertilizing.

**Q. How did you develop ANR's meter station removal estimates?**

A. ANR has twenty-two small and medium Underground Storage meter stations throughout its storage system. First, an MTO was performed to determine the estimated quantity of materials to be removed from the meter station plot plan and standard detail (*see* Exhibit No ANR-0033, "Material Takeoff Packet" section). Second, I estimated the tasks, crew, time, equipment, and labor necessary to retire each category of meter station material based on the quantities generated from the MTO. Third, I estimated the costs for the crew and equipment, as shown in Exhibit No. ANR-0033, TDC Workpapers, pages 110-115. In summary, the total cost to decommission ANR's Underground Storage meter station facilities are estimated at $7,090,199, as shown in Exhibit No. ANR-0033, page 103, "Cost Estimate Summary" spreadsheet.

### E. Compressor Station Retirement

**Q. What is the order of operation underlying your Underground Storage**

**compressor station removal estimates?**

A. As previously described in Storage compressor station removal section, there are seven steps that will be undertaken to remove the compressor stations and underlie my estimate. First, miscellaneous surface material and fencing would be removed to make the site ready for demolition work. Second, valves, blowdowns and yard piping would be removed. This work involves excavation down three feet, cutting and capping, lifting, and hauling. Third, station equipment would be disconnected, lifted, and stockpiled for transportation to a salvage yard. Fourth, buildings would be demolished, and material transported to a salvage yard. Fifth, compressor blocks and concrete slabs would be broken up and removed to three feet below ground surface. This work also involves excavation, cutting, lifting, and hauling. Sixth, pavement, gravel, and unsuitable materials would be removed and hauled from the site, and the site would be graded. Seventh, and finally, the site would be restored by backfilling, grading, placing topsoil, seeding, and fertilizing.

**Q. How did you develop ANR's Underground Storage compressor station removal estimates?**

A. I utilized a three-phase cost estimating approach by grouping tasks into the following criteria: (1) surface material, (2) subsurface material, and (3) restoration. The quantity of material to be removed from compressor station locations were derived from each compressor station plot plan and standard detail MTOs (*see* Exhibit No. ANR-0033, "Material Takeoff Packet"). I then estimated the tasks, crew, time, equipment, and labor necessary to retire each category of compressor station material based on the quantities generated from the MTO. Finally, I estimated the costs for the crew and equipment, as shown in Exhibit No. ANR-0033, Workpapers. The total cost to decommission ANR's four compressor stations is $19,412,721 as summarized in Exhibit No. ANR-0033, page 103.

### F. Cathodic Protection

**Q. Please describe the decommissioning costs related to cathodic protection.**

A. Cathodic protection is necessary throughout the pipeline system in order to preserve the pipe integrity by controlling the pipe corrosion through the use of a power source and sacrificial anode. Terminally retiring this equipment requires personnel experienced in electrical work to safely and efficiently decommission the electrical system. ANR has a total of 3,519 storage cathodic protection rectifiers and test sites throughout the system to monitor the system integrity. The total cost to decommission ANR's cathodic protection facilities are estimated at $1,118,897, as shown in Exhibit No. ANR-0033, TDC Workpapers, pages 116-117, and summarized in page 103, "Cost Estimate Summary" spreadsheet.

### G. ROW Markers

**Q. Please describe the ROW marker decommissioning costs.**

A. To identify the location of buried pipelines within the ROWs, marker posts are placed in the ground at intervals above the centerline of the pipeline, or as close as possible. The ROW decommissioning process involves excavating down approximately three feet, removing the marker, backfilling, and seeding the disturbed site location. The ANR system has approximately 597 storage ROW markers estimated to cost $35,162, as shown in Exhibit No. ANR-0033, TDC Workpapers, page 118, and summarized in page 103, “Cost Estimate Summary” spreadsheet.

### H. Remote Communication Towers

**Q. Please describe the remote communication tower decommissioning costs.**

A. ANR has 2 remote communication towers used to communicate throughout the Underground Storage system. The tower decommissioning process involves cutting the guyed wires and disassembling the tower in sections, removal of the concrete foundation, backfill, and seeding the disturbed site. The estimated to cost to remove ANR’s 2 remote communication towers is $150,775, as shown in Exhibit No. ANR-0033, TDC Workpapers, page 119, and summarized on page 103, “Cost Estimate Summary” spreadsheet.

### I. Tap Locations

**Q. Please describe the decommissioning costs associated with tap locations.**

A. Tap locations tie into, or connect to, the existing mainline system. The decommissioning process involves excavating down three feet, cutting and capping, lifting, hauling, and site restoration. The ANR system has 112 storage tap locations estimated to cost $500,775 to remove, as shown in Exhibit No. ANR-0033, TDC

Workpapers, page 120, and summarized in page 103, "Cost Estimate Summary" spreadsheet.

### J. Storage Well Locations

**Q. What is the order of operation for the removal of ANR's 870 storage wells?**

A. The tasks necessary to plug and abandon a storage well vary for each individual well. Generally, wells are retired by setting cement plugs across the production interval of the reservoir so that gas is isolated within the reservoir. To ensure that gas does not migrate, intermediate cement plugs are installed at intervals between the bottom of the well to the surface. The well-head is then removed three feet below the surface, plugged, and the surface area restored to its original condition.

**Q. How did you develop ANR's storage well removal estimates?**

A. I estimated material to be installed and removed based on the average field well depth and diameter. I then estimated the tasks, crew, time, equipment, and labor necessary to retire each well. Third, I estimated the costs for the crew and equipment, as shown in Exhibit No. ANR-0033, pages 123-132. Finally, I multiplied the total number of wells per field times average well cost to achieve a total cost per field, as shown on page 122. The total cost to decommission ANR's underground storage wells is $69,719,107, as summarized in Exhibit No. ANR-0033, page 103.

## VII. ANR PIPELINE PRODUCTION PLANT

**Q. What are the tasks included in your ANR Production estimate?**

A. I estimate that the work to retire ANR's Production plant would include the following tasks:

i. Clean and purge system of hydrocarbons;
ii. Remove meter stations;
iii. Remove taps; and,
iv. Restore all sites.

These tasks are predicated on using the most economical method of retirement compatible with a sample of ANR's ROW agreements, environmental considerations, DOT minimum safety regulations, and Corps of Engineers' regulations pertaining to navigable waters and dredge and fill permits.

### A. Meter Station Retirement

**Q. What is the order of operation underlying your Production meter station removal estimates?**

A. As previously stated, there are six steps that will be undertaken to remove meter stations and underlie my estimate. First, miscellaneous surface material and fencing would be removed to make the site ready for demolition work. Second, valves and yard piping would be removed. This work involves excavation down three feet, cutting and capping, lifting, and hauling. Third, station equipment would be disconnected, lifted, and stockpiled for transportation to a salvage yard. Fourth, buildings would be demolished, and material transported to a salvage yard. Fifth, pavement, gravel and unsuitable materials would be removed and hauled from the site, and the site would then be graded. Finally, the site would be restored by backfilling, grading, placing topsoil, seeding and fertilizing.

**Q. How did you develop ANR's meter station removal estimates?**

A. ANR has five small and medium Production stations throughout its system. First, an MTO was performed to determine the estimated quantity of materials to be removed from the meter station plot plan and standard detail (*see* Exhibit No ANR-0033, "Material Takeoff Packet" section). Second, I estimated the tasks, crew, time, equipment, and labor necessary to retire each category of meter station material based on the quantities generated from the MTO. Third, I estimated the costs for the crew and equipment, as shown in Exhibit No. ANR-0033, TDC Workpapers, pages 136-141. In summary, the total cost to decommission ANR's Production meter station facilities are estimated at $1,163,108, as shown in Exhibit No. ANR-0033, page 135, "Cost Estimate Summary" spreadsheet.

### B. Tap Locations

**Q. Please describe the decommissioning costs associated with tap locations.**

A. Tap locations tie into, or connect to, the existing mainline system. The decommissioning process involves excavating down three feet, cutting and capping, lifting, hauling, and site restoration. The ANR system has 109 Production tap locations estimated to cost $487,362 to remove, as shown in Exhibit No. ANR-0033, TDC Workpapers, page 142, and summarized in page 135, "Cost Estimate Summary" spreadsheet.

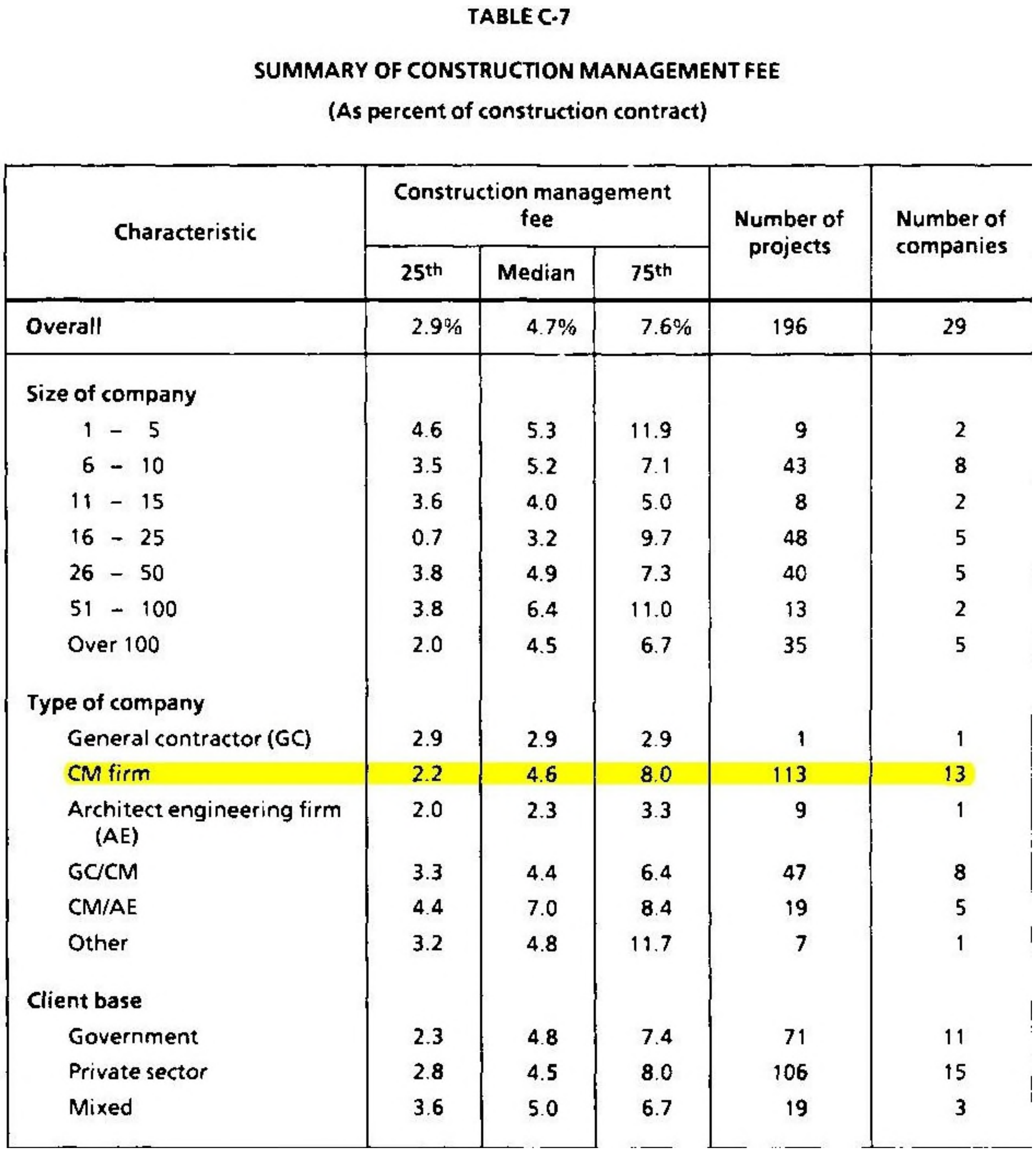
## VIII. CONSTRUCTION MANAGEMENT FEES ASSOCIATED WITH DECOMMISSIONING

**Q. How were CM expenses calculated for the cost estimate?**

A. Construction Management ("CM") is a professional service that provides a project's owner(s) with effective management of the project's schedule, cost, quality, safety, scope, and function.

**Q. Did you rely upon any additional information for your CM fee?**

A. Yes. As I previously mentioned, I reviewed U.S. Army Corps of Engineers publications *Cost-Competitive Construction Management: A Review of Corps of Engineers Construction Management Costs* and *U.S. Army Corps of Engineers Military Construction Management Cost* regarding construction management firm ("CM firm") fees used to develop private-sector costs as a percent of construction contract for providing construction management services.



## TABLE C-7

## SUMMARY OF CONSTRUCTION MANAGEMENT FEE

(As percent of construction contract)

| Characteristic | Construction management fee | | | Number of projects | Number of companies |
|---|---|---|---|---|---|
| | 25th | Median | 75th | | |
| **Overall** | 2.9% | 4.7% | 7.6% | 196 | 29 |
| **Size of company** | | | | | |
| 1 – 5 | 4.6 | 5.3 | 11.9 | 9 | 2 |
| 6 – 10 | 3.5 | 5.2 | 7.1 | 43 | 8 |
| 11 – 15 | 3.6 | 4.0 | 5.0 | 8 | 2 |
| 16 – 25 | 0.7 | 3.2 | 9.7 | 48 | 5 |
| 26 – 50 | 3.8 | 4.9 | 7.3 | 40 | 5 |
| 51 – 100 | 3.8 | 6.4 | 11.0 | 13 | 2 |
| Over 100 | 2.0 | 4.5 | 6.7 | 35 | 5 |
| **Type of company** | | | | | |
| General contractor (GC) | 2.9 | 2.9 | 2.9 | 1 | 1 |
| CM firm | 2.2 | 4.6 | 8.0 | 113 | 13 |
| Architect engineering firm (AE) | 2.0 | 2.3 | 3.3 | 9 | 1 |
| GC/CM | 3.3 | 4.4 | 6.4 | 47 | 8 |
| CM/AE | 4.4 | 7.0 | 8.4 | 19 | 5 |
| Other | 3.2 | 4.8 | 11.7 | 7 | 1 |
| **Client base** | | | | | |
| Government | 2.3 | 4.8 | 7.4 | 71 | 11 |
| Private sector | 2.8 | 4.5 | 8.0 | 106 | 15 |
| Mixed | 3.6 | 5.0 | 6.7 | 19 | 3 |

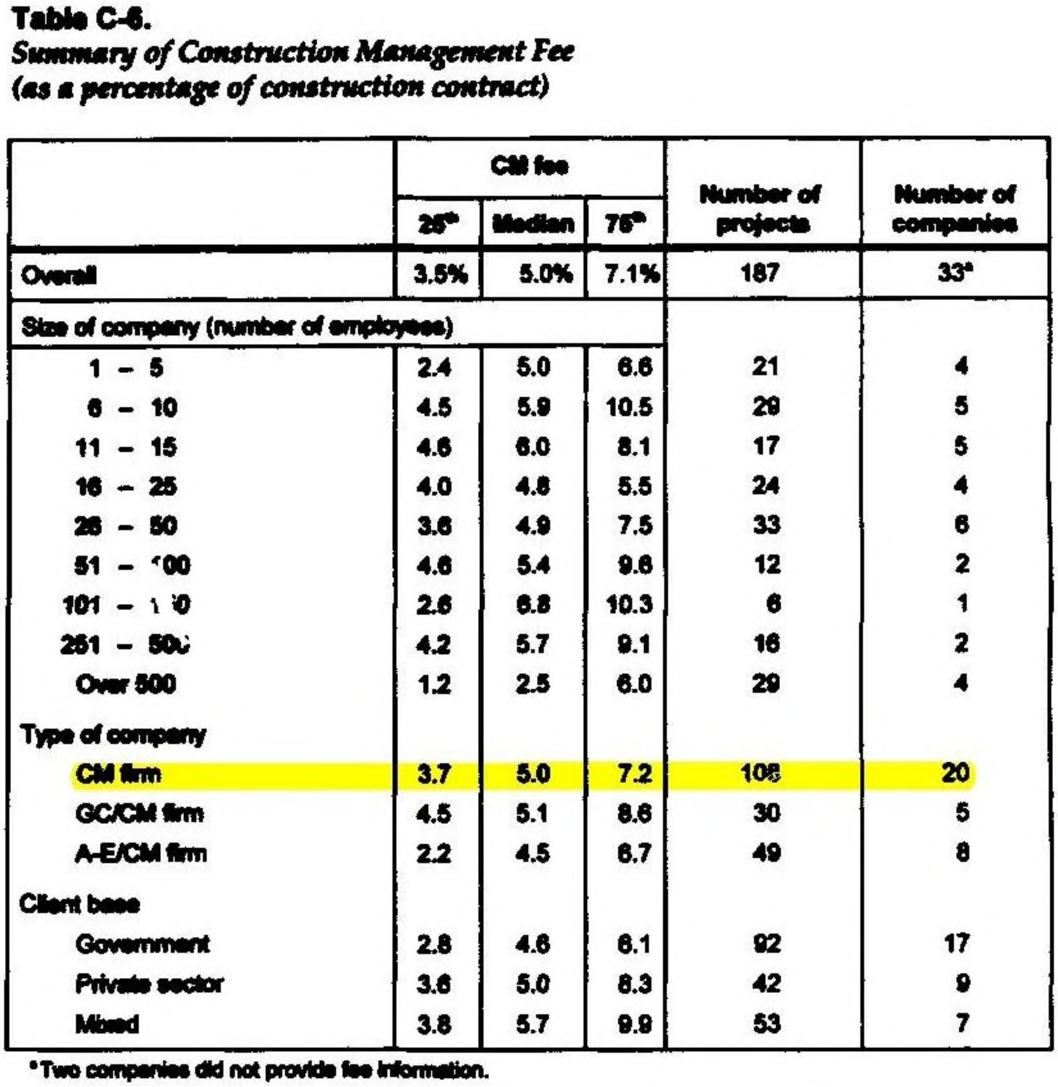


**Table C-6.**
***Summary of Construction Management Fee***
***(as a percentage of construction contract)***

| | CM fee | | | Number of projects | Number of companies |
|---|---|---|---|---|---|
| | 25th | Median | 75th | | |
| Overall | 3.5% | 5.0% | 7.1% | 187 | 33* |
| Size of company (number of employees) | | | | | |
| 1 – 5 | 2.4 | 5.0 | 6.6 | 21 | 4 |
| 6 – 10 | 4.5 | 5.9 | 10.5 | 29 | 5 |
| 11 – 15 | 4.6 | 6.0 | 8.1 | 17 | 5 |
| 16 – 25 | 4.0 | 4.8 | 5.5 | 24 | 4 |
| 26 – 50 | 3.6 | 4.9 | 7.5 | 33 | 6 |
| 51 – 100 | 4.6 | 5.4 | 9.6 | 12 | 2 |
| 101 – 1 0 | 2.6 | 6.8 | 10.3 | 6 | 1 |
| 251 – 500 | 4.2 | 5.7 | 9.1 | 16 | 2 |
| Over 500 | 1.2 | 2.5 | 6.0 | 29 | 4 |
| Type of company | | | | | |
| CM firm | 3.7 | 5.0 | 7.2 | 108 | 20 |
| GC/CM firm | 4.5 | 5.1 | 8.6 | 30 | 5 |
| A-E/CM firm | 2.2 | 4.5 | 6.7 | 49 | 8 |
| Client base | | | | | |
| Government | 2.8 | 4.6 | 6.1 | 92 | 17 |
| Private sector | 3.6 | 5.0 | 8.3 | 42 | 9 |
| Mixed | 3.8 | 5.7 | 9.9 | 53 | 7 |

*Two companies did not provide fee information.

The information by the USACE clearly show that a 2.5% CM fee is lower than the median 4.6% and 5.0% of CM firm fees surveyed by USACE applied to construction projects. The estimate CM fee for ANR's Transmission, Storage, and Production facilities are $29,134,170, $2,590,425 and $41,262, respectively. *See* Exhibit No. ANR-0033, pages 3, 103, and 135, "Cost Estimate Summary" spreadsheets.

## IX. CONTINGENCY COSTS

**Q. What are contingency costs?**

A. Establishing a budget is one of the first steps in planning a construction project. However, there are always unforeseen issues, or items that come up where additional work will be needed at a cost incremental to the cost estimates established for specific tasks in the budget estimate. A contingency budget is money set aside to cover unexpected costs during the construction process. This money is on reserve and not allocated to one area of the work. Unknown risks are a factor for determining contingency. By identifying risks, you will better understand where the contingency budget might go, which will elucidate how much you might need. Examples of risks that contribute to a higher contingency cost during construction include (1) the condition of material being removed, (2) market conditions for labor, equipment and materials and their availability, (3) weather, and (4) seasonal delays that impact scheduling. This is a critical component of the budget.

**Q. What is your contingency cost estimate and how was that developed?**

A. I estimate a conservative ten percent contingency. I base this ten percent contingency estimate on (1) my construction experience, (2) Chapter 11, Contingency, of the DOE's Cost Estimating Guide, and (3) delays due to weather. My ten percent contingency costs for ANR's Transmission, Storage, and Production total $119,450,096, $10,620,742, and $169,173, respectively (*see* Exhibit No. ANR-0033, "Cost Estimate Summary" spreadsheets). My estimated costs, based on this scope of work, are significantly lower than it would have been had I assumed the use of union labor, installation of temporary access roads to remote locations, and clean-up and removal of hazardous materials at measuring and regulating ("M&R") stations, mainline facilities, and pipeline locations. Further, the contingency costs estimated are well within the acceptable range of five percent to fifteen percent documented within Chapter 11 of the *Cost Estimating Guide and Engineering and Design: Civil Works Cost Engineering*, as well as below the fifteen percent used by Viking Gas Transmission Company and Gas Transmission Northwest in Commission Docket Nos. RP98-290-000 and RP06-407-000, respectively.

## X. SALVAGE VALUES

**Q. Did you consider material salvage in your TDC estimate?**

A. Yes. I included gross salvage value allowances for equipment, buildings, valves, and pipe. I followed the recommended construction and demolition debris guidelines of FEMA's *Debris Estimating Filed Guide* that calculated gross salvage weight in tons would be half the volume removed measured in cubic yards. I estimated that the gross salvage value for equipment, buildings, valves, and pipe would be $168 per ton for steel based on Scrap Sales USA pricing, which translated into Transmission, Storage, and Production totals of $15,803,068, $3,602,776, and $5,456, respectively. *See* Exhibit No. ANR-0033, TDC Workpapers, pages 3, 103, and 135, "Cost Estimate Summary" spreadsheets.

## XI. TOTAL ESTIMATED RETIREMENT COST AND CONCLUSION

**Q. Please describe how your TDC estimate is organized.**

A. My TDC estimate contains separate estimates of terminal decommissioning costs and salvage value for ANR Transmission and Storage plant. Each of the estimates consists of three sections, as detailed in each corresponding Exhibit No. ANR-0033, “Cost Estimate Summary” spreadsheets. The first section, “Decommissioning Costs,” details estimated costs by line-item of required tasks to be performed during the terminal abandonment. The second section, “Contingency,” details contingency costs included in the TDC estimate, calculated at ten percent of the base cost plus CM fees. The third and final section, “Salvage,” recognizes the gross salvage value of ANR’s Transmission, Storage, and Production scrap, as applicable, at the time of final abandonment.

**Q. What conclusions have you reached with respect to the TDC estimate for ANR’s facilities?**

A. The estimated and market adjusted total TDC costs and credits for abandonment, removal, and restoration of the ROW for ANR’s Transmission, Storage, and Production facilities in 2021 U.S. dollars are $1,298,147,990, $113,225,388 and $1,855,449, respectively. *See* Exhibit No. ANR-0033, pages 3, 103, and 135, “Cost Estimate Summary” spreadsheets.

**Q. How would you characterize the final ANR TDC estimate?**

A. My final TDC estimate of $1,413,228,828 in 2021 U.S dollars for ANR's Transmission, Storage, and Production facilities is conservative for several reasons. First, my TDC estimate is based upon abandoning in place all underground pipe and crossings. My estimated costs, based on this scope of work, are significantly lower than it would have been had I assumed complete removal and disposal of all of ANR's pipelines and crossings would be conducted rather than abandoning in place. Second, it is assumed that all pipe is within five feet of the surface, negating the use of trench boxes, engineered shoring, and additional excavation. Third, it is assumed access roads are available to each site and that temporary access roads will not need to be installed. Fourth, ROW costs were conservatively estimated based upon removal or abandonment in place and do not account for unforeseen compensation upon final restoration. For instance, in my experience, using sod versus seed and straw can increase the cost of a typical restoration. However, there may be requirements to undertake more expensive sodding restoration is an unknown at this time. Finally, should hazardous material issues arise with respect to ANR's compressor and M&R stations, mainline facilities, and pipelines, these costs are not specifically identified and are not included in my TDC estimate.

**Q. Does this conclude your prepared direct testimony?**

A. Yes.

## UNITED STATES OF AMERICA
## BEFORE THE
## FEDERAL ENERGY REGULATORY COMMISSION

**ANR Pipeline Company** )
)  **Docket No. RP22-___-000**
)

## AFFIDAVIT OF
## STEVEN R. FALL

Steven R. Fall, being first duly sworn, on oath states that he is the witness whose testimony appears on the preceding pages entitled "Prepared Direct Testimony of Steven R. Fall on Behalf of ANR Pipeline Company" that, if asked the questions which appear in the text of said testimony, he would give the answers that are therein set forth; and that affiant adopts the aforesaid testimony as Steven R. Fall's sworn testimony in this proceeding.

____________________________
Steven R. Fall

Subscribed and sworn to before me, a Notary Public in and for District of Columbia, this 21st day of January 2022.

STEPHANIE J. WILKERSON
EXP. 9-14-24

____________________________
Notary Public

My Commission expires:

STEPHANIE J. WILKERSON
NOTARY PUBLIC DISTRICT OF COLUMBIA
My Commission Expires September 14, 2024

____________________________

# CURRICULUM VITAE

| | |
|---|---|
| **NAME** | Steven Fall |
| **BUSINESS ADDRESS** | 1155 15th Street N.W., Suite 1004<br>Washington, DC 20005 |
| **EDUCATION** | Pennsylvania State University; Bachelor of Science in Biology/Minor in Chemistry<br>Certifications:<br>Maryland State Highway Traffic Control Manager<br>OSHA 30 Card<br>Certificate of Completion – Deck and Ramp Guidelines<br>Certificate of Completion – Chimneys and Vents<br>Confidential Clearance Eligible<br>NUCA – National Utility Contractors Association<br>HeavyBid/HeavyJob Software<br>Foundation Software<br>RSMeans |
| **PRESENT POSITION** | Vice President<br>Brown, Williams, Moorhead & Quinn, Inc.<br>1155 15th Street N.W., Suite 1004<br>Washington, DC 20005 |
| **NATURE OF WORK PERFORMED WITH FIRM** | Analysis of terminal negative salvage and pipeline operations. Natural gas pipeline terminal negative salvage testimony provided for the Federal Energy Regulatory Commission. A list of cases in which Mr. Fall provided testimony is attached below. |
| **PREVIOUS EMPLOYMENT** | Department of Consumer and Regulatory Affairs<br>Washington, DC (District of Columbia agency responsible for issuance of and adherence to licenses and permits)<br>Project Manager 6/2017 – 10/2017<br>High impact position designated for situations requiring immediate resolution. |

Mobile Inspection Implementation: Research and development of the Mobile Inspection application and platform, which includes but is not limited to development of the Mobile Inspection Standard Operating Provisions Manual, training protocols and regimens.

International Accreditation Services Semi-Annual Report: Collection and interpretation of data from multiple departments summarized into a deliverable report required for inspection and permitting accreditation.

Hot Properties: District of Columbia properties undergoing construction that require guidance to achieve resolution of ongoing compliance difficulties. Understanding of the IRC, IBC, and DC Municipal Regulations required for situational analysis of safety and code compliance.

Anchor Construction Washington, DC
(Anchor Construction specializes in utility construction: water, storm, sewer, and conduits.)

Project Engineer 7/2014 – 6/2017
WSSC ESA IDIQ: Manage a $32.5 million dollar sewer mainline repair, rehabilitation, and/or replacement project in coordination with the WSSC at the Cabin John and Paint Branch Basin. Required hands-on scheduling and management of materials, equipment, and crew members.

DDOT Klingle Valley Trail: $7.6 million dollar green infrastructure installation including: bio-swale, bio-retention structures, permeable asphalt multi-use trail, Klingle Creek restoration, lighting and landscaping. Multi-agency coordination with underground utilities operated byDDOT, Washington Gas, National Park Service, PEPCO, and DC Water.

Howard Hughes Medical Institute Retaining Wall: $1.5 million dollar project designed to remove, salvage and rebuild an existing retaining wall located on a designated conservation area at the Howard Hughes Medical Institute campus. Required understanding and compliance with restrictions imposed on operating areas, materials handling, and site restoration standards.

WSSC Large Meter Vault: $575 thousand dollar large meter vault replacement project at various locations throughout Montgomery County, MD. Required hands-on scheduling and management of materials, equipment, and crew members.

Additional accomplishments and responsibilities include:

- Develop project objectives by reviewing project proposals, blue prints, drawings and required permits.
- Determine project responsibilities by identifying project phases and elements; assigning personnel to phases and elements; reviewing bids from contractors.
- Determine project specifications by studying product design, customer requirements, and performance standards.
- Determine project schedule by studying project plan and specifications; calculating time requirements; sequencing project elements.
- Develop and maintain project schedule by monitoring progress; coordinating activities through weekly and bi-weekly schedule updates.
- Control project plan by reviewing and inspecting design, specifications, and plan and schedule changes; recommending actions.
- Provide leadership through thorough communication of attainable goals, project direction and production analysis of daily/weekly/monthly activities.
- Maintain safe and clean working environment by enforcing OSHA mandated procedures, rules and regulations.

AKA White House Washington, DC
(The fusion of the long-term comfort of a luxury furnished apartment with the style and service of an intimate hotel)

Director of Engineering 7/2012 – 7/2014
Directly oversaw the $1 million dollar renovation improvement, adding another level of hotel luxury suites to the existing facility. Received global recognition from company for outstanding work ethics and policies implemented. Improved department efficiency and established preventative maintenance procedures.
Additional accomplishments and responsibilities include:

Managed electrical systems, mechanical work and safety aspects of a 141 room hotel.

Directly oversaw the implementation of work planned for building maintenance, including assigning and delegating multiple projects to staff and vendors.

Monitored and controlled expenditures to successfully stay within property's monthly budget.

Supervised the maintenance of air conditioning, elevators, room appliances, building wire systems, roofing, landscaping and all operational equipment.

Independently created request for proposals to negotiate contract/vendor proposals.

Interviewed, trained, inspired and evaluated staff; disciplined and implemented corrective actions as necessary.

Developed the implemented the building Emergency Evacuation Plan in coordination with DC Fire Department.

Humanetics Corporation Eden Prairie, MN

(Humanetics is focused in three key areas organized around FDA regulatory boundaries: prescription drugs, medical foods, and consumer products)

Research Analyst 7/2005 – 3/2012

Oversaw and performed research and development of a radioprotectant in coordination with the Armed Forces Radiobiology Research Institute, Henry Jackson Foundation, Uniformed Services University of the Health Sciences, and BioReliance.

Designed and implemented testing of complex experiments to test prospective radiological protective and therapeutic agents.

Completed analysis on test results to assess the biological and physiological effects of designed experimentation.

Effectively communicated research ideas and methodology via written reports and oral presentations.

Generated experimental protocols and methodology.

Conducted laboratory site assessments, including site activation, interim monitoring and close-out visits.

Achieved proof of efficacy through preclinical testing conducted of an experimental radioprotectant designed to combat the effects of Acute Radiation Syndrome (ARS).

Organized and maintained detailed records of new research data as well as relevant published studies.

Provided technical guidance in training to no less than two dozen AFRRI staff and military employees.
Completed yearly detailed FDA summary report.
Designed, implemented and updated experimental SOP's.

BioReliance Corporation Rockville, MD
(Provides nonclinical testing and manufacturing services for biologics)

Senior Research Associate 7/2000 – 7/2005
Team leader hired to assist in experimental development, data documentation and analysis at an established biotech corporation.

- Executed over 50 multi-phased experiments per year to assess the biological and physiological effects of carcinogenic exposure on rodents and cell cultures.
- Captured test results and collated consumable forms for supervisor.
- Assisted in the design of secondary experiments based on initial results.
- Ensured each experiment adhered to FDA mandated GLP standards.
- Provided daily briefings to laboratory manager regarding status and results of experiments.
- Designed and subsequently implemented and updated dozens of experimental SOP's.
- Monitored and maintained laboratory equipment and supplies.

| # | JURISDICTION | CASE OR DOCKET NO. | UTILITY/ORGANIZATION INITIATING PROCEEDING | POSITION | SUBJECT MATTER |
|---|---|---|---|---|---|
| | | | Formal Proceedings In Which Steven Fall Testified | | |
| 1 | FERC | RP18-877 | MOGAS PIPE LINE COMPANY | Witness | Natural Gas Terminal Decommissioning |
| 2 | FERC | RP18-940 | EMPIRE PIPELINE INC. | Witness | Natural Gas Terminal Decommissioning |
| 3 | FERC | RP18-922 | TRAILBLAZER PIPELINE COMPANY | Witness | Natural Gas Terminal Decommissioning |
| 4 | FERC | RP18-923 | ENABLE MISSISSIPPI RIVER TRANSMISSION, LLC | Witness | Natural Gas Terminal Decommissioning |
| 5 | FERC | RP18-1115 | SALTVILLE GAS STORAGE COMPANY | Witness | Natural Gas Terminal Decommissioning |
| 6 | FERC | RP18-1126 | TRANSCONINENTAL GAS PIPELINE COMPANY | Witness | Natural Gas Terminal Decommissioning |
| 7 | FERC | RP19-78 | PANHANDLE EASTERN PIPE LINE COMPANY, LP | Witness | Natural Gas Terminal Decommissioning |
| 8 | FERC | RP19-165 | WBI ENERGY TRANSMISSION, INC. | Witness | Natural Gas Terminal Decommissioning |
| 9 | FERC | RP19-343 | TEXAS EASTERN TRANSMISSION, LP | Witness | Natural Gas Terminal Decommissioning |
| 10 | FERC | RP19-352 | SEA ROBIN PIPELINE COMPANY, LLC | Witness | Natural Gas Terminal Decommissioning |
| 11 | FERC | RP19-1426 | NATIONAL FUEL GAS SUPPLY CORPORATION | Witness | Natural Gas Terminal Decommissioning |
| 12 | FERC | RP19-1523 | PANHANDLE EASTERN PIPE LINE COMPANY, LP | Witness | Natural Gas Terminal Decommissioning |
| 13 | FERC | RP20-131 | ENABLE MISSISSIPPI RIVER TRANSMISSION, LLC | Witness | Natural Gas Terminal Decommissioning |
| 14 | FERC | RP20-467 | DOMINION ENERGY COVE POINT LNG, LP | Witness | Natural Gas Terminal Decommissioning |
| 15 | FERC | RP20-908 | ALLIANCE PIPELINE, LP | Witness | Natural Gas Terminal Decommissioning |
| 16 | FERC | RP20-921 | MARITIMES & NORTHEAST PIPELINE, LLC | Witness | Natural Gas Terminal Decommissioning |

| # | JURISDICTION | CASE OR DOCKET NO. | UTILITY/ORGANIZATION INITIATING PROCEEDING | POSITION | SUBJECT MATTER |
|---|---|---|---|---|---|
| 17 | FERC | RP20-980 | EAST TENNESSEE NATURAL GAS, LLC | Witness | Natural Gas Terminal Decommissioning |
| 18 | FERC | RP21-441 | FLORIDA GAS TRANSMISSION, LLC | Witness | Natural Gas Terminal Decommissioning |
| 19 | FERC | DO21-20 | SHELL PIPELINE COMPANY, LP | Witness | Oil Depreciation Study |
| 20 | FERC | RP21-1001 | TEXAS EASTERN TRANSMISSION, LP | Witness | Natural Gas Terminal Decommissioning |
| 21 | FERC | RP21-1187 | EASTERN GAST TRANSMISSION AND STORAGE, INC. | Witness | Natural Gas Terminal Decommissioning |
| 22 | FERC | RP22-18 | TEXAS EASTERN TRANSMISSION, LP | Witness | Natural Gas Terminal Decommissioning |

# ANR Pipeline Company
## Summary of Terminal Decommissioning Cost Estimate

| | |
|---|---|
| Transmission | $ 1,298,147,990 |
| Underground Storage | $ 113,225,388 |
| Production | $ 1,855,449 |
| Total TDC Estimate: | **$ 1,413,228,828** |

# ANR PIPELINE COMPANY

# TRANSMISSION COST ESTIMATE PACKET

## ANR Pipeline Company
## Summary of Terminal Decommissioning Cost Estimate - Transmission

| Line No. | Particular | Cost ($) | Item | Total TDC Estimate ($) | Total Adjusted (*) Cost Estimate ($) |
|---|---|---|---|---|---|
| | (A) | (B) | (C) | (D) | (E) |
| 1 | A. DECOMMISSIONING COSTS | | | | |
| 2 | **Transmission Line** | **Cost / Mile** | **Total Miles** | **Total** | |
| 3 | 1-1 - <24" Pipeline Clean and Purge | $ 38,608 | 5457.6 | $ 210,707,808 | |
| 4 | 1-1A - >26" Pipeline Clean and Purge | $ 43,688 | 3441.5 | $ 150,351,922 | |
| 5 | 1-2 - Trench Excavation | $ 96,769 | 190.4 | $ 18,428,712 | |
| 6 | 1-3 - Pipe Removal | $ 201,427 | 190.4 | $ 38,359,817 | |
| 7 | 1-4 - Trench Backfill | $ 115,816 | 190.4 | $ 22,056,102 | |
| 8 | 1-5 - Trench Restoration | $ 10,806 | 190.4 | $ 2,057,916 | |
| 9 | | | | * | **$ 413,084,846** |
| 10 | | | | Decommissioning Cost Owed Through % Ownership: | $ (2,116,050) |
| 11 | | | | | **$ 410,968,796** |
| 12 | | | | | |
| 13 | **Abandonment** | **Cost /** | **Total Crossing** | **Total** | |
| 14 | 2-2 - Road Crossing Abandonment | $ 27,063 | 6925 | $ 187,409,707 | |
| 15 | 2-4 - Highway Crossing Abandonment | $ 30,186 | 1179 | $ 35,588,864 | |
| 16 | 2-5 - RR Line Crossing Abandonment | $ 46,248 | 403 | $ 18,637,999 | |
| 17 | 2-6 - Stream Crossing Abandonment | $ 43,689 | 10 | $ 436,890 | |
| 18 | 2-7 - River Crossing Abandonment | $ 48,583 | 148 | $ 7,190,255 | |
| 19 | | | 8665 | * | **$ 232,977,040** |
| 20 | | | | | |
| 21 | **Meter Station** | **Cost / Station** | **Total Stations** | **Total** | |
| 22 | 3-1 - Small Meter Station Removal | $ 24,599 | 322 | $ 7,920,852 | |
| 23 | 3-2 - Small Meter Station Sub Material Removal | $ 72,918 | 322 | $ 23,479,742 | |
| 24 | 3-3 - Small Meter Station Backfill and Restoration | $ 114,980 | 322 | $ 37,023,509 | |
| 25 | | | | * | **$ 63,953,331** |
| 26 | 3-4 - Medium Meter Station Removal | $ 65,279 | 300 | $ 19,583,776 | |
| 27 | 3-5 - Medium Meter Station Sub Material Removal | $ 137,609 | 300 | $ 41,282,746 | |
| 28 | 3-6 - Medium Meter Station Backfill and Restoration | $ 191,541 | 300 | $ 57,462,273 | |
| 29 | | | | * | **$ 110,597,295** |
| 30 | 3-7 - Large Meter Station Removal | $ 92,858 | 10 | $ 928,580 | |
| 31 | 3-8 - Large Meter Station Sub Material Removal | $ 248,766 | 10 | $ 2,487,663 | |
| 32 | 3-9 - Large Meter Station Backfill and Restoration | $ 484,458 | 10 | $ 4,844,580 | |
| 33 | | | | * | **$ 7,721,067** |
| 34 | | | | | |
| 35 | **Compressor Station** | **Ave. Cost / Station** | **Total Stations** | **Total** | |
| 36 | Compressor Station Removal | $ 5,192,451 | 55 | $ 340,143,510 | |
| 37 | | | | * | **$ 317,918,828** |
| 38 | | | | | |
| 39 | **Cathodic Protection** | **Cost / CP** | **Total CP** | **Total** | |
| 40 | 5-1 - Cathodic Protection - Rectifier Removal | $ 3,509 | 579 | $ 2,031,795 | |
| 41 | 5-2 - Cathodic Protection - Test Site Removal | $ 221 | 23493 | $ 5,198,789 | |
| 42 | | | | * | **$ 6,758,144** |
| 43 | | | | | |
| 44 | **Right of Way Markers** | **Cost / ROW** | **Total ROW** | **Total** | |
| 45 | 6-1 - ROW Marker Removal | $ 57 | 51804 | $ 2,962,975 | |
| 46 | | | | * | **$ 2,769,376** |
| 47 | **Tower Removal** | **Cost / Tower** | **Total Towers** | **Total** | |
| 48 | 6-3- Remote Tower Locations | $ 80,657 | 80 | $ 6,452,596 | |
| 49 | | | | * | **$ 6,030,989** |
| 50 | | | | | |
| 51 | **Tap Removal** | **Cost / Tap** | **Total Taps** | **Total** | |
| 52 | 7-1 - Tap Locations | $ 6,428 | 944 | $ 6,068,434 | |
| 53 | | | | * | **$ 5,671,927** |
| 56 | | | | | |
| 57 | | | | Base Total: | $ 1,165,366,792 |
| 58 | | | C.M. Expense | $ 29,134,170 | |
| 59 | | | | | $ 1,194,500,962 |
| 60 | B. CONTINGENCY | | 10% Contingency Fees | $ 119,450,096 | |
| 61 | | | | Subtotal: | $ 1,313,951,058 |
| 62 | C. SALVAGE | | | | |
| 63 | | | | Salvage Material - Scrap Metal: | $ (15,803,068) |
| 64 | | | | | |
| 65 | | | | **Grand Total:** | **$ 1,298,147,990** |
| 66 | * City Cost Index Adjustment Factor Used | = 0.9347 | | | |
| 67 | 0.9347 is the Average City Cost Index Adjustment Factor of locations found within ANR's Geographic Locations | | | | |

## 1-1 - Pipeline Clean and Purge

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for small equipment, placed in rear of, or towed by pickup truck | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton | 4 | 2 | $ - | $ 130.00 | $ 48.50 | $ 178.50 |
| 8362 | C.F. | Gas Pipelines, Nitrogen purge method, lengths 1000' to 10,000' | | 0 | 0 | $ 919.82 | $ 1,087.06 | $ 919.82 | $ 2,926.70 |
| 5280 | L.F. | Sewer pipelines, cleaning, pig method, lengths 1000' to 10,000', 4" diameter through 24" diameter, minimum | | 0 | 0 | $ - | $ - | $ - | $ 21,859.20 |
| 15 | Ton | Hazardous waste cleanup/pickup/disposal, dumpsite disposal charge, maximum | | 0 | 0 | $ - | $ - | $ - | $ 6,825.00 |
| 0.8 | Week | Field personnel, general purpose laborer, average | | 0.2 | 40 | $ - | $ 1,640.00 | $ - | $ 1,640.00 |
| 0.4 | Week | Field personnel, general purpose laborer, average | | 0.2 | 40 | $ - | $ 820.00 | $ - | $ 820.00 |
| 0.2 | Week | Field personnel, field engineer, engineer, | | 0 | 0 | $ - | $ 555.00 | $ - | $ 555.00 |
| 0.2 | Week | Field personnel, field engineer, engineer, | | 0 | 0 | $ - | $ 555.00 | $ - | $ 555.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for small equipment, placed in rear of, or towed by pickup truck | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton | 4 | 2 | $ - | $ 130.00 | $ 48.50 | $ 178.50 |
| 1 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 535.00 | $ - | $ 535.00 |
| 0.5 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 257.50 | $ - | $ 257.50 |
| 122 | $/Day | Per Diem | | 1 | 100 | $ - | $ - | $ - | $ 1,520.72 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 757.02 | $ - | $ 757.02 |

**Total** **$ 38,608.14**

# 1-1 - Pipeline Clean and Purge

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for small equipment, placed in rear of, or towed by pickup truck | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton | 4 | 2 | $ - | $ 130.00 | $ 48.50 | $ 178.50 |
| 22591 | C.F. | Gas Pipelines, Nitrogen purge method, lengths 1000' to 10,000' | | 0 | 0 | $2,485.01 | $ 2,936.83 | $ 2,485.01 | $ 7,906.85 |
| 5280 | L.F. | Sewer pipelines, cleaning, pig method, lengths 1000' to 10,000', 4" diameter through 24" diameter, minimum | | 0 | 0 | $ - | $ - | $ - | $ 21,859.20 |
| 15 | Ton | Hazardous waste cleanup/pickup/disposal, dumpsite disposal charge, maximum | | 0 | 0 | $ - | $ - | $ - | $ 6,825.00 |
| 0.8 | Week | Field personnel, general purpose laborer, average | | 0.2 | 40 | $ - | $ 1,640.00 | $ - | $ 1,640.00 |
| 0.4 | Week | Field personnel, general purpose laborer, average | | 0.2 | 40 | $ - | $ 820.00 | $ - | $ 820.00 |
| 0.2 | Week | Field personnel, field engineer, engineer, | | 0 | 0 | $ - | $ 555.00 | $ - | $ 555.00 |
| 0.2 | Week | Field personnel, field engineer, engineer, | | 0 | 0 | $ - | $ 555.00 | $ - | $ 555.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for small equipment, placed in rear of, or towed by pickup truck | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton | 4 | 2 | $ - | $ 130.00 | $ 48.50 | $ 178.50 |
| 1 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 535.00 | $ - | $ 535.00 |
| 0.5 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 257.50 | $ - | $ 257.50 |
| 122 | $/Day | Per Diem | | 1 | 100 | $ - | $ - | $ - | $ 1,520.72 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 856.63 | $ - | $ 856.63 |

**Total** **$ 43,687.90**

## 1-2 - Trench Excavation

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 40-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (medium)<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Flatbed Trailer, 40 Ton | 2 | 8 | $ - | $ 515.00 | $ 380.00 | $ 895.00 |
| 5280 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 475.20 | $ 8,923.20 | $ 211.20 | $ 9,609.60 |
| 10560 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $5,068.80 | $ 21,859.20 | $ 3,168.00 | $ 30,096.00 |
| 391 | C.Y. | Topsoil stripping and stockpiling, topsoil, sandy loam, ideal conditions, 200 HP dozer | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P. | 2300 | 0 | $ - | $ 93.84 | $ 285.43 | $ 379.27 |
| 2174 | B.C.Y. | Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering | 1 Equip. Oper. (crane)<br>1 Laborer<br>1 Hyd. Excavator, .75 C.Y. | 270 | 0.06 | $ - | $ 7,891.43 | $ 6,217.49 | $ 14,108.93 |
| 17 | Day | Rent truck pickup 3/4 ton 4 wheel drive, Incl. Hourly | | 0 | 0 | $ - | $ - | $ 4,559.06 | $ 4,559.06 |
| 3 | Week | Field personnel, field engineer, senior engineer, | | 0 | 0 | $ - | $ 10,875.00 | $ - | $ 10,875.00 |
| 3 | Week | Field personnel, superintendent, maximum | | 0 | 0 | $ - | $ 9,750.00 | $ - | $ 9,750.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 40-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (medium)<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Flatbed Trailer, 40 Ton | 2 | 8 | $ - | $ 515.00 | $ 380.00 | $ 895.00 |
| 17 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 9,095.00 | $ - | $ 9,095.00 |
| 8 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 4,120.00 | $ - | $ 4,120.00 |
| 122 | $/Day | Per Diem | | 1 | 32.12 | $ - | $ - | $ - | $ 488.46 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 1,897.43 | $ - | $ 1,897.43 |

**Total** **$ 96,768.75**

## 1-3 - Pipe Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 40-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (medium)<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Flatbed Trailer, 40 Ton | 2 | 8 | $ - | $ 515.00 | $ 380.00 | $ 895.00 |
| 5280 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 18" - 24", excludes excavation | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 160 | 0.2 | $ - | $ 60,456.00 | $ 30,888.00 | $ 91,344.00 |
| 33 | Ea. | Delivery charge for pipe, hauled on 40-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (medium)<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Flatbed Trailer, 40 Ton | 2 | 8 | $ - | $ 16,995.00 | $ 12,540.00 | $ 29,535.00 |
| 33 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 18,810.00 | $ 29,370.00 | $ 48,180.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 40-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (medium)<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Flatbed Trailer, 40 Ton | 2 | 8 | $ - | $ 515.00 | $ 380.00 | $ 895.00 |
| 33 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 17,655.00 | $ - | $ 17,655.00 |
| 16 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 8,240.00 | $ - | $ 8,240.00 |
| 122 | $/Day | Per Diem | | 1 | 48.2 | $ - | $ - | $ - | $ 732.99 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 3,949.54 | $ - | $ 3,949.54 |

**Total** **$ 201,426.53**

# 1-4 - Trench Backfill

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 40-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (medium)<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Flatbed Trailer, 40 Ton | 2 | 8 | $ - | $ 515.00 | $ 380.00 | $ 895.00 |
| 22 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 120 | 0.07 | $ - | $ 95.48 | $ 53.90 | $ 149.38 |
| 564 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 3,722.00 | $ 4,990.87 | $ 8,712.87 |
| 564 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | $ 8,374.51 | $ 1,607.23 | $ 2,768.95 | $ 12,750.69 |
| 3129 | C.Y. | Topsoil stripping and stockpiling, topsoil, sandy loam, ideal conditions, 200 HP dozer | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P. | 2300 | 0 | $ - | $ 750.96 | $ 2,284.17 | $ 3,035.13 |
| 3129 | E.C.Y. | Backfill, bulk, air tamped compaction, add | 1 Equipment Oper. (light)<br>1 Laborer<br>1 Air Powered Tamper<br>1 Air Compressor, 365 cfm<br>2 -50' Air Hoses, 1.5 | 80 | 0.2 | $ - | $ 36,452.85 | $ 18,461.10 | $ 54,913.95 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 40-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (medium)<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Flatbed Trailer, 40 Ton | 2 | 8 | $ - | $ 515.00 | $ 380.00 | $ 895.00 |
| 40 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 21,400.00 | $ - | $ 21,400.00 |
| 20 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 10,300.00 | $ - | $ 10,300.00 |
| 122 | $/Day | Per Diem | | 1 | 32.43 | $ - | $ - | $ - | $ 493.17 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 2,270.90 | $ - | $ 2,270.90 |

**Total** **$115,816.09**

## 1-5 - Trench Restoration

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for small equipment, placed in rear of, or towed by pickup truck | | 4 | 2 | $ - | $ 130.00 | $ 48.50 | $ 178.50 |
| 5 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | | 1.5 | 16 | $ - | $ 4,475.00 | $ 660.00 | $ 5,135.00 |
| 2347 | S.Y. | Seeding, mechanical seeding, 44 lb/M.S.Y. | | 2500 | 0 | $610.22 | $ 492.87 | $ 281.64 | $ 1,384.73 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for small equipment, placed in rear of, or towed by pickup truck | | 4 | 2 | $ - | $ 130.00 | $ 48.50 | $ 178.50 |
| 4 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 2,140.00 | $ - | $ 2,140.00 |
| 2 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 1,030.00 | $ - | $ 1,030.00 |
| 122 | $/Day | Per Diem | | 1 | 36 | $ - | $ - | $ - | $ 547.46 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 211.88 | $ - | $ 211.88 |

**Total** **$ 10,806.07**

## 2-2 - Road Crossing Abandonment

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 195.00 | $ 102.00 | $ 297.00 |
| 800 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 72.00 | $ 1,352.00 | $ 32.00 | $ 1,456.00 |
| 800 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 384.00 | $ 1,656.00 | $ 240.00 | $ 2,280.00 |
| 8 | Ea. | 8'x16' 3-Ply Temp. Matting, Includes Install/Remove, 6" Mulch | | 0 | 0 | $14,256.00 | $ - | $ - | $ 14,256.00 |
| 10 | C.Y. | Subsurface investigation, test pits, loader/backhoe, light soil | 1 Equipment Oper. (med.)<br>1 Laborer<br>1 Backhoe Loader, 80 H.P. | 28 | 0.57 | $ - | $ 345.00 | $ 92.50 | $ 437.50 |
| 25 | L.F. | Sewer pipelines, cleaning, pig method, lengths 1000' to 10,000', 4" diameter through 24" diameter, minimum | | 0 | 0 | $ - | $ - | $ - | $ 103.50 |
| 0.4 | Week | Field personnel, general purpose laborer, average | | 0.2 | 40 | $ - | $ 820.00 | $ - | $ 820.00 |
| 0.2 | Week | Field personnel, field engineer, engineer, average | | 0 | 0 | $ - | $ 555.00 | $ - | $ 555.00 |
| 79 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $ 9.48 | $ 12.64 | $ 9.48 | $ 31.60 |
| 3 | C.Y. | Structural concrete, ready mix, flowable fill, 40-80 psi, includes ash, Portland cement Type I, sand and water, delivered, excludes all additives and treatments | | 0 | 0 | $ 253.50 | $ - | $ - | $ 253.50 |
| 4 | Ea. | Pipe, cut one groove, labor only, 24" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 15 | 1.07 | $ - | $ 288.00 | $ - | $ 288.00 |
| 4 | Ea. | Gasket and bolt set, for flanges, 150 lb., 24" pipe size | | 1.9 | 4.21 | $ 1,200.00 | $ 1,260.00 | $ - | $ 2,460.00 |
| 10 | E.C.Y. | Backfill, bulk, air tamped compaction, add | 1 Equipment Oper. (light)<br>1 Laborer<br>1 Air Powered Tamper<br>1 Air Compressor, 365 cfm<br>2 -50' Air Hoses, 1.5 | 80 | 0.2 | $ - | $ 116.50 | $ 59.00 | $ 175.50 |
| 14.22 | S.Y. | Seeding, mechanical seeding, 44 lb/M.S.Y. | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 2500 | 0 | $ 3.70 | $ 2.99 | $ 1.71 | $ 8.39 |
| 3 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 1,605.00 | $ - | $ 1,605.00 |
| 1 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 515.00 | $ - | $ 515.00 |
| 122 | $/Day | Per Diem | | 1 | 65.11 | $ - | $ - | $ - | $ 990.14 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 530.64 | $ - | $ 530.64 |

| | |
|---|---|
| **Total** | **$ 27,062.77** |

## 2-4 - HIghway Crossing Abandonment

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 195.00 | $ 102.00 | $ 297.00 |
| 800 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 72.00 | $ 1,352.00 | $ 32.00 | $ 1,456.00 |
| 800 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 384.00 | $ 1,656.00 | $ 240.00 | $ 2,280.00 |
| 10 | C.Y. | Subsurface investigation, test pits, loader/backhoe, light soil | 1 Equipment Oper. (med.)<br>1 Laborer<br>1 Backhoe Loader, 80 H.P. | 28 | 0.57 | $ - | $ 345.00 | $ 92.50 | $ 437.50 |
| 8 | Ea. | 8'x16' 3-Ply Temp. Matting, Includes Install/Remove, 6" Mulch | | 0 | 0 | $14,256.00 | $ - | $ - | $ 14,256.00 |
| 200 | L.F. | Sewer pipelines, cleaning, pig method, lengths 1000' to 10,000', 4" diameter through 24" diameter, minimum | | 0 | 0 | $ - | $ - | $ - | $ 828.00 |
| 0.4 | Week | Field personnel, general purpose laborer, average | | 0.2 | 40 | $ - | $ 820.00 | $ - | $ 820.00 |
| 0.2 | Week | Field personnel, field engineer, engineer, average | | 0 | 0 | $ - | $ 555.00 | $ - | $ 555.00 |
| 629 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $ 75.48 | $ 100.64 | $ 75.48 | $ 251.60 |
| 24 | C.Y. | Structural concrete, ready mix, flowable fill, 40-80 psi, includes ash, Portland cement Type I, sand and water, delivered, excludes all additives and treatments | | 0 | 0 | $ 2,028.00 | $ - | $ - | $ 2,028.00 |
| 4 | Ea. | Pipe, cut one groove, labor only, 24" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 15 | 1.07 | $ - | $ 288.00 | $ - | $ 288.00 |
| 4 | Ea. | Gasket and bolt set, for flanges, 150 lb., 24" pipe size | | 1.9 | 4.21 | $ 1,200.00 | $ 1,260.00 | $ - | $ 2,460.00 |
| 10 | E.C.Y. | Backfill, bulk, air tamped compaction, add | 1 Equipment Oper. (light)<br>1 Laborer<br>1 Air Powered Tamper<br>1 Air Compressor, 365 cfm<br>2 -50’ Air Hoses, 1.5 | 80 | 0.2 | $ - | $ 116.50 | $ 59.00 | $ 175.50 |
| 14.22 | S.Y. | Seeding, mechanical seeding, 44 lb/M.S.Y. | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 2500 | 0 | $ 3.70 | $ 2.99 | $ 1.71 | $ 8.39 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 195.00 | $ 102.00 | $ 297.00 |
| 3 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 1,605.00 | $ - | $ 1,605.00 |
| 1 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 515.00 | $ - | $ 515.00 |
| 122 | $/Day | Per Diem | | 1 | 68.11 | $ - | $ - | $ - | $ 1,035.77 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 591.88 | $ - | $ 591.88 |

**Total** **$ 30,185.64**

## 2-5 - Railroad Crossing Abandonment

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 2 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 390.00 | $ 204.00 | $ 594.00 |
| 800 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman | 1000 | 0.02 | $ 72.00 | $1,352.00 | $ 32.00 | $ 1,456.00 |
| 800 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light) | 650 | 0.04 | $ 384.00 | $1,656.00 | $ 240.00 | $ 2,280.00 |
| 16 | Ea. | 8'x16' 3-Ply Temp. Matting, Includes Install/Remove, 6" Mulch | | 0 | 0 | $28,512.00 | $ - | $ - | $28,512.00 |
| 10 | C.Y. | Subsurface investigation, test pits, loader/backhoe, light soil | 1 Equipment Oper. (med.)<br>1 Laborer<br>1 Backhoe Loader, 80 H.P. | 28 | 0.57 | $ - | $ 345.00 | $ 92.50 | $ 437.50 |
| 200 | L.F. | Sewer pipelines, cleaning, pig method, lengths 1000' to 10,000', 4" diameter through 24" diameter, minimum | | 0 | 0 | $ - | $ - | $ - | $ 828.00 |
| 0.4 | Week | Field personnel, general purpose laborer, average | | 0.2 | 40 | $ - | $ 820.00 | $ - | $ 820.00 |
| 0.2 | Week | Field personnel, field engineer, engineer, average | | 0 | 0 | $ - | $ 555.00 | $ - | $ 555.00 |
| 629 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $ 75.48 | $ 100.64 | $ 75.48 | $ 251.60 |
| 24 | C.Y. | Structural concrete, ready mix, flowable fill, 40-80 psi, includes ash, Portland cement Type I, sand and water, delivered, excludes all additives and treatments | | 0 | 0 | $ 2,028.00 | $ - | $ - | $ 2,028.00 |
| 4 | Ea. | Pipe, cut one groove, labor only, 24" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 15 | 1.07 | $ - | $ 288.00 | $ - | $ 288.00 |
| 4 | Ea. | Gasket and bolt set, for flanges, 150 lb., 24" pipe size | | 1.9 | 4.21 | $ 1,200.00 | $1,260.00 | $ - | $ 2,460.00 |
| 1 | Day | Rent tractor with A frame boom and winch 225 HP, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 545.95 | $ 545.95 |
| 1 | Day | Rent crane, flatbed mounted, 3 ton capacity, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 351.60 | $ 351.60 |
| 10 | E.C.Y. | Backfill, bulk, air tamped compaction, add | 1 Equipment Oper. (light)<br>1 Laborer<br>1 Air Powered Tamper<br>1 Air Compressor, 365 cfm<br>2 -50' Air Hoses, 1.5 | 80 | 0.2 | $ - | $ 116.50 | $ 59.00 | $ 175.50 |
| 14.22 | S.Y. | Seeding, mechanical seeding, 44 lb/M.S.Y. | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 2500 | 0 | $ 3.70 | $ 2.99 | $ 1.71 | $ 8.39 |
| 2 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 390.00 | $ 204.00 | $ 594.00 |
| 3 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $1,605.00 | $ - | $ 1,605.00 |
| 1 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 515.00 | $ - | $ 515.00 |
| 122 | $/Day | Per Diem | | 1 | 68.11 | $ - | $ - | $ - | $ 1,035.77 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 906.83 | $ - | $ 906.83 |

| | |
|---|---|
| **Total** | **$46,248.14** |

## 2-6 - Stream Crossing Abandonment

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 2 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 390.00 | $ 204.00 | $ 594.00 |
| 800 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 72.00 | $ 1,352.00 | $ 32.00 | $ 1,456.00 |
| 800 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 384.00 | $ 1,656.00 | $ 240.00 | $ 2,280.00 |
| 16 | Ea. | 8'x16' 3-Ply Temp. Matting, Includes Install/Remove, 6" Mulch | | 0 | 0 | $28,512.00 | $ - | $ - | $ 28,512.00 |
| 10 | C.Y. | Subsurface investigation, test pits, loader/backhoe, light soil | 1 Equipment Oper. (med.)<br>1 Laborer<br>1 Backhoe Loader, 80 H.P. | 28 | 0.57 | $ - | $ 345.00 | $ 92.50 | $ 437.50 |
| 50 | L.F. | Sewer pipelines, cleaning, pig method, lengths 1000' to 10,000', 4" diameter through 24" diameter, minimum | | 0 | 0 | $ - | $ - | $ - | $ 207.00 |
| 0.4 | Week | Field personnel, general purpose laborer, average | | 0.2 | 40 | $ - | $ 820.00 | $ - | $ 820.00 |
| 0.2 | Week | Field personnel, field engineer, engineer, average | | 0 | 0 | $ - | $ 555.00 | $ - | $ 555.00 |
| 158 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $ 18.96 | $ 25.28 | $ 18.96 | $ 63.20 |
| 6 | C.Y. | Structural concrete, ready mix, flowable fill, 40-80 psi, includes ash, Portland cement Type I, sand and water, delivered, excludes all additives and treatments | | 0 | 0 | $ 507.00 | $ - | $ - | $ 507.00 |
| 4 | Ea. | Pipe, cut one groove, labor only, 24" pipe size, grooved-joint | | 15 | 1.07 | $ - | $ 288.00 | $ - | $ 288.00 |
| 4 | Ea. | Gasket and bolt set, for flanges, 150 lb., 24" pipe size | | 1.9 | 4.21 | $ 1,200.00 | $ 1,260.00 | $ - | $ 2,460.00 |
| 1 | Day | Rent tractor with A frame boom and winch 225 HP, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 545.95 | $ 545.95 |
| 1 | Day | Rent crane, flatbed mounted, 3 ton capacity, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 351.60 | $ 351.60 |
| 14.22 | S.Y. | Seeding, mechanical seeding, 44 lb/M.S.Y. | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 2500 | 0 | $ 3.70 | $ 2.99 | $ 1.71 | $ 8.39 |
| 2 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 390.00 | $ 204.00 | $ 594.00 |
| 3 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 1,605.00 | $ - | $ 1,605.00 |
| 1 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 515.00 | $ - | $ 515.00 |
| 122 | $/Day | Per Diem | | 1 | 67.91 | $ - | $ - | $ - | $ 1,032.72 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 856.65 | $ - | $ 856.65 |

| | |
|---|---|
| **Total** | **$ 43,689.01** |

## 2-7 - River Crossing Abandonment

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 2 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 390.00 | $ 204.00 | $ 594.00 |
| 800 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 72.00 | $ 1,352.00 | $ 32.00 | $ 1,456.00 |
| 800 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 384.00 | $ 1,656.00 | $ 240.00 | $ 2,280.00 |
| 16 | Ea. | 8'x16' 3-Ply Temp. Matting, Includes Install/Remove, 6" Mulch | | 0 | 0 | $28,512.00 | $ - | $ - | $ 28,512.00 |
| 10 | C.Y. | Subsurface investigation, test pits, loader/backhoe, light soil | 1 Equipment Oper. (med.)<br>1 Laborer<br>1 Backhoe Loader, 80 H.P. | 28 | 0.57 | $ - | $ 345.00 | $ 92.50 | $ 437.50 |
| 20 | L.F. | Sewer pipelines, cleaning, pig method, lengths 1000' to 10,000', 4" diameter through 24" diameter, minimum | | 0 | 0 | $ - | $ - | $ - | $ 82.80 |
| 0.4 | Week | Field personnel, general purpose laborer, average | | 0.2 | 40 | $ - | $ 820.00 | $ - | $ 820.00 |
| 0.2 | Week | Field personnel, field engineer, engineer, average | | 0 | 0 | $ - | $ 555.00 | $ - | $ 555.00 |
| 1571 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $ 188.52 | $ 251.36 | $ 188.52 | $ 628.40 |
| 59 | C.Y. | Structural concrete, ready mix, flowable fill, 40-80 psi, includes ash, Portland cement Type I, sand and water, delivered, excludes all additives and treatments | | 0 | 0 | $ 4,985.50 | $ - | $ - | $ 4,985.50 |
| 4 | Ea. | Pipe, cut one groove, labor only, 24" pipe size, grooved-joint | | 15 | 1.07 | $ - | $ 288.00 | $ - | $ 288.00 |
| 4 | Ea. | Gasket and bolt set, for flanges, 150 lb., 24" pipe size | | 1.9 | 4.21 | $ 1,200.00 | $ 1,260.00 | $ - | $ 2,460.00 |
| 1 | Day | Rent tractor with A frame boom and winch 225 HP, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 545.95 | $ 545.95 |
| 1 | Day | Rent crane, flatbed mounted, 3 ton capacity, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 351.60 | $ 351.60 |
| 14.22 | S.Y. | Seeding, mechanical seeding, 44 lb/M.S.Y. | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 2500 | 0 | $ 3.70 | $ 2.99 | $ 1.71 | $ 8.39 |
| 2 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 390.00 | $ 204.00 | $ 594.00 |
| 3 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 1,605.00 | $ - | $ 1,605.00 |
| 1 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 515.00 | $ - | $ 515.00 |
| 122 | $/Day | Per Diem | | 1 | 59.91 | $ - | $ - | $ - | $ 911.07 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 952.60 | $ - | $ 952.60 |

**Total** **$ 48,582.81**

## 3-1 - Small Meter Station Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 502 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 45.18 | $ 848.38 | $ 20.08 | $ 913.64 |
| 502 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 1,516.04 | $ 266.06 | $ 1,782.10 |
| 8 | Ea. | Selective demolition, parking appurtenances, pipe bollards, 6"-12" diameter | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 80 | 0.3 | $ - | $ 134.40 | $ 23.76 | $ 158.16 |
| 2 | Ea. | Steel tank, double wall, above ground, 500 thru 2,000 gallon, selective demolition, excluding foundation, pumps & piping | 1 Pipe Fitter<br>1 Truck Driver (light)<br>1 Equip. Oper. (medium)<br>1 Flatbed Truck, Gas, 3 Ton<br>1 Backhoe Loader, 48 H.P. | 2 | 12 | $ - | $ 1,640.00 | $ 1,170.00 | $ 2,810.00 |
| 232 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $ 23.20 | $ 27.84 | $ 23.20 | $ 74.24 |
| 146 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 18" - 24", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane)<br>2 Cutting Torches<br>2 Sets of Gases<br>1 Hyd. Crane, 12 Ton | 160 | 0.2 | $ - | $ 1,671.70 | $ 854.10 | $ 2,525.80 |
| 3 | Ea. | Selective demolition, utility valves & accessories, utility valves, 14"-24", excludes excavation | 1 Labor Foreman (outside)<br>1 Skilled Worker<br>1 Laborer<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 2 | 14 | $ - | $ 2,310.00 | $ 315.00 | $ 2,625.00 |
| 1 | Ea. | Selective demolition, utility poles & cross arms, utility poles, wood, 20'-30' high | 1 Electrician Foreman<br>1 Electrician<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 6 | 3.33 | $ - | $ 253.00 | $ 35.00 | $ 288.00 |
| 1 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 570.00 | $ 890.00 | $ 1,460.00 |
| 1 | Day | Rent trailer, platform, flush deck 2 axle, 25 ton, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 215.03 | $ 215.03 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 2 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 1,070.00 | $ - | $ 1,070.00 |
| 1 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 515.00 | $ - | $ 515.00 |
| 122 | $/Day | Per Diem | | 1 | 101.9 | $ - | $ - | $ - | $ 1,549.62 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 482.33 | $ - | $ 482.33 |

**Total** **$ 24,598.92**

## 3-2 - Small Meter Station Sub Material Removal
### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 502 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | | 650 | 0.04 | $ 240.96 | $ 1,039.14 | $ 150.60 | $ 1,430.70 |
| 158 | C.F. | Selective demolition, cutout, concrete, elevated slab, bar reinforced, over 6 C.F., excludes loading and disposal | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Air Compressor, 250 cfm<br>2 Breakers, Pavement, 60 lb.<br>2 -50' Air Hoses, 1.5 | 50 | 0.8 | $ - | $ 6,557.00 | $ 1,232.40 | $ 7,789.40 |
| 6 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | | 72 | 0.11 | $ - | $ 39.60 | $ 53.10 | $ 92.70 |
| 1376 | B.C.Y. | Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering | | 270 | 0.06 | $ - | $ 4,994.88 | $ 3,935.36 | $ 8,930.24 |
| 1376 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | | 72 | 0.11 | $ - | $ 9,081.60 | $12,177.60 | $ 21,259.20 |
| 1 | Week | Rent front end loader, 4WD, art. frame, diesel, 7 - 9 CY 475 HP, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $12,566.61 | $ 12,566.61 |
| 4 | Ea. | Pipe, cut one groove, labor only, 24" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 15 | 1.07 | $ - | $ 288.00 | $ - | $ 288.00 |
| 4 | Ea. | Gasket and bolt set, for flanges, 150 lb., 24" pipe size | | 1.9 | 4.21 | $ 1,200.00 | $ 1,260.00 | $ - | $ 2,460.00 |
| 3 | Ea. | Selective demolition, utility materials, utility valves, 14"-24", excludes excavation | | 2 | 14 | $ - | $ 2,310.00 | $ 315.00 | $ 2,625.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 6 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 3,210.00 | $ - | $ 3,210.00 |
| 3 | Day | Environmental Engineer | | 0 | 0 | $ - | $ 1,545.00 | $ - | $ 1,545.00 |
| 122 | $/Day | Per Diem | | 1 | 76.4 | $ - | $ - | $ - | $ 1,161.83 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 1,429.77 | $ - | $ 1,429.77 |

**Total** **$ 72,918.45**

## 3-3 - Small Meter Station Backfill and Restoration

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 13 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | | 120 | 0.07 | $ - | $ 56.42 | $ 31.85 | $ 88.27 |
| 1376 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | $19,057.60 | $ 3,852.80 | $ 6,687.36 | $ 29,597.76 |
| 1376 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | | 72 | 0.11 | $ - | $ 9,081.60 | $12,177.60 | $ 21,259.20 |
| 13 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | | 1.5 | 16 | $ - | $11,635.00 | $ 1,716.00 | $ 13,351.00 |
| 1376 | E.C.Y. | Backfill, bulk, air tamped compaction, add | 1 Equipment Oper. (light)<br>1 Laborer<br>1 Air Powered Tamper<br>1 Air Compressor, 365 cfm<br>2 -50’ Air Hoses, 1.5 | 80 | 0.2 | $ - | $16,030.40 | $ 8,118.40 | $ 24,148.80 |
| 1376 | S.Y. | Seeding, mechanical seeding hydro or air seeding for large areas, includes lime, fertilizer and seed with wood fiber mulch added | | 8900 | 0 | $ 3,329.92 | $ 137.60 | $ 96.32 | $ 3,563.84 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 18 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 9,630.00 | $ - | $ 9,630.00 |
| 9 | Day | Environmental Engineer | | 0 | 0 | $ - | $ 4,635.00 | $ - | $ 4,635.00 |
| 122 | $/Day | Per Diem | | 1 | 72.43 | $ - | $ - | $ - | $ 1,101.46 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 2,254.51 | $ - | $ 2,254.51 |

**Total** **$114,979.84**

## 3-4 - Medium Meter Station Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 662 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 59.58 | $ 1,118.78 | $ 26.48 | $ 1,204.84 |
| 662 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 1,999.24 | $ 350.86 | $ 2,350.10 |
| 47329 | C.F. | Building demolition, small buildings or single buildings, steel, includes 20 mile haul, excludes salvage, foundation demolition or dump fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (medium)<br>2 Truck Drivers (heavy)<br>1 Crawler Loader, 3 C.Y.<br>2 Dump Trucks, 12 C.Y., 400 H.P. | 14800 | 0 | $ - | $ 8,992.51 | $ 8,045.93 | $ 17,038.44 |
| 1 | Ea. | Steel tank, single wall, above ground, 15,000 thru 30,000 gallon, selective demolition, excluding foundation, pumps or piping | 2 Pipe Fitters<br>1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Flatbed Trailer, 40 Ton<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Hyd. Crane, 80 Ton<br>1 Hyd. Excavator, 2 C.Y. | 2 | 16 | $ - | $ 1,150.00 | $ 1,700.00 | $ 2,850.00 |
| 536 | C.F. | Gas pipelines, nitrogen purge method |  | 0 | 0 | $ 53.60 | $ 64.32 | $ 53.60 | $ 171.52 |
| 338 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 18" - 24", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane)<br>2 Cutting Torches<br>2 Sets of Gases<br>1 Hyd. Crane, 12 Ton | 160 | 0.2 | $ - | $ 3,870.10 | $ 1,977.30 | $ 5,847.40 |
| 14 | Ea. | Selective demolition, utility valves & accessories, utility valves, 14"-24", excludes excavation | 1 Labor Foreman (outside)<br>1 Skilled Worker<br>1 Laborer<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 2 | 14 | $ - | $ 10,780.00 | $ 1,470.00 | $ 12,250.00 |
| 1 | Ea. | Selective demolition, utility poles & cross arms, utility poles, wood, 20'-30' high | 1 Electrician Foreman<br>1 Electrician<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 6 | 3.33 | $ - | $ 253.00 | $ 35.00 | $ 288.00 |
| 4 | Day | Rented truck, flatbed, GVW = 20,000 Lbs, Incl. Hourly Oper. Cost. |  | 0 | 0 | $ - | $ - | $ 1,133.08 | $ 1,133.08 |
| 4 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 2,280.00 | $ 3,560.00 | $ 5,840.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only |  | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 7 | Day | Testing and inspecting, supervision of earthwork |  | 1 | 8 | $ - | $ 3,745.00 | $ - | $ 3,745.00 |
| 3 | Day | Environmental Engineer |  | 1 | 8 | $ - | $ 1,545.00 | $ - | $ 1,545.00 |
| 122 | $/Day | Per Diem |  | 1 | 105.6 | $ - | $ - | $ - | $ 1,605.88 |
| 1 | Job | Permitting cost |  | 0 | 0 | $ - | $ 1,279.99 | $ - | $ 1,279.99 |

**Total** **$ 65,279.25**

## 3-5 - Medium Meter Station Sub Material Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 662 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | | 650 | 0.04 | $ 317.76 | $ 1,370.34 | $ 198.60 | $ 1,886.70 |
| 185 | C.F. | Selective demolition, cutout, concrete, elevated slab, bar reinforced, over 6 C.F., excludes loading and disposal | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Air Compressor, 250 cfm<br>2 Breakers, Pavement, 60 lb.<br>2 -50’ Air Hoses, 1.5 | 50 | 0.8 | $ - | $ 7,677.50 | $ 1,443.00 | $ 9,120.50 |
| 7 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 46.20 | $ 61.95 | $ 108.15 |
| 2681 | B.C.Y. | Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering | | 270 | 0.06 | $ - | $ 9,732.03 | $ 7,667.66 | $ 17,399.69 |
| 2681 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | | 72 | 0.11 | $ - | $17,694.60 | $23,726.85 | $ 41,421.45 |
| 1 | Week | Rent front end loader, 4WD, art. frame, diesel, 7 - 9 CY 475 HP, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $12,566.61 | $ 12,566.61 |
| 14 | Ea. | Selective demolition, utility materials, utility valves, 14"-24", excludes excavation | | 2 | 14 | $ - | $10,780.00 | $ 1,470.00 | $ 12,250.00 |
| 28 | Ea. | Pipe, cut one groove, labor only, 24" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 15 | 1.07 | $ - | $ 2,016.00 | $ - | $ 2,016.00 |
| 28 | Ea. | Gasket and bolt set, for flanges, 150 lb., 24" pipe size | | 1.9 | 4.21 | $ 8,400.00 | $ 8,820.00 | $ - | $ 17,220.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 15 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 8,025.00 | $ - | $ 8,025.00 |
| 7 | Day | Environmental Engineer | | 0 | 0 | $ - | $ 3,605.00 | $ - | $ 3,605.00 |
| 122 | $/Day | Per Diem | | 1 | 76.4 | $ - | $ - | $ - | $ 1,161.83 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 2,698.22 | $ - | $ 2,698.22 |

**Total** **$137,609.15**

## 3-6 - Medium Meter Station Backfill and Restoration

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 2681 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | | 120 | 0.07 | $ - | $11,635.54 | $ 6,568.45 | $ 18,203.99 |
| 2681 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | $37,131.85 | $ 7,506.80 | $13,029.66 | $ 57,668.31 |
| 25 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | | 72 | 0.11 | $ - | $ 165.00 | $ 221.25 | $ 386.25 |
| 25 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | | 1.5 | 16 | $ - | $22,375.00 | $ 3,300.00 | $ 25,675.00 |
| 2681 | E.C.Y. | Backfill, bulk, air tamped compaction, add | 1 Equipment Oper. (light)<br>1 Laborer<br>1 Air Powered Tamper<br>1 Air Compressor, 365 cfm<br>2 -50' Air Hoses, 1.5 | 80 | 0.2 | $ - | $31,233.65 | $15,817.90 | $ 47,051.55 |
| 2681 | S.Y. | Seeding, mechanical seeding hydro or air seeding for large areas, includes lime, fertilizer and seed with wood fiber mulch added | | 8900 | 0 | $ 6,488.02 | $ 268.10 | $ 187.67 | $ 6,943.79 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 34 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $18,190.00 | $ - | $ 18,190.00 |
| 17 | Day | Environmental Engineer | | 0 | 0 | $ - | $ 8,755.00 | $ - | $ 8,755.00 |
| 122 | $/Day | Per Diem | | 1 | 72.43 | $ - | $ - | $ - | $ 1,101.46 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 2,215.56 | $ - | $ 2,215.56 |

**Total** $191,540.91

## 3-7 - Large Meter Station Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 1086 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 97.74 | $ 1,835.34 | $ 43.44 | $ 1,976.52 |
| 1086 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 3,279.72 | $ 575.58 | $ 3,855.30 |
| 98644 | C.F. | Building demolition, small buildings or single buildings, steel, includes 20 mile haul, excludes salvage, foundation demolition or dump fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (medium)<br>2 Truck Drivers (heavy)<br>1 Crawler Loader, 3 C.Y.<br>2 Dump Trucks, 12 C.Y., 400 H.P. | 14800 | 0 | $ - | $18,742.36 | $16,769.48 | $ 35,511.84 |
| 624 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $ 62.40 | $ 74.88 | $ 62.40 | $ 199.68 |
| 394 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 18" - 24", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane)<br>2 Cutting Torches<br>2 Sets of Gases<br>1 Hyd. Crane, 12 Ton | 160 | 0.2 | $ - | $ 4,511.30 | $ 2,304.90 | $ 6,816.20 |
| 20 | Ea. | Selective demolition, utility valves & accessories, utility valves, 14"-24", excludes excavation | 1 Labor Foreman (outside)<br>1 Skilled Worker<br>1 Laborer<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 2 | 14 | $ - | $15,400.00 | $ 2,100.00 | $ 17,500.00 |
| 4 | Day | Rented truck, flatbed, GVW = 20,000 Lbs, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 1,133.08 | $ 1,133.08 |
| 4 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 2,280.00 | $ 3,560.00 | $ 5,840.00 |
| 4 | Ea. | Selective demolition, utility poles & cross arms, utility poles, wood, 20'-30' high | 1 Electrician Foreman<br>1 Electrician<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 6 | 3.33 | $ - | $ 1,012.00 | $ 140.00 | $ 1,152.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 10 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 5,350.00 | $ - | $ 5,350.00 |
| 5 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 2,575.00 | $ - | $ 2,575.00 |
| 122 | $/Day | Per Diem | | 1 | 65.6 | $ - | $ - | $ - | $ 997.60 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 1,820.74 | $ - | $ 1,820.74 |

**Total** **$ 92,857.96**

## 3-8 - Large Meter Station Sub Material Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 1086 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | | 650 | 0.04 | $ 521.28 | $ 2,248.02 | $ 325.80 | $ 3,095.10 |
| 1361 | C.F. | Selective demolition, cutout, concrete, elevated slab, bar reinforced, over 6 C.F., excludes loading and disposal | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Air Compressor, 250 cfm<br>2 Breakers, Pavement, 60 lb.<br>2 -50' Air Hoses, 1.5 | 50 | 0.8 | $ - | $56,481.50 | $10,615.80 | $ 67,097.30 |
| 51 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 336.60 | $ 451.35 | $ 787.95 |
| 6080 | B.C.Y. | Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering | | 270 | 0.06 | $ - | $22,070.40 | $17,388.80 | $ 39,459.20 |
| 6080 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | | 72 | 0.11 | $ - | $40,128.00 | $53,808.00 | $ 93,936.00 |
| 12 | Ea. | Pipe, cut one groove, labor only, 24" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 15 | 1.07 | $ - | $ 864.00 | $ - | $ 864.00 |
| 12 | Ea. | Gasket and bolt set, for flanges, 150 lb., 24" pipe size | | 1.9 | 4.21 | $ 3,600.00 | $ 3,780.00 | $ - | $ 7,380.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 28 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $14,980.00 | $ - | $ 14,980.00 |
| 14 | Day | Environmental Engineer | | 0 | 0 | $ - | $ 7,210.00 | $ - | $ 7,210.00 |
| 122 | $/Day | Per Diem | | 1 | 62.4 | $ - | $ - | $ - | $ 948.93 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 4,877.77 | $ - | $ 4,877.77 |

**Total** **$248,766.25**

## 3-9 - Large Meter Station Backfill and Restoration

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 55 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | | 120 | 0.07 | $ - | $ 238.70 | $ 134.75 | $ 373.45 |
| 6080 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | $84,208.00 | $17,024.00 | $29,548.80 | $130,780.80 |
| 6080 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | | 72 | 0.11 | $ - | $40,128.00 | $53,808.00 | $ 93,936.00 |
| 55 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | | 1.5 | 16 | $ - | $49,225.00 | $ 7,260.00 | $ 56,485.00 |
| 6080 | E.C.Y. | Backfill, bulk, air tamped compaction, add | 1 Equipment Oper. (light)<br>1 Laborer<br>1 Air Powered Tamper<br>1 Air Compressor, 365 cfm<br>2 -50' Air Hoses, 1.5 | 80 | 0.2 | $ - | $70,832.00 | $35,872.00 | $106,704.00 |
| 6080 | S.Y. | Seeding, mechanical seeding hydro or air seeding for large areas, includes lime, fertilizer and seed with wood fiber mulch added | | 8900 | 0 | $14,713.60 | $ 608.00 | $ 425.60 | $ 15,747.20 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 85 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $45,475.00 | $ - | $ 45,475.00 |
| 42 | Day | Environmental Engineer | | 0 | 0 | $ - | $21,630.00 | $ - | $ 21,630.00 |
| 122 | $/Day | Per Diem | | 1 | 72.43 | $ - | $ - | $ - | $ 1,101.46 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 6,875.07 | $ - | $ 6,875.07 |

**Total** $484,457.98

## ANR Pipeline Company
## Compressor Station Summary Report

| Line No. | | Particular | Cost ($) | Estimate ($) |
|---|---|---|---|---|
| | | (A) | (B) | (C) |
| 1 | 1 | **Celestine** | **Cost / Phase** | |
| 2 | | 4-1 - Compressor Station Removal | $ 943,925 | |
| 3 | | 4-2 - Compressor Station Sub Material Removal | $ 4,122,843 | |
| 4 | | 4-3 - Compressor Station Backfill and Restoration | $ 2,143,806 | |
| 5 | | | Total | **$7,210,574** |
| 6 | 2 | **Eugene** | | |
| 7 | | 4-4 - Compressor Station Removal | $ 1,321,112 | |
| 8 | | 4-5 - Compressor Station Sub Material Removal | $ 4,480,237 | |
| 9 | | 4-6 - Compressor Station Backfill and Restoration | $ 1,880,456 | |
| 10 | | | Total | **$7,681,804** |
| 11 | 3 | **Klickitat** | | |
| 12 | | 4-7 - Compressor Station Removal | $ 576,015 | |
| 13 | | 4-8 - Compressor Station Sub Material Removal | $ 3,400,078 | |
| 14 | | 4-9 - Compressor Station Backfill and Restoration | $ 3,536,523 | |
| 15 | | | Total | **$7,512,616** |
| 16 | 4 | **La Plata** | | |
| 17 | | 4-10 - Compressor Station Removal | $ 867,151 | |
| 18 | | 4-11 - Compressor Station Sub Material Removal | $ 3,898,969 | |
| 19 | | 4-12 - Compressor Station Backfill and Restoration | $ 937,758 | |
| 20 | | | Total | **$5,703,879** |
| 21 | 5 | **Lava Springs** | | |
| 22 | | 4-13 - Compressor Station Removal | $ 879,248 | |
| 23 | | 4-14 - Compressor Station Sub Material Removal | $ 5,260,055 | |
| 24 | | 4-15 - Compressor Station Backfill and Restoration | $ 1,648,524 | |
| 25 | | | Total | **$7,787,828** |
| 26 | 6 | **Mt. Vernon** | | |
| 27 | | 4-16 - Compressor Station Removal | $ 555,011 | |
| 28 | | 4-17 - Compressor Station Sub Material Removal | $ 4,302,044 | |
| 29 | | 4-18 - Compressor Station Backfill and Restoration | $ 2,439,498 | |
| 30 | | | Total | **$7,296,553** |
| 31 | 7 | **Mountain Home** | | |
| 32 | | 4-19 - Compressor Station Removal | $ 647,787 | |
| 33 | | 4-20 - Compressor Station Sub Material Removal | $ 915,113 | |
| 34 | | 4-21 - Compressor Station Backfill and Restoration | $ 1,394,440 | |
| 35 | | | Total | **$2,957,339** |
| 36 | 8 | **Muddy Creek** | | |
| 37 | | 4-22- Compressor Station Removal | $ 373,606 | |
| 38 | | 4-23- Compressor Station Sub Material Removal | $ 2,320,985 | |
| 39 | | 4-24- Compressor Station Backfill and Restoration | $ 3,309,430 | |
| 40 | | | Total | **$6,004,021** |
| 41 | 9 | **Oregon City** | | |
| 42 | | 4-25 - Compressor Station Removal | $ 752,007 | |
| 43 | | 4-26 - Compressor Station Sub Material Removal | $ 687,484 | |
| 44 | | 4-27 - Compressor Station Backfill and Restoration | $ 490,907 | |

| | | | | | |
|---|---|---|---|---|---|
| 45 | | | | Total | **$1,930,399** |
| 46 | 10 | **Owyhee** | | | |
| 47 | | 4-28 - Compressor Station Removal | $ | 326,507 | |
| 48 | | 4-29 - Compressor Station Sub Material Removal | $ | 1,383,821 | |
| 49 | | 4-30 - Compressor Station Backfill and Restoration | $ | 1,077,571 | |
| 50 | | | | Total | **$2,787,899** |
| 51 | 11 | **Pleasant View** | | | |
| 52 | | 4-31 - Compressor Station Removal | $ | 231,732 | |
| 53 | | 4-32 - Compressor Station Sub Material Removal | $ | 2,183,880 | |
| 54 | | 4-33 - Compressor Station Backfill and Restoration | $ | 2,884,933 | |
| 55 | | | | Total | **$5,300,544** |
| 56 | 12 | **Plymouth LNG** | | | |
| 57 | | 4-34 - Compressor Station Removal | $ | 1,846,361 | |
| 57 | | 4-35 - Compressor Station LNG Tank Removal | $ | 30,508,659 | |
| 58 | | 4-36 - Compressor Station Sub Material Removal | $ | 9,424,754 | |
| 59 | | 4-37 - Compressor Station Backfill and Restoration | $ | 12,778,954 | |
| 60 | | | | Total | **$54,558,728** |
| 61 | 13 | **Rangely** | | | |
| 62 | | 4-38 - Compressor Station Removal | $ | 494,571 | |
| 63 | | 4-39 - Compressor Station Sub Material Removal | $ | 1,825,551 | |
| 64 | | 4-40 - Compressor Station Backfill and Restoration | $ | 1,102,621 | |
| 65 | | | | Total | **$3,422,743** |
| 66 | 14 | **Roosevelt** | | | |
| 67 | | 4-41 - Compressor Station Removal | $ | 369,661 | |
| 68 | | 4-42 - Compressor Station Sub Material Removal | $ | 2,282,088 | |
| 69 | | 4-43 - Compressor Station Backfill and Restoration | $ | 2,167,531 | |
| 70 | | | | Total | **$4,819,281** |
| 71 | 15 | **Willard** | | | |
| 72 | | 4-44 - Compressor Station Removal | $ | 400,113 | |
| 73 | | 4-45 - Compressor Station Sub Material Removal | $ | 2,438,894 | |
| 74 | | 4-46 - Compressor Station Backfill and Restoration | $ | 2,377,291 | |
| 75 | | | | Total | **$5,216,299** |
| 76 | 16 | **Winchester** | | | |
| 77 | | 4-47 - Compressor Station Removal | $ | 187,529 | |
| 78 | | 4-48 - Compressor Station Sub Material Removal | $ | 872,367 | |
| 79 | | 4-49 - Compressor Station Backfill and Restoration | $ | 1,195,083 | |
| 80 | | | | Total | **$2,254,979** |
| 81 | | | | | |
| 82 | | | | **Average Cost ($) / Station:** | **$5,192,451** |

## 4-1 - Celestine Compressor Station Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 4275 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 384.75 | $ 7,224.75 | $ 171.00 | $ 7,780.50 |
| 4275 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 12,910.50 | $ 2,265.75 | $ 15,176.25 |
| 9191 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $ 919.10 | $ 1,102.92 | $ 919.10 | $ 2,941.12 |
| 3181 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 18" - 24", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane)<br>2 Cutting Torches<br>2 Sets of Gases<br>1 Hyd. Crane, 12 Ton | 160 | 0.2 | $ - | $ 36,422.45 | $ 18,608.85 | $ 55,031.30 |
| 1055215 | C.F. | Building demolition, small buildings or single buildings, steel, includes 20 mile haul, excludes salvage, foundation demolition or dump fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (medium)<br>2 Truck Drivers (heavy)<br>1 Crawler Loader, 3 C.Y.<br>2 Dump Trucks, 12 C.Y., 400 H.P. | 14800 | 0 | $ - | $ 200,490.85 | $179,386.55 | $ 379,877.40 |
| 8 | Ea. | Boiler, gas and or oil or solid, 12,200 thru 25,000 MBH, selective demolition | 1 Steamfitter Foreman (inside)<br>2 Steamfitters<br>1 Steamfitter Apprentice | 0.12 | 267 | $ - | $ 149,600.00 | $ - | $ 149,600.00 |
| 19 | Ea. | Air conditioner, split unit air conditioner, package unit, 3 ton, selective demolition | 2 Steamfitters<br>1 Steamfitter Apprentice | 3 | 8 | $ - | $ 10,260.00 | $ - | $ 10,260.00 |
| 34 | Ea. | Steel tank, single wall, above ground, 15,000 thru 30,000 gallon, selective demolition, excluding foundation, pumps or piping | 2 Pipe Fitters<br>1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Flatbed Trailer, 40 Ton<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Hyd. Crane, 80 Ton<br>1 Hyd. Excavator, 2 C.Y. | 2 | 16 | $ - | $ 39,100.00 | $ 57,800.00 | $ 96,900.00 |
| 33 | Ea. | Selective demolition, utility valves & accessories, utility valves, 14"-24", excludes excavation | 1 Labor Foreman (outside)<br>1 Skilled Worker<br>1 Laborer<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 2 | 14 | $ - | $ 25,410.00 | $ 3,465.00 | $ 28,875.00 |
| 1 | Ea. | Selective demolition, radio towers, guyed, 200' high, 70 lb section | 1 Struc. Steel Foreman (outside)<br>1 Struc. Steel Worker<br>1 Truck Driver (light)<br>1 Flatbed Truck, Gas, 3 Ton | 0.7 | 34.29 | $ - | $ 2,350.00 | $ 1,325.00 | $ 3,675.00 |
| 62 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 35,340.00 | $ 55,180.00 | $ 90,520.00 |
| 62 | Day | Rent trailer, platform, flush deck 2 axle, 25 ton, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 13,331.86 | $ 13,331.86 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $2,780.00 | $ - | $ - | $ 2,780.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 72 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 38,520.00 | $ - | $ 38,520.00 |
| 36 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 18,540.00 | $ - | $ 18,540.00 |
| 122 | $/Day | Per Diem | | 1 | 411.6 | $ - | $ - | $ - | $ 6,258.69 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 18,508.34 | $ - | $ 18,508.34 |

**Total** **$ 943,925.46**

# 4-2 - Celestine Compressor Station Sub Material Removal

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 4275 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 2,052.00 | $ 8,849.25 | $ 1,282.50 | $ 12,183.75 |
| 47209 | C.F. | Selective demolition, cutout, concrete, elevated slab, bar reinforced, over 6 C.F., excludes loading and disposal | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Air Compressor, 250 cfm<br>2 Breakers, Pavement, 60 lb.<br>2 -50' Air Hoses, 1.5 | 50 | 0.8 | $ - | $ 1,959,173.50 | $ 368,230.20 | $ 2,327,403.70 |
| 6588 | S.Y. | Demolish, remove pavement & curb, remove concrete, rod reinforced, to 6" thick, excludes hauling and disposal fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (light)<br>1 Equip. Oper. (medium)<br>1 Backhoe Loader, 48 H.P.<br>1 Hyd. Hammer (1200 lb.)<br>1 F.E. Loader, W.M., 4 C.Y.<br>1 Pvmt. Rem. Bucket | 200 | 0.12 | $ - | $ 44,139.60 | $ 44,139.60 | $ 88,279.20 |
| 10380 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 68,508.00 | $ 91,863.00 | $ 160,371.00 |
| 39386 | B.C.Y. | Excavating, bulk, dozer, open site, bank measure, sand and gravel, 200 HP dozer, 300' haul | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P. | 310 | 0.03 | $ - | $ 70,500.94 | $ 212,684.40 | $ 283,185.34 |
| 39386 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 259,947.60 | $ 348,566.10 | $ 608,513.70 |
| 4 | Month | Rent front end loader, 4WD, art. frame, diesel, 7 - 9 CY 475 HP, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 166,840.96 | $ 166,840.96 |
| 8 | Ea. | Pipe, cut one groove, labor only, 24" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 15 | 1.07 | $ - | $ 576.00 | $ - | $ 576.00 |
| 8 | Ea. | Gasket and bolt set, for flanges, 150 lb., 24" pipe size | | 1.9 | 4.21 | $ 2,400.00 | $ 2,520.00 | $ - | $ 4,920.00 |
| 500 | V.L.F. | Selective demolition, wells, well screen & casing, 6" to 16" dia | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Drill Rig, Truck-Mounted<br>1 Flatbed Truck, Gas, 3 Ton | 300 | 0.13 | $ - | $ 3,475.00 | $ 2,975.00 | $ 6,450.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 472 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 252,520.00 | $ - | $ 252,520.00 |
| 236 | Day | Environmental Engineer | | 1 | 9 | $ - | $ 121,540.00 | $ - | $ 121,540.00 |
| 122 | $/Day | Per Diem | | 1 | 71.62 | $ - | $ - | $ - | $ 1,089.14 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 80,840.06 | $ - | $ 80,840.06 |

| | |
|---|---|
| **Total** | **$ 4,122,842.85** |

## 4-3 - Celestine Compressor Station Backfill and Restoration

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 355 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 120 | 0.07 | $ - | $ 1,519.40 | $ 784.55 | $ 2,303.95 |
| 39386 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | $545,496.10 | $110,280.80 | $191,415.96 | $ 847,192.86 |
| 39386 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $256,009.00 | $344,627.50 | $ 600,636.50 |
| 355 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 1.5 | 16 | $ - | $312,400.00 | $ 46,150.00 | $ 358,550.00 |
| 39386 | E.C.Y. | Backfill, bulk, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P.<br>1 Vibratory Roller, Towed, 23 Ton | 800 | 0.01 | $ - | $ 27,176.34 | $110,674.66 | $ 137,851.00 |
| 39386 | S.Y. | Seeding, mechanical seeding hydro or air seeding for large areas, includes lime, fertilizer and seed with wood fiber mulch added | 1 Laborer<br>1 Equip. Oper. (medium)<br>1 Truck Driver (heavy)<br>1 Hydromulcher, T.M., 3000 Gal.<br>1 Truck Tractor, 220 H.P. | 8900 | 0 | $ 89,800.08 | $ 3,938.60 | $ 2,757.02 | $ 96,495.70 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 66 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 34,980.00 | $ - | $ 34,980.00 |
| 33 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 17,490.00 | $ - | $ 17,490.00 |
| 122 | $/Day | Per Diem | | 1 | 80.24 | $ - | $ - | $ - | $ 1,220.23 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 42,035.40 | $ - | $ 42,035.40 |

**Total** **$ 2,143,805.64**

# 4-4 - Defiance Compressor Station Removal

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 3877 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 348.93 | $ 6,552.13 | $ 155.08 | $ 7,056.14 |
| 3877 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 11,708.54 | $ 2,054.81 | $ 13,763.35 |
| 112904 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $11,290.40 | $ 13,548.48 | $ 11,290.40 | $ 36,129.28 |
| 4466 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 18" - 24", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane)<br>2 Cutting Torches<br>2 Sets of Gases<br>1 Hyd. Crane, 12 Ton | 160 | 0.2 | $ - | $ 51,135.70 | $ 26,126.10 | $ 77,261.80 |
| 1403166 | C.F. | Building demolition, small buildings or single buildings, steel, includes 20 mile haul, excludes salvage, foundation demolition or dump fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (medium)<br>2 Truck Drivers (heavy)<br>1 Crawler Loader, 3 C.Y.<br>2 Dump Trucks, 12 C.Y., 400 H.P. | 14800 | 0 | $ - | $ 266,601.54 | $238,538.22 | $ 505,139.76 |
| 10 | Ea. | Boiler, gas and or oil or solid, 12,200 thru 25,000 MBH, selective demolition | 1 Steamfitter Foreman (inside)<br>2 Steamfitters<br>1 Steamfitter Apprentice | 0.12 | 267 | $ - | $ 187,000.00 | $ - | $ 187,000.00 |
| 16 | Ea. | Air conditioner, split unit air conditioner, package unit, 3 ton, selective demolition | 2 Steamfitters<br>1 Steamfitter Apprentice | 3 | 8 | $ - | $ 8,640.00 | $ - | $ 8,640.00 |
| 67 | Ea. | Steel tank, single wall, above ground, 15,000 thru 30,000 gallon, selective demolition, excluding foundation, pumps or piping | 2 Pipe Fitters<br>1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Flatbed Trailer, 40 Ton<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Hyd. Crane, 80 Ton<br>1 Hyd. Excavator, 2 C.Y. | 2 | 16 | $ - | $ 77,050.00 | $113,900.00 | $ 190,950.00 |
| 26 | Ea. | Selective demolition, utility valves & accessories, utility valves, 14"-24", excludes excavation | 1 Labor Foreman (outside)<br>1 Skilled Worker<br>1 Laborer<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 2 | 14 | $ - | $ 20,020.00 | $ 2,730.00 | $ 22,750.00 |
| 1 | Ea. | Transformer, dry type, primary, 3 phase, to 600 V, 750 kVA, electrical demolition, remove, including removal of supports, wire & conduit terminations | 1 Electrician Foreman<br>1 Electrician<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 1.1 | 18.18 | $ - | $ 1,375.00 | $ 191.00 | $ 1,566.00 |
| 93 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 53,010.00 | $ 82,770.00 | $ 135,780.00 |
| 93 | Day | Rent trailer, platform, flush deck 2 axle, 25 ton, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 19,997.79 | $ 19,997.79 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 95 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 50,825.00 | $ - | $ 50,825.00 |
| 47 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 24,205.00 | $ - | $ 24,205.00 |
| 122 | $/Day | Per Diem | | 1 | 395.5 | $ - | $ - | $ - | $ 6,013.70 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 25,904.16 | $ - | $ 25,904.16 |

| | |
|---|---|
| **Total** | **$ 1,321,111.98** |

# 4-5 - Defiance Compressor Station Sub Material Removal

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 3877 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 1,860.96 | $ 8,025.39 | $ 1,163.10 | $ 11,049.45 |
| 55516 | C.F. | Selective demolition, cutout, concrete, elevated slab, bar reinforced, over 6 C.F., excludes loading and disposal | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Air Compressor, 250 cfm<br>2 Breakers, Pavement, 60 lb.<br>2 -50' Air Hoses, 1.5 | 50 | 0.8 | $ - | $ 2,303,914.00 | $ 433,024.80 | $ 2,736,938.80 |
| 13119 | S.Y. | Demolish, remove pavement & curb, remove concrete, rod reinforced, to 6" thick, excludes hauling and disposal fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (light)<br>1 Equip. Oper. (medium)<br>1 Backhoe Loader, 48 H.P.<br>1 Hyd. Hammer (1200 lb.)<br>1 F.E. Loader, W.M., 4 C.Y.<br>1 Pvmt. Rem. Bucket | 200 | 0.12 | $ - | $ 87,897.30 | $ 87,897.30 | $ 175,794.60 |
| 4243 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 28,003.80 | $ 37,550.55 | $ 65,554.35 |
| 34537 | B.C.Y. | Excavating, bulk, dozer, open site, bank measure, sand and gravel, 200 HP dozer, 300' haul | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P. | 310 | 0.03 | $ - | $ 61,821.23 | $ 186,499.80 | $ 248,321.03 |
| 34537 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 227,944.20 | $ 305,652.45 | $ 533,596.65 |
| 4 | Month | Rent front end loader, 4WD, art. frame, diesel, 7 - 9 CY 475 HP, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 166,840.96 | $ 166,840.96 |
| 8 | Ea. | Pipe, cut one groove, labor only, 24" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 15 | 1.07 | $ - | $ 576.00 | $ - | $ 576.00 |
| 8 | Ea. | Gasket and bolt set, for flanges, 150 lb., 24" pipe size | | 1.9 | 4.21 | $ 2,400.00 | $ 2,520.00 | $ - | $ 4,920.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 555 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 296,925.00 | $ - | $ 296,925.00 |
| 277 | Day | Environmental Engineer | | 1 | 9 | $ - | $ 142,655.00 | $ - | $ 142,655.00 |
| 122 | $/Day | Per Diem | | 1 | 71.49 | $ - | $ - | $ - | $ 1,087.17 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 87,847.78 | $ - | $ 87,847.78 |

**Total** **$ 4,480,236.79**

## 4-6 - Defiance Compressor Station Backfill and Restoration

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 311 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 120 | 0.07 | $ - | $ 1,331.08 | $ 687.31 | $ 2,018.39 |
| 34537 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | $478,337.45 | $ 96,703.60 | $167,849.82 | $ 742,890.87 |
| 34537 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $224,490.50 | $302,198.75 | $ 526,689.25 |
| 311 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 1.5 | 16 | $ - | $273,680.00 | $ 40,430.00 | $ 314,110.00 |
| 34537 | E.C.Y. | Backfill, bulk, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P.<br>1 Vibratory Roller, Towed, 23 Ton | 800 | 0.01 | $ - | $ 23,830.53 | $ 97,048.97 | $ 120,879.50 |
| 34537 | S.Y. | Seeding, mechanical seeding hydro or air seeding for large areas, includes lime, fertilizer and seed with wood fiber mulch added | 1 Laborer<br>1 Equip. Oper. (medium)<br>1 Truck Driver (heavy)<br>1 Hydromulcher, T.M., 3000 Gal.<br>1 Truck Tractor, 220 H.P. | 8900 | 0 | $ 78,744.36 | $ 3,453.70 | $ 2,417.59 | $ 84,615.65 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 58 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 30,740.00 | $ - | $ 30,740.00 |
| 29 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 15,370.00 | $ - | $ 15,370.00 |
| 122 | $/Day | Per Diem | | 1 | 80.24 | $ - | $ - | $ - | $ 1,220.23 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 36,871.68 | $ - | $ 36,871.68 |

**Total** **$ 1,880,455.57**

## 4-7 - Eunice Compressor Station Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 3329 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 299.61 | $ 5,626.01 | $ 133.16 | $ 6,058.78 |
| 3329 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 10,053.58 | $ 1,764.37 | $ 11,817.95 |
| 17455 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $1,745.50 | $ 2,094.60 | $ 1,745.50 | $ 5,585.60 |
| 6041 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 18" - 24", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane)<br>2 Cutting Torches<br>2 Sets of Gases<br>1 Hyd. Crane, 12 Ton | 160 | 0.2 | $ - | $ 69,169.45 | $35,339.85 | $ 104,509.30 |
| 561027 | C.F. | Building demolition, small buildings or single buildings, steel, includes 20 mile haul, excludes salvage, foundation demolition or dump fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (medium)<br>2 Truck Drivers (heavy)<br>1 Crawler Loader, 3 C.Y.<br>2 Dump Trucks, 12 C.Y., 400 H.P. | 14800 | 0 | $ - | $ 106,595.13 | $95,374.59 | $ 201,969.72 |
| 1 | Ea. | Boiler, gas and or oil or solid, 12,200 thru 25,000 MBH, selective demolition | 1 Steamfitter Foreman (inside)<br>2 Steamfitters<br>1 Steamfitter Apprentice | 0.12 | 267 | $ - | $ 18,700.00 | $ - | $ 18,700.00 |
| 11 | Ea. | Air conditioner, split unit air conditioner, package unit, 3 ton, selective demolition | 2 Steamfitters<br>1 Steamfitter Apprentice | 3 | 8 | $ - | $ 5,940.00 | $ - | $ 5,940.00 |
| 23 | Ea. | Steel tank, single wall, above ground, 15,000 thru 30,000 gallon, selective demolition, excluding foundation, pumps or piping | 2 Pipe Fitters<br>1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Flatbed Trailer, 40 Ton<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Hyd. Crane, 80 Ton<br>1 Hyd. Excavator, 2 C.Y. | 2 | 16 | $ - | $ 26,450.00 | $39,100.00 | $ 65,550.00 |
| 33 | Ea. | Selective demolition, utility valves & accessories, utility valves, 14"-24", excludes excavation | 1 Labor Foreman (outside)<br>1 Skilled Worker<br>1 Laborer<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 2 | 14 | $ - | $ 25,410.00 | $ 3,465.00 | $ 28,875.00 |
| 18 | Ea. | Selective demolition, utility poles & cross arms, utility poles, wood, 20'-30' high | 1 Electrician Foreman<br>1 Electrician<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 6 | 3.33 | $ - | $ 4,554.00 | $ 630.00 | $ 5,184.00 |
| 2 | Ea. | Selective demolition, radio towers, guyed, 200' high, 70 lb section | 1 Struc. Steel Foreman (outside)<br>1 Struc. Steel Worker<br>1 Truck Driver (light)<br>1 Flatbed Truck, Gas, 3 Ton | 0.7 | 34.29 | $ - | $ 4,700.00 | $ 2,650.00 | $ 7,350.00 |
| 35 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 19,950.00 | $31,150.00 | $ 51,100.00 |
| 35 | Day | Rent trailer, platform, flush deck 2 axle, 25 ton, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 7,526.05 | $ 7,526.05 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 38 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 20,330.00 | $ - | $ 20,330.00 |
| 19 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 9,785.00 | $ - | $ 9,785.00 |
| 122 | $/Day | Per Diem | | 1 | 414.9 | $ - | $ - | $ - | $ 6,309.33 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 11,294.41 | $ - | $ 11,294.41 |

**Total** **$ 576,015.14**

# 4-8 - Eunice Compressor Station Sub Material Removal

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 3329 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 1,597.92 | $ 6,891.03 | $ 998.70 | $ 9,487.65 |
| 21616 | C.F. | Selective demolition, cutout, concrete, elevated slab, bar reinforced, over 6 C.F., excludes loading and disposal | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Air Compressor, 250 cfm<br>2 Breakers, Pavement, 60 lb.<br>2 -50' Air Hoses, 1.5 | 50 | 0.8 | $ - | $897,064.00 | $ 168,604.80 | $ 1,065,668.80 |
| 7683 | S.Y. | Demolish, remove pavement & curb, remove concrete, rod reinforced, to 6" thick, excludes hauling and disposal fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (light)<br>1 Equip. Oper. (medium)<br>1 Backhoe Loader, 48 H.P.<br>1 Hyd. Hammer (1200 lb.)<br>1 F.E. Loader, W.M., 4 C.Y.<br>1 Pvmt. Rem. Bucket | 200 | 0.12 | $ - | $ 51,476.10 | $ 51,476.10 | $ 102,952.20 |
| 2081 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 13,734.60 | $ 18,416.85 | $ 32,151.45 |
| 65087 | B.C.Y. | Excavating, bulk, dozer, open site, bank measure, sand and gravel, 200 HP dozer, 300' haul | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P. | 310 | 0.03 | $ - | $116,505.73 | $ 351,469.80 | $ 467,975.53 |
| 65087 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $429,574.20 | $ 576,019.95 | $ 1,005,594.15 |
| 7 | Month | Rent front end loader, 4WD, art. frame, diesel, 7 - 9 CY 475 HP, Incl. Hourly Oper. Cost. |  | 0 | 0 | $ - | $ - | $ 291,971.68 | $ 291,971.68 |
| 8 | Ea. | Pipe, cut one groove, labor only, 24" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 15 | 1.07 | $ - | $ 576.00 | $ - | $ 576.00 |
| 8 | Ea. | Gasket and bolt set, for flanges, 150 lb., 24" pipe size |  | 1.9 | 4.21 | $ 2,400.00 | $ 2,520.00 | $ - | $ 4,920.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only |  | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 433 | Day | Testing and inspecting, supervision of earthwork |  | 1 | 8 | $ - | $231,655.00 | $ - | $ 231,655.00 |
| 216 | Day | Environmental Engineer |  | 1 | 9 | $ - | $111,240.00 | $ - | $ 111,240.00 |
| 122 | $/Day | Per Diem |  | 1 | 71.49 | $ - | $ - | $ - | $ 1,087.17 |
| 1 | Job | Permitting cost |  | 0 | 0 | $ - | $ 66,668.19 | $ - | $ 66,668.19 |

**Total** **$ 3,400,077.82**

## 4-9 - Eunice Compressor Station Backfill and Restoration

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 586 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 120 | 0.07 | $ - | $ 2,508.08 | $ 1,295.06 | $ 3,803.14 |
| 65087 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | $901,454.95 | $182,243.60 | $316,322.82 | $ 1,400,021.37 |
| 65087 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $423,065.50 | $569,511.25 | $ 992,576.75 |
| 585 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 1.5 | 16 | $ - | $514,800.00 | $ 76,050.00 | $ 590,850.00 |
| 65087 | E.C.Y. | Backfill, bulk, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P.<br>1 Vibratory Roller, Towed, 23 Ton | 800 | 0.01 | $ - | $ 44,910.03 | $182,894.47 | $ 227,804.50 |
| 65087 | S.Y. | Seeding, mechanical seeding hydro or air seeding for large areas, includes lime, fertilizer and seed with wood fiber mulch added | 1 Laborer<br>1 Equip. Oper. (medium)<br>1 Truck Driver (heavy)<br>1 Hydromulcher, T.M., 3000 Gal.<br>1 Truck Tractor, 220 H.P. | 8900 | 0 | $148,398.36 | $ 6,508.70 | $ 4,556.09 | $ 159,463.15 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 109 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 57,770.00 | $ - | $ 57,770.00 |
| 54 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 28,620.00 | $ - | $ 28,620.00 |
| 122 | $/Day | Per Diem | | 1 | 80.24 | $ - | $ - | $ - | $ 1,220.23 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 69,343.58 | $ - | $ 69,343.58 |

| | |
|---|---|
| **Total** | **$ 3,536,522.72** |

## 4-10 - Greensburg Compressor Station Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 5269 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 474.21 | $ 8,904.61 | $ 210.76 | $ 9,589.58 |
| 5269 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 15,912.38 | $ 2,792.57 | $ 18,704.95 |
| 6883 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $ 688.30 | $ 825.96 | $ 688.30 | $ 2,202.56 |
| 2382 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 18" - 24", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane)<br>2 Cutting Torches<br>2 Sets of Gases<br>1 Hyd. Crane, 12 Ton | 160 | 0.2 | $ - | $ 27,273.90 | $ 13,934.70 | $ 41,208.60 |
| 18 | Ea. | Selective demolition, utility valves & accessories, utility valves, 14"-24", excludes excavation | 1 Labor Foreman (outside)<br>1 Skilled Worker<br>1 Laborer<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 2 | 14 | $ - | $ 13,860.00 | $ 1,890.00 | $ 15,750.00 |
| 875081 | C.F. | Building demolition, small buildings or single buildings, steel, includes 20 mile haul, excludes salvage, foundation demolition or dump fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (medium)<br>2 Truck Drivers (heavy)<br>1 Crawler Loader, 3 C.Y.<br>2 Dump Trucks, 12 C.Y., 400 H.P. | 14800 | 0 | $ - | $ 166,265.39 | $148,763.77 | $ 315,029.16 |
| 9 | Ea. | Boiler, gas and or oil or solid, 12,200 thru 25,000 MBH, selective demolition | 1 Steamfitter Foreman (inside)<br>2 Steamfitters<br>1 Steamfitter Apprentice | 0.12 | 267 | $ - | $ 168,300.00 | $ - | $ 168,300.00 |
| 17 | Ea. | Air conditioner, split unit air conditioner, package unit, 3 ton, selective demolition | 2 Steamfitters<br>1 Steamfitter Apprentice | 3 | 8 | $ - | $ 9,180.00 | $ - | $ 9,180.00 |
| 35 | Ea. | Steel tank, single wall, above ground, 15,000 thru 30,000 gallon, selective demolition, excluding foundation, pumps or piping | 2 Pipe Fitters<br>1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Flatbed Trailer, 40 Ton<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Hyd. Crane, 80 Ton<br>1 Hyd. Excavator, 2 C.Y. | 2 | 16 | $ - | $ 40,250.00 | $ 59,500.00 | $ 99,750.00 |
| 9 | Ea. | Selective demolition, utility poles & cross arms, utility poles, wood, 20'-30' high | 1 Electrician Foreman<br>1 Electrician<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 6 | 3.33 | $ - | $ 2,277.00 | $ 315.00 | $ 2,592.00 |
| 1 | Ea. | Selective demolition, radio towers, guyed, 200' high, 70 lb section | 1 Struc. Steel Foreman (outside)<br>1 Struc. Steel Worker<br>1 Truck Driver (light)<br>1 Flatbed Truck, Gas, 3 Ton | 0.7 | 34.29 | $ - | $ 2,350.00 | $ 1,325.00 | $ 3,675.00 |
| 61 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 34,770.00 | $ 54,290.00 | $ 89,060.00 |
| 61 | Day | Rent trailer, platform, flush deck 2 axle, 25 ton, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 13,116.83 | $ 13,116.83 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 60 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 32,100.00 | $ - | $ 32,100.00 |
| 30 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 15,450.00 | $ - | $ 15,450.00 |
| 122 | $/Day | Per Diem | | 1 | 414.9 | $ - | $ - | $ - | $ 6,309.33 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 17,002.96 | $ - | $ 17,002.96 |

**Total** **$ 867,150.97**

## 4-11 - Greensburg Compressor Station Sub Material Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 5269 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 2,529.12 | $ 10,906.83 | $ 1,580.70 | $ 15,016.65 |
| 49294 | C.F. | Selective demolition, cutout, concrete, elevated slab, bar reinforced, over 6 C.F., excludes loading and disposal | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Air Compressor, 250 cfm<br>2 Breakers, Pavement, 60 lb.<br>2 -50’ Air Hoses, 1.5 | 50 | 0.8 | $ - | $ 2,045,701.00 | $ 384,493.20 | $ 2,430,194.20 |
| 4676 | S.Y. | Demolish, remove pavement & curb, remove concrete, rod reinforced, to 6" thick, excludes hauling and disposal fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (light)<br>1 Equip. Oper. (medium)<br>1 Backhoe Loader, 48 H.P.<br>1 Hyd. Hammer (1200 lb.)<br>1 F.E. Loader, W.M., 4 C.Y.<br>1 Pvmt. Rem. Bucket | 200 | 0.12 | $ - | $ 31,329.20 | $ 31,329.20 | $ 62,658.40 |
| 2605 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 17,193.00 | $ 23,054.25 | $ 40,247.25 |
| 17156 | B.C.Y. | Excavating, bulk, dozer, open site, bank measure, sand and gravel, 200 HP dozer, 300' haul | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P. | 310 | 0.03 | $ - | $ 30,709.24 | $ 92,642.40 | $ 123,351.64 |
| 17156 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 113,229.60 | $ 151,830.60 | $ 265,060.20 |
| 2 | Month | Rent front end loader, 4WD, art. frame, diesel, 7 - 9 CY 475 HP, Incl. Hourly Oper. Cost. |  | 0 | 0 | $ - | $ - | $ 83,420.48 | $ 83,420.48 |
| 8 | Ea. | Pipe, cut one groove, labor only, 24" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 15 | 1.07 | $ - | $ 576.00 | $ - | $ 576.00 |
| 8 | Ea. | Gasket and bolt set, for flanges, 150 lb., 24" pipe size |  | 1.9 | 4.21 | $ 2,400.00 | $ 2,520.00 | $ - | $ 4,920.00 |
| 500 | V.L.F. | Selective demolition, wells, well screen & casing, 6" to 16" dia | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Drill Rig, Truck-Mounted<br>1 Flatbed Truck, Gas, 3 Ton | 300 | 0.13 | $ - | $ 3,475.00 | $ 2,975.00 | $ 6,450.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only |  | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 986 | Day | Testing and inspecting, supervision of earthwork |  | 1 | 8 | $ - | $ 527,510.00 | $ - | $ 527,510.00 |
| 493 | Day | Environmental Engineer |  | 1 | 9 | $ - | $ 253,895.00 | $ - | $ 253,895.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 122 | $/Day | Per Diem | | 1 | 71.62 | $ - | $ - | $ - | $ 1,089.14 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 76,450.38 | $ - | $ 76,450.38 |

**Total** **$ 3,898,969.34**

## 4-12 - Greensburg Compressor Station Backfill and Restoration

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 155 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 120 | 0.07 | $ - | $ 663.40 | $ 342.55 | $ 1,005.95 |
| 17156 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | $237,610.60 | $ 48,036.80 | $ 83,378.16 | $ 369,025.56 |
| 17156 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $111,514.00 | $150,115.00 | $ 261,629.00 |
| 155 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 1.5 | 16 | $ - | $136,400.00 | $ 20,150.00 | $ 156,550.00 |
| 17156 | E.C.Y. | Backfill, bulk, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P.<br>1 Vibratory Roller, Towed, 23 Ton | 800 | 0.01 | $ - | $ 11,837.64 | $ 48,208.36 | $ 60,046.00 |
| 17165 | S.Y. | Seeding, mechanical seeding hydro or air seeding for large areas, includes lime, fertilizer and seed with wood fiber mulch added | 1 Laborer<br>1 Equip. Oper. (medium)<br>1 Truck Driver (heavy)<br>1 Hydromulcher, T.M., 3000 Gal.<br>1 Truck Tractor, 220 H.P. | 8900 | 0 | $ 39,136.20 | $ 1,716.50 | $ 1,201.55 | $ 42,054.25 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 29 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 15,370.00 | $ - | $ 15,370.00 |
| 14 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 7,420.00 | $ - | $ 7,420.00 |
| 122 | $/Day | Per Diem | | 1 | 80.24 | $ - | $ - | $ - | $ 1,220.23 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 18,387.42 | $ - | $ 18,387.42 |

**Total** **$ 937,758.41**

## 4-13 - Jena Compressor Station Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 3542 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 318.78 | $ 5,985.98 | $ 141.68 | $ 6,446.44 |
| 3542 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 10,696.84 | $ 1,877.26 | $ 12,574.10 |
| 9096 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $ 909.60 | $ 1,091.52 | $ 909.60 | $ 2,910.72 |
| 3148 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 18" - 24", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane)<br>2 Cutting Torches<br>2 Sets of Gases<br>1 Hyd. Crane, 12 Ton | 160 | 0.2 | $ - | $ 36,044.60 | $18,415.80 | $ 54,460.40 |
| 14 | Ea. | Selective demolition, utility valves & accessories, utility valves, 14"-24", excludes excavation | 1 Labor Foreman (outside)<br>1 Skilled Worker<br>1 Laborer<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 2 | 14 | $ - | $ 10,780.00 | $ 1,470.00 | $ 12,250.00 |
| 1069730 | C.F. | Building demolition, small buildings or single buildings, steel, includes 20 mile haul, excludes salvage, foundation demolition or dump fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (medium)<br>2 Truck Drivers (heavy)<br>1 Crawler Loader, 3 C.Y.<br>2 Dump Trucks, 12 C.Y., 400 H.P. | 14800 | 0 | $ - | $ 203,248.70 | ######### | $ 385,102.80 |
| 7 | Ea. | Boiler, gas and or oil or solid, 12,200 thru 25,000 MBH, selective demolition | 1 Steamfitter Foreman (inside)<br>2 Steamfitters<br>1 Steamfitter Apprentice | 0.12 | 267 | $ - | $ 130,900.00 | $ - | $ 130,900.00 |
| 14 | Ea. | Air conditioner, split unit air conditioner, package unit, 3 ton, selective demolition | 2 Steamfitters<br>1 Steamfitter Apprentice | 3 | 8 | $ - | $ 7,560.00 | $ - | $ 7,560.00 |
| 30 | Ea. | Steel tank, single wall, above ground, 15,000 thru 30,000 gallon, selective demolition, excluding foundation, pumps or piping | 2 Pipe Fitters<br>1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Flatbed Trailer, 40 Ton<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Hyd. Crane, 80 Ton<br>1 Hyd. Excavator, 2 C.Y. | 2 | 16 | $ - | $ 34,500.00 | $51,000.00 | $ 85,500.00 |
| 11 | Ea. | Selective demolition, utility poles & cross arms, utility poles, wood, 20'-30' high | 1 Electrician Foreman<br>1 Electrician<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 6 | 3.33 | $ - | $ 2,783.00 | $ 385.00 | $ 3,168.00 |
| 1 | Ea. | Selective demolition, radio towers, guyed, 200' high, 70 lb section | 1 Struc. Steel Foreman (outside)<br>1 Struc. Steel Worker<br>1 Truck Driver (light)<br>1 Flatbed Truck, Gas, 3 Ton | 0.7 | 34.29 | $ - | $ 2,350.00 | $ 1,325.00 | $ 3,675.00 |
| 51 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 29,070.00 | $45,390.00 | $ 74,460.00 |
| 51 | Day | Rent trailer, platform, flush deck 2 axle, 25 ton, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $10,966.53 | $ 10,966.53 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 73 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 39,055.00 | $ - | $ 39,055.00 |
| 36 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 18,540.00 | $ - | $ 18,540.00 |
| 122 | $/Day | Per Diem | | 1 | 414.9 | $ - | $ - | $ - | $ 6,309.33 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 17,240.17 | $ - | $ 17,240.17 |

**Total** **$ 879,248.49**

## 4-14 - Jena Compressor Station Sub Material Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 3542 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 1,700.16 | $ 7,331.94 | $ 1,062.60 | $ 10,094.70 |
| 63389 | C.F. | Selective demolition, cutout, concrete, elevated slab, bar reinforced, over 6 C.F., excludes loading and disposal | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Air Compressor, 250 cfm<br>2 Breakers, Pavement, 60 lb.<br>2 -50’ Air Hoses, 1.5 | 50 | 0.8 | $ - | $ 2,630,643.50 | $ 494,434.20 | $ 3,125,077.70 |
| 9752 | S.Y. | Demolish, remove pavement & curb, remove concrete, rod reinforced, to 6" thick, excludes hauling and disposal fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (light)<br>1 Equip. Oper. (medium)<br>1 Backhoe Loader, 48 H.P.<br>1 Hyd. Hammer (1200 lb.)<br>1 F.E. Loader, W.M., 4 C.Y.<br>1 Pvmt. Rem. Bucket | 200 | 0.12 | $ - | $ 65,338.40 | $ 65,338.40 | $ 130,676.80 |
| 3973 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 26,221.80 | $ 35,161.05 | $ 61,382.85 |
| 30254 | B.C.Y. | Excavating, bulk, dozer, open site, bank measure, sand and gravel, 200 HP dozer, 300' haul | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P. | 310 | 0.03 | $ - | $ 54,154.66 | $ 163,371.60 | $ 217,526.26 |
| 30254 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 199,676.40 | $ 267,747.90 | $ 467,424.30 |
| 3 | Month | Rent front end loader, 4WD, art. frame, diesel, 7 - 9 CY 475 HP, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 125,130.72 | $ 125,130.72 |
| 8 | Ea. | Pipe, cut one groove, labor only, 24" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 15 | 1.07 | $ - | $ 576.00 | $ - | $ 576.00 |
| 8 | Ea. | Gasket and bolt set, for flanges, 150 lb., 24" pipe size | | 1.9 | 4.21 | $ 2,400.00 | $ 2,520.00 | $ - | $ 4,920.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 1268 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 678,380.00 | $ - | $ 678,380.00 |
| 634 | Day | Environmental Engineer | | 1 | 9 | $ - | $ 326,510.00 | $ - | $ 326,510.00 |
| 122 | $/Day | Per Diem | | 1 | 71.49 | $ - | $ - | $ - | $ 1,087.17 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 103,138.33 | $ - | $ 103,138.33 |

**Total** **$ 5,260,054.83**

## 4-15 - Jena Compressor Station Backfill and Restoration

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 273 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 120 | 0.07 | $ - | $ 1,168.44 | $ 603.33 | $ 1,771.77 |
| 30254 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | $419,017.90 | $ 84,711.20 | $147,034.44 | $ 650,763.54 |
| 30254 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $196,651.00 | $264,722.50 | $ 461,373.50 |
| 273 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 1.5 | 16 | $ - | $240,240.00 | $ 35,490.00 | $ 275,730.00 |
| 30254 | E.C.Y. | Backfill, bulk, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P.<br>1 Vibratory Roller, Towed, 23 Ton | 800 | 0.01 | $ - | $ 20,875.26 | $ 85,013.74 | $ 105,889.00 |
| 30254 | S.Y. | Seeding, mechanical seeding hydro or air seeding for large areas, includes lime, fertilizer and seed with wood fiber mulch added | 1 Laborer<br>1 Equip. Oper. (medium)<br>1 Truck Driver (heavy)<br>1 Hydromulcher, T.M., 3000 Gal.<br>1 Truck Tractor, 220 H.P. | 8900 | 0 | $ 68,979.12 | $ 3,025.40 | $ 2,117.78 | $ 74,122.30 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 51 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 27,030.00 | $ - | $ 27,030.00 |
| 25 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 13,250.00 | $ - | $ 13,250.00 |
| 122 | $/Day | Per Diem | | 1 | 80.24 | $ - | $ - | $ - | $ 1,220.23 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 32,324.01 | $ - | $ 32,324.01 |

**Total** **$ 1,648,524.35**

## 4-16 - Joliet Compressor Station Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 3242 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 291.78 | $ 5,478.98 | $ 129.68 | $ 5,900.44 |
| 3242 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 9,790.84 | $ 1,718.26 | $ 11,509.10 |
| 9073 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $ 907.30 | $ 1,088.76 | $ 907.30 | $ 2,903.36 |
| 3140 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 18" - 24", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane)<br>2 Cutting Torches<br>2 Sets of Gases<br>1 Hyd. Crane, 12 Ton | 160 | 0.2 | $ - | $ 35,953.00 | $18,369.00 | $ 54,322.00 |
| 14 | Ea. | Selective demolition, utility valves & accessories, utility valves, 14"-24", excludes excavation | 1 Labor Foreman (outside)<br>1 Skilled Worker<br>1 Laborer<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 2 | 14 | $ - | $ 10,780.00 | $ 1,470.00 | $ 12,250.00 |
| 708248 | C.F. | Building demolition, small buildings or single buildings, steel, includes 20 mile haul, excludes salvage, foundation demolition or dump fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (medium)<br>2 Truck Drivers (heavy)<br>1 Crawler Loader, 3 C.Y.<br>2 Dump Trucks, 12 C.Y., 400 H.P. | 14800 | 0 | $ - | $ 134,567.12 | ######### | $ 254,969.28 |
| 2 | Ea. | Boiler, gas and or oil or solid, 12,200 thru 25,000 MBH, selective demolition | 1 Steamfitter Foreman (inside)<br>2 Steamfitters<br>1 Steamfitter Apprentice | 0.12 | 267 | $ - | $ 37,400.00 | $ - | $ 37,400.00 |
| 10 | Ea. | Air conditioner, split unit air conditioner, package unit, 3 ton, selective demolition | 2 Steamfitters<br>1 Steamfitter Apprentice | 3 | 8 | $ - | $ 5,400.00 | $ - | $ 5,400.00 |
| 19 | Ea. | Steel tank, single wall, above ground, 15,000 thru 30,000 gallon, selective demolition, excluding foundation, pumps or piping | 2 Pipe Fitters<br>1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Flatbed Trailer, 40 Ton<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Hyd. Crane, 80 Ton<br>1 Hyd. Excavator, 2 C.Y. | 2 | 16 | $ - | $ 21,850.00 | $32,300.00 | $ 54,150.00 |
| 5 | Ea. | Selective demolition, utility poles & cross arms, utility poles, wood, 20'-30' high | 1 Electrician Foreman<br>1 Electrician<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 6 | 3.33 | $ - | $ 1,265.00 | $ 175.00 | $ 1,440.00 |
| 31 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 17,670.00 | $27,590.00 | $ 45,260.00 |
| 31 | Day | Rent trailer, platform, flush deck 2 axle, 25 ton, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 6,665.93 | $ 6,665.93 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $2,780.00 | $ - | $ - | $ 2,780.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 48 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 25,680.00 | $ - | $ 25,680.00 |
| 24 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 12,360.00 | $ - | $ 12,360.00 |
| 122 | $/Day | Per Diem | | 1 | 380.6 | $ - | $ - | $ - | $ 5,787.88 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 10,882.56 | $ - | $ 10,882.56 |

**Total** **$ 555,010.55**

# 4-17 - Joliet Compressor Station Sub Material Removal

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 3242 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 1,556.16 | $ 6,710.94 | $ 972.60 | $ 9,239.70 |
| 44038 | C.F. | Selective demolition, cutout, concrete, elevated slab, bar reinforced, over 6 C.F., excludes loading and disposal | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Air Compressor, 250 cfm<br>2 Breakers, Pavement, 60 lb.<br>2 -50' Air Hoses, 1.5 | 50 | 0.8 | $ - | $ 1,827,577.00 | $ 343,496.40 | $ 2,171,073.40 |
| 7347 | S.Y. | Demolish, remove pavement & curb, remove concrete, rod reinforced, to 6" thick, excludes hauling and disposal fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (light)<br>1 Equip. Oper. (medium)<br>1 Backhoe Loader, 48 H.P.<br>1 Hyd. Hammer (1200 lb.)<br>1 F.E. Loader, W.M., 4 C.Y.<br>1 Pvmt. Rem. Bucket | 200 | 0.12 | $ - | $ 49,224.90 | $ 49,224.90 | $ 98,449.80 |
| 2856 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 18,849.60 | $ 25,275.60 | $ 44,125.20 |
| 44846 | B.C.Y. | Excavating, bulk, dozer, open site, bank measure, sand and gravel, 200 HP dozer, 300' haul | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P. | 310 | 0.03 | $ - | $ 80,274.34 | $ 242,168.40 | $ 322,442.74 |
| 44846 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 295,983.60 | $ 396,887.10 | $ 692,870.70 |
| 4 | Month | Rent front end loader, 4WD, art. frame, diesel, 7 - 9 CY 475 HP, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 166,840.96 | $ 166,840.96 |
| 8 | Ea. | Pipe, cut one groove, labor only, 24" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 15 | 1.07 | $ - | $ 576.00 | $ - | $ 576.00 |
| 8 | Ea. | Gasket and bolt set, for flanges, 150 lb., 24" pipe size | | 1.9 | 4.21 | $ 2,400.00 | $ 2,520.00 | $ - | $ 4,920.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 881 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 471,335.00 | $ - | $ 471,335.00 |
| 440 | Day | Environmental Engineer | | 1 | 9 | $ - | $ 226,600.00 | $ - | $ 226,600.00 |
| 122 | $/Day | Per Diem | | 1 | 71.49 | $ - | $ - | $ - | $ 1,087.17 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 84,353.81 | $ - | $ 84,353.81 |

**Total** **$ 4,302,044.48**

## 4-18 - Joliet Compressor Station Backfill and Restoration

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 404 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 120 | 0.07 | $ - | $ 1,729.12 | $ 892.84 | $ 2,621.96 |
| 44846 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | $621,117.10 | $125,568.80 | $217,951.56 | $ 964,637.46 |
| 44846 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $291,499.00 | $392,402.50 | $ 683,901.50 |
| 404 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 1.5 | 16 | $ - | $355,520.00 | $ 52,520.00 | $ 408,040.00 |
| 44846 | E.C.Y. | Backfill, bulk, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P.<br>1 Vibratory Roller, Towed, 23 Ton | 800 | 0.01 | $ - | $ 30,943.74 | $126,017.26 | $ 156,961.00 |
| 44846 | S.Y. | Seeding, mechanical seeding hydro or air seeding for large areas, includes lime, fertilizer and seed with wood fiber mulch added | 1 Laborer<br>1 Equip. Oper. (medium)<br>1 Truck Driver (heavy)<br>1 Hydromulcher, T.M., 3000 Gal.<br>1 Truck Tractor, 220 H.P. | 8900 | 0 | $102,248.88 | $ 4,484.60 | $ 3,139.22 | $ 109,872.70 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 75 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 39,750.00 | $ - | $ 39,750.00 |
| 37 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 19,610.00 | $ - | $ 19,610.00 |
| 122 | $/Day | Per Diem | | 1 | 80.24 | $ - | $ - | $ - | $ 1,220.23 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 47,833.30 | $ - | $ 47,833.30 |

**Total** **$ 2,439,498.15**

## 4-19 - Marshfield Compressor Station Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 3757 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 338.13 | $ 6,349.33 | $ 150.28 | $ 6,837.74 |
| 3757 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 11,346.14 | $ 1,991.21 | $ 13,337.35 |
| 4675 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $ 467.50 | $ 561.00 | $ 467.50 | $ 1,496.00 |
| 1618 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 26" - 34", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane)<br>2 Cutting Torches<br>2 Sets of Gases<br>1 Hyd. Crane, 12 Ton | 107 | 0.33 | $ - | $ 27,069.14 | $13,833.90 | $ 40,903.04 |
| 627246 | C.F. | Building demolition, small buildings or single buildings, steel, includes 20 mile haul, excludes salvage, foundation demolition or dump fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (medium)<br>2 Truck Drivers (heavy)<br>1 Crawler Loader, 3 C.Y.<br>2 Dump Trucks, 12 C.Y., 400 H.P. | 14800 | 0 | $ - | $ 119,176.74 | ######### | $ 225,808.56 |
| 6 | Ea. | Boiler, gas and or oil or solid, 12,200 thru 25,000 MBH, selective demolition | 1 Steamfitter Foreman (inside)<br>2 Steamfitters<br>1 Steamfitter Apprentice | 0.12 | 267 | $ - | $ 112,200.00 | $ - | $ 112,200.00 |
| 13 | Ea. | Air conditioner, split unit air conditioner, package unit, 3 ton, selective demolition | 2 Steamfitters<br>1 Steamfitter Apprentice | 3 | 8 | $ - | $ 7,020.00 | $ - | $ 7,020.00 |
| 29 | Ea. | Steel tank, single wall, above ground, 15,000 thru 30,000 gallon, selective demolition, excluding foundation, pumps or piping | 2 Pipe Fitters<br>1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Flatbed Trailer, 40 Ton<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Hyd. Crane, 80 Ton<br>1 Hyd. Excavator, 2 C.Y. | 2 | 16 | $ - | $ 33,350.00 | $49,300.00 | $ 82,650.00 |
| 6 | Ea. | Selective demolition, utility valves & accessories, utility valves, 14"-24", excludes excavation | 1 Labor Foreman (outside)<br>1 Skilled Worker<br>1 Laborer<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 2 | 14 | $ - | $ 4,620.00 | $ 630.00 | $ 5,250.00 |
| 5 | Ea. | Selective demolition, utility poles & cross arms, utility poles, wood, 20'-30' high | 1 Electrician Foreman<br>1 Electrician<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 6 | 3.33 | $ - | $ 1,265.00 | $ 175.00 | $ 1,440.00 |
| 1 | Ea. | Selective demolition, radio towers, guyed, 200' high, 70 lb section | 1 Struc. Steel Foreman (outside)<br>1 Struc. Steel Worker<br>1 Truck Driver (light)<br>1 Flatbed Truck, Gas, 3 Ton | 0.7 | 34.29 | $ - | $ 2,350.00 | $ 1,325.00 | $ 3,675.00 |
| 48 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 27,360.00 | $42,720.00 | $ 70,080.00 |
| 48 | Day | Rent trailer, platform, flush deck 2 axle, 25 ton, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $10,321.44 | $ 10,321.44 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 50 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 26,750.00 | $ - | $ 26,750.00 |
| 25 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 12,875.00 | $ - | $ 12,875.00 |
| 122 | $/Day | Per Diem | | 1 | 415 | $ - | $ - | $ - | $ 6,311.31 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 12,701.71 | $ - | $ 12,701.71 |

**Total** **$ 647,787.15**

## 4-20 - Mountain Home Compressor Station Sub Material Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 2164 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 1,038.72 | $ 4,479.48 | $ 649.20 | $ 6,167.40 |
| 2021 | C.F. | Selective demolition, cutout, concrete, elevated slab, bar reinforced, over 6 C.F., excludes loading and disposal | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Air Compressor, 250 cfm<br>2 Breakers, Pavement, 60 lb.<br>2 -50’ Air Hoses, 1.5 | 50 | 0.8 | $ - | $ 83,871.50 | $ 15,763.80 | $ 99,635.30 |
| 362 | S.Y. | Demolish, remove pavement & curb, remove concrete, rod reinforced, to 6" thick, excludes hauling and disposal fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (light)<br>1 Equip. Oper. (medium)<br>1 Backhoe Loader, 48 H.P.<br>1 Hyd. Hammer (1200 lb.)<br>1 F.E. Loader, W.M., 4 C.Y.<br>1 Pvmt. Rem. Bucket | 200 | 0.12 | $ - | $ 2,425.40 | $ 2,425.40 | $ 4,850.80 |
| 136 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 897.60 | $ 1,203.60 | $ 2,101.20 |
| 25570 | B.C.Y. | Excavating, bulk, dozer, open site, bank measure, sand and gravel, 200 HP dozer, 300' haul | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P. | 310 | 0.03 | $ - | $ 45,770.30 | $ 138,078.00 | $ 183,848.30 |
| 25570 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 168,762.00 | $ 226,294.50 | $ 395,056.50 |
| 3 | Month | Rent front end loader, 4WD, art. frame, diesel, 7 - 9 CY 475 HP, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 125,130.72 | $ 125,130.72 |
| 10 | Ea. | Pipe, cut one groove, labor only, 20" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 17 | 0.94 | $ - | $ 635.00 | $ - | $ 635.00 |
| 10 | Ea. | Gasket and bolt set, for flanges, 150 lb., 20" pipe size | | 2.3 | 3.48 | $ 2,410.00 | $ 2,610.00 | $ - | $ 5,020.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 83 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 44,405.00 | $ - | $ 44,405.00 |
| 41 | Day | Environmental Engineer | | 1 | 9 | $ - | $ 21,115.00 | $ - | $ 21,115.00 |
| 122 | $/Day | Per Diem | | 1 | 70.63 | $ - | $ - | $ - | $ 1,074.09 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 17,943.39 | $ - | $ 17,943.39 |

**Total** **$ 915,112.70**

## 4-21 - Mountain Home Compressor Station Backfill and Restoration

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 231 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 120 | 0.07 | $ - | $ 988.68 | $ 510.51 | $ 1,499.19 |
| 25570 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | $354,144.50 | $ 71,596.00 | $124,270.20 | $ 550,010.70 |
| 25570 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $166,205.00 | $223,737.50 | $ 389,942.50 |
| 231 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 1.5 | 16 | $ - | $203,280.00 | $ 30,030.00 | $ 233,310.00 |
| 25571 | E.C.Y. | Backfill, bulk, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P.<br>1 Vibratory Roller, Towed, 23 Ton | 800 | 0.01 | $ - | $ 17,643.99 | $ 71,854.51 | $ 89,498.50 |
| 25570 | S.Y. | Seeding, mechanical seeding hydro or air seeding for large areas, includes lime, fertilizer and seed with wood fiber mulch added | 1 Laborer<br>1 Equip. Oper. (medium)<br>1 Truck Driver (heavy)<br>1 Hydromulcher, T.M., 3000 Gal.<br>1 Truck Tractor, 220 H.P. | 8900 | 0 | $ 58,299.60 | $ 2,557.00 | $ 1,789.90 | $ 62,646.50 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 43 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 22,790.00 | $ - | $ 22,790.00 |
| 21 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 11,130.00 | $ - | $ 11,130.00 |
| 122 | $/Day | Per Diem | | 1 | 80.24 | $ - | $ - | $ - | $ 1,220.23 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 27,341.95 | $ - | $ 27,341.95 |

**Total** **$ 1,394,439.57**

## 4-22 - Muddy Creek Compressor Station Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 3026 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 272.34 | $ 5,113.94 | $ 121.04 | $ 5,507.32 |
| 3026 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 9,138.52 | $ 1,603.78 | $ 10,742.30 |
| 8065 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $ 806.50 | $ 967.80 | $ 806.50 | $ 2,580.80 |
| 3353 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 26" - 34", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane)<br>2 Cutting Torches<br>2 Sets of Gases<br>1 Hyd. Crane, 12 Ton | 107 | 0.33 | $ - | $ 56,095.69 | $28,668.15 | $ 84,763.84 |
| 242341 | C.F. | Building demolition, small buildings or single buildings, steel, includes 20 mile haul, excludes salvage, foundation demolition or dump fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (medium)<br>2 Truck Drivers (heavy)<br>1 Crawler Loader, 3 C.Y.<br>2 Dump Trucks, 12 C.Y., 400 H.P. | 14800 | 0 | $ - | $ 46,044.79 | $41,197.97 | $ 87,242.76 |
| 2 | Ea. | Boiler, gas and or oil or solid, 12,200 thru 25,000 MBH, selective demolition | 1 Steamfitter Foreman (inside)<br>2 Steamfitters<br>1 Steamfitter Apprentice | 0.12 | 267 | $ - | $ 37,400.00 | $ - | $ 37,400.00 |
| 2 | Ea. | Air conditioner, split unit air conditioner, package unit, 3 ton, selective demolition | 2 Steamfitters<br>1 Steamfitter Apprentice | 3 | 8 | $ - | $ 1,080.00 | $ - | $ 1,080.00 |
| 19 | Ea. | Steel tank, single wall, above ground, 15,000 thru 30,000 gallon, selective demolition, excluding foundation, pumps or piping | 2 Pipe Fitters<br>1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Flatbed Trailer, 40 Ton<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Hyd. Crane, 80 Ton<br>1 Hyd. Excavator, 2 C.Y. | 2 | 16 | $ - | $ 21,850.00 | $32,300.00 | $ 54,150.00 |
| 6 | Ea. | Selective demolition, utility poles & cross arms, utility poles, wood, 20'-30' high | 1 Electrician Foreman<br>1 Electrician<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 6 | 3.33 | $ - | $ 1,518.00 | $ 210.00 | $ 1,728.00 |
| 7 | Ea. | Selective demolition, parking appurtenances, pipe bollards, 6"-12" diameter | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 80 | 0.3 | $ - | $ 117.60 | $ 20.79 | $ 138.39 |
| 25 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 14,250.00 | $22,250.00 | $ 36,500.00 |
| 25 | Day | Rent trailer, platform, flush deck 2 axle, 25 ton, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 5,375.75 | $ 5,375.75 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $2,780.00 | $ - | $ - | $ 2,780.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 32 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 17,120.00 | $ - | $ 17,120.00 |
| 16 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 8,240.00 | $ - | $ 8,240.00 |
| 122 | $/Day | Per Diem | | 1 | 367 | $ - | $ - | $ - | $ 5,581.51 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 7,325.61 | $ - | $ 7,325.61 |

**Total** **$ 373,606.28**

# 4-23 - Muddy Creek Compressor Station Sub Material Removal

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 3026 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 1,452.48 | $ 6,263.82 | $ 907.80 | $ 8,624.10 |
| 8378 | C.F. | Selective demolition, cutout, concrete, elevated slab, bar reinforced, over 6 C.F., excludes loading and disposal | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Air Compressor, 250 cfm<br>2 Breakers, Pavement, 60 lb.<br>2 -50' Air Hoses, 1.5 | 50 | 0.8 | $ - | $ 347,687.00 | $ 65,348.40 | $ 413,035.40 |
| 573 | S.Y. | Demolish, remove pavement & curb, remove concrete, rod reinforced, to 6" thick, excludes hauling and disposal fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (light)<br>1 Equip. Oper. (medium)<br>1 Backhoe Loader, 48 H.P.<br>1 Hyd. Hammer (1200 lb.)<br>1 F.E. Loader, W.M., 4 C.Y.<br>1 Pvmt. Rem. Bucket | 200 | 0.12 | $ - | $ 3,839.10 | $ 3,839.10 | $ 7,678.20 |
| 406 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 2,679.60 | $ 3,593.10 | $ 6,272.70 |
| 60879 | B.C.Y. | Excavating, bulk, dozer, open site, bank measure, sand and gravel, 200 HP dozer, 300' haul | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P. | 310 | 0.03 | $ - | $ 108,973.41 | $ 328,746.60 | $ 437,720.01 |
| 60879 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 401,801.40 | $ 538,779.15 | $ 940,580.55 |
| 7 | Month | Rent front end loader, 4WD, art. frame, diesel, 7 - 9 CY 475 HP, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 291,971.68 | $ 291,971.68 |
| 8 | Ea. | Pipe, cut one groove, labor only, 20" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 17 | 0.94 | $ - | $ 508.00 | $ - | $ 508.00 |
| 8 | Ea. | Gasket and bolt set, for flanges, 150 lb., 20" pipe size | | 2.3 | 3.48 | $ 1,928.00 | $ 2,088.00 | $ - | $ 4,016.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 197 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 105,395.00 | $ - | $ 105,395.00 |
| 98 | Day | Environmental Engineer | | 1 | 9 | $ - | $ 50,470.00 | $ - | $ 50,470.00 |
| 122 | $/Day | Per Diem | | 1 | 70.63 | $ - | $ - | $ - | $ 1,074.09 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 45,509.51 | $ - | $ 45,509.51 |

**Total** **$ 2,320,985.24**

## 4-24 - Muddy Creek Compressor Station Backfill and Restoration

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 548 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 120 | 0.07 | $ - | $ 2,345.44 | $ 1,211.08 | $ 3,556.52 |
| 60879 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | $843,174.15 | $170,461.20 | $295,871.94 | $ 1,309,507.29 |
| 60879 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $395,713.50 | $532,691.25 | $ 928,404.75 |
| 548 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 1.5 | 16 | $ - | $482,240.00 | $ 71,240.00 | $ 553,480.00 |
| 60879 | E.C.Y. | Backfill, bulk, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P.<br>1 Vibratory Roller, Towed, 23 Ton | 800 | 0.01 | $ - | $ 42,006.51 | $171,069.99 | $ 213,076.50 |
| 60879 | S.Y. | Seeding, mechanical seeding hydro or air seeding for large areas, includes lime, fertilizer and seed with wood fiber mulch added | 1 Laborer<br>1 Equip. Oper. (medium)<br>1 Truck Driver (heavy)<br>1 Hydromulcher, T.M., 3000 Gal.<br>1 Truck Tractor, 220 H.P. | 8900 | 0 | $138,804.12 | $ 6,087.90 | $ 4,261.53 | $ 149,153.55 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 102 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 54,060.00 | $ - | $ 54,060.00 |
| 51 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 27,030.00 | $ - | $ 27,030.00 |
| 122 | $/Day | Per Diem | | 1 | 80.24 | $ - | $ - | $ - | $ 1,220.23 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 64,890.78 | $ - | $ 64,890.78 |

**Total** **$ 3,309,429.62**

## 4-25 - Oregon City Compressor Station Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 1581 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 142.29 | $ 2,671.89 | $ 63.24 | $ 2,877.42 |
| 1581 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 4,774.62 | $ 837.93 | $ 5,612.55 |
| 4405 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $ 440.50 | $ 528.60 | $ 440.50 | $ 1,409.60 |
| 1831 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 26" - 34", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane)<br>2 Cutting Torches<br>2 Sets of Gases<br>1 Hyd. Crane, 12 Ton | 107 | 0.33 | $ - | $ 30,632.63 | $15,655.05 | $ 46,287.68 |
| 169544 | C.F. | Building demolition, small buildings or single buildings, steel, includes 20 mile haul, excludes salvage, foundation demolition or dump fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (medium)<br>2 Truck Drivers (heavy)<br>1 Crawler Loader, 3 C.Y.<br>2 Dump Trucks, 12 C.Y., 400 H.P. | 14800 | 0 | $ - | $ 32,213.36 | $28,822.48 | $ 61,035.84 |
| 3 | Ea. | Boiler, gas and or oil or solid, 12,200 thru 25,000 MBH, selective demolition | 1 Steamfitter Foreman (inside)<br>2 Steamfitters<br>1 Steamfitter Apprentice | 0.12 | 267 | $ - | $ 56,100.00 | $ - | $ 56,100.00 |
| 5 | Ea. | Air conditioner, split unit air conditioner, package unit, 3 ton, selective demolition | 2 Steamfitters<br>1 Steamfitter Apprentice | 3 | 8 | $ - | $ 2,700.00 | $ - | $ 2,700.00 |
| 13 | Ea. | Steel tank, single wall, above ground, 15,000 thru 30,000 gallon, selective demolition, excluding foundation, pumps or piping | 2 Pipe Fitters<br>1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Flatbed Trailer, 40 Ton<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Hyd. Crane, 80 Ton<br>1 Hyd. Excavator, 2 C.Y. | 2 | 16 | $ - | $ 14,950.00 | $22,100.00 | $ 37,050.00 |
| 2 | Ea. | Steel tank, Large, double wall, above ground, selective demolition, excluding foundation, pumps & piping | 2 Pipe Fitter / 1 Truck Driver (light) / 1 Equip. Oper. (medium) / 1 Flatbed Truck, Gas, 3 Ton / 1 Excavator Long Boom w/ shear / / / / / / / / / | 0.016 | 0.012 | $ - | $ 246,422.40 | $89,376.00 | $ 335,798.40 |
| 5 | Ea. | Selective demolition, utility valves & accessories, utility valves, 14"-24", excludes excavation | 1 Labor Foreman (outside)<br>1 Skilled Worker<br>1 Laborer<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 2 | 14 | $ - | $ 3,850.00 | $ 525.00 | $ 4,375.00 |
| 1 | Ea. | Generator, dry type, primary, 3 phase, to 600 V, 750 kVA, electrical demolition, remove, including removal of supports, wire & conduit terminations | 1 Electrician Foreman<br>1 Electrician<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 1.1 | 18.18 | $ - | $ 1,375.00 | $ 191.00 | $ 1,566.00 |
| 8 | Ea. | Selective demolition, utility poles & cross arms, utility poles, wood, 20'-30' high | 1 Electrician Foreman<br>1 Electrician<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 6 | 3.33 | $ - | $ 2,024.00 | $ 280.00 | $ 2,304.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 7 | Ea. | Selective demolition, parking appurtenances, pipe bollards, 6"-12" diameter | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 80 | 0.3 | $ - | $ 117.60 | $ 20.79 | $ 138.39 |
| 40 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 22,800.00 | $35,600.00 | $ 58,400.00 |
| 40 | Day | Rent trailer, platform, flush deck 2 axle, 25 ton, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 8,601.20 | $ 8,601.20 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 125 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 66,875.00 | $ - | $ 66,875.00 |
| 62 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 31,930.00 | $ - | $ 31,930.00 |
| 122 | $/Day | Per Diem | | 1 | 399.22 | $ - | $ - | $ - | $ 6,071.07 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 14,745.24 | $ - | $ 14,745.24 |

**Total** **$ 752,007.39**

# 4-26 - Oregon City Compressor Station Sub Material Removal

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 1581 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 758.88 | $ 3,272.67 | $ 474.30 | $ 4,505.85 |
| 6039 | C.F. | Selective demolition, cutout, concrete, elevated slab, bar reinforced, over 6 C.F., excludes loading and disposal | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Air Compressor, 250 cfm<br>2 Breakers, Pavement, 60 lb.<br>2 -50' Air Hoses, 1.5 | 50 | 0.8 | $ - | $ 250,618.50 | $ 47,104.20 | $ 297,722.70 |
| 552 | S.Y. | Demolish, remove pavement & curb, remove concrete, rod reinforced, to 6" thick, excludes hauling and disposal fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (light)<br>1 Equip. Oper. (medium)<br>1 Backhoe Loader, 48 H.P.<br>1 Hyd. Hammer (1200 lb.)<br>1 F.E. Loader, W.M., 4 C.Y.<br>1 Pvmt. Rem. Bucket | 200 | 0.12 | $ - | $ 3,698.40 | $ 3,698.40 | $ 7,396.80 |
| 316 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 2,085.60 | $ 2,796.60 | $ 4,882.20 |
| 8921 | B.C.Y. | Excavating, bulk, dozer, open site, bank measure, sand and gravel, 200 HP dozer, 300' haul | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P. | 310 | 0.03 | $ - | $ 15,968.59 | $ 48,173.40 | $ 64,141.99 |
| 8921 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 58,878.60 | $ 78,950.85 | $ 137,829.45 |
| 1 | Month | Rent front end loader, 4WD, art. frame, diesel, 7 - 9 CY 475 HP, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 41,710.24 | $ 41,710.24 |
| 8 | Ea. | Pipe, cut one groove, labor only, 20" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 17 | 0.94 | $ - | $ 508.00 | $ - | $ 508.00 |
| 8 | Ea. | Gasket and bolt set, for flanges, 150 lb., 20" pipe size | | 2.3 | 3.48 | $ 1,928.00 | $ 2,088.00 | $ - | $ 4,016.00 |
| 500 | V.L.F. | Selective demolition, wells, well screen & casing, 6" to 16" dia | 1 Labor Foreman (outside) | 300 | 0.13 | $ - | $ 3,475.00 | $ 2,975.00 | $ 6,450.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 121 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 64,735.00 | $ - | $ 64,735.00 |
| 60 | Day | Environmental Engineer | | 1 | 9 | $ - | $ 30,900.00 | $ - | $ 30,900.00 |
| 122 | $/Day | Per Diem | | 1 | 70.76 | $ - | $ - | $ - | $ 1,076.06 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 13,480.09 | $ - | $ 13,480.09 |

**Total** $ 687,484.38

## 4-24 - Oregon City Compressor Station Backfill and Restoration

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 81 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 120 | 0.07 | $ - | $ 346.68 | $ 179.01 | $ 525.69 |
| 8921 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | $123,555.85 | $ 24,978.80 | $ 43,356.06 | $ 191,890.71 |
| 8921 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 57,986.50 | $ 78,058.75 | $ 136,045.25 |
| 81 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 1.5 | 16 | $ - | $ 71,280.00 | $ 10,530.00 | $ 81,810.00 |
| 8921 | E.C.Y. | Backfill, bulk, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P.<br>1 Vibratory Roller, Towed, 23 Ton | 800 | 0.01 | $ - | $ 6,155.49 | $ 25,068.01 | $ 31,223.50 |
| 8921 | S.Y. | Seeding, mechanical seeding hydro or air seeding for large areas, includes lime, fertilizer and seed with wood fiber mulch added | 1 Laborer<br>1 Equip. Oper. (medium)<br>1 Truck Driver (heavy)<br>1 Hydromulcher, T.M., 3000 Gal.<br>1 Truck Tractor, 220 H.P. | 8900 | 0 | $ 20,339.88 | $ 892.10 | $ 624.47 | $ 21,856.45 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 15 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 7,950.00 | $ - | $ 7,950.00 |
| 7 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 3,710.00 | $ - | $ 3,710.00 |
| 122 | $/Day | Per Diem | | 1 | 80.24 | $ - | $ - | $ - | $ 1,220.23 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 9,625.64 | $ - | $ 9,625.64 |

**Total** **$ 490,907.47**

## 4-28 - Owyhee Compressor Station Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 1581 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 142.29 | $ 2,671.89 | $ 63.24 | $ 2,877.42 |
| 1581 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 4,774.62 | $ 837.93 | $ 5,612.55 |
| 4405 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $ 440.50 | $ 528.60 | $ 440.50 | $ 1,409.60 |
| 1831 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 18" - 24", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane)<br>2 Cutting Torches<br>2 Sets of Gases<br>1 Hyd. Crane, 12 Ton | 160 | 0.2 | $ - | $ 20,964.95 | $10,711.35 | $ 31,676.30 |
| 347847 | C.F. | Building demolition, small buildings or single buildings, steel, includes 20 mile haul, excludes salvage, foundation demolition or dump fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (medium)<br>2 Truck Drivers (heavy)<br>1 Crawler Loader, 3 C.Y.<br>2 Dump Trucks, 12 C.Y., 400 H.P. | 14800 | 0 | $ - | $ 66,090.93 | $59,133.99 | $ 125,224.92 |
| 3 | Ea. | Boiler, gas and or oil or solid, 12,200 thru 25,000 MBH, selective demolition | 1 Steamfitter Foreman (inside)<br>2 Steamfitters<br>1 Steamfitter Apprentice | 0.12 | 267 | $ - | $ 56,100.00 | $ - | $ 56,100.00 |
| 3 | Ea. | Air conditioner, split unit air conditioner, package unit, 3 ton, selective demolition | 2 Steamfitters<br>1 Steamfitter Apprentice | 3 | 8 | $ - | $ 1,620.00 | $ - | $ 1,620.00 |
| 10 | Ea. | Steel tank, single wall, above ground, 15,000 thru 30,000 gallon, selective demolition, excluding foundation, pumps or piping | 2 Pipe Fitters<br>1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Flatbed Trailer, 40 Ton<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Hyd. Crane, 80 Ton<br>1 Hyd. Excavator, 2 C.Y. | 2 | 16 | $ - | $ 11,500.00 | $17,000.00 | $ 28,500.00 |
| 4 | Ea. | Selective demolition, utility poles & cross arms, utility poles, wood, 20'-30' high | 1 Electrician Foreman<br>1 Electrician<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 6 | 3.33 | $ - | $ 1,012.00 | $ 140.00 | $ 1,152.00 |
| 1 | Ea. | Selective demolition, radio towers, guyed, 200' high, 70 lb section | 1 Struc. Steel Foreman (outside)<br>1 Struc. Steel Worker<br>1 Truck Driver (light)<br>1 Flatbed Truck, Gas, 3 Ton | 0.7 | 34.29 | $ - | $ 2,350.00 | $ 1,325.00 | $ 3,675.00 |
| 17 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 9,690.00 | $15,130.00 | $ 24,820.00 |
| 17 | Day | Rent trailer, platform, flush deck 2 axle, 25 ton, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 3,655.51 | $ 3,655.51 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $2,780.00 | $ - | $ - | $ 2,780.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 25 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 13,375.00 | $ - | $ 13,375.00 |
| 12 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 6,180.00 | $ - | $ 6,180.00 |
| 122 | $/Day | Per Diem | | 1 | 400.9 | $ - | $ - | $ - | $ 6,096.43 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 6,402.09 | $ - | $ 6,402.09 |

**Total** **$ 326,506.82**

## 4-29 - Owyhee Compressor Station Sub Material Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 1694 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 813.12 | $ 3,506.58 | $ 508.20 | $ 4,827.90 |
| 11597 | C.F. | Selective demolition, cutout, concrete, elevated slab, bar reinforced, over 6 C.F., excludes loading and disposal | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Air Compressor, 250 cfm<br>2 Breakers, Pavement, 60 lb.<br>2 -50' Air Hoses, 1.5 | 50 | 0.8 | $ - | $481,275.50 | $ 90,456.60 | $ 571,732.10 |
| 2988 | S.Y. | Demolish, remove pavement & curb, remove concrete, rod reinforced, to 6" thick, excludes hauling and disposal fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (light)<br>1 Equip. Oper. (medium)<br>1 Backhoe Loader, 48 H.P.<br>1 Hyd. Hammer (1200 lb.)<br>1 F.E. Loader, W.M., 4 C.Y.<br>1 Pvmt. Rem. Bucket | 200 | 0.12 | $ - | $ 20,019.60 | $ 20,019.60 | $ 40,039.20 |
| 928 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 6,124.80 | $ 8,212.80 | $ 14,337.60 |
| 19744 | B.C.Y. | Excavating, bulk, dozer, open site, bank measure, sand and gravel, 200 HP dozer, 300' haul | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P. | 310 | 0.03 | $ - | $ 35,341.76 | $ 106,617.60 | $ 141,959.36 |
| 19744 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $130,310.40 | $ 174,734.40 | $ 305,044.80 |
| 2 | Month | Rent front end loader, 4WD, art. frame, diesel, 7 - 9 CY 475 HP, Incl. Hourly Oper. Cost. |  | 0 | 0 | $ - | $ - | $ 83,420.48 | $ 83,420.48 |
| 4 | Ea. | Pipe, cut one groove, labor only, 20" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 17 | 0.94 | $ - | $ 254.00 | $ - | $ 254.00 |
| 4 | Ea. | Gasket and bolt set, for flanges, 150 lb., 20" pipe size |  | 2.3 | 3.48 | $ 964.00 | $ 1,044.00 | $ - | $ 2,008.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only |  | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 232 | Day | Testing and inspecting, supervision of earthwork |  | 1 | 8 | $ - | $124,120.00 | $ - | $ 124,120.00 |
| 116 | Day | Environmental Engineer |  | 1 | 9 | $ - | $ 59,740.00 | $ - | $ 59,740.00 |
| 122 | $/Day | Per Diem |  | 1 | 70.63 | $ - | $ - | $ - | $ 1,074.09 |
| 1 | Job | Permitting cost |  | 0 | 0 | $ - | $ 27,133.75 | $ - | $ 27,133.75 |

| **Total** | **$ 1,383,821.28** |
|---|---|

## 4-30 - Owyhee Compressor Station Backfill and Restoration

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 178 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 120 | 0.07 | $ - | $ 761.84 | $ 393.38 | $ 1,155.22 |
| 19744 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | $273,454.40 | $ 55,283.20 | $ 95,955.84 | $ 424,693.44 |
| 19744 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $128,336.00 | $172,760.00 | $ 301,096.00 |
| 178 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 1.5 | 16 | $ - | $156,640.00 | $ 23,140.00 | $ 179,780.00 |
| 19744 | E.C.Y. | Backfill, bulk, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P.<br>1 Vibratory Roller, Towed, 23 Ton | 800 | 0.01 | $ - | $ 13,623.36 | $ 55,480.64 | $ 69,104.00 |
| 19744 | S.Y. | Seeding, mechanical seeding hydro or air seeding for large areas, includes lime, fertilizer and seed with wood fiber mulch added | 1 Laborer<br>1 Equip. Oper. (medium)<br>1 Truck Driver (heavy)<br>1 Hydromulcher, T.M., 3000 Gal.<br>1 Truck Tractor, 220 H.P. | 8900 | 0 | $ 45,016.32 | $ 1,974.40 | $ 1,382.08 | $ 48,372.80 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 33 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 17,490.00 | $ - | $ 17,490.00 |
| 16 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 8,480.00 | $ - | $ 8,480.00 |
| 122 | $/Day | Per Diem | | 1 | 80.24 | $ - | $ - | $ - | $ 1,220.23 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 21,128.83 | $ - | $ 21,128.83 |

**Total** **$ 1,077,570.52**

# 4-31 - Pleasant View Compressor Station Removal

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 2811 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 252.99 | $ 4,750.59 | $ 112.44 | $ 5,116.02 |
| 2811 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 8,489.22 | $ 1,489.83 | $ 9,979.05 |
| 1492 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $ 149.20 | $ 179.04 | $ 149.20 | $ 477.44 |
| 1722 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 18" - 24", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane)<br>2 Cutting Torches<br>2 Sets of Gases<br>1 Hyd. Crane, 12 Ton | 160 | 0.2 | $ - | $ 19,716.90 | $10,073.70 | $ 29,790.60 |
| 246616 | C.F. | Building demolition, small buildings or single buildings, steel, includes 20 mile haul, excludes salvage, foundation demolition or dump fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (medium)<br>2 Truck Drivers (heavy)<br>1 Crawler Loader, 3 C.Y.<br>2 Dump Trucks, 12 C.Y., 400 H.P. | 14800 | 0 | $ - | $ 46,857.04 | $41,924.72 | $ 88,781.76 |
| 0 | Ea. | Boiler, gas and or oil or solid, 12,200 thru 25,000 MBH, selective demolition | 1 Steamfitter Foreman (inside)<br>2 Steamfitters<br>1 Steamfitter Apprentice | 0.12 | 267 | $ - | $ - | $ - | $ - |
| 5 | Ea. | Air conditioner, split unit air conditioner, package unit, 3 ton, selective demolition | 2 Steamfitters<br>1 Steamfitter Apprentice | 3 | 8 | $ - | $ 2,700.00 | $ - | $ 2,700.00 |
| 10 | Ea. | Steel tank, single wall, above ground, 15,000 thru 30,000 gallon, selective demolition, excluding foundation, pumps or piping | 2 Pipe Fitters<br>1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Flatbed Trailer, 40 Ton<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Hyd. Crane, 80 Ton<br>1 Hyd. Excavator, 2 C.Y. | 2 | 16 | $ - | $ 11,500.00 | $17,000.00 | $ 28,500.00 |
| 2 | Ea. | Selective demolition, utility poles & cross arms, utility poles, wood, 20'-30' high | 1 Electrician Foreman<br>1 Electrician<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 6 | 3.33 | $ - | $ 506.00 | $ 70.00 | $ 576.00 |
| 1 | Ea. | Selective demolition, radio towers, guyed, 200' high, 70 lb section | 1 Struc. Steel Foreman (outside)<br>1 Struc. Steel Worker<br>1 Truck Driver (light)<br>1 Flatbed Truck, Gas, 3 Ton | 0.7 | 34.29 | $ - | $ 2,350.00 | $ 1,325.00 | $ 3,675.00 |
| 18 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 10,260.00 | $16,020.00 | $ 26,280.00 |
| 18 | Day | Rent trailer, platform, flush deck 2 axle, 25 ton, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 3,870.54 | $ 3,870.54 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $2,780.00 | $ - | $ - | $ 2,780.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 17 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 9,095.00 | $ - | $ 9,095.00 |
| 8 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 4,120.00 | $ - | $ 4,120.00 |
| 122 | $/Day | Per Diem | | 1 | 400.9 | $ - | $ - | $ - | $ 6,096.43 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 4,543.76 | $ - | $ 4,543.76 |

**Total** **$ 231,731.60**

# 4-32 - Pleasant View Compressor Station Sub Material Removal

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 2811 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 1,349.28 | $ 5,818.77 | $ 843.30 | $ 8,011.35 |
| 10099 | C.F. | Selective demolition, cutout, concrete, elevated slab, bar reinforced, over 6 C.F., excludes loading and disposal | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Air Compressor, 250 cfm<br>2 Breakers, Pavement, 60 lb.<br>2 -50' Air Hoses, 1.5 | 50 | 0.8 | $ - | $419,108.50 | $ 78,772.20 | $ 497,880.70 |
| 409 | S.Y. | Demolish, remove pavement & curb, remove concrete, rod reinforced, to 6" thick, excludes hauling and disposal fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (light)<br>1 Equip. Oper. (medium)<br>1 Backhoe Loader, 48 H.P.<br>1 Hyd. Hammer (1200 lb.)<br>1 F.E. Loader, W.M., 4 C.Y.<br>1 Pvmt. Rem. Bucket | 200 | 0.12 | $ - | $ 2,740.30 | $ 2,740.30 | $ 5,480.60 |
| 443 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 2,923.80 | $ 3,920.55 | $ 6,844.35 |
| 53049 | B.C.Y. | Excavating, bulk, dozer, open site, bank measure, sand and gravel, 200 HP dozer, 300' haul | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P. | 310 | 0.03 | $ - | $ 94,957.71 | $ 286,464.60 | $ 381,422.31 |
| 53049 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $350,123.40 | $ 469,483.65 | $ 819,607.05 |
| 6 | Month | Rent front end loader, 4WD, art. frame, diesel, 7 - 9 CY 475 HP, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 250,261.44 | $ 250,261.44 |
| 4 | Ea. | Pipe, cut one groove, labor only, 20" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 17 | 0.94 | $ - | $ 254.00 | $ - | $ 254.00 |
| 4 | Ea. | Gasket and bolt set, for flanges, 150 lb., 20" pipe size | | 2.3 | 3.48 | $ 964.00 | $ 1,044.00 | $ - | $ 2,008.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 202 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $108,070.00 | $ - | $ 108,070.00 |
| 101 | Day | Environmental Engineer | | 1 | 9 | $ - | $ 52,015.00 | $ - | $ 52,015.00 |
| 122 | $/Day | Per Diem | | 1 | 70.63 | $ - | $ - | $ - | $ 1,074.09 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 42,821.18 | $ - | $ 42,821.18 |

**Total** **$ 2,183,880.07**

# 4-33 - Pleasant View Compressor Station Backfill and Restoration

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 478 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 120 | 0.07 | $ - | $ 2,045.84 | $ 1,056.38 | $ 3,102.22 |
| 53049 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | $734,728.65 | $148,537.20 | $257,818.14 | $ 1,141,083.99 |
| 53049 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $344,818.50 | $464,178.75 | $ 808,997.25 |
| 478 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 1.5 | 16 | $ - | $420,640.00 | $ 62,140.00 | $ 482,780.00 |
| 53049 | E.C.Y. | Backfill, bulk, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P.<br>1 Vibratory Roller, Towed, 23 Ton | 800 | 0.01 | $ - | $ 36,603.81 | $149,067.69 | $ 185,671.50 |
| 53049 | S.Y. | Seeding, mechanical seeding hydro or air seeding for large areas, includes lime, fertilizer and seed with wood fiber mulch added | 1 Laborer<br>1 Equip. Oper. (medium)<br>1 Truck Driver (heavy)<br>1 Hydromulcher, T.M., 3000 Gal.<br>1 Truck Tractor, 220 H.P. | 8900 | 0 | $120,951.72 | $ 5,304.90 | $ 3,713.43 | $ 129,970.05 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 89 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 47,170.00 | $ - | $ 47,170.00 |
| 44 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 23,320.00 | $ - | $ 23,320.00 |
| 122 | $/Day | Per Diem | | 1 | 80.24 | $ - | $ - | $ - | $ 1,220.23 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 56,567.30 | $ - | $ 56,567.30 |

**Total** **$ 2,884,932.54**

## 4-34 - Plymouth LNG Compressor Station Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 7812 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 703.08 | $ 13,202.28 | $ 312.48 | $ 14,217.84 |
| 7812 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 23,592.24 | $ 4,140.36 | $ 27,732.60 |
| 45152 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $4,515.20 | $ 5,418.24 | $ 4,515.20 | $ 14,448.64 |
| 18772 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 18" - 24", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane)<br>2 Cutting Torches<br>2 Sets of Gases<br>1 Hyd. Crane, 12 Ton | 160 | 0.2 | $ - | $ 214,939.40 | $109,816.20 | $ 324,755.60 |
| 1076186 | C.F. | Building demolition, small buildings or single buildings, steel, includes 20 mile haul, excludes salvage, foundation demolition or dump fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (medium)<br>2 Truck Drivers (heavy)<br>1 Crawler Loader, 3 C.Y.<br>2 Dump Trucks, 12 C.Y., 400 H.P. | 14800 | 0 | $ - | $ 204,475.34 | $182,951.62 | $ 387,426.96 |
| 5 | Ea. | Boiler, gas and or oil or solid, 12,200 thru 25,000 MBH, selective demolition | 1 Steamfitter Foreman (inside)<br>2 Steamfitters<br>1 Steamfitter Apprentice | 0.12 | 267 | $ - | $ 93,500.00 | $ - | $ 93,500.00 |
| 17 | Ea. | Air conditioner, split unit air conditioner, package unit, 3 ton, selective demolition | 2 Steamfitters<br>1 Steamfitter Apprentice | 3 | 8 | $ - | $ 9,180.00 | $ - | $ 9,180.00 |
| 43 | Ea. | Steel tank, single wall, above ground, 15,000 thru 30,000 gallon, selective demolition, excluding foundation, pumps or piping | 2 Pipe Fitters<br>1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Flatbed Trailer, 40 Ton<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Hyd. Crane, 80 Ton<br>1 Hyd. Excavator, 2 C.Y. | 2 | 16 | $ - | $ 49,450.00 | $ 73,100.00 | $ 122,550.00 |
| 3 | Ea. | Steel tank, Large, double wall, above ground, selective demolition, excluding foundation, pumps & piping | 2 Pipe Fitter / 1 Truck Driver (light) / 1 Equip. Oper. (medium) / 1 Flatbed Truck, Gas, 3 Ton / 1 Excavator Long Boom w/ shear / / / / / / / / / / | 0.016 | 0.012 | $ - | $ 369,633.60 | $134,064.00 | $ 503,697.60 |
| 35 | Ea. | Selective demolition, utility poles & cross arms, utility poles, wood, 20'-30' high | 1 Electrician Foreman<br>1 Electrician<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 6 | 3.33 | $ - | $ 8,855.00 | $ 1,225.00 | $ 10,080.00 |
| 1 | Ea. | Selective demolition, radio towers, guyed, 200' high, 70 lb section | 1 Struc. Steel Foreman (outside)<br>1 Struc. Steel Worker<br>1 Truck Driver (light)<br>1 Flatbed Truck, Gas, 3 Ton | 0.7 | 34.29 | $ - | $ 2,350.00 | $ 1,325.00 | $ 3,675.00 |
| 81 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 46,170.00 | $ 72,090.00 | $ 118,260.00 |
| 81 | Day | Rent trailer, platform, flush deck 2 axle, 25 ton, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 17,417.43 | $ 17,417.43 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 188 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 100,580.00 | $ - | $ 100,580.00 |
| 94 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 48,410.00 | $ - | $ 48,410.00 |
| 122 | $/Day | Per Diem | | 1 | 400.9 | $ - | $ - | $ - | $ 6,096.61 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 36,203.17 | $ - | $ 36,203.17 |

**Total** **$ 1,846,361.45**

## 4-2B - Compressor Station LNG Tank E Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 4180000 | C.F. | Gas LNG tank, Nitrogen purge method | | 0 | 0 | $ 418,000.00 | $ 501,600.00 | $ 418,000.00 | $ 1,337,600.00 |
| 2290140 | C.F. | Explosive/implosive demolition, large projects, based on building volume, steel building, includes 20 mile haul, excludes foundation demolition, disposal of material or dump fees | 1 Powderman<br>2 Equip. Oper. (medium)<br>3 Truck Drivers (heavy)<br>1 F.E. Loader, W.M., 2.5 C.Y.<br>3 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Air Compressor, 365 CFM | 16900 | 0 | $ - | $ 412,225.20 | $ 412,225.20 | $ 824,450.40 |
| 640 | Hr. | Perlite waste cleanup/pickup/disposal, heavy sludge or dry vacuumable material | | 0 | 0 | $ - | $ - | $ - | $ 99,200.00 |
| 9974 | Mile | Hazardous waste cleanup/pickup/disposal, transportation to disposal site, truckload = 80 drums or 25 C.Y. or 18 tons, minimum | | 0 | 0 | $ - | $ - | $ - | $ 44,384.30 |
| 3590 | Ton | Perlite waste cleanup/pickup/disposal, dumpsite disposal charge, maximum | | 0 | 0 | $ - | $ - | $ - | $ 1,633,450.00 |
| 2 | Month | Rent vacuum truck, hazardous material, 5000 gallons, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 13,439.36 | $ 13,439.36 |
| 2 | Week | Rent vacuum truck, hazardous material, 5000 gallons, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 4,091.60 | $ 4,091.60 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 2 | Ea. | Steel tank, double wall, above ground, selective demolition, excluding foundation, pumps & piping | 2 Pipe Fitter / 1 Truck Driver (light) / 1 Equip. Oper. (medium) / 1 Flatbed Truck, Gas, 3 Ton / 1 Excavator Long Boom w/ shear / / / / / / / / / / | 0.016 | 0.012 | $ - | $ 18,569,940.17 | $ 6,735,211.46 | $ 25,305,151.63 |
| 4 | Month | Rent crane truck mounted, hydraulic, 120 ton capacity, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 148,343.36 | $ 148,343.36 |
| 125 | Day | Rent trailer, platform, flush deck 2 axle, 25 ton, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 26,878.75 | $ 26,878.75 |
| 3670 | C.Y. | Demolish, remove pavement & curb, remove concrete, plain, 7" to 24" thick, excludes hauling and disposal fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (light)<br>1 Equip. Oper. (medium)<br>1 Backhoe Loader, 48 H.P.<br>1 Hyd. Hammer (1200 lb.)<br>1 F.E. Loader, W.M., 4 C.Y.<br>1 Pvmt. Rem. Bucket | 33 | 0.73 | $ - | $ 148,635.00 | $ 148,635.00 | $ 297,270.00 |
| 3670 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 23,855.00 | $ 32,112.50 | $ 55,967.50 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 136 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 72,760.00 | $ - | $ 72,760.00 |
| 68 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 35,020.00 | $ - | $ 35,020.00 |
| 147.5 | $/Day | Per Diem | | 1 | 88.852 | $ - | $ - | $ - | $ 1,638.21 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 598,209.00 | $ - | $ 598,209.00 |

**$ 30,508,659.11**

# 4-36 - Plymouth LNG Compressor Station Sub Material Removal

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 7812 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 3,749.76 | $ 16,170.84 | $ 2,343.60 | $ 22,264.20 |
| 36710 | C.F. | Selective demolition, cutout, concrete, elevated slab, bar reinforced, over 6 C.F., excludes loading and disposal | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Air Compressor, 250 cfm<br>2 Breakers, Pavement, 60 lb.<br>2 -50' Air Hoses, 1.5 | 50 | 0.8 | $ - | ########## | $ 286,338.00 | $ 1,809,803.00 |
| 22149 | S.Y. | Demolish, remove pavement & curb, remove concrete, rod reinforced, to 6" thick, excludes hauling and disposal fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (light)<br>1 Equip. Oper. (medium)<br>1 Backhoe Loader, 48 H.P.<br>1 Hyd. Hammer (1200 lb.)<br>1 F.E. Loader, W.M., 4 C.Y.<br>1 Pvmt. Rem. Bucket | 200 | 0.12 | $ - | $148,398.30 | $ 148,398.30 | $ 296,796.60 |
| 5051 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 33,336.60 | $ 44,701.35 | $ 78,037.95 |
| 235587 | B.C.Y. | Excavating, bulk, dozer, open site, bank measure, sand and gravel, 200 HP dozer, 300' haul | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P. | 310 | 0.03 | $ - | $421,700.73 | $ 1,272,169.80 | $ 1,693,870.53 |
| 235587 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | ########## | $ 2,084,944.95 | $ 3,639,819.15 |
| 26 | Month | Rent front end loader, 4WD, art. frame, diesel, 7 - 9 CY 475 HP, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 1,084,466.24 | $ 1,084,466.24 |
| 6 | Ea. | Pipe, cut one groove, labor only, 20" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 17 | 0.94 | $ - | $ 381.00 | $ - | $ 381.00 |
| 6 | Ea. | Gasket and bolt set, for flanges, 150 lb., 20" pipe size | | 2.3 | 3.48 | $ 1,446.00 | $ 1,566.00 | $ - | $ 3,012.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 760 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $406,600.00 | $ - | $ 406,600.00 |
| 380 | Day | Environmental Engineer | | 1 | 9 | $ - | $195,700.00 | $ - | $ 195,700.00 |
| 122 | $/Day | Per Diem | | 1 | 70.63 | $ - | $ - | $ - | $ 1,074.09 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $184,799.10 | $ - | $ 184,799.10 |

**Total** **$ 9,424,753.86**

## 4-37 - Plymouth LNG Compressor Station Backfill and Restoration

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 2121 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 120 | 0.07 | $ - | $ 9,077.88 | $ 4,687.41 | $ 13,765.29 |
| 235587 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | ########## | $ 659,643.60 | $ 1,144,952.82 | $ 5,067,476.37 |
| 235587 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 1,531,315.50 | $ 2,061,386.25 | $ 3,592,701.75 |
| 2121 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 1.5 | 16 | $ - | $ 1,866,480.00 | $ 275,730.00 | $ 2,142,210.00 |
| 235587 | E.C.Y. | Backfill, bulk, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P.<br>1 Vibratory Roller, Towed, 23 Ton | 800 | 0.01 | $ - | $ 162,555.03 | $ 661,999.47 | $ 824,554.50 |
| 235587 | S.Y. | Seeding, mechanical seeding hydro or air seeding for large areas, includes lime, fertilizer and seed with wood fiber mulch added | 1 Laborer<br>1 Equip. Oper. (medium)<br>1 Truck Driver (heavy)<br>1 Hydromulcher, T.M., 3000 Gal.<br>1 Truck Tractor, 220 H.P. | 8900 | 0 | $537,138.36 | $ 23,558.70 | $ 16,491.09 | $ 577,188.15 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 393 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 208,290.00 | $ - | $ 208,290.00 |
| 181 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 95,930.00 | $ - | $ 95,930.00 |
| 122 | $/Day | Per Diem | | 1 | 80.24 | $ - | $ - | $ - | $ 1,220.23 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 250,567.73 | $ - | $ 250,567.73 |

**Total** **$ 12,778,954.02**

# 4-38 - Rangely Compressor Station Removal

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 2092 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 188.28 | $ 3,535.48 | $ 83.68 | $ 3,807.44 |
| 2982 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 9,005.64 | $ 1,580.46 | $ 10,586.10 |
| 3527 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $ 352.70 | $ 423.24 | $ 352.70 | $ 1,128.64 |
| 1466 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 26" - 34", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane)<br>2 Cutting Torches<br>2 Sets of Gases<br>1 Hyd. Crane, 12 Ton | 107 | 0.33 | $ - | $ 24,526.18 | $12,534.30 | $ 37,060.48 |
| 620959 | C.F. | Building demolition, small buildings or single buildings, steel, includes 20 mile haul, excludes salvage, foundation demolition or dump fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (medium)<br>2 Truck Drivers (heavy)<br>1 Crawler Loader, 3 C.Y.<br>2 Dump Trucks, 12 C.Y., 400 H.P. | 14800 | 0 | $ - | $ 117,982.21 | ######### | $ 223,545.24 |
| 4 | Ea. | Boiler, gas and or oil or solid, 12,200 thru 25,000 MBH, selective demolition | 1 Steamfitter Foreman (inside)<br>2 Steamfitters<br>1 Steamfitter Apprentice | 0.12 | 267 | $ - | $ 74,800.00 | $ - | $ 74,800.00 |
| 11 | Ea. | Air conditioner, split unit air conditioner, package unit, 3 ton, selective demolition | 2 Steamfitters<br>1 Steamfitter Apprentice | 3 | 8 | $ - | $ 5,940.00 | $ - | $ 5,940.00 |
| 13 | Ea. | Steel tank, single wall, above ground, 15,000 thru 30,000 gallon, selective demolition, excluding foundation, pumps or piping | 2 Pipe Fitters<br>1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Flatbed Trailer, 40 Ton<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Hyd. Crane, 80 Ton<br>1 Hyd. Excavator, 2 C.Y. | 2 | 16 | $ - | $ 14,950.00 | $22,100.00 | $ 37,050.00 |
| 6 | Ea. | Selective demolition, utility poles & cross arms, utility poles, wood, 20'-30' high | 1 Electrician Foreman<br>1 Electrician<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 6 | 3.33 | $ - | $ 1,518.00 | $ 210.00 | $ 1,728.00 |
| 29 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 16,530.00 | $25,810.00 | $ 42,340.00 |
| 29 | Day | Rent trailer, platform, flush deck 2 axle, 25 ton, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 6,235.87 | $ 6,235.87 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 34 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 18,190.00 | $ - | $ 18,190.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 17 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 8,755.00 | $ - | $ 8,755.00 |
| 122 | $/Day | Per Diem | | 1 | 366.7 | $ - | $ - | $ - | $ 5,576.95 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 9,697.47 | $ - | $ 9,697.47 |

**Total** **$ 494,571.19**

# 4-39 - Rangely Compressor Station Sub Material Removal
## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 2092 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 1,004.16 | $ 4,330.44 | $ 627.60 | $ 5,962.20 |
| 16963 | C.F. | Selective demolition, cutout, concrete, elevated slab, bar reinforced, over 6 C.F., excludes loading and disposal | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Air Compressor, 250 cfm<br>2 Breakers, Pavement, 60 lb.<br>2 -50' Air Hoses, 1.5 | 50 | 0.8 | $ - | $ 703,964.50 | $ 132,311.40 | $ 836,275.90 |
| 6868 | S.Y. | Demolish, remove pavement & curb, remove concrete, rod reinforced, to 6" thick, excludes hauling and disposal fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (light)<br>1 Equip. Oper. (medium)<br>1 Backhoe Loader, 48 H.P.<br>1 Hyd. Hammer (1200 lb.)<br>1 F.E. Loader, W.M., 4 C.Y.<br>1 Pvmt. Rem. Bucket | 200 | 0.12 | $ - | $ 46,015.60 | $ 46,015.60 | $ 92,031.20 |
| 1773 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 11,701.80 | $ 15,691.05 | $ 27,392.85 |
| 20199 | B.C.Y. | Excavating, bulk, dozer, open site, bank measure, sand and gravel, 200 HP dozer, 300' haul | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P. | 310 | 0.03 | $ - | $ 36,156.21 | $ 109,074.60 | $ 145,230.81 |
| 20199 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 133,313.40 | $ 178,761.15 | $ 312,074.55 |
| 2 | Month | Rent front end loader, 4WD, art. frame, diesel, 7 - 9 CY 475 HP, Incl. Hourly Oper. Cost. |  | 0 | 0 | $ - | $ - | $ 83,420.48 | $ 83,420.48 |
| 4 | Ea. | Pipe, cut one groove, labor only, 20" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 17 | 0.94 | $ - | $ 254.00 | $ - | $ 254.00 |
| 4 | Ea. | Gasket and bolt set, for flanges, 150 lb., 20" pipe size |  | 2.3 | 3.48 | $ 964.00 | $ 1,044.00 | $ - | $ 2,008.00 |
| 500 | V.L.F. | Selective demolition, wells, well screen & casing, 6" to 16" dia | 1 Labor Foreman (outside) | 300 | 0.13 | $ - | $ 3,475.00 | $ 2,975.00 | $ 6,450.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only |  | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 340 | Day | Testing and inspecting, supervision of earthwork |  | 1 | 8 | $ - | $ 181,900.00 | $ - | $ 181,900.00 |
| 170 | Day | Environmental Engineer |  | 1 | 9 | $ - | $ 87,550.00 | $ - | $ 87,550.00 |
| 122 | $/Day | Per Diem |  | 1 | 70.76 | $ - | $ - | $ - | $ 1,076.06 |
| 1 | Job | Permitting cost |  | 0 | 0 | $ - | $ 35,795.12 | $ - | $ 35,795.12 |

**Total** **$ 1,825,551.17**

# 4-40 - Rangely Compressor Station Backfill and Restoration

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 182 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 120 | 0.07 | $ - | $ 778.96 | $ 402.22 | $ 1,181.18 |
| 20199 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | $279,756.15 | $ 56,557.20 | $ 98,167.14 | $ 434,480.49 |
| 20199 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $131,293.50 | $176,741.25 | $ 308,034.75 |
| 182 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 1.5 | 16 | $ - | $160,160.00 | $ 23,660.00 | $ 183,820.00 |
| 20199 | E.C.Y. | Backfill, bulk, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P.<br>1 Vibratory Roller, Towed, 23 Ton | 800 | 0.01 | $ - | $ 13,937.31 | $ 56,759.19 | $ 70,696.50 |
| 20199 | S.Y. | Seeding, mechanical seeding hydro or air seeding for large areas, includes lime, fertilizer and seed with wood fiber mulch added | 1 Laborer<br>1 Equip. Oper. (medium)<br>1 Truck Driver (heavy)<br>1 Hydromulcher, T.M., 3000 Gal.<br>1 Truck Tractor, 220 H.P. | 8900 | 0 | $ 46,053.72 | $ 2,019.90 | $ 1,413.93 | $ 49,487.55 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 34 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 18,020.00 | $ - | $ 18,020.00 |
| 17 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 9,010.00 | $ - | $ 9,010.00 |
| 122 | $/Day | Per Diem | | 1 | 80.24 | $ - | $ - | $ - | $ 1,220.23 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 21,620.01 | $ - | $ 21,620.01 |

| | |
|---|---|
| **Total** | **$ 1,102,620.71** |

## 4-41 - Roosevelt Compressor Station Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 2650 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 238.50 | $ 4,478.50 | $ 106.00 | $ 4,823.00 |
| 2650 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 8,003.00 | $ 1,404.50 | $ 9,407.50 |
| 5831 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $ 583.10 | $ 699.72 | $ 583.10 | $ 1,865.92 |
| 2424 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 18" - 24", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane)<br>2 Cutting Torches<br>2 Sets of Gases<br>1 Hyd. Crane, 12 Ton | 160 | 0.2 | $ - | $ 27,754.80 | $14,180.40 | $ 41,935.20 |
| 248658 | C.F. | Building demolition, small buildings or single buildings, steel, includes 20 mile haul, excludes salvage, foundation demolition or dump fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (medium)<br>2 Truck Drivers (heavy)<br>1 Crawler Loader, 3 C.Y.<br>2 Dump Trucks, 12 C.Y., 400 H.P. | 14800 | 0 | $ - | $ 47,245.02 | $42,271.86 | $ 89,516.88 |
| 3 | Ea. | Boiler, gas and or oil or solid, 12,200 thru 25,000 MBH, selective demolition | 1 Steamfitter Foreman (inside)<br>2 Steamfitters<br>1 Steamfitter Apprentice | 0.12 | 267 | $ - | $ 56,100.00 | $ - | $ 56,100.00 |
| 11 | Ea. | Air conditioner, split unit air conditioner, package unit, 3 ton, selective demolition | 2 Steamfitters<br>1 Steamfitter Apprentice | 3 | 8 | $ - | $ 5,940.00 | $ - | $ 5,940.00 |
| 19 | Ea. | Steel tank, single wall, above ground, 15,000 thru 30,000 gallon, selective demolition, excluding foundation, pumps or piping | 2 Pipe Fitters<br>1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Flatbed Trailer, 40 Ton<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Hyd. Crane, 80 Ton<br>1 Hyd. Excavator, 2 C.Y. | 2 | 16 | $ - | $ 21,850.00 | $32,300.00 | $ 54,150.00 |
| 9 | Ea. | Selective demolition, utility poles & cross arms, utility poles, wood, 20'-30' high | 1 Electrician Foreman<br>1 Electrician<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 6 | 3.33 | $ - | $ 2,277.00 | $ 315.00 | $ 2,592.00 |
| 1 | Ea. | Selective demolition, radio towers, guyed, 200' high, 70 lb section | 1 Struc. Steel Foreman (outside)<br>1 Struc. Steel Worker<br>1 Truck Driver (light)<br>1 Flatbed Truck, Gas, 3 Ton | 0.7 | 34.29 | $ - | $ 2,350.00 | $ 1,325.00 | $ 3,675.00 |
| 35 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 19,950.00 | $31,150.00 | $ 51,100.00 |
| 35 | Day | Rent trailer, platform, flush deck 2 axle, 25 ton, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 7,526.05 | $ 7,526.05 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $2,780.00 | $ - | $ - | $ 2,780.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 25 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 13,375.00 | $ - | $ 13,375.00 |
| 12 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 6,180.00 | $ - | $ 6,180.00 |
| 122 | $/Day | Per Diem | | 1 | 400.9 | $ - | $ - | $ - | $ 6,096.43 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 7,248.26 | $ - | $ 7,248.26 |

**Total** **$ 369,661.24**

# 4-42 - Roosevelt Compressor Station Sub Material Removal

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 2650 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 1,272.00 | $ 5,485.50 | $ 795.00 | $ 7,552.50 |
| 1 | Ea. | Selective demolition, septic tanks and related components, precast septic tanks, 1000-1250 gal., excludes excavation | 1 Labor Foreman (outside)<br>1 Skilled Worker<br>1 Laborer<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 8 | 3.5 | $ - | $ 193.00 | $ 26.50 | $ 219.50 |
| 17178 | C.F. | Selective demolition, cutout, concrete, elevated slab, bar reinforced, over 6 C.F., excludes loading and disposal | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Air Compressor, 250 cfm<br>2 Breakers, Pavement, 60 lb.<br>2 -50' Air Hoses, 1.5 | 50 | 0.8 | $ - | $ 712,887.00 | $ 133,988.40 | $ 846,875.40 |
| 469 | S.Y. | Demolish, remove pavement & curb, remove concrete, rod reinforced, to 6" thick, excludes hauling and disposal fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (light)<br>1 Equip. Oper. (medium)<br>1 Backhoe Loader, 48 H.P.<br>1 Hyd. Hammer (1200 lb.)<br>1 F.E. Loader, W.M., 4 C.Y.<br>1 Pvmt. Rem. Bucket | 200 | 0.12 | $ - | $ 3,142.30 | $ 3,142.30 | $ 6,284.60 |
| 715 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 4,719.00 | $ 6,327.75 | $ 11,046.75 |
| 39823 | B.C.Y. | Excavating, bulk, dozer, open site, bank measure, sand and gravel, 200 HP dozer, 300' haul | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P. | 310 | 0.03 | $ - | $ 71,283.17 | $ 215,044.20 | $ 286,327.37 |
| 39823 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 262,831.80 | $ 352,433.55 | $ 615,265.35 |
| 4 | Month | Rent front end loader, 4WD, art. frame, diesel, 7 - 9 CY 475 HP, Incl. Hourly Oper. Cost. |  | 0 | 0 | $ - | $ - | $ 166,840.96 | $ 166,840.96 |
| 4 | Ea. | Pipe, cut one groove, labor only, 20" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 17 | 0.94 | $ - | $ 254.00 | $ - | $ 254.00 |
| 4 | Ea. | Gasket and bolt set, for flanges, 150 lb., 20" pipe size |  | 2.3 | 3.48 | $ 964.00 | $ 1,044.00 | $ - | $ 2,008.00 |
| 7 | Ea. | Selective demolition, utility materials, utility valves, 14"-24", excludes excavation |  | 2 | 14 | $ - | $ 5,390.00 | $ 735.00 | $ 6,125.00 |
| 500 | V.L.F. | Selective demolition, wells, well screen & casing, 6" to 16" dia | 1 Labor Foreman (outside) | 300 | 0.13 | $ - | $ 3,475.00 | $ 2,975.00 | $ 6,450.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only |  | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 344 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 184,040.00 | $ - | $ 184,040.00 |
| 172 | Day | Environmental Engineer | | 1 | 9 | $ - | $ 88,580.00 | $ - | $ 88,580.00 |
| 122 | $/Day | Per Diem | | 1 | 88.26 | $ - | $ - | $ - | $ 1,342.19 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 44,746.83 | $ - | $ 44,746.83 |

**Total** **$ 2,282,088.45**

## 4-43 - Roosevelt Compressor Station Backfill and Restoration

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 359 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 120 | 0.07 | $ - | $ 1,536.52 | $ 793.39 | $ 2,329.91 |
| 39823 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | $551,548.55 | $111,504.40 | $193,539.78 | $ 856,592.73 |
| 39823 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $258,849.50 | $348,451.25 | $ 607,300.75 |
| 359 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 1.5 | 16 | $ - | $315,920.00 | $ 46,670.00 | $ 362,590.00 |
| 39823 | E.C.Y. | Backfill, bulk, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P.<br>1 Vibratory Roller, Towed, 23 Ton | 800 | 0.01 | $ - | $ 27,477.87 | $111,902.63 | $ 139,380.50 |
| 39823 | S.Y. | Seeding, mechanical seeding hydro or air seeding for large areas, includes lime, fertilizer and seed with wood fiber mulch added | 1 Laborer<br>1 Equip. Oper. (medium)<br>1 Truck Driver (heavy)<br>1 Hydromulcher, T.M., 3000 Gal.<br>1 Truck Tractor, 220 H.P. | 8900 | 0 | $ 90,796.44 | $ 3,982.30 | $ 2,787.61 | $ 97,566.35 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 67 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 35,510.00 | $ - | $ 35,510.00 |
| 33 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 17,490.00 | $ - | $ 17,490.00 |
| 122 | $/Day | Per Diem | | 1 | 80.24 | $ - | $ - | $ - | $ 1,220.23 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 42,500.61 | $ - | $ 42,500.61 |

**Total** **$ 2,167,531.08**

## 4-44 - Willard Compressor Station Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 2821 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 253.89 | $ 4,767.49 | $ 112.84 | $ 5,134.22 |
| 2821 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 8,519.42 | $ 1,495.13 | $ 10,014.55 |
| 5706 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $ 570.60 | $ 684.72 | $ 570.60 | $ 1,825.92 |
| 2372 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 18" - 24", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane)<br>2 Cutting Torches<br>2 Sets of Gases<br>1 Hyd. Crane, 12 Ton | 160 | 0.2 | $ - | $ 27,159.40 | $13,876.20 | $ 41,035.60 |
| 302056 | C.F. | Building demolition, small buildings or single buildings, steel, includes 20 mile haul, excludes salvage, foundation demolition or dump fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (medium)<br>2 Truck Drivers (heavy)<br>1 Crawler Loader, 3 C.Y.<br>2 Dump Trucks, 12 C.Y., 400 H.P. | 14800 | 0 | $ - | $ 57,390.64 | $51,349.52 | $ 108,740.16 |
| 3 | Ea. | Boiler, gas and or oil or solid, 12,200 thru 25,000 MBH, selective demolition | 1 Steamfitter Foreman (inside)<br>2 Steamfitters<br>1 Steamfitter Apprentice | 0.12 | 267 | $ - | $ 56,100.00 | $ - | $ 56,100.00 |
| 13 | Ea. | Air conditioner, split unit air conditioner, package unit, 3 ton, selective demolition | 2 Steamfitters<br>1 Steamfitter Apprentice | 3 | 8 | $ - | $ 7,020.00 | $ - | $ 7,020.00 |
| 21 | Ea. | Steel tank, single wall, above ground, 15,000 thru 30,000 gallon, selective demolition, excluding foundation, pumps or piping | 2 Pipe Fitters<br>1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Flatbed Trailer, 40 Ton<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Hyd. Crane, 80 Ton<br>1 Hyd. Excavator, 2 C.Y. | 2 | 16 | $ - | $ 24,150.00 | $35,700.00 | $ 59,850.00 |
| 5 | Ea. | Selective demolition, utility poles & cross arms, utility poles, wood, 20'-30' high | 1 Electrician Foreman<br>1 Electrician<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 6 | 3.33 | $ - | $ 1,265.00 | $ 175.00 | $ 1,440.00 |
| 1 | Ea. | Selective demolition, radio towers, guyed, 200' high, 70 lb section | 1 Struc. Steel Foreman (outside)<br>1 Struc. Steel Worker<br>1 Truck Driver (light)<br>1 Flatbed Truck, Gas, 3 Ton | 0.7 | 34.29 | $ - | $ 2,350.00 | $ 1,325.00 | $ 3,675.00 |
| 38 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 21,660.00 | $33,820.00 | $ 55,480.00 |
| 38 | Day | Rent trailer, platform, flush deck 2 axle, 25 ton, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 8,171.14 | $ 8,171.14 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $2,780.00 | $ - | $ - | $ 2,780.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 25 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 13,375.00 | $ - | $ 13,375.00 |
| 12 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 6,180.00 | $ - | $ 6,180.00 |
| 122 | $/Day | Per Diem | | 1 | 400.9 | $ - | $ - | $ - | $ 6,096.43 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 7,845.36 | $ - | $ 7,845.36 |

**Total** **$ 400,113.38**

# 4-45 - Willard Compressor Station Sub Material Removal

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 2372 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 1,138.56 | $ 4,910.04 | $ 711.60 | $ 6,760.20 |
| 1 | Ea. | Selective demolition, septic tanks and related components, precast septic tanks, 1000-1250 gal., excludes excavation | 1 Labor Foreman (outside)<br>1 Skilled Worker<br>1 Laborer<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 8 | 3.5 | $ - | $ 193.00 | $ 26.50 | $ 219.50 |
| 17681 | C.F. | Selective demolition, cutout, concrete, elevated slab, bar reinforced, over 6 C.F., excludes loading and disposal | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Air Compressor, 250 cfm<br>2 Breakers, Pavement, 60 lb.<br>2 -50’ Air Hoses, 1.5 | 50 | 0.8 | $ - | $ 733,761.50 | $ 137,911.80 | $ 871,673.30 |
| 377 | S.Y. | Demolish, remove pavement & curb, remove concrete, rod reinforced, to 6" thick, excludes hauling and disposal fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (light)<br>1 Equip. Oper. (medium)<br>1 Backhoe Loader, 48 H.P.<br>1 Hyd. Hammer (1200 lb.)<br>1 F.E. Loader, W.M., 4 C.Y.<br>1 Pvmt. Rem. Bucket | 200 | 0.12 | $ - | $ 2,525.90 | $ 2,525.90 | $ 5,051.80 |
| 718 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 4,738.80 | $ 6,354.30 | $ 11,093.10 |
| 43593 | B.C.Y. | Excavating, bulk, dozer, open site, bank measure, sand and gravel, 200 HP dozer, 300' haul | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P. | 310 | 0.03 | $ - | $ 78,031.47 | $ 235,402.20 | $ 313,433.67 |
| 43593 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 287,713.80 | $ 385,798.05 | $ 673,511.85 |
| 5 | Month | Rent front end loader, 4WD, art. frame, diesel, 7 - 9 CY 475 HP, Incl. Hourly Oper. Cost. |  | 0 | 0 | $ - | $ - | $ 208,551.20 | $ 208,551.20 |
| 8 | Ea. | Pipe, cut one groove, labor only, 20" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 17 | 0.94 | $ - | $ 508.00 | $ - | $ 508.00 |
| 8 | Ea. | Gasket and bolt set, for flanges, 150 lb., 20" pipe size |  | 2.3 | 3.48 | $ 1,928.00 | $ 2,088.00 | $ - | $ 4,016.00 |
| 500 | V.L.F. | Selective demolition, wells, well screen & casing, 6" to 16" dia | 1 Labor Foreman (outside) | 300 | 0.13 | $ - | $ 3,475.00 | $ 2,975.00 | $ 6,450.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only |  | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 354 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 189,390.00 | $ - | $ 189,390.00 |
| 177 | Day | Environmental Engineer | | 1 | 9 | $ - | $ 91,155.00 | $ - | $ 91,155.00 |
| 122 | $/Day | Per Diem | | 1 | 74.26 | $ - | $ - | $ - | $ 1,129.29 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 47,821.46 | $ - | $ 47,821.46 |

| | |
|---|---|
| **Total** | **$ 2,438,894.37** |

## 4-46 - Willard Compressor Station Backfill and Restoration

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 393 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 120 | 0.07 | $ - | $ 1,682.04 | $ 868.53 | $ 2,550.57 |
| 43593 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | $603,763.05 | $122,060.40 | $211,861.98 | $ 937,685.43 |
| 43593 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $283,354.50 | $381,438.75 | $ 664,793.25 |
| 393 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 1.5 | 16 | $ - | $345,840.00 | $ 51,090.00 | $ 396,930.00 |
| 43593 | E.C.Y. | Backfill, bulk, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P.<br>1 Vibratory Roller, Towed, 23 Ton | 800 | 0.01 | $ - | $ 30,079.17 | $122,496.33 | $ 152,575.50 |
| 43593 | S.Y. | Seeding, mechanical seeding hydro or air seeding for large areas, includes lime, fertilizer and seed with wood fiber mulch added | 1 Laborer<br>1 Equip. Oper. (medium)<br>1 Truck Driver (heavy)<br>1 Hydromulcher, T.M., 3000 Gal.<br>1 Truck Tractor, 220 H.P. | 8900 | 0 | $ 99,392.04 | $ 4,359.30 | $ 3,051.51 | $ 106,802.85 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 73 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 38,690.00 | $ - | $ 38,690.00 |
| 46 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 24,380.00 | $ - | $ 24,380.00 |
| 122 | $/Day | Per Diem | | 1 | 80.24 | $ - | $ - | $ - | $ 1,220.23 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 46,613.56 | $ - | $ 46,613.56 |

**Total** **$ 2,377,291.39**

## 4-47 - Winchester Compressor Station Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 2756 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 248.04 | $ 4,657.64 | $ 110.24 | $ 5,015.92 |
| 2756 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 8,323.12 | $ 1,460.68 | $ 9,783.80 |
| 1492 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $ 149.20 | $ 179.04 | $ 149.20 | $ 477.44 |
| 620 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 26" - 34", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane)<br>2 Cutting Torches<br>2 Sets of Gases<br>1 Hyd. Crane, 12 Ton | 107 | 0.33 | $ - | $ 10,372.60 | $ 5,301.00 | $ 15,673.60 |
| 189165 | C.F. | Building demolition, small buildings or single buildings, steel, includes 20 mile haul, excludes salvage, foundation demolition or dump fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (medium)<br>2 Truck Drivers (heavy)<br>1 Crawler Loader, 3 C.Y.<br>2 Dump Trucks, 12 C.Y., 400 H.P. | 14800 | 0 | $ - | $ 35,941.35 | $32,158.05 | $ 68,099.40 |
| 1 | Ea. | Boiler, gas and or oil or solid, 12,200 thru 25,000 MBH, selective demolition | 1 Steamfitter Foreman (inside)<br>2 Steamfitters<br>1 Steamfitter Apprentice | 0.12 | 267 | $ - | $ 18,700.00 | $ - | $ 18,700.00 |
| 3 | Ea. | Air conditioner, split unit air conditioner, package unit, 3 ton, selective demolition | 2 Steamfitters<br>1 Steamfitter Apprentice | 3 | 8 | $ - | $ 1,620.00 | $ - | $ 1,620.00 |
| 5 | Ea. | Steel tank, single wall, above ground, 15,000 thru 30,000 gallon, selective demolition, excluding foundation, pumps or piping | 2 Pipe Fitters<br>1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Flatbed Trailer, 40 Ton<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Hyd. Crane, 80 Ton<br>1 Hyd. Excavator, 2 C.Y. | 2 | 16 | $ - | $ 5,750.00 | $ 8,500.00 | $ 14,250.00 |
| 1 | Ea. | Transformer, dry type, primary, 3 phase, to 600 V, 750 kVA, electrical demolition, remove, including removal of supports, wire & conduit terminations | 1 Electrician Foreman<br>1 Electrician<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 1.1 | 18.18 | $ - | $ 1,375.00 | $ 191.00 | $ 1,566.00 |
| 7 | Ea. | Selective demolition, utility poles & cross arms, utility poles, wood, 20'-30' high | 1 Electrician Foreman<br>1 Electrician<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 6 | 3.33 | $ - | $ 1,771.00 | $ 245.00 | $ 2,016.00 |
| 1 | Ea. | Selective demolition, radio towers, guyed, 200' high, 70 lb section | 1 Struc. Steel Foreman (outside)<br>1 Struc. Steel Worker<br>1 Truck Driver (light)<br>1 Flatbed Truck, Gas, 3 Ton | 0.7 | 34.29 | $ - | $ 2,350.00 | $ 1,325.00 | $ 3,675.00 |
| 11 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 6,270.00 | $ 9,790.00 | $ 16,060.00 |
| 11 | Day | Rent trailer, platform, flush deck 2 axle, 25 ton, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 2,365.33 | $ 2,365.33 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $2,780.00 | $ - | $ - | $ 2,780.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 13 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 6,955.00 | $ - | $ 6,955.00 |
| 6 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 3,090.00 | $ - | $ 3,090.00 |
| 122 | $/Day | Per Diem | | 1 | 419.2 | $ - | $ - | $ - | $ 6,374.88 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 3,677.05 | $ - | $ 3,677.05 |

**Total** **$ 187,529.42**

## 4-48 - Winchester Compressor Station Sub Material Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 2756 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 1,322.88 | $ 5,704.92 | $ 826.80 | $ 7,854.60 |
| 3775 | C.F. | Selective demolition, cutout, concrete, elevated slab, bar reinforced, over 6 C.F., excludes loading and disposal | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Air Compressor, 250 cfm<br>2 Breakers, Pavement, 60 lb.<br>2 -50' Air Hoses, 1.5 | 50 | 0.8 | $ - | $ 156,662.50 | $ 29,445.00 | $ 186,107.50 |
| 526 | S.Y. | Demolish, remove pavement & curb, remove concrete, rod reinforced, to 6" thick, excludes hauling and disposal fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (light)<br>1 Equip. Oper. (medium)<br>1 Backhoe Loader, 48 H.P.<br>1 Hyd. Hammer (1200 lb.)<br>1 F.E. Loader, W.M., 4 C.Y.<br>1 Pvmt. Rem. Bucket | 200 | 0.12 | $ - | $ 3,524.20 | $ 3,524.20 | $ 7,048.40 |
| 228 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 1,504.80 | $ 2,017.80 | $ 3,522.60 |
| 21891 | B.C.Y. | Excavating, bulk, dozer, open site, bank measure, sand and gravel, 200 HP dozer, 300' haul | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P. | 310 | 0.03 | $ - | $ 39,184.89 | $ 118,211.40 | $ 157,396.29 |
| 21891 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 144,480.60 | $ 193,735.35 | $ 338,215.95 |
| 2 | Month | Rent front end loader, 4WD, art. frame, diesel, 7 - 9 CY 475 HP, Incl. Hourly Oper. Cost. |  | 0 | 0 | $ - | $ - | $ 83,420.48 | $ 83,420.48 |
| 4 | Ea. | Pipe, cut one groove, labor only, 20" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 17 | 0.94 | $ - | $ 254.00 | $ - | $ 254.00 |
| 4 | Ea. | Gasket and bolt set, for flanges, 150 lb., 20" pipe size |  | 2.3 | 3.48 | $ 964.00 | $ 1,044.00 | $ - | $ 2,008.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only |  | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 76 | Day | Testing and inspecting, supervision of earthwork |  | 1 | 8 | $ - | $ 40,660.00 | $ - | $ 40,660.00 |
| 38 | Day | Environmental Engineer |  | 1 | 9 | $ - | $ 19,570.00 | $ - | $ 19,570.00 |
| 122 | $/Day | Per Diem |  | 1 | 70.63 | $ - | $ - | $ - | $ 1,074.09 |
| 1 | Job | Permitting cost |  | 0 | 0 | $ - | $ 17,105.24 | $ - | $ 17,105.24 |

| | |
|---|---|
| **Total** | **$ 872,367.15** |

## 4-49 - Winchester Compressor Station Backfill and Restoration

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 198 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 120 | 0.07 | $ - | $ 847.44 | $ 437.58 | $ 1,285.02 |
| 21891 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | $303,190.35 | $ 61,294.80 | $106,390.26 | $ 470,875.41 |
| 21891 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $142,291.50 | $191,546.25 | $ 333,837.75 |
| 198 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 1.5 | 16 | $ - | $174,240.00 | $ 25,740.00 | $ 199,980.00 |
| 21891 | E.C.Y. | Backfill, bulk, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P.<br>1 Vibratory Roller, Towed, 23 Ton | 800 | 0.01 | $ - | $ 15,104.79 | $ 61,513.71 | $ 76,618.50 |
| 21891 | S.Y. | Seeding, mechanical seeding hydro or air seeding for large areas, includes lime, fertilizer and seed with wood fiber mulch added | 1 Laborer<br>1 Equip. Oper. (medium)<br>1 Truck Driver (heavy)<br>1 Hydromulcher, T.M., 3000 Gal.<br>1 Truck Tractor, 220 H.P. | 8900 | 0 | $ 49,911.48 | $ 2,189.10 | $ 1,532.37 | $ 53,632.95 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,525.00 | $ 1,000.00 | $ 2,525.00 |
| 37 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 19,610.00 | $ - | $ 19,610.00 |
| 18 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 9,540.00 | $ - | $ 9,540.00 |
| 122 | $/Day | Per Diem | | 1 | 80.24 | $ - | $ - | $ - | $ 1,220.23 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 23,433.00 | $ - | $ 23,433.00 |

**Total** **$ 1,195,082.86**

# 5-1 - Cathodic Protection - Rectifier Removal

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 166 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 32,370.00 | $ 16,932.00 | $ 49,302.00 |
| 579 | Ea. | Cathodic protection, rectifiers, silicon type, air cooled, 28 V/10 A, underground storage tanks | .5 Electrician Foreman<br>2 Electricians | 3.5 | 5.71 | $ 1,505,400.00 | $254,760.00 | $ - | $ 1,760,160.00 |
| 15 | Ton | Selective demolition, dump charges, typical urban city, reclamation station, usual charge, includes tipping fees only | | 0 | 0 | $ 1,215.00 | $ - | $ - | $ 1,215.00 |
| 166 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 32,370.00 | $ 16,932.00 | $ 49,302.00 |
| 166 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 88,810.00 | $ - | $ 88,810.00 |
| 83 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 42,745.00 | $ - | $ 42,745.00 |
| 122 | $/Day | Per Diem | | 1 | 27.71 | $ - | $ - | $ - | $ 421.39 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 39,839.11 | $ - | $ 39,839.11 |

**Total** **$ 2,031,794.50**

## 5-2 - Cathodic Protection - Test Site Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1469 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 286,455.00 | $149,838.00 | $ 436,293.00 |
| 23493 | Ea. | Signs, traffic sign removal, to 10 S.F., including supports | 3 Laborers<br>1 Equip. Oper. (light)<br>1 Crane, Flatbed Mounted, 3 Ton | 16 | 2 | $ - | $ 2,584,230.00 | $385,285.20 | $ 2,969,515.20 |
| 36 | Ton | Selective demolition, dump charges, typical urban city, reclamation station, usual charge, includes tipping fees only | | 0 | 0 | $2,916.00 | $ - | $ - | $ 2,916.00 |
| 1469 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 286,455.00 | $149,838.00 | $ 436,293.00 |
| 1468 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 785,380.00 | $ - | $ 785,380.00 |
| 734 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 466,090.00 | $ - | $ 466,090.00 |
| 122 | $/Day | Per Diem | | 1 | 24 | $ - | $ - | $ - | $ 364.97 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 101,937.04 | $ - | $ 101,937.04 |

**Total** **$ 5,198,789.21**

## 6-1 - ROW Marker Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 377 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 73,515.00 | $ 38,454.00 | $ 111,969.00 |
| 52693 | C.L.F. | Utility line signs, markers, and flags, underground tape, detectable, reinforced, aluminum foil core, 6", excludes excavation and backfill | | 140 | 0.06 | $ 2,239,452.50 | $ 154,917.42 | $ - | $ 2,394,369.92 |
| 80 | Ton | Selective demolition, dump charges, typical urban city, reclamation station, usual charge, includes tipping fees only | | 0 | 0 | $ 6,480.00 | $ - | $ - | $ 6,480.00 |
| 52693 | S.Y. | Seeding, mechanical seeding, 44 lb/M.S.Y. | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 | 2500 | 0 | $ 13,700.18 | $ 11,065.53 | $ 6,323.16 | $ 31,088.87 |
| 377 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 73,515.00 | $ 38,454.00 | $ 111,969.00 |
| 377 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 201,695.00 | $ - | $ 201,695.00 |
| 188 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 96,820.00 | $ - | $ 96,820.00 |
| 122 | $/Day | Per Diem | | 1 | 22.06 | $ - | $ - | $ - | $ 335.47 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 59,094.55 | $ - | $ 59,094.55 |

**Total** **$ 3,013,821.81**

## 6-3 - Remote Communication Tower

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 200 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 604.00 | $ 106.00 | $ 710.00 |
| 200 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' | 2 Laborers<br>1 Equip. Oper. (light) | 650 | 0.04 | $ 96.00 | $ 414.00 | $ 60.00 | $ 570.00 |
| 1 | Ea. | Communications transmission tower, radio towers guyed, 100 lb. section, wind load 70 mph basic wind speed, 400' high | 1 Struc. Steel Foreman (outside)<br>1 Struc. Steel Worker<br>1 Truck Driver (light)<br>1 Flatbed Truck, Gas, 3 Ton | 0.14 | 171 | $ 33,600.00 | $ 11,800.00 | $ 6,675.00 | $ 52,075.00 |
| 10 | Ea. | Delivery charge for tower, hauled on 40-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (medium)<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Flatbed Trailer, 40 Ton | 2 | 8 | $ - | $ 5,150.00 | $ 3,800.00 | $ 8,950.00 |
| 1 | Day | Rent tractor with A frame boom and winch 225 HP, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 545.95 | $ 545.95 |
| 45 | S.Y. | Demolish, remove pavement & curb, remove concrete, rod reinforced, to 6" thick, excludes hauling and disposal fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (light)<br>1 Equip. Oper. (medium)<br>1 Backhoe Loader, 48 H.P.<br>1 Hyd. Hammer (1200 lb.)<br>1 F.E. Loader, W.M., 4 C.Y.<br>1 Pvmt. Rem. Bucket | 200 | 0.12 | $ - | $ 301.50 | $ 301.50 | $ 603.00 |
| 15 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 99.00 | $ 132.75 | $ 231.75 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 8 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 4,280.00 | $ - | $ 4,280.00 |
| 4 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 2,060.00 | $ - | $ 2,060.00 |
| 122 | $/Day | Per Diem | | 1 | 243.3 | $ - | $ - | $ - | $ 3,700.23 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 1,581.52 | $ - | $ 1,581.52 |

| | |
|---|---|
| **Total** | **$ 80,657.45** |

# 7-1 - Tap Locations

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 195.00 | $ 102.00 | $ 297.00 |
| 200 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 18.00 | $ 338.00 | $ 8.00 | $ 364.00 |
| 200 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 96.00 | $ 414.00 | $ 60.00 | $ 570.00 |
| 10 | B.C.Y. | Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering | 1 Equip. Oper. (crane)<br>1 Laborer<br>1 Hyd. Excavator, .75 C.Y. | 270 | 0.06 | $ - | $ 36.30 | $ 28.60 | $ 64.90 |
| 2 | Ea. | Pipe, cut one groove, labor only, 24" pipe size, grooved-joint | | 15 | 1.07 | $ - | $ 144.00 | $ - | $ 144.00 |
| 2 | Ea. | Gasket and bolt set, for flanges, 150 lb., 24" pipe size | | 1.9 | 4.21 | $600.00 | $ 630.00 | $ - | $ 1,230.00 |
| 5 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 33.00 | $ 44.25 | $ 77.25 |
| 1 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 1.5 | 16 | $ - | $ 880.00 | $ 130.00 | $ 1,010.00 |
| 0.03 | M.S.F. | Seeding, mechanical seeding grass seed, 4.5 lb./M.S.F., hand push spreader | | 180 | 0.04 | $ 0.89 | $ 0.07 | $ - | $ 0.95 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 195.00 | $ 102.00 | $ 297.00 |
| 2 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 1,070.00 | $ - | $ 1,070.00 |
| 1 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 515.00 | $ - | $ 515.00 |
| 122 | $/Day | Per Diem | | 1 | 43.55 | $ - | $ - | $ - | $ 662.28 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 126.05 | $ - | $ 126.05 |

**Total** **$ 6,428.43**

## ANR Pipeline Company
## System Salvage Scrap Metal Calculations - Transmission

9/21/2021 Price / Ton (Nat. Ave.) = 164.00
https://iscrapapp.com/prices/

| | (A) | (B) | (C) | (D) | (E) | | (F) |
|---|---|---|---|---|---|---|---|
| 1.3 | Pipe Removal - Transmission | Length Removed (ft) | lb/ft | Total Weight (lb) | Total Weight (ton) | | Salvage Amt. |
| | 2" | 140.11 | 3.66 | 512.80 | 0.26 | | $ (42) |
| | 3" | 399.99 | 7.58 | 3031.94 | 1.52 | | $ (249) |
| | 4" | 7538.83 | 10.80 | 81419.32 | 40.71 | | $ (6,676) |
| | 6" | 24002.89 | 18.99 | 455814.89 | 227.91 | | $ (37,377) |
| | 8" | 17163.48 | 28.58 | 490532.40 | 245.27 | | $ (40,224) |
| | 10" | 38703.15 | 40.52 | 1568251.63 | 784.13 | | $ (128,597) |
| | 12" | 19636.88 | 49.61 | 974185.60 | 487.09 | | $ (79,883) |
| | 14" | 6.78 | 54.62 | 370.30 | 0.19 | | $ (30) |
| | 16" | 35471.58 | 62.64 | 2221939.68 | 1110.97 | | $ (182,199) |
| | 18" | 1831.60 | 70.65 | 129402.56 | 64.70 | | $ (10,611) |
| | 20" | 33133.77 | 78.67 | 2606634.01 | 1303.32 | | $ (213,744) |
| | 22" | 76141.92 | 86.69 | 6600742.96 | 3300.37 | | $ (541,261) |
| | 24" | 61607.76 | 94.71 | 5834870.77 | 2917.44 | | $ (478,459) |
| | 26" | 95810.44 | 102.72 | 9841648.04 | 4920.82 | | $ (807,015) |
| | 30" | 56441.76 | 118.76 | 6703023.87 | 3351.51 | | $ (549,648) |
| | 34" | 49.72 | 134.70 | 6696.81 | 3.35 | | $ (549) |
| | 36" | 12172.63 | 142.81 | 1738373.03 | 869.19 | | $ (142,547) |
| | 42" | 5.65 | 166.86 | 942.69 | 0.47 | | $ (77) |
| | | 480258.94 | | | Subtotal: | | $ (3,219,188) |
| | | | | | Total | | **$ (3,219,188)** |
| | | Weight/Site (ton) | Scrap Value | Estimated | No. of Stations | | Salvage Amt. |
| 3.3 | M&R Stations - Transmission | | | | | | |
| | Small M&R Station | 5.00 | 164.00 | 820.00 | 322 | | $ (264,040) |
| | Medium M&R Station | 10.00 | 164.00 | 1640.00 | 300 | | $ (492,000) |
| | Large M&R Station | 15.00 | 164.00 | 2460.00 | 10 | | $ (24,600) |
| | | | | | Subtotal: | | $ (780,640) |
| | | | | | Total: | | **$ (780,640)** |
| 4.3 | Compressor Station - Storage | Ave. No./Site | Weight/Site (ton) | Total Weight (ton) | Scrap Value (ton) | Total Stations | Salvage Amt. |
| | Compressor Engine (Ave.) | 2 | 160.00 | 320.00 | $ 164.00 | 55 | $ (2,886,400) |
| | LNG Tank | 2 | 6091 | 6091 | $ 164.00 | 0 | $ - |
| | Equipment (Ave.) | 18 | 22.50 | 405.00 | $ 164.00 | 55 | $ (3,653,100) |
| | Bldg (Ave.) | 3 | 4557.26 | 31900.81 | $ 164.00 | 55 | $ (5,231,732) |
| | | | | | Subtotal: | | $ (11,771,232) |
| | | | | | Total: | | **$ (11,771,232)** |
| 5.3 | Cathodic Protection - Transmission | No. | Weight/Site (ton) | Total Weight (ton) | Scrap Value (ton) | | Salvage Amt. |
| | Rectifier | 579 | 0.03 | 14.48 | $ 164.00 | | $ (2,374) |
| | Test Site | 23493 | 0.002 | 46.99 | $ 164.00 | | $ (7,706) |
| | | | | | Subtotal: | | **$ (10,080)** |
| | | | | | Total: | | **$ (10,080)** |
| 6.2 | ROW Marker - Transmission | No. | Weight/Site (ton) | Total Weight (ton) | Scrap Value (ton) | | Salvage Amt. |
| | Marker | 52693 | 0.002 | 105.39 | $ 164.00 | | $ (17,283) |
| | | | | | Subtotal: | | **$ (17,283)** |
| | | | | | Total: | | **$ (17,283)** |
| 7.2 | Tap Site - Transmission | No. | Weight/Site (ton) | Total Weight (ton) | Scrap Value (ton) | | Salvage Amt. |
| | Typical Tap Site | 944 | 0.03 | 28.32 | $ 164.00 | | $ (4,644) |
| | | | | | Subtotal: | | **$ (4,644)** |
| | | | | | Total: | | **$ (4,644)** |
| | | | | | Total Salvage Amount: | | **$ (15,803,068)** |

# ANR PIPELINE COMPANY

# STORAGE COST ESTIMATE PACKET

## ANR Pipeline Company
## Summary of Terminal Decommissioning Cost Estimate - Underground Storage

| Line No. | Particular | Cost ($) | Item | Total TDC Estimate ($) | Total Adjusted (*) Cost Estimate ($) |
|---|---|---|---|---|---|
| | (A) | (B) | (C) | (D) | (E) |
| 1 | A. DECOMMISSIONING COSTS | | | | |
| 2 | **Transmission Line** | **Cost / Mile** | **Total Miles** | **Total** | |
| 3 | 1-1 - <24" Pipeline Clean and Purge | $ 36,281 | 145.3 | $ 5,271,662 | |
| 4 | 1-2 - Trench Excavation | $ 100,050 | 3.1 | $ 311,098 | |
| 5 | 1-3 - Pipe Removal | $ 91,881 | 3.1 | $ 285,697 | |
| 6 | 1-4 - Trench Backfill | $ 96,572 | 3.1 | $ 300,283 | |
| 7 | 1-5 - Trench Restoration | $ 10,806 | 3.1 | $ 33,601 | |
| 8 | | | | * | **$ 5,797,085** |
| 9 | | | | Decommissioning Cost Owed Through % Ownership: | $ (386,159) |
| 10 | | | | | **$ 5,410,926** |
| 11 | | | | | |
| 12 | | **Cost /** | | | |
| 13 | **Abandonment** | **Abandonment** | **Total Crossing** | **Total** | |
| 14 | 2-2 - Road Crossing Abandonment | $ 24,171 | 8 | $ 193,365 | |
| 15 | | | | * | **$ 180,731** |
| 16 | | | | | |
| 17 | **Meter Station** | **Cost / Station** | **Total Stations** | **Total** | |
| 18 | 3-1 - Small Meter Station Removal | $ 24,599 | 6 | $ 147,594 | |
| 19 | 3-2 - Small Meter Station Sub Material Removal | $ 72,918 | 6 | $ 437,511 | |
| 20 | 3-3 - Small Meter Station Backfill and Restoration | $ 114,980 | 6 | $ 689,879 | |
| 21 | | | | * | **$ 1,191,677** |
| 22 | 3-4 - Medium Meter Station Removal | $ 65,279 | 16 | $ 1,044,468 | |
| 23 | 3-5 - Medium Meter Station Sub Material Removal | $ 137,609 | 16 | $ 2,201,746 | |
| 24 | 3-6 - Medium Meter Station Backfill and Restoration | $ 191,541 | 16 | $ 3,064,655 | |
| 25 | | | | * | **$ 5,898,522** |
| 26 | | | | | |
| 27 | **Compressor Station** | **Ave. Cost / Station** | **Total Stations** | **Total** | |
| 28 | Compressor Station Removal | $ 5,192,450.6 | 4 | $ 20,769,802 | |
| 29 | | | | * | **$ 19,412,721** |
| 30 | | | | | |
| 31 | **Cathodic Protection** | **Cost / CP** | **Total CP** | **Total** | |
| 32 | 5-1 - Cathodic Protection - Rectifier Removal | $ 3,511 | 126 | $ 442,373 | |
| 33 | 5-2 - Cathodic Protection - Test Site Removal | $ 222 | 3393 | $ 754,742 | |
| 34 | | | | * | **$ 1,118,897** |
| 35 | | | | | |
| 36 | **Right of Way Markers** | **Cost / ROW** | **Total ROW** | **Total** | |
| 37 | 6-1 - ROW Marker Removal | $ 59 | 597 | $ 35,162 | |
| 38 | | | | * | **$ 32,865** |
| 39 | **Tower Removal** | **Cost / Tower** | **Total Towers** | **Total** | |
| 40 | 6-3- Remote Tower Locations | $ 80,657 | 2 | $ 161,315 | |
| 41 | | | | * | **$ 150,775** |
| 42 | | | | | |
| 43 | **Tap Removal** | **Cost / Tap** | **Total Taps** | **Total** | |
| 44 | 7-1 - Tap Locations | $ 4,784 | 112 | $ 535,783 | |
| 45 | | | | * | **$ 500,775** |
| 46 | **Well Abandonment** | **Cost / Well** | **Total Wells** | **Cost ($)** | |
| 47 | 9-1 - Well Summary | $ 85,739.0 | 870 | $ 74,592,946 | |
| 48 | | | | * | **$ 69,719,107** |
| 49 | | | | | |
| 50 | | | | Base Total: | $ 103,616,997 |
| 51 | | | C.M. Expense | $ 2,590,425 | |
| 52 | | | | | $ 106,207,422 |
| 53 | B. CONTINGENCY | | 10% Contingency Fees | $ 10,620,742 | |
| 54 | | | | Subtotal: | $ 116,828,164 |
| 55 | C. SALVAGE | | | | |
| 56 | | | | Salvage Material - Scrap Metal: | $ (3,602,776) |
| 57 | | | | | |
| 58 | | | | **Grand Total:** | **$ 113,225,388** |
| 59 | * City Cost Index Adjustment Factor Used = 0.9347 | | | | |
| 60 | 0.9347 is the Average City Cost Index Adjustment Factor of locations found within ANR's Geographic Locations | | | | |

# 1-1 - Pipeline Clean and Purge
## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for small equipment, placed in rear of, or towed by pickup truck | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton | 4 | 2 | $ - | $ 130.00 | $ 48.50 | $ 178.50 |
| 1844 | C.F. | Gas Pipelines, Nitrogen purge method, lengths 1000' to 10,000' | | 0 | 0 | $ 202.84 | $ 239.72 | $ 202.84 | $ 645.40 |
| 5280 | L.F. | Sewer pipelines, cleaning, pig method, lengths 1000' to 10,000', 4" diameter through 24" diameter, minimum | | 0 | 0 | $ - | $ - | $ - | $ 21,859.20 |
| 15 | Ton | Hazardous waste cleanup/pickup/disposal, dumpsite disposal charge, maximum | | 0 | 0 | $ - | $ - | $ - | $ 6,825.00 |
| 0.8 | Week | Field personnel, general purpose laborer, average | | 0.2 | 40 | $ - | $ 1,640.00 | $ - | $ 1,640.00 |
| 0.4 | Week | Field personnel, general purpose laborer, average | | 0.2 | 40 | $ - | $ 820.00 | $ - | $ 820.00 |
| 0.2 | Week | Field personnel, field engineer, engineer, | | 0 | 0 | $ - | $ 555.00 | $ - | $ 555.00 |
| 0.2 | Week | Field personnel, field engineer, engineer, | | 0 | 0 | $ - | $ 555.00 | $ - | $ 555.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for small equipment, placed in rear of, or towed by pickup truck | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton | 4 | 2 | $ - | $ 130.00 | $ 48.50 | $ 178.50 |
| 1 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 535.00 | $ - | $ 535.00 |
| 0.5 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 257.50 | $ - | $ 257.50 |
| 122 | $/Day | Per Diem | | 1 | 100 | $ - | $ - | $ - | $ 1,520.72 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 711.40 | $ - | $ 711.40 |

**Total** **$ 36,281.22**

# 1-2 - Trench Excavation

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 40-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (medium)<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Flatbed Trailer, 40 Ton | 2 | 8 | $ - | $ 515.00 | $ 380.00 | $ 895.00 |
| 5280 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 475.20 | $ 8,923.20 | $ 211.20 | $ 9,609.60 |
| 10560 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $5,068.80 | $ 21,859.20 | $ 3,168.00 | $ 30,096.00 |
| 391 | C.Y. | Topsoil stripping and stockpiling, topsoil, sandy loam, ideal conditions, 200 HP dozer | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P. | 2300 | 0 | $ - | $ 93.84 | $ 285.43 | $ 379.27 |
| 2670 | B.C.Y. | Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering | 1 Equip. Oper. (crane)<br>1 Laborer<br>1 Hyd. Excavator, .75 C.Y. | 270 | 0.06 | $ - | $ 9,690.87 | $ 7,635.23 | $ 17,326.10 |
| 17 | Day | Rent truck pickup 3/4 ton 4 wheel drive, Incl. Hourly |  | 0 | 0 | $ - | $ - | $ 4,559.06 | $ 4,559.06 |
| 3 | Week | Field personnel, field engineer, senior engineer, |  | 0 | 0 | $ - | $ 10,875.00 | $ - | $ 10,875.00 |
| 3 | Week | Field personnel, superintendent, maximum |  | 0 | 0 | $ - | $ 9,750.00 | $ - | $ 9,750.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 40-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (medium)<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Flatbed Trailer, 40 Ton | 2 | 8 | $ - | $ 515.00 | $ 380.00 | $ 895.00 |
| 17 | Day | Testing and inspecting, supervision of earthwork |  | 1 | 8 | $ - | $ 9,095.00 | $ - | $ 9,095.00 |
| 8 | Day | Environmental Engineer |  | 1 | 8 | $ - | $ 4,120.00 | $ - | $ 4,120.00 |
| 122 | $/Day | Per Diem |  | 1 | 32.12 | $ - | $ - | $ - | $ 488.46 |
| 1 | Job | Permitting cost |  | 0 | 0 | $ - | $ 1,961.77 | $ - | $ 1,961.77 |

| | |
|---|---|
| **Total** | **$100,050.26** |

# 1-3 - Pipe Removal

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 40-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (medium)<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Flatbed Trailer, 40 Ton | 2 | 8 | $ - | $ 515.00 | $ 380.00 | $ 895.00 |
| 5280 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 5" - 10", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane) | 360 | 0.09 | $ - | $ 26,928.00 | $ 13,675.20 | $ 40,603.20 |
| 15 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 8,550.00 | $ 13,350.00 | $ 21,900.00 |
| 15 | Ea. | Delivery charge for pipe, hauled on 40-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (medium)<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Flatbed Trailer, 40 Ton | 2 | 8 | $ - | $ 7,725.00 | $ 5,700.00 | $ 13,425.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 40-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (medium)<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Flatbed Trailer, 40 Ton | 2 | 8 | $ - | $ 515.00 | $ 380.00 | $ 895.00 |
| 15 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 8,025.00 | $ - | $ 8,025.00 |
| 7 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 3,605.00 | $ - | $ 3,605.00 |
| 122 | $/Day | Per Diem | | 1 | 48.1 | $ - | $ - | $ - | $ 731.32 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 1,801.59 | $ - | $ 1,801.59 |

**Total** **$ 91,881.11**

## 1-4 - Trench Backfill

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 40-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (medium)<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Flatbed Trailer, 40 Ton | 2 | 8 | $ - | $ 515.00 | $ 380.00 | $ 895.00 |
| 22 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 120 | 0.07 | $ - | $ 95.48 | $ 53.90 | $ 149.38 |
| 68 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 450.30 | $ 603.81 | $ 1,054.11 |
| 68 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | $ 1,013.17 | $ 194.45 | $ 335.00 | $ 1,542.62 |
| 3129 | C.Y. | Topsoil stripping and stockpiling, topsoil, sandy loam, ideal conditions, 200 HP dozer | 1 Equip. Oper. (medium)<br>.5 Laborer<br>1 Dozer, 200 H.P. | 2300 | 0 | $ - | $ 750.96 | $ 2,284.17 | $ 3,035.13 |
| 3129 | E.C.Y. | Backfill, bulk, air tamped compaction, add | 1 Equipment Oper. (light)<br>1 Laborer<br>1 Air Powered Tamper<br>1 Air Compressor, 365 cfm<br>2 -50' Air Hoses, 1.5 | 80 | 0.2 | $ - | $ 36,452.85 | $ 18,461.10 | $ 54,913.95 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 40-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (medium)<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Flatbed Trailer, 40 Ton | 2 | 8 | $ - | $ 515.00 | $ 380.00 | $ 895.00 |
| 40 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 21,400.00 | $ - | $ 21,400.00 |
| 20 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 10,300.00 | $ - | $ 10,300.00 |
| 122 | $/Day | Per Diem | | 1 | 32.43 | $ - | $ - | $ - | $ 493.17 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 1,893.57 | $ - | $ 1,893.57 |

**Total** **$ 96,571.93**

# 1-5 - Trench Restoration

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for small equipment, placed in rear of, or towed by pickup truck | | 4 | 2 | $ - | $ 130.00 | $ 48.50 | $ 178.50 |
| 5 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | | 1.5 | 16 | $ - | $ 4,475.00 | $ 660.00 | $ 5,135.00 |
| 2347 | S.Y. | Seeding, mechanical seeding, 44 lb/M.S.Y. | | 2500 | 0 | $610.22 | $ 492.87 | $ 281.64 | $ 1,384.73 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for small equipment, placed in rear of, or towed by pickup truck | | 4 | 2 | $ - | $ 130.00 | $ 48.50 | $ 178.50 |
| 4 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 2,140.00 | $ - | $ 2,140.00 |
| 2 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 1,030.00 | $ - | $ 1,030.00 |
| 122 | $/Day | Per Diem | | 1 | 36 | $ - | $ - | $ - | $ 547.46 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 211.88 | $ - | $ 211.88 |

**Total** **$ 10,806.07**

## 2-2 - Road Crossing Abandonment

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 195.00 | $ 102.00 | $ 297.00 |
| 800 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 72.00 | $ 1,352.00 | $ 32.00 | $ 1,456.00 |
| 800 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 384.00 | $ 1,656.00 | $ 240.00 | $ 2,280.00 |
| 8 | Ea. | 8'x16' 3-Ply Temp. Matting, Includes Install/Remove, 6" Mulch | | 0 | 0 | $14,256.00 | $ - | $ - | $ 14,256.00 |
| 10 | C.Y. | Subsurface investigation, test pits, loader/backhoe, light soil | 1 Equipment Oper. (med.)<br>1 Laborer<br>1 Backhoe Loader, 80 H.P. | 28 | 0.57 | $ - | $ 345.00 | $ 92.50 | $ 437.50 |
| 25 | L.F. | Sewer pipelines, cleaning, pig method, lengths 1000' to 10,000', 4" diameter through 24" diameter, minimum | | 0 | 0 | $ - | $ - | $ - | $ 103.50 |
| 0.4 | Week | Field personnel, general purpose laborer, average | | 0.2 | 40 | $ - | $ 820.00 | $ - | $ 820.00 |
| 0.2 | Week | Field personnel, field engineer, engineer, average | | 0 | 0 | $ - | $ 555.00 | $ - | $ 555.00 |
| 9 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $ 1.08 | $ 1.44 | $ 1.08 | $ 3.60 |
| 1 | C.Y. | Structural concrete, ready mix, flowable fill, 40-80 psi, includes ash, Portland cement Type I, sand and water, delivered, excludes all additives and treatments | | 0 | 0 | $ 84.50 | $ - | $ - | $ 84.50 |
| 4 | Ea. | Pipe, cut one groove, labor only, 8" pipe size, grooved-joint | #N/A | 54 | 0.3 | $ - | $ 80.00 | $ - | $ 80.00 |
| 4 | Ea. | Gasket and bolt set, for flanges, 150 lb., 8" pipe size | #N/A | 5 | 1.6 | $ 136.00 | $ 480.00 | $ - | $ 616.00 |
| 10 | E.C.Y. | Backfill, bulk, air tamped compaction, add | 1 Equipment Oper. (light)<br>1 Laborer<br>1 Air Powered Tamper<br>1 Air Compressor, 365 cfm<br>2 -50' Air Hoses, 1.5 | 80 | 0.2 | $ - | $ 116.50 | $ 59.00 | $ 175.50 |
| 14.22 | S.Y. | Seeding, mechanical seeding, 44 lb/M.S.Y. | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 2500 | 0 | $ 3.70 | $ 2.99 | $ 1.71 | $ 8.39 |
| 2 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 1,070.00 | $ - | $ 1,070.00 |
| 1 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 515.00 | $ - | $ 515.00 |
| 122 | $/Day | Per Diem | | 1 | 61.73 | $ - | $ - | $ - | $ 938.74 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 473.93 | $ - | $ 473.93 |

**Total** **$ 24,170.66**

## 3-1 - Small Meter Station Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 502 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 45.18 | $ 848.38 | $ 20.08 | $ 913.64 |
| 502 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 1,516.04 | $ 266.06 | $ 1,782.10 |
| 8 | Ea. | Selective demolition, parking appurtenances, pipe bollards, 6"-12" diameter | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 80 | 0.3 | $ - | $ 134.40 | $ 23.76 | $ 158.16 |
| 2 | Ea. | Steel tank, double wall, above ground, 500 thru 2,000 gallon, selective demolition, excluding foundation, pumps & piping | 1 Pipe Fitter<br>1 Truck Driver (light)<br>1 Equip. Oper. (medium)<br>1 Flatbed Truck, Gas, 3 Ton<br>1 Backhoe Loader, 48 H.P. | 2 | 12 | $ - | $ 1,640.00 | $ 1,170.00 | $ 2,810.00 |
| 232 | C.F. | Gas pipelines, nitrogen purge method |  | 0 | 0 | $ 23.20 | $ 27.84 | $ 23.20 | $ 74.24 |
| 146 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 18" - 24", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane)<br>2 Cutting Torches<br>2 Sets of Gases<br>1 Hyd. Crane, 12 Ton | 160 | 0.2 | $ - | $ 1,671.70 | $ 854.10 | $ 2,525.80 |
| 3 | Ea. | Selective demolition, utility valves & accessories, utility valves, 14"-24", excludes excavation | 1 Labor Foreman (outside)<br>1 Skilled Worker<br>1 Laborer<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 2 | 14 | $ - | $ 2,310.00 | $ 315.00 | $ 2,625.00 |
| 1 | Ea. | Selective demolition, utility poles & cross arms, utility poles, wood, 20'-30' high | 1 Electrician Foreman<br>1 Electrician<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 6 | 3.33 | $ - | $ 253.00 | $ 35.00 | $ 288.00 |
| 1 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 570.00 | $ 890.00 | $ 1,460.00 |
| 1 | Day | Rent trailer, platform, flush deck 2 axle, 25 ton, Incl. Hourly Oper. Cost. |  | 0 | 0 | $ - | $ - | $ 215.03 | $ 215.03 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only |  | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 2 | Day | Testing and inspecting, supervision of earthwork |  | 1 | 8 | $ - | $ 1,070.00 | $ - | $ 1,070.00 |
| 1 | Day | Environmental Engineer |  | 1 | 8 | $ - | $ 515.00 | $ - | $ 515.00 |
| 122 | $/Day | Per Diem |  | 1 | 101.9 | $ - | $ - | $ - | $ 1,549.62 |
| 1 | Job | Permitting cost |  | 0 | 0 | $ - | $ 482.33 | $ - | $ 482.33 |

**Total** **$ 24,598.92**

## 3-2 - Small Meter Station Sub Material Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 502 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | | 650 | 0.04 | $ 240.96 | $ 1,039.14 | $ 150.60 | $ 1,430.70 |
| 158 | C.F. | Selective demolition, cutout, concrete, elevated slab, bar reinforced, over 6 C.F., excludes loading and disposal | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Air Compressor, 250 cfm<br>2 Breakers, Pavement, 60 lb.<br>2 -50' Air Hoses, 1.5 | 50 | 0.8 | $ - | $ 6,557.00 | $ 1,232.40 | $ 7,789.40 |
| 6 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | | 72 | 0.11 | $ - | $ 39.60 | $ 53.10 | $ 92.70 |
| 1376 | B.C.Y. | Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering | | 270 | 0.06 | $ - | $ 4,994.88 | $ 3,935.36 | $ 8,930.24 |
| 1376 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | | 72 | 0.11 | $ - | $ 9,081.60 | $12,177.60 | $ 21,259.20 |
| 1 | Week | Rent front end loader, 4WD, art. frame, diesel, 7 - 9 CY 475 HP, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $12,566.61 | $ 12,566.61 |
| 4 | Ea. | Pipe, cut one groove, labor only, 24" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 15 | 1.07 | $ - | $ 288.00 | $ - | $ 288.00 |
| 4 | Ea. | Gasket and bolt set, for flanges, 150 lb., 24" pipe size | | 1.9 | 4.21 | $ 1,200.00 | $ 1,260.00 | $ - | $ 2,460.00 |
| 3 | Ea. | Selective demolition, utility materials, utility valves, 14"-24", excludes excavation | | 2 | 14 | $ - | $ 2,310.00 | $ 315.00 | $ 2,625.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 6 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 3,210.00 | $ - | $ 3,210.00 |
| 3 | Day | Environmental Engineer | | 0 | 0 | $ - | $ 1,545.00 | $ - | $ 1,545.00 |
| 122 | $/Day | Per Diem | | 1 | 76.4 | $ - | $ - | $ - | $ 1,161.83 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 1,429.77 | $ - | $ 1,429.77 |

**Total** **$ 72,918.45**

## 3-3 - Small Meter Station Backfill and Restoration

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 13 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | | 120 | 0.07 | $ - | $ 56.42 | $ 31.85 | $ 88.27 |
| 1376 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | $19,057.60 | $ 3,852.80 | $ 6,687.36 | $ 29,597.76 |
| 1376 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | | 72 | 0.11 | $ - | $ 9,081.60 | $12,177.60 | $ 21,259.20 |
| 13 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | | 1.5 | 16 | $ - | $11,635.00 | $ 1,716.00 | $ 13,351.00 |
| 1376 | E.C.Y. | Backfill, bulk, air tamped compaction, add | 1 Equipment Oper. (light)<br>1 Laborer<br>1 Air Powered Tamper<br>1 Air Compressor, 365 cfm<br>2 -50' Air Hoses, 1.5 | 80 | 0.2 | $ - | $16,030.40 | $ 8,118.40 | $ 24,148.80 |
| 1376 | S.Y. | Seeding, mechanical seeding hydro or air seeding for large areas, includes lime, fertilizer and seed with wood fiber mulch added | | 8900 | 0 | $ 3,329.92 | $ 137.60 | $ 96.32 | $ 3,563.84 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 18 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 9,630.00 | $ - | $ 9,630.00 |
| 9 | Day | Environmental Engineer | | 0 | 0 | $ - | $ 4,635.00 | $ - | $ 4,635.00 |
| 122 | $/Day | Per Diem | | 1 | 72.43 | $ - | $ - | $ - | $ 1,101.46 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 2,254.51 | $ - | $ 2,254.51 |

**Total** **$114,979.84**

## 3-4 - Medium Meter Station Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 662 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 59.58 | $ 1,118.78 | $ 26.48 | $ 1,204.84 |
| 662 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 1,999.24 | $ 350.86 | $ 2,350.10 |
| 47329 | C.F. | Building demolition, small buildings or single buildings, steel, includes 20 mile haul, excludes salvage, foundation demolition or dump fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (medium)<br>2 Truck Drivers (heavy)<br>1 Crawler Loader, 3 C.Y.<br>2 Dump Trucks, 12 C.Y., 400 H.P. | 14800 | 0 | $ - | $ 8,992.51 | $ 8,045.93 | $ 17,038.44 |
| 1 | Ea. | Steel tank, single wall, above ground, 15,000 thru 30,000 gallon, selective demolition, excluding foundation, pumps or piping | 2 Pipe Fitters<br>1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Flatbed Trailer, 40 Ton<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Hyd. Crane, 80 Ton<br>1 Hyd. Excavator, 2 C.Y. | 2 | 16 | $ - | $ 1,150.00 | $ 1,700.00 | $ 2,850.00 |
| 536 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $ 53.60 | $ 64.32 | $ 53.60 | $ 171.52 |
| 338 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 18" - 24", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane)<br>2 Cutting Torches<br>2 Sets of Gases<br>1 Hyd. Crane, 12 Ton | 160 | 0.2 | $ - | $ 3,870.10 | $ 1,977.30 | $ 5,847.40 |
| 14 | Ea. | Selective demolition, utility valves & accessories, utility valves, 14"-24", excludes excavation | 1 Labor Foreman (outside)<br>1 Skilled Worker<br>1 Laborer<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 2 | 14 | $ - | $ 10,780.00 | $ 1,470.00 | $ 12,250.00 |
| 1 | Ea. | Selective demolition, utility poles & cross arms, utility poles, wood, 20'-30' high | 1 Electrician Foreman<br>1 Electrician<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 6 | 3.33 | $ - | $ 253.00 | $ 35.00 | $ 288.00 |
| 4 | Day | Rented truck, flatbed, GVW = 20,000 Lbs, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 1,133.08 | $ 1,133.08 |
| 4 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 2,280.00 | $ 3,560.00 | $ 5,840.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 7 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 3,745.00 | $ - | $ 3,745.00 |
| 3 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 1,545.00 | $ - | $ 1,545.00 |
| 122 | $/Day | Per Diem | | 1 | 105.6 | $ - | $ - | $ - | $ 1,605.88 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 1,279.99 | $ - | $ 1,279.99 |

**Total** **$ 65,279.25**

# 3-5 - Medium Meter Station Sub Material Removal

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 662 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | | 650 | 0.04 | $ 317.76 | $ 1,370.34 | $ 198.60 | $ 1,886.70 |
| 185 | C.F. | Selective demolition, cutout, concrete, elevated slab, bar reinforced, over 6 C.F., excludes loading and disposal | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Air Compressor, 250 cfm<br>2 Breakers, Pavement, 60 lb.<br>2 -50' Air Hoses, 1.5 | 50 | 0.8 | $ - | $ 7,677.50 | $ 1,443.00 | $ 9,120.50 |
| 7 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 46.20 | $ 61.95 | $ 108.15 |
| 2681 | B.C.Y. | Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering | | 270 | 0.06 | $ - | $ 9,732.03 | $ 7,667.66 | $ 17,399.69 |
| 2681 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | | 72 | 0.11 | $ - | $17,694.60 | $23,726.85 | $ 41,421.45 |
| 1 | Week | Rent front end loader, 4WD, art. frame, diesel, 7 - 9 CY 475 HP, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $12,566.61 | $ 12,566.61 |
| 14 | Ea. | Selective demolition, utility materials, utility valves, 14"-24", excludes excavation | | 2 | 14 | $ - | $10,780.00 | $ 1,470.00 | $ 12,250.00 |
| 28 | Ea. | Pipe, cut one groove, labor only, 24" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 15 | 1.07 | $ - | $ 2,016.00 | $ - | $ 2,016.00 |
| 28 | Ea. | Gasket and bolt set, for flanges, 150 lb., 24" pipe size | | 1.9 | 4.21 | $ 8,400.00 | $ 8,820.00 | $ - | $ 17,220.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 15 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 8,025.00 | $ - | $ 8,025.00 |
| 7 | Day | Environmental Engineer | | 0 | 0 | $ - | $ 3,605.00 | $ - | $ 3,605.00 |
| 122 | $/Day | Per Diem | | 1 | 76.4 | $ - | $ - | $ - | $ 1,161.83 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 2,698.22 | $ - | $ 2,698.22 |

**Total** **$137,609.15**

## 3-6 - Medium Meter Station Backfill and Restoration

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 2681 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | | 120 | 0.07 | $ - | $11,635.54 | $ 6,568.45 | $ 18,203.99 |
| 2681 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | ######## | $ 7,506.80 | $13,029.66 | $ 57,668.31 |
| 25 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | | 72 | 0.11 | $ - | $ 165.00 | $ 221.25 | $ 386.25 |
| 25 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | | 1.5 | 16 | $ - | $22,375.00 | $ 3,300.00 | $ 25,675.00 |
| 2681 | E.C.Y. | Backfill, bulk, air tamped compaction, add | 1 Equipment Oper. (light)<br>1 Laborer<br>1 Air Powered Tamper<br>1 Air Compressor, 365 cfm<br>2 -50' Air Hoses, 1.5 | 80 | 0.2 | $ - | $31,233.65 | $15,817.90 | $ 47,051.55 |
| 2681 | S.Y. | Seeding, mechanical seeding hydro or air seeding for large areas, includes lime, fertilizer and seed with wood fiber mulch added | | 8900 | 0 | $ 6,488.02 | $ 268.10 | $ 187.67 | $ 6,943.79 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 34 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $18,190.00 | $ - | $ 18,190.00 |
| 17 | Day | Environmental Engineer | | 0 | 0 | $ - | $ 8,755.00 | $ - | $ 8,755.00 |
| 122 | $/Day | Per Diem | | 1 | 72.43 | $ - | $ - | $ - | $ 1,101.46 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 2,215.56 | $ - | $ 2,215.56 |

**Total** **$191,540.91**

## 5-1 - Cathodic Protection - Rectifier Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 36 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 7,020.00 | $ 3,672.00 | $ 10,692.00 |
| 126 | Ea. | Cathodic protection, rectifiers, silicon type, air cooled, 28 V/10 A, underground storage tanks | .5 Electrician Foreman<br>2 Electricians | 3.5 | 5.71 | $327,600.00 | $ 55,440.00 | $ - | $ 383,040.00 |
| 4 | Ton | Selective demolition, dump charges, typical urban city, reclamation station, usual charge, includes tipping fees only | | 0 | 0 | $ 324.00 | $ - | $ - | $ 324.00 |
| 36 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 7,020.00 | $ 3,672.00 | $ 10,692.00 |
| 36 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 19,260.00 | $ - | $ 19,260.00 |
| 18 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 9,270.00 | $ - | $ 9,270.00 |
| 122 | $/Day | Per Diem | | 1 | 27.71 | $ - | $ - | $ - | $ 421.39 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 8,673.99 | $ - | $ 8,673.99 |

**Total** **$ 442,373.38**

## 5-2 - Cathodic Protection - Test Site Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 213 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 41,535.00 | $ 21,726.00 | $ 63,261.00 |
| 3393 | Ea. | Signs, traffic sign removal, to 10 S.F., including supports | 3 Laborers<br>1 Equip. Oper. (light)<br>1 Crane, Flatbed Mounted, 3 Ton | 16 | 2 | $ - | $ 373,230.00 | $ 55,645.20 | $ 428,875.20 |
| 36 | Ton | Selective demolition, dump charges, typical urban city, reclamation station, usual charge, includes tipping fees only | | 0 | 0 | $2,916.00 | $ - | $ - | $ 2,916.00 |
| 213 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 41,535.00 | $ 21,726.00 | $ 63,261.00 |
| 213 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 113,955.00 | $ - | $ 113,955.00 |
| 106 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 67,310.00 | $ - | $ 67,310.00 |
| 122 | $/Day | Per Diem | | 1 | 24 | $ - | $ - | $ - | $ 364.97 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 14,798.86 | $ - | $ 14,798.86 |

**Total** **$ 754,742.03**

## 6-1 - ROW Marker Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 7 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 1,365.00 | $ 714.00 | $ 2,079.00 |
| 849 | C.L.F. | Utility line signs, markers, and flags, underground tape, detectable, reinforced, aluminum foil core, 6", excludes excavation and backfill | | 140 | 0.06 | $ 36,082.50 | $ 2,496.06 | $ - | $ 38,578.56 |
| 2 | Ton | Selective demolition, dump charges, typical urban city, reclamation station, usual charge, includes tipping fees only | | 0 | 0 | $ 162.00 | $ - | $ - | $ 162.00 |
| 848 | S.Y. | Seeding, mechanical seeding, 44 lb/M.S.Y. | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 | 2500 | 0 | $ 220.48 | $ 178.08 | $ 101.76 | $ 500.32 |
| 7 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 1,365.00 | $ 714.00 | $ 2,079.00 |
| 7 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 3,745.00 | $ - | $ 3,745.00 |
| 3 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 1,545.00 | $ - | $ 1,545.00 |
| 122 | $/Day | Per Diem | | 1 | 22.06 | $ - | $ - | $ - | $ 335.47 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 980.49 | $ - | $ 980.49 |

**Total** **$ 50,004.84**

## 6-3 - Remote Communication Tower

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 200 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 604.00 | $ 106.00 | $ 710.00 |
| 200 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' | 2 Laborers<br>1 Equip. Oper. (light) | 650 | 0.04 | $ 96.00 | $ 414.00 | $ 60.00 | $ 570.00 |
| 1 | Ea. | Communications transmission tower, radio towers guyed, 100 lb. section, wind load 70 mph basic wind speed, 400' high | 1 Struc. Steel Foreman (outside)<br>1 Struc. Steel Worker<br>1 Truck Driver (light)<br>1 Flatbed Truck, Gas, 3 Ton | 0.14 | 171 | $ 33,600.00 | $ 11,800.00 | $ 6,675.00 | $ 52,075.00 |
| 10 | Ea. | Delivery charge for tower, hauled on 40-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (medium)<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Flatbed Trailer, 40 Ton | 2 | 8 | $ - | $ 5,150.00 | $ 3,800.00 | $ 8,950.00 |
| 1 | Day | Rent tractor with A frame boom and winch 225 HP, Incl. Hourly Oper. Cost. |  | 0 | 0 | $ - | $ - | $ 545.95 | $ 545.95 |
| 45 | S.Y. | Demolish, remove pavement & curb, remove concrete, rod reinforced, to 6" thick, excludes hauling and disposal fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (light)<br>1 Equip. Oper. (medium)<br>1 Backhoe Loader, 48 H.P.<br>1 Hyd. Hammer (1200 lb.)<br>1 F.E. Loader, W.M., 4 C.Y.<br>1 Pvmt. Rem. Bucket | 200 | 0.12 | $ - | $ 301.50 | $ 301.50 | $ 603.00 |
| 15 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 99.00 | $ 132.75 | $ 231.75 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 8 | Day | Testing and inspecting, supervision of earthwork |  | 1 | 8 | $ - | $ 4,280.00 | $ - | $ 4,280.00 |
| 4 | Day | Environmental Engineer |  | 1 | 8 | $ - | $ 2,060.00 | $ - | $ 2,060.00 |
| 122 | $/Day | Per Diem |  | 1 | 243.3 | $ - | $ - | $ - | $ 3,700.23 |
| 1 | Job | Permitting cost |  | 0 | 0 | $ - | $ 1,581.52 | $ - | $ 1,581.52 |

**Total** **$ 80,657.45**

# 7-1 - Tap Locations

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 195.00 | $ 102.00 | $ 297.00 |
| 200 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 18.00 | $ 338.00 | $ 8.00 | $ 364.00 |
| 200 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 96.00 | $ 414.00 | $ 60.00 | $ 570.00 |
| 10 | B.C.Y. | Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering | 1 Equip. Oper. (crane)<br>1 Laborer<br>1 Hyd. Excavator, .75 C.Y. | 270 | 0.06 | $ - | $ 36.30 | $ 28.60 | $ 64.90 |
| 2 | Ea. | Pipe, cut one groove, labor only, 8" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 54 | 0.3 | $ - | $ 40.00 | $ - | $ 40.00 |
| 2 | Ea. | Gasket and bolt set, for flanges, 150 lb., 8" pipe size | | 5 | 1.6 | $ 68.00 | $ 240.00 | $ - | $ 308.00 |
| 5 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 33.00 | $ 44.25 | $ 77.25 |
| 1 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 1.5 | 16 | $ - | $ 880.00 | $ 130.00 | $ 1,010.00 |
| 0.03 | M.S.F. | Seeding, mechanical seeding grass seed, 4.5 lb./M.S.F., hand push spreader | | 180 | 0.04 | $ 0.89 | $ 0.07 | $ - | $ 0.95 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 195.00 | $ 102.00 | $ 297.00 |
| 1 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 535.00 | $ - | $ 535.00 |
| 1 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 515.00 | $ - | $ 515.00 |
| 122 | $/Day | Per Diem | | 1 | 40.17 | $ - | $ - | $ - | $ 610.87 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 93.80 | $ - | $ 93.80 |

**Total** **$ 4,783.77**

# 8-1 - Mainline Valve Locations
## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 195.00 | $ 102.00 | $ 297.00 |
| 120 | L.F. | Selective demolition, miscellaneous metal fences & gates, fence, miscellaneous steel mesh, 4'-6' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 600 | 0.04 | $ - | $ 268.80 | $ 48.00 | $ 316.80 |
| 120 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 362.40 | $ 63.60 | $ 426.00 |
| 800 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 72.00 | $ 1,352.00 | $ 32.00 | $ 1,456.00 |
| 19 | B.C.Y. | Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering | 1 Equip. Oper. (crane)<br>1 Laborer<br>1 Hyd. Excavator, .75 C.Y. | 270 | 0.06 | $ - | $ 68.97 | $ 54.34 | $ 123.31 |
| 36 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 5" - 10", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane)<br>2 Cutting Torches<br>2 Sets of Gases<br>1 Hyd. Crane, 12 Ton | 360 | 0.09 | $ - | $ 183.60 | $ 93.24 | $ 276.84 |
| 2 | Ea. | Pipe, cut one groove, labor only, 8" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 54 | 0.3 | $ - | $ 40.00 | $ - | $ 40.00 |
| 2 | Ea. | Gasket and bolt set, for flanges, 150 lb., 8" pipe size | #N/A | 5 | 1.6 | $ 68.00 | $ 240.00 | $ - | $ 308.00 |
| 1 | Ea. | Selective demolition, utility materials, utility valves, 14"-24", excludes excavation | 1 Labor Foreman (outside)<br>1 Skilled Worker<br>1 Laborer<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 2 | 14 | $ - | $ 770.00 | $ 105.00 | $ 875.00 |
| 36 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 237.60 | $ 318.60 | $ 556.20 |
| 1 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 1.5 | 16 | $ - | $ 880.00 | $ 130.00 | $ 1,010.00 |
| 0.8 | M.S.F. | Seeding, mechanical seeding grass seed, 4.5 lb./M.S.F., hand push spreader | | 180 | 0.04 | $ 23.60 | $ 1.82 | $ - | $ 25.42 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 195.00 | $ 102.00 | $ 297.00 |
| 1 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 535.00 | $ - | $ 535.00 |
| 1 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 515.00 | $ - | $ 515.00 |
| 122 | $/Day | Per Diem | | 1 | 54.31 | $ - | $ - | $ - | $ 825.91 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 157.67 | $ - | $ 157.67 |

**Total** **$ 8,041.15**

# ANR Pipeline Company
## Well Abandonment Summary Report

| Line No. | Particular | Cost ($) | Qty | Estimate ($) |
|---|---|---|---|---|
| | (A) | (B) | (C) | (D) |
| 1 | Austin | $ 68,738.84 | 118 | $ 8,111,183.29 |
| 2 | Central Charlton | $ 160,852.96 | 10 | $ 1,608,529.61 |
| 3 | Cold Springs 1 | $ 179,711.88 | 7 | $ 1,257,983.17 |
| 4 | Goodwell | $ 89,457.10 | 108 | $ 9,661,366.96 |
| 5 | Lincoln Freeman | $ 71,929.58 | 178 | $ 12,803,465.50 |
| 6 | Loreed | $ 114,105.07 | 210 | $ 23,962,065.00 |
| 7 | Muttonville | $ 97,693.74 | 18 | $ 1,758,487.35 |
| 8 | Reed City | $ 65,524.11 | 135 | $ 8,845,755.04 |
| 9 | South Chester | $ 170,745.96 | 9 | $ 1,536,713.65 |
| 10 | Winfield | $ 63,345.33 | 77 | $ 4,877,590.52 |
| | | | Total: | $ 74,423,140.09 |

## 9-1 - Well Abandonment Austin

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 200 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 604.00 | $ 106.00 | $ 710.00 |
| 200 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 18.00 | $ 338.00 | $ 8.00 | $ 364.00 |
| 200 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 96.00 | $ 414.00 | $ 60.00 | $ 570.00 |
| 16 | Ea. | 8'x16' 3-Ply Temp. Matting, Includes Install/Remove, 6" Mulch | | 0 | 0 | $28,512.00 | $ - | $ - | $ 28,512.00 |
| 1385 | L.F. | Sewer pipelines, cleaning, pig method, lengths 1000' to 10,000', 4" diameter through 24" diameter, minimum | | 0 | 0 | $ - | $ - | $ - | $ 5,733.90 |
| 60 | B.C.Y. | Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering | 1 Equip. Oper. (crane)<br>1 Laborer<br>1 Hyd. Excavator, .75 C.Y. | 270 | 0.06 | $ - | $ 217.80 | $ 171.60 | $ 389.40 |
| 60 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 396.00 | $ 531.00 | $ 927.00 |
| 1385 | V.L.F. | Selective demolition, wells, well screen & casing, 6" to 16" dia | 1 Labor Foreman (outside)<br>4 Laborers | 300 | 0.13 | $ - | $ 9,625.75 | $ 8,240.75 | $ 17,866.50 |
| 3 | Ea. | Selective demolition, natural gas valves, fittings & regulators, regulator, steel, 3" - 4" | 1 Plumber<br>1 Plumber Apprentice | 22 | 0.73 | $ - | $ 147.00 | $ - | $ 147.00 |
| 1 | Ea. | Pipe, cut one groove, labor only, 8" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 54 | 0.3 | $ - | $ 20.00 | $ - | $ 20.00 |
| 1 | Ea. | Gasket and bolt set, for flanges, 150 lb., 8" pipe size | | 5 | 1.6 | $ 34.00 | $ 120.00 | $ - | $ 154.00 |
| 9 | C.Y. | Structural concrete, ready mix, flowable fill, 40-80 psi, includes ash, Portland cement Type I, sand and water, delivered, excludes all additives and treatments | | 0 | 0 | $ 760.50 | $ - | $ - | $ 760.50 |
| 1 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light) | 1.5 | 16 | $ - | $ 895.00 | $ 132.00 | $ 1,027.00 |
| 23 | S.Y. | Seeding, mechanical seeding, 44 lb/M.S.Y. | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 2500 | 0 | $ 5.98 | $ 4.83 | $ 2.76 | $ 13.57 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 5 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 2,675.00 | $ - | $ 2,675.00 |
| 2 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 1,030.00 | $ - | $ 1,030.00 |
| 122 | $/Day | Per Diem | | 1.0 | 75.0 | $ - | $ - | $ - | $ 1,141.15 |
| 1.0 | Job | Permitting cost | | 0.0 | 0.0 | $ - | $ 1,347.82 | $ - | $ 1,347.82 |
| **Total** | | | | | | | | | **$ 68,738.84** |

## 9-1 - Well Abandonment Central Charlton

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 200 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 604.00 | $ 106.00 | $ 710.00 |
| 200 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 18.00 | $ 338.00 | $ 8.00 | $ 364.00 |
| 200 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 96.00 | $ 414.00 | $ 60.00 | $ 570.00 |
| 16 | Ea. | 8'x16' 3-Ply Temp. Matting, Includes Install/Remove, 6" Mulch | | 0 | 0 | $28,512.00 | $ - | $ - | $ 28,512.00 |
| 5734 | L.F. | Sewer pipelines, cleaning, pig method, lengths 1000' to 10,000', 4" diameter through 24" diameter, minimum | | 0 | 0 | $ - | $ - | $ - | $ 23,738.76 |
| 60 | B.C.Y. | Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering | 1 Equip. Oper. (crane)<br>1 Laborer<br>1 Hyd. Excavator, .75 C.Y. | 270 | 0.06 | $ - | $ 217.80 | $ 171.60 | $ 389.40 |
| 60 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 396.00 | $ 531.00 | $ 927.00 |
| 5734 | V.L.F. | Selective demolition, wells, well screen & casing, 6" to 16" dia | 1 Labor Foreman (outside)<br>4 Laborers | 300 | 0.13 | $ - | $39,851.30 | $34,117.30 | $ 73,968.60 |
| 3 | Ea. | Selective demolition, natural gas valves, fittings & regulators, regulator, steel, 3" - 4" | 1 Plumber<br>1 Plumber Apprentice | 22 | 0.73 | $ - | $ 147.00 | $ - | $ 147.00 |
| 1 | Ea. | Pipe, cut one groove, labor only, 8" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 54 | 0.3 | $ - | $ 20.00 | $ - | $ 20.00 |
| 1 | Ea. | Gasket and bolt set, for flanges, 150 lb., 8" pipe size | | 5 | 1.6 | $ 34.00 | $ 120.00 | $ - | $ 154.00 |
| 57 | C.Y. | Structural concrete, ready mix, flowable fill, 40-80 psi, includes ash, Portland cement Type I, sand and water, delivered, excludes all additives and treatments | | 0 | 0 | $ 4,816.50 | $ - | $ - | $ 4,816.50 |
| 1 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light) | 1.5 | 16 | $ - | $ 895.00 | $ 132.00 | $ 1,027.00 |
| 23 | S.Y. | Seeding, mechanical seeding, 44 lb/M.S.Y. | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 2500 | 0 | $ 5.98 | $ 4.83 | $ 2.76 | $ 13.57 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 20 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $10,700.00 | $ - | $ 10,700.00 |
| 10 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 5,150.00 | $ - | $ 5,150.00 |
| 122 | $/Day | Per Diem | | 1.0 | 75.0 | $ - | $ - | $ - | $ 1,141.15 |
| 1.0 | Job | Permitting cost | | 0.0 | 0.0 | $ - | $ 3,153.98 | $ - | $ 3,153.98 |

**Total** **$160,852.96**

# 9-1 - Well Abandonment Cold Springs 1

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 200 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 604.00 | $ 106.00 | $ 710.00 |
| 200 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 18.00 | $ 338.00 | $ 8.00 | $ 364.00 |
| 200 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 96.00 | $ 414.00 | $ 60.00 | $ 570.00 |
| 16 | Ea. | 8'x16' 3-Ply Temp. Matting, Includes Install/Remove, 6" Mulch | | 0 | 0 | $28,512.00 | $ - | $ - | $ 28,512.00 |
| 6650 | L.F. | Sewer pipelines, cleaning, pig method, lengths 1000' to 10,000', 4" diameter through 24" diameter, minimum | | 0 | 0 | $ - | $ - | $ - | $ 27,531.00 |
| 60 | B.C.Y. | Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering | 1 Equip. Oper. (crane)<br>1 Laborer<br>1 Hyd. Excavator, .75 C.Y. | 270 | 0.06 | $ - | $ 217.80 | $ 171.60 | $ 389.40 |
| 60 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 396.00 | $ 531.00 | $ 927.00 |
| 6650 | V.L.F. | Selective demolition, wells, well screen & casing, 6" to 16" dia | 1 Labor Foreman (outside)<br>4 Laborers | 300 | 0.13 | $ - | $46,217.50 | $39,567.50 | $ 85,785.00 |
| 3 | Ea. | Selective demolition, natural gas valves, fittings & regulators, regulator, steel, 3" - 4" | 1 Plumber<br>1 Plumber Apprentice | 22 | 0.73 | $ - | $ 147.00 | $ - | $ 147.00 |
| 1 | Ea. | Pipe, cut one groove, labor only, 8" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 54 | 0.3 | $ - | $ 20.00 | $ - | $ 20.00 |
| 1 | Ea. | Gasket and bolt set, for flanges, 150 lb., 8" pipe size | | 5 | 1.6 | $ 34.00 | $ 120.00 | $ - | $ 154.00 |
| 66 | C.Y. | Structural concrete, ready mix, flowable fill, 40-80 psi, includes ash, Portland cement Type I, sand and water, delivered, excludes all additives and treatments | | 0 | 0 | $ 5,577.00 | $ - | $ - | $ 5,577.00 |
| 1 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light) | 1.5 | 16 | $ - | $ 895.00 | $ 132.00 | $ 1,027.00 |
| 23 | S.Y. | Seeding, mechanical seeding, 44 lb/M.S.Y. | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 2500 | 0 | $ 5.98 | $ 4.83 | $ 2.76 | $ 13.57 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 23 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $12,305.00 | $ - | $ 12,305.00 |
| 11 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 5,665.00 | $ - | $ 5,665.00 |
| 122 | $/Day | Per Diem | | 1.0 | 75.0 | $ - | $ - | $ - | $ 1,141.15 |
| 1.0 | Job | Permitting cost | | 0.0 | 0.0 | $ - | $ 3,523.76 | $ - | $ 3,523.76 |

**Total** **$179,711.88**

## 9-1 - Well Abandonment Goodwell

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 200 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 604.00 | $ 106.00 | $ 710.00 |
| 200 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 18.00 | $ 338.00 | $ 8.00 | $ 364.00 |
| 200 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 96.00 | $ 414.00 | $ 60.00 | $ 570.00 |
| 16 | Ea. | 8'x16' 3-Ply Temp. Matting, Includes Install/Remove, 6" Mulch | | 0 | 0 | $28,512.00 | $ - | $ - | $ 28,512.00 |
| 2348 | L.F. | Sewer pipelines, cleaning, pig method, lengths 1000' to 10,000', 4" diameter through 24" diameter, minimum | | 0 | 0 | $ - | $ - | $ - | $ 9,720.72 |
| 60 | B.C.Y. | Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering | 1 Equip. Oper. (crane)<br>1 Laborer<br>1 Hyd. Excavator, .75 C.Y. | 270 | 0.06 | $ - | $ 217.80 | $ 171.60 | $ 389.40 |
| 60 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 396.00 | $ 531.00 | $ 927.00 |
| 2348 | V.L.F. | Selective demolition, wells, well screen & casing, 6" to 16" dia | 1 Labor Foreman (outside)<br>4 Laborers | 300 | 0.13 | $ - | $16,318.60 | $13,970.60 | $ 30,289.20 |
| 3 | Ea. | Selective demolition, natural gas valves, fittings & regulators, regulator, steel, 3" - 4" | 1 Plumber<br>1 Plumber Apprentice | 22 | 0.73 | $ - | $ 147.00 | $ - | $ 147.00 |
| 1 | Ea. | Pipe, cut one groove, labor only, 8" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 54 | 0.3 | $ - | $ 20.00 | $ - | $ 20.00 |
| 1 | Ea. | Gasket and bolt set, for flanges, 150 lb., 8" pipe size | | 5 | 1.6 | $ 34.00 | $ 120.00 | $ - | $ 154.00 |
| 24 | C.Y. | Structural concrete, ready mix, flowable fill, 40-80 psi, includes ash, Portland cement Type I, sand and water, delivered, excludes all additives and treatments | | 0 | 0 | $ 2,028.00 | $ - | $ - | $ 2,028.00 |
| 1 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light) | 1.5 | 16 | $ - | $ 895.00 | $ 132.00 | $ 1,027.00 |
| 23 | S.Y. | Seeding, mechanical seeding, 44 lb/M.S.Y. | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 2500 | 0 | $ 5.98 | $ 4.83 | $ 2.76 | $ 13.57 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 8 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 4,280.00 | $ - | $ 4,280.00 |
| 4 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 2,060.00 | $ - | $ 2,060.00 |
| 122 | $/Day | Per Diem | | 1.0 | 75.0 | $ - | $ - | $ - | $ 1,141.15 |
| 1.0 | Job | Permitting cost | | 0.0 | 0.0 | $ - | $ 1,754.06 | $ - | $ 1,754.06 |

**Total** **$ 89,457.10**

## 9-1 - Well Abandonment Lincoln Freeman

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 200 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 604.00 | $ 106.00 | $ 710.00 |
| 200 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 18.00 | $ 338.00 | $ 8.00 | $ 364.00 |
| 200 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 96.00 | $ 414.00 | $ 60.00 | $ 570.00 |
| 16 | Ea. | 8'x16' 3-Ply Temp. Matting, Includes Install/Remove, 6" Mulch | | 0 | 0 | $28,512.00 | $ - | $ - | $ 28,512.00 |
| 1502 | L.F. | Sewer pipelines, cleaning, pig method, lengths 1000' to 10,000', 4" diameter through 24" diameter, minimum | | 0 | 0 | $ - | $ - | $ - | $ 6,218.28 |
| 60 | B.C.Y. | Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering | 1 Equip. Oper. (crane)<br>1 Laborer<br>1 Hyd. Excavator, .75 C.Y. | 270 | 0.06 | $ - | $ 217.80 | $ 171.60 | $ 389.40 |
| 60 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 396.00 | $ 531.00 | $ 927.00 |
| 1502 | V.L.F. | Selective demolition, wells, well screen & casing, 6" to 16" dia | 1 Labor Foreman (outside)<br>4 Laborers | 300 | 0.13 | $ - | $10,438.90 | $ 8,936.90 | $ 19,375.80 |
| 3 | Ea. | Selective demolition, natural gas valves, fittings & regulators, regulator, steel, 3" - 4" | 1 Plumber<br>1 Plumber Apprentice | 22 | 0.73 | $ - | $ 147.00 | $ - | $ 147.00 |
| 1 | Ea. | Pipe, cut one groove, labor only, 8" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 54 | 0.3 | $ - | $ 20.00 | $ - | $ 20.00 |
| 1 | Ea. | Gasket and bolt set, for flanges, 150 lb., 8" pipe size | | 5 | 1.6 | $ 34.00 | $ 120.00 | $ - | $ 154.00 |
| 10 | C.Y. | Structural concrete, ready mix, flowable fill, 40-80 psi, includes ash, Portland cement Type I, sand and water, delivered, excludes all additives and treatments | | 0 | 0 | $ 845.00 | $ - | $ - | $ 845.00 |
| 1 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light) | 1.5 | 16 | $ - | $ 895.00 | $ 132.00 | $ 1,027.00 |
| 23 | S.Y. | Seeding, mechanical seeding, 44 lb/M.S.Y. | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 2500 | 0 | $ 5.98 | $ 4.83 | $ 2.76 | $ 13.57 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 6 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 3,210.00 | $ - | $ 3,210.00 |
| 3 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 1,545.00 | $ - | $ 1,545.00 |
| 122 | $/Day | Per Diem | | 1.0 | 75.0 | $ - | $ - | $ - | $ 1,141.15 |
| 1.0 | Job | Permitting cost | | 0.0 | 0.0 | $ - | $ 1,410.38 | $ - | $ 1,410.38 |

**Total** **$ 71,929.58**

## 9-1 - Well Abandonment Loreed

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 200 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 604.00 | $ 106.00 | $ 710.00 |
| 200 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 18.00 | $ 338.00 | $ 8.00 | $ 364.00 |
| 200 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 96.00 | $ 414.00 | $ 60.00 | $ 570.00 |
| 16 | Ea. | 8'x16' 3-Ply Temp. Matting, Includes Install/Remove, 6" Mulch | | 0 | 0 | $28,512.00 | $ - | $ - | $ 28,512.00 |
| 3590 | L.F. | Sewer pipelines, cleaning, pig method, lengths 1000' to 10,000', 4" diameter through 24" diameter, minimum | | 0 | 0 | $ - | $ - | $ - | $ 14,862.60 |
| 60 | B.C.Y. | Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering | 1 Equip. Oper. (crane)<br>1 Laborer<br>1 Hyd. Excavator, .75 C.Y. | 270 | 0.06 | $ - | $ 217.80 | $ 171.60 | $ 389.40 |
| 60 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 396.00 | $ 531.00 | $ 927.00 |
| 3590 | V.L.F. | Selective demolition, wells, well screen & casing, 6" to 16" dia | 1 Labor Foreman (outside)<br>4 Laborers | 300 | 0.13 | $ - | $24,950.50 | $21,360.50 | $ 46,311.00 |
| 3 | Ea. | Selective demolition, natural gas valves, fittings & regulators, regulator, steel, 3" - 4" | 1 Plumber<br>1 Plumber Apprentice | 22 | 0.73 | $ - | $ 147.00 | $ - | $ 147.00 |
| 1 | Ea. | Pipe, cut one groove, labor only, 8" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 54 | 0.3 | $ - | $ 20.00 | $ - | $ 20.00 |
| 1 | Ea. | Gasket and bolt set, for flanges, 150 lb., 8" pipe size | | 5 | 1.6 | $ 34.00 | $ 120.00 | $ - | $ 154.00 |
| 22 | C.Y. | Structural concrete, ready mix, flowable fill, 40-80 psi, includes ash, Portland cement Type I, sand and water, delivered, excludes all additives and treatments | | 0 | 0 | $ 1,859.00 | $ - | $ - | $ 1,859.00 |
| 1 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light) | 1.5 | 16 | $ - | $ 895.00 | $ 132.00 | $ 1,027.00 |
| 23 | S.Y. | Seeding, mechanical seeding, 44 lb/M.S.Y. | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 2500 | 0 | $ 5.98 | $ 4.83 | $ 2.76 | $ 13.57 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 12 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 6,420.00 | $ - | $ 6,420.00 |
| 6 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 3,090.00 | $ - | $ 3,090.00 |
| 122 | $/Day | Per Diem | | 1.0 | 75.0 | $ - | $ - | $ - | $ 1,141.15 |
| 1.0 | Job | Permitting cost | | 0.0 | 0.0 | $ - | $ 2,237.35 | $ - | $ 2,237.35 |

**Total** **$114,105.07**

## 9-1 - Well Abandonment Muttonville

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 200 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 604.00 | $ 106.00 | $ 710.00 |
| 200 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 18.00 | $ 338.00 | $ 8.00 | $ 364.00 |
| 200 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 96.00 | $ 414.00 | $ 60.00 | $ 570.00 |
| 16 | Ea. | 8'x16' 3-Ply Temp. Matting, Includes Install/Remove, 6" Mulch | | 0 | 0 | $28,512.00 | $ - | $ - | $ 28,512.00 |
| 2714 | L.F. | Sewer pipelines, cleaning, pig method, lengths 1000' to 10,000', 4" diameter through 24" diameter, minimum | | 0 | 0 | $ - | $ - | $ - | $ 11,235.96 |
| 60 | B.C.Y. | Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering | 1 Equip. Oper. (crane)<br>1 Laborer<br>1 Hyd. Excavator, .75 C.Y. | 270 | 0.06 | $ - | $ 217.80 | $ 171.60 | $ 389.40 |
| 60 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 396.00 | $ 531.00 | $ 927.00 |
| 2714 | V.L.F. | Selective demolition, wells, well screen & casing, 6" to 16" dia | 1 Labor Foreman (outside)<br>4 Laborers | 300 | 0.13 | $ - | $18,862.30 | $16,148.30 | $ 35,010.60 |
| 3 | Ea. | Selective demolition, natural gas valves, fittings & regulators, regulator, steel, 3" - 4" | 1 Plumber<br>1 Plumber Apprentice | 22 | 0.73 | $ - | $ 147.00 | $ - | $ 147.00 |
| 1 | Ea. | Pipe, cut one groove, labor only, 8" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 54 | 0.3 | $ - | $ 20.00 | $ - | $ 20.00 |
| 1 | Ea. | Gasket and bolt set, for flanges, 150 lb., 8" pipe size | | 5 | 1.6 | $ 34.00 | $ 120.00 | $ - | $ 154.00 |
| 27 | C.Y. | Structural concrete, ready mix, flowable fill, 40-80 psi, includes ash, Portland cement Type I, sand and water, delivered, excludes all additives and treatments | | 0 | 0 | $ 2,281.50 | $ - | $ - | $ 2,281.50 |
| 1 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 1.5 | 16 | $ - | $ 895.00 | $ 132.00 | $ 1,027.00 |
| 23 | S.Y. | Seeding, mechanical seeding, 44 lb/M.S.Y. | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 2500 | 0 | $ 5.98 | $ 4.83 | $ 2.76 | $ 13.57 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 10 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 5,350.00 | $ - | $ 5,350.00 |
| 5 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 2,575.00 | $ - | $ 2,575.00 |
| 122 | $/Day | Per Diem | | 1.0 | 75.0 | $ - | $ - | $ - | $ 1,141.15 |
| 1.0 | Job | Permitting cost | | 0.0 | 0.0 | $ - | $ 1,915.56 | $ - | $ 1,915.56 |
| **Total** | | | | | | | | | **$ 97,693.74** |

# 9-1 - Well Abandonment Reed City

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 200 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 604.00 | $ 106.00 | $ 710.00 |
| 200 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 18.00 | $ 338.00 | $ 8.00 | $ 364.00 |
| 200 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 96.00 | $ 414.00 | $ 60.00 | $ 570.00 |
| 16 | Ea. | 8'x16' 3-Ply Temp. Matting, Includes Install/Remove, 6" Mulch | | 0 | 0 | $28,512.00 | $ - | $ - | $ 28,512.00 |
| 1205 | L.F. | Sewer pipelines, cleaning, pig method, lengths 1000' to 10,000', 4" diameter through 24" diameter, minimum | | 0 | 0 | $ - | $ - | $ - | $ 4,988.70 |
| 60 | B.C.Y. | Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering | 1 Equip. Oper. (crane)<br>1 Laborer<br>1 Hyd. Excavator, .75 C.Y. | 270 | 0.06 | $ - | $ 217.80 | $ 171.60 | $ 389.40 |
| 60 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 396.00 | $ 531.00 | $ 927.00 |
| 1205 | V.L.F. | Selective demolition, wells, well screen & casing, 6" to 16" dia | 1 Labor Foreman (outside)<br>4 Laborers | 300 | 0.13 | $ - | $ 8,374.75 | $ 7,169.75 | $ 15,544.50 |
| 3 | Ea. | Selective demolition, natural gas valves, fittings & regulators, regulator, steel, 3" - 4" | 1 Plumber<br>1 Plumber Apprentice | 22 | 0.73 | $ - | $ 147.00 | $ - | $ 147.00 |
| 1 | Ea. | Pipe, cut one groove, labor only, 8" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 54 | 0.3 | $ - | $ 20.00 | $ - | $ 20.00 |
| 1 | Ea. | Gasket and bolt set, for flanges, 150 lb., 8" pipe size | | 5 | 1.6 | $ 34.00 | $ 120.00 | $ - | $ 154.00 |
| 8 | C.Y. | Structural concrete, ready mix, flowable fill, 40-80 psi, includes ash, Portland cement Type I, sand and water, delivered, excludes all additives and treatments | | 0 | 0 | $ 676.00 | $ - | $ - | $ 676.00 |
| 1 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light) | 1.5 | 16 | $ - | $ 895.00 | $ 132.00 | $ 1,027.00 |
| 23 | S.Y. | Seeding, mechanical seeding, 44 lb/M.S.Y. | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 2500 | 0 | $ 5.98 | $ 4.83 | $ 2.76 | $ 13.57 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 5 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 2,675.00 | $ - | $ 2,675.00 |
| 2 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 1,030.00 | $ - | $ 1,030.00 |
| 122 | $/Day | Per Diem | | 1.0 | 75.0 | $ - | $ - | $ - | $ 1,141.15 |
| 1.0 | Job | Permitting cost | | 0.0 | 0.0 | $ - | $ 1,284.79 | $ - | $ 1,284.79 |

**Total** **$ 65,524.11**

# 9-1 - Well Abandonment South Chester

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 200 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 604.00 | $ 106.00 | $ 710.00 |
| 200 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 18.00 | $ 338.00 | $ 8.00 | $ 364.00 |
| 200 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 96.00 | $ 414.00 | $ 60.00 | $ 570.00 |
| 16 | Ea. | 8'x16' 3-Ply Temp. Matting, Includes Install/Remove, 6" Mulch | | 0 | 0 | $28,512.00 | $ - | $ - | $ 28,512.00 |
| 6247 | L.F. | Sewer pipelines, cleaning, pig method, lengths 1000' to 10,000', 4" diameter through 24" diameter, minimum | | 0 | 0 | $ - | $ - | $ - | $ 25,862.58 |
| 60 | B.C.Y. | Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering | 1 Equip. Oper. (crane)<br>1 Laborer<br>1 Hyd. Excavator, .75 C.Y. | 270 | 0.06 | $ - | $ 217.80 | $ 171.60 | $ 389.40 |
| 60 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 396.00 | $ 531.00 | $ 927.00 |
| 6247 | V.L.F. | Selective demolition, wells, well screen & casing, 6" to 16" dia | 1 Labor Foreman (outside)<br>4 Laborers | 300 | 0.13 | $ - | $43,416.65 | $37,169.65 | $ 80,586.30 |
| 3 | Ea. | Selective demolition, natural gas valves, fittings & regulators, regulator, steel, 3" - 4" | 1 Plumber<br>1 Plumber Apprentice | 22 | 0.73 | $ - | $ 147.00 | $ - | $ 147.00 |
| 1 | Ea. | Pipe, cut one groove, labor only, 8" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 54 | 0.3 | $ - | $ 20.00 | $ - | $ 20.00 |
| 1 | Ea. | Gasket and bolt set, for flanges, 150 lb., 8" pipe size | | 5 | 1.6 | $ 34.00 | $ 120.00 | $ - | $ 154.00 |
| 62 | C.Y. | Structural concrete, ready mix, flowable fill, 40-80 psi, includes ash, Portland cement Type I, sand and water, delivered, excludes all additives and treatments | | 0 | 0 | $ 5,239.00 | $ - | $ - | $ 5,239.00 |
| 1 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light) | 1.5 | 16 | $ - | $ 895.00 | $ 132.00 | $ 1,027.00 |
| 23 | S.Y. | Seeding, mechanical seeding, 44 lb/M.S.Y. | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 2500 | 0 | $ 5.98 | $ 4.83 | $ 2.76 | $ 13.57 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 21 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $11,235.00 | $ - | $ 11,235.00 |
| 10 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 5,150.00 | $ - | $ 5,150.00 |
| 122 | $/Day | Per Diem | | 1.0 | 75.0 | $ - | $ - | $ - | $ 1,141.15 |
| 1.0 | Job | Permitting cost | | 0.0 | 0.0 | $ - | $ 3,347.96 | $ - | $ 3,347.96 |

**Total** **$170,745.96**

## 9-1 - Well Abandonment Winfield

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 200 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 604.00 | $ 106.00 | $ 710.00 |
| 200 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 18.00 | $ 338.00 | $ 8.00 | $ 364.00 |
| 200 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 96.00 | $ 414.00 | $ 60.00 | $ 570.00 |
| 16 | Ea. | 8'x16' 3-Ply Temp. Matting, Includes Install/Remove, 6" Mulch | | 0 | 0 | $28,512.00 | $ - | $ - | $ 28,512.00 |
| 1116 | L.F. | Sewer pipelines, cleaning, pig method, lengths 1000' to 10,000', 4" diameter through 24" diameter, minimum | | 0 | 0 | $ - | $ - | $ - | $ 4,620.24 |
| 60 | B.C.Y. | Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering | 1 Equip. Oper. (crane)<br>1 Laborer<br>1 Hyd. Excavator, .75 C.Y. | 270 | 0.06 | $ - | $ 217.80 | $ 171.60 | $ 389.40 |
| 60 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 396.00 | $ 531.00 | $ 927.00 |
| 1116 | V.L.F. | Selective demolition, wells, well screen & casing, 6" to 16" dia | 1 Labor Foreman (outside)<br>4 Laborers | 300 | 0.13 | $ - | $ 7,756.20 | $ 6,640.20 | $ 14,396.40 |
| 3 | Ea. | Selective demolition, natural gas valves, fittings & regulators, regulator, steel, 3" - 4" | 1 Plumber<br>1 Plumber Apprentice | 22 | 0.73 | $ - | $ 147.00 | $ - | $ 147.00 |
| 1 | Ea. | Pipe, cut one groove, labor only, 8" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 54 | 0.3 | $ - | $ 20.00 | $ - | $ 20.00 |
| 1 | Ea. | Gasket and bolt set, for flanges, 150 lb., 8" pipe size | | 5 | 1.6 | $ 34.00 | $ 120.00 | $ - | $ 154.00 |
| 7 | C.Y. | Structural concrete, ready mix, flowable fill, 40-80 psi, includes ash, Portland cement Type I, sand and water, delivered, excludes all additives and treatments | | 0 | 0 | $ 591.50 | $ - | $ - | $ 591.50 |
| 1 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light) | 1.5 | 16 | $ - | $ 895.00 | $ 132.00 | $ 1,027.00 |
| 23 | S.Y. | Seeding, mechanical seeding, 44 lb/M.S.Y. | 1 Equip. Oper. (light)<br>1 Loader-Backhoe, 40 H.P. | 2500 | 0 | $ 5.98 | $ 4.83 | $ 2.76 | $ 13.57 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 4 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 2,140.00 | $ - | $ 2,140.00 |
| 2 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 1,030.00 | $ - | $ 1,030.00 |
| 122 | $/Day | Per Diem | | 1.0 | 75.0 | $ - | $ - | $ - | $ 1,141.15 |
| 1.0 | Job | Permitting cost | | 0.0 | 0.0 | $ - | $ 1,242.07 | $ - | $ 1,242.07 |

**Total** **$ 63,345.33**

# ANR Pipeline Company
## System Salvage Scrap Metal Calculations - Storage

9/21/2021 Price / Ton (Nat. Ave.) = 164.00
https://iscrapapp.com/prices/

| (A) | Length Removed (ft) (B) | lb/ft (C) | Total Weight (lb) (D) | Total Weight (ton) (E) | | Salvage Amt. (F) |
|---|---|---|---|---|---|---|
| 1.3 Pipe Removal | Length Removed (ft) | lb/ft | Total Weight (lb) | Total Weight (ton) | | Salvage Amt. |
| 3" | 33.90 | 7.58 | 256.94 | 0.13 | $ | (21) |
| 4" | 9254.04 | 10.80 | 99943.68 | 49.97 | $ | (8,195) |
| 6" | 5672.20 | 18.99 | 107715.05 | 53.86 | $ | (8,833) |
| 8" | 3242.87 | 28.58 | 92681.24 | 46.34 | $ | (7,600) |
| 10" | 1096.02 | 40.52 | 44410.83 | 22.21 | $ | (3,642) |
| 12" | 2079.05 | 49.61 | 103141.81 | 51.57 | $ | (8,458) |
| 16" | 1412.40 | 62.64 | 88472.74 | 44.24 | $ | (7,255) |
| 20" | 768.35 | 78.67 | 60445.75 | 30.22 | $ | (4,957) |
| 22" | 271.18 | 86.69 | 23508.66 | 11.75 | $ | (1,928) |
| 24" | 158.19 | 94.71 | 14982.06 | 7.49 | $ | (1,229) |
| | 23988.20 | | | Subtotal: | $ | (52,116) |
| | | | | Total | **$** | **(104,232)** |

| 3.3 M&R Stations - Storage | | | | | | |
|---|---|---|---|---|---|---|
| Small M&R Station | 5.00 | 164.00 | 820.00 | 6 | $ | (4,920) |
| Medium M&R Station | 10.00 | 164.00 | 1640.00 | 16 | $ | (26,240) |
| Large M&R Station | 15.00 | 164.00 | 2460.00 | 0 | $ | - |
| | | | | Subtotal: | $ | (31,160) |
| | | | | Total: | **$** | **(31,160)** |

| 4.3 Compressor Station - Storage | Ave. No./Site | Weight/Site (ton) | Total Weight (ton) | Scrap Value (ton) | Total Stations | | Salvage Amt. |
|---|---|---|---|---|---|---|---|
| Compressor Engine (Ave.) | 2 | 160.00 | 320.00 | $ 164.00 | 4 | $ | (209,920) |
| Equipment (Ave.) | 18 | 22.50 | 405.00 | $ 164.00 | 4 | $ | (265,680) |
| Bldg (Ave.) | 3 | 4557.26 | 31900.81 | $ 164.00 | 4 | $ | (2,989,561) |
| | | | | Subtotal: | | $ | (3,465,161) |
| | | | | Total: | | **$** | **(3,465,161)** |

| 5.2 Cathodic Protection - Storage | No. | Weight/Site (ton) | Total Weight (ton) | Scrap Value (ton) | | Salvage Amt. |
|---|---|---|---|---|---|---|
| Rectifier | 126 | 0.03 | 3.15 | $ 145.00 | $ | (457) |
| Test Site | 3393 | 0.002 | 6.79 | $ 145.00 | $ | (984) |
| | | | | Subtotal: | $ | (1,441) |
| | | | | Total: | **$** | **(1,441)** |

| 6.1 ROW Marker - Storage | No. | Weight/Site (ton) | Total Weight (ton) | Scrap Value (ton) | | Salvage Amt. |
|---|---|---|---|---|---|---|
| Marker | 849 | 0.002 | 1.70 | $ 145.00 | $ | (246) |
| | | | | Subtotal: | **$** | **(246)** |
| | | | | Total: | **$** | **(246)** |

| 7.2 Tap Site | No. | Weight/Site (ton) | Total Weight (ton) | Scrap Value (ton) | | Salvage Amt. |
|---|---|---|---|---|---|---|
| Typical Tap Site | 109 | 0.03 | 3.27 | $ 164.00 | $ | (536) |
| | | | | Subtotal: | **$** | **(536)** |
| | | | | Total: | **$** | **(536)** |
| | | | | Total Salvage Amount: | **$** | **(3,602,776)** |

# ANR PIPELINE COMPANY

# PRODUCTION COST ESTIMATE PACKET

## ANR Pipeline Company
## Summary of Terminal Decommissioning Cost Estimate - Production

| Line No. | Particular | Cost ($) | Item | Total TDC Estimate ($) | Total Adjusted (*) Cost Estimate ($) |
|---|---|---|---|---|---|
| | (A) | (B) | (C) | (D) | (E) |
| 1 | A. DECOMMISSIONING COSTS | | | | |
| 2 | **Meter Station** | **Cost / Station** | **Total Stations** | **Total** | |
| 3 | 3-1 - Small Meter Station Removal | $ 24,599 | 4 | $ 98,396 | |
| 4 | 3-2 - Small Meter Station Sub Material Removal | $ 72,918 | 4 | $ 291,674 | |
| 5 | 3-3 - Small Meter Station Backfill and Restoration | $ 114,980 | 4 | $ 459,919 | |
| 6 | | | | * | **$ 794,451** |
| 7 | 3-4 - Medium Meter Station Removal | $ 65,279 | 1 | $ 65,279 | |
| 8 | 3-5 - Medium Meter Station Sub Material Removal | $ 137,609 | 1 | $ 137,609 | |
| 9 | 3-6 - Medium Meter Station Backfill and Restoration | $ 191,541 | 1 | $ 191,541 | |
| 10 | | | | * | **$ 368,658** |
| 11 | | | | | |
| 12 | **Tap Removal** | **Cost / Tap** | **Total Taps** | **Total** | |
| 13 | 7-1 - Tap Locations | $ 4,784 | 109 | $ 521,431 | |
| 14 | | | | * | **$ 487,362** |
| 15 | | | | | |
| 16 | | | | Base Total: | $ 1,650,471 |
| 17 | | | C.M. Expense | $ 41,262 | |
| 18 | | | | | $ 1,691,732 |
| 19 | B. CONTINGENCY | | 10% Contingency Fees | $ 169,173 | |
| 20 | | | | Subtotal: | $ 1,860,906 |
| 21 | C. SALVAGE | | | | |
| 22 | | | | Salvage Material - Scrap Metal: | $ (5,456) |
| 23 | | | | | |
| 24 | | | | **Grand Total:** | **$ 1,855,449** |
| 25 | * City Cost Index Adjustment Factor Used | = 0.9347 | | | |
| 26 | 0.9347 is the Average City Cost Index Adjustment Factor of locations found within ANR's Geographic Locations | | | | |

## 3-1 - Small Meter Station Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 502 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 45.18 | $ 848.38 | $ 20.08 | $ 913.64 |
| 502 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 1,516.04 | $ 266.06 | $ 1,782.10 |
| 8 | Ea. | Selective demolition, parking appurtenances, pipe bollards, 6"-12" diameter | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 80 | 0.3 | $ - | $ 134.40 | $ 23.76 | $ 158.16 |
| 2 | Ea. | Steel tank, double wall, above ground, 500 thru 2,000 gallon, selective demolition, excluding foundation, pumps & piping | 1 Pipe Fitter<br>1 Truck Driver (light)<br>1 Equip. Oper. (medium)<br>1 Flatbed Truck, Gas, 3 Ton<br>1 Backhoe Loader, 48 H.P. | 2 | 12 | $ - | $ 1,640.00 | $ 1,170.00 | $ 2,810.00 |
| 232 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $ 23.20 | $ 27.84 | $ 23.20 | $ 74.24 |
| 146 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 18" - 24", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane)<br>2 Cutting Torches<br>2 Sets of Gases<br>1 Hyd. Crane, 12 Ton | 160 | 0.2 | $ - | $ 1,671.70 | $ 854.10 | $ 2,525.80 |
| 3 | Ea. | Selective demolition, utility valves & accessories, utility valves, 14"-24", excludes excavation | 1 Labor Foreman (outside)<br>1 Skilled Worker<br>1 Laborer<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 2 | 14 | $ - | $ 2,310.00 | $ 315.00 | $ 2,625.00 |
| 1 | Ea. | Selective demolition, utility poles & cross arms, utility poles, wood, 20'-30' high | 1 Electrician Foreman<br>1 Electrician<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 6 | 3.33 | $ - | $ 253.00 | $ 35.00 | $ 288.00 |
| 1 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 570.00 | $ 890.00 | $ 1,460.00 |
| 1 | Day | Rent trailer, platform, flush deck 2 axle, 25 ton, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 215.03 | $ 215.03 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 2 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 1,070.00 | $ - | $ 1,070.00 |
| 1 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 515.00 | $ - | $ 515.00 |
| 122 | $/Day | Per Diem | | 1 | 101.9 | $ - | $ - | $ - | $ 1,549.62 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 482.33 | $ - | $ 482.33 |

**Total** **$ 24,598.92**

## 3-2 - Small Meter Station Sub Material Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 502 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | | 650 | 0.04 | $ 240.96 | $ 1,039.14 | $ 150.60 | $ 1,430.70 |
| 158 | C.F. | Selective demolition, cutout, concrete, elevated slab, bar reinforced, over 6 C.F., excludes loading and disposal | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Air Compressor, 250 cfm<br>2 Breakers, Pavement, 60 lb.<br>2 -50' Air Hoses, 1.5 | 50 | 0.8 | $ - | $ 6,557.00 | $ 1,232.40 | $ 7,789.40 |
| 6 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | | 72 | 0.11 | $ - | $ 39.60 | $ 53.10 | $ 92.70 |
| 1376 | B.C.Y. | Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering | | 270 | 0.06 | $ - | $ 4,994.88 | $ 3,935.36 | $ 8,930.24 |
| 1376 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | | 72 | 0.11 | $ - | $ 9,081.60 | $12,177.60 | $ 21,259.20 |
| 1 | Week | Rent front end loader, 4WD, art. frame, diesel, 7 - 9 CY 475 HP, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $12,566.61 | $ 12,566.61 |
| 4 | Ea. | Pipe, cut one groove, labor only, 24" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 15 | 1.07 | $ - | $ 288.00 | $ - | $ 288.00 |
| 4 | Ea. | Gasket and bolt set, for flanges, 150 lb., 24" pipe size | | 1.9 | 4.21 | $ 1,200.00 | $ 1,260.00 | $ - | $ 2,460.00 |
| 3 | Ea. | Selective demolition, utility materials, utility valves, 14"-24", excludes excavation | | 2 | 14 | $ - | $ 2,310.00 | $ 315.00 | $ 2,625.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 6 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 3,210.00 | $ - | $ 3,210.00 |
| 3 | Day | Environmental Engineer | | 0 | 0 | $ - | $ 1,545.00 | $ - | $ 1,545.00 |
| 122 | $/Day | Per Diem | | 1 | 76.4 | $ - | $ - | $ - | $ 1,161.83 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 1,429.77 | $ - | $ 1,429.77 |

**Total** **$ 72,918.45**

## 3-3 - Small Meter Station Backfill and Restoration

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 13 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | | 120 | 0.07 | $ - | $ 56.42 | $ 31.85 | $ 88.27 |
| 1376 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | ######## | $ 3,852.80 | $ 6,687.36 | $ 29,597.76 |
| 1376 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | | 72 | 0.11 | $ - | $ 9,081.60 | $12,177.60 | $ 21,259.20 |
| 13 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | | 1.5 | 16 | $ - | $11,635.00 | $ 1,716.00 | $ 13,351.00 |
| 1376 | E.C.Y. | Backfill, bulk, air tamped compaction, add | 1 Equipment Oper. (light)<br>1 Laborer<br>1 Air Powered Tamper<br>1 Air Compressor, 365 cfm<br>2 -50' Air Hoses, 1.5 | 80 | 0.2 | $ - | $16,030.40 | $ 8,118.40 | $ 24,148.80 |
| 1376 | S.Y. | Seeding, mechanical seeding hydro or air seeding for large areas, includes lime, fertilizer and seed with wood fiber mulch added | | 8900 | 0 | $ 3,329.92 | $ 137.60 | $ 96.32 | $ 3,563.84 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 18 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 9,630.00 | $ - | $ 9,630.00 |
| 9 | Day | Environmental Engineer | | 0 | 0 | $ - | $ 4,635.00 | $ - | $ 4,635.00 |
| 122 | $/Day | Per Diem | | 1 | 72.43 | $ - | $ - | $ - | $ 1,101.46 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 2,254.51 | $ - | $ 2,254.51 |

**Total** **$114,979.84**

## 3-4 - Medium Meter Station Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 662 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 59.58 | $ 1,118.78 | $ 26.48 | $ 1,204.84 |
| 662 | L.F. | Fencing demolition, remove chain link posts & fabric, 8' to 10' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Backhoe Loader, 48 H.P. | 445 | 0.05 | $ - | $ 1,999.24 | $ 350.86 | $ 2,350.10 |
| 47329 | C.F. | Building demolition, small buildings or single buildings, steel, includes 20 mile haul, excludes salvage, foundation demolition or dump fees | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (medium)<br>2 Truck Drivers (heavy)<br>1 Crawler Loader, 3 C.Y.<br>2 Dump Trucks, 12 C.Y., 400 H.P. | 14800 | 0 | $ - | $ 8,992.51 | $ 8,045.93 | $ 17,038.44 |
| 1 | Ea. | Steel tank, single wall, above ground, 15,000 thru 30,000 gallon, selective demolition, excluding foundation, pumps or piping | 2 Pipe Fitters<br>1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Flatbed Trailer, 40 Ton<br>1 Truck Tractor, 6x4, 380 H.P.<br>1 Hyd. Crane, 80 Ton<br>1 Hyd. Excavator, 2 C.Y. | 2 | 16 | $ - | $ 1,150.00 | $ 1,700.00 | $ 2,850.00 |
| 536 | C.F. | Gas pipelines, nitrogen purge method | | 0 | 0 | $ 53.60 | $ 64.32 | $ 53.60 | $ 171.52 |
| 338 | L.F. | Selective demolition, natural gas, steel pipe, pipe, 18" - 24", excludes excavation | 1 Labor Foreman (outside)<br>2 Laborers<br>1 Equip. Oper. (crane)<br>2 Cutting Torches<br>2 Sets of Gases<br>1 Hyd. Crane, 12 Ton | 160 | 0.2 | $ - | $ 3,870.10 | $ 1,977.30 | $ 5,847.40 |
| 14 | Ea. | Selective demolition, utility valves & accessories, utility valves, 14"-24", excludes excavation | 1 Labor Foreman (outside)<br>1 Skilled Worker<br>1 Laborer<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 2 | 14 | $ - | $ 10,780.00 | $ 1,470.00 | $ 12,250.00 |
| 1 | Ea. | Selective demolition, utility poles & cross arms, utility poles, wood, 20'-30' high | 1 Electrician Foreman<br>1 Electrician<br>.5 Equip. Oper. (crane)<br>.5 S.P. Crane, 4x4, 5 Ton | 6 | 3.33 | $ - | $ 253.00 | $ 35.00 | $ 288.00 |
| 4 | Day | Rented truck, flatbed, GVW = 20,000 Lbs, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $ 1,133.08 | $ 1,133.08 |
| 4 | Day | Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal | 1 Equip. Oper. (crane)<br>1 Hyd. Crane, 25 Ton (Daily) | 1 | 8 | $ - | $ 2,280.00 | $ 3,560.00 | $ 5,840.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 7 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 3,745.00 | $ - | $ 3,745.00 |
| 3 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 1,545.00 | $ - | $ 1,545.00 |
| 122 | $/Day | Per Diem | | 1 | 105.6 | $ - | $ - | $ - | $ 1,605.88 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 1,279.99 | $ - | $ 1,279.99 |

**Total** **$ 65,279.25**

## 3-5 - Medium Meter Station Sub Material Removal

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 662 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | | 650 | 0.04 | $ 317.76 | $ 1,370.34 | $ 198.60 | $ 1,886.70 |
| 185 | C.F. | Selective demolition, cutout, concrete, elevated slab, bar reinforced, over 6 C.F., excludes loading and disposal | 1 Labor Foreman (outside)<br>4 Laborers<br>1 Air Compressor, 250 cfm<br>2 Breakers, Pavement, 60 lb.<br>2 -50' Air Hoses, 1.5 | 50 | 0.8 | $ - | $ 7,677.50 | $ 1,443.00 | $ 9,120.50 |
| 7 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 46.20 | $ 61.95 | $ 108.15 |
| 2681 | B.C.Y. | Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering | | 270 | 0.06 | $ - | $ 9,732.03 | $ 7,667.66 | $ 17,399.69 |
| 2681 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | | 72 | 0.11 | $ - | $17,694.60 | $23,726.85 | $ 41,421.45 |
| 1 | Week | Rent front end loader, 4WD, art. frame, diesel, 7 - 9 CY 475 HP, Incl. Hourly Oper. Cost. | | 0 | 0 | $ - | $ - | $12,566.61 | $ 12,566.61 |
| 14 | Ea. | Selective demolition, utility materials, utility valves, 14"-24", excludes excavation | | 2 | 14 | $ - | $10,780.00 | $ 1,470.00 | $ 12,250.00 |
| 28 | Ea. | Pipe, cut one groove, labor only, 24" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 15 | 1.07 | $ - | $ 2,016.00 | $ - | $ 2,016.00 |
| 28 | Ea. | Gasket and bolt set, for flanges, 150 lb., 24" pipe size | | 1.9 | 4.21 | $ 8,400.00 | $ 8,820.00 | $ - | $ 17,220.00 |
| 40 | Ton | Selective demolition, dump charges, typical urban city, rubbish only, includes tipping fees only | | 0 | 0 | $ 2,780.00 | $ - | $ - | $ 2,780.00 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 15 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 8,025.00 | $ - | $ 8,025.00 |
| 7 | Day | Environmental Engineer | | 0 | 0 | $ - | $ 3,605.00 | $ - | $ 3,605.00 |
| 122 | $/Day | Per Diem | | 1 | 76.4 | $ - | $ - | $ - | $ 1,161.83 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 2,698.22 | $ - | $ 2,698.22 |

| | |
|---|---|
| **Total** | **$137,609.15** |

## 3-6 - Medium Meter Station Backfill and Restoration

### Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 2681 | M.S.F. | Soil preparation, structural soil mixing, scarify subsoil, municipal, 50 HP skid steer loader w/scarifiers | | 120 | 0.07 | $ - | $11,635.54 | $ 6,568.45 | $ 18,203.99 |
| 2681 | C.Y. | Soils for earthwork, common borrow, spread with 200 HP dozer, includes load at pit and haul, 2 miles round trip, excludes compaction | 1 Equipment Oper. (med.)<br>.5 Laborer<br>2 Truck Drivers (heavy)<br>2 Dump Trucks, 12 C.Y., 400 H.P.<br>1 Dozer, 200 H.P. | 600 | 0.05 | ######## | $ 7,506.80 | $13,029.66 | $ 57,668.31 |
| 25 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | | 72 | 0.11 | $ - | $ 165.00 | $ 221.25 | $ 386.25 |
| 25 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | | 1.5 | 16 | $ - | $22,375.00 | $ 3,300.00 | $ 25,675.00 |
| 2681 | E.C.Y. | Backfill, bulk, air tamped compaction, add | 1 Equipment Oper. (light)<br>1 Laborer<br>1 Air Powered Tamper<br>1 Air Compressor, 365 cfm<br>2 -50’ Air Hoses, 1.5 | 80 | 0.2 | $ - | $31,233.65 | $15,817.90 | $ 47,051.55 |
| 2681 | S.Y. | Seeding, mechanical seeding hydro or air seeding for large areas, includes lime, fertilizer and seed with wood fiber mulch added | | 8900 | 0 | $ 6,488.02 | $ 268.10 | $ 187.67 | $ 6,943.79 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 50-ton capacity towed trailer | 1 Truck Driver (heavy)<br>1 Equip. Oper. (crane)<br>1 Equip. Oper. (light)<br>1 Truck Tractor, 6x4, 450 H.P.<br>1 Equipment Trailer, 50 Ton<br>1 Pickup Truck, 4x4, 3/4 Ton | 1 | 24 | $ - | $ 1,575.00 | $ 1,100.00 | $ 2,675.00 |
| 34 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $18,190.00 | $ - | $ 18,190.00 |
| 17 | Day | Environmental Engineer | | 0 | 0 | $ - | $ 8,755.00 | $ - | $ 8,755.00 |
| 122 | $/Day | Per Diem | | 1 | 72.43 | $ - | $ - | $ - | $ 1,101.46 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 2,215.56 | $ - | $ 2,215.56 |

**Total** **$191,540.91**

# 7-1 - Tap Locations

## Unit Cost Estimate

| Quantity | Unit | Description | Crew Description | Daily Output | Labor Hours | Ext. Mat. O&P | Ext. Labor O&P | Ext. Equip. O&P | Ext. Total O&P |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 195.00 | $ 102.00 | $ 297.00 |
| 200 | L.F. | Boundary & survey markers, property lines, perimeter, cleared land | 1 Chief of Party<br>1 Instrument Man<br>1 Rodman/Chainman<br>1 Level, Electronic | 1000 | 0.02 | $ 18.00 | $ 338.00 | $ 8.00 | $ 364.00 |
| 200 | L.F. | Synthetic erosion control, silt fence, install and remove, 3' high | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 650 | 0.04 | $ 96.00 | $ 414.00 | $ 60.00 | $ 570.00 |
| 10 | B.C.Y. | Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering | 1 Equip. Oper. (crane)<br>1 Laborer<br>1 Hyd. Excavator, .75 C.Y. | 270 | 0.06 | $ - | $ 36.30 | $ 28.60 | $ 64.90 |
| 2 | Ea. | Pipe, cut one groove, labor only, 8" pipe size, grooved-joint | 1 Plumber<br>1 Plumber Apprentice | 54 | 0.3 | $ - | $ 40.00 | $ - | $ 40.00 |
| 2 | Ea. | Gasket and bolt set, for flanges, 150 lb., 8" pipe size | | 5 | 1.6 | $ 68.00 | $ 240.00 | $ - | $ 308.00 |
| 5 | L.C.Y. | Cycle hauling(wait, load, travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 15 min load/wait/unload, 12 C.Y. truck, cycle 50 miles, 50 MPH, excludes loading equipment | 1 Truck Driver (heavy)<br>1 Dump Truck, 12 C.Y., 400 H.P. | 72 | 0.11 | $ - | $ 33.00 | $ 44.25 | $ 77.25 |
| 1 | Ea. | Rough grading sites, 1,100-3,000 S.F., skid steer & labor | 2 Laborers<br>1 Equip. Oper. (light)<br>1 Loader, Skid Steer, 30 H.P. | 1.5 | 16 | $ - | $ 880.00 | $ 130.00 | $ 1,010.00 |
| 0.03 | M.S.F. | Seeding, mechanical seeding grass seed, 4.5 lb./M.S.F., hand push spreader | | 180 | 0.04 | $ 0.89 | $ 0.07 | $ - | $ 0.95 |
| 1 | Ea. | Mobilization or demobilization, delivery charge for equipment, hauled on 3-ton capacity towed trailer | 1 Equip. Oper. (light)<br>1 Pickup Truck, 4x4, 3/4 Ton<br>1 Flatbed Trailer, 3 Ton | 2.67 | 3 | $ - | $ 195.00 | $ 102.00 | $ 297.00 |
| 1 | Day | Testing and inspecting, supervision of earthwork | | 1 | 8 | $ - | $ 535.00 | $ - | $ 535.00 |
| 1 | Day | Environmental Engineer | | 1 | 8 | $ - | $ 515.00 | $ - | $ 515.00 |
| 122 | $/Day | Per Diem | | 1 | 40.17 | $ - | $ - | $ - | $ 610.87 |
| 1 | Job | Permitting cost | | 0 | 0 | $ - | $ 93.80 | $ - | $ 93.80 |

**Total** **$ 4,783.77**

# ANR Pipeline Company
## System Salvage Scrap Metal Calculations - Production

9/21/2021 Price / Ton (Nat. Ave.) = 164.00

https://iscrapapp.com/prices/

| | (A) | (B) | (C) | (D) | (E) | (F) |
|---|---|---|---|---|---|---|
| 3.3 | M&R Stations - Production | | | | | |
| | Small M&R Station | 5.00 | 164.00 | 820.00 | 4 | $ (3,280) |
| | Medium M&R Station | 10.00 | 164.00 | 1640.00 | 1 | $ (1,640) |
| | Large M&R Station | 15.00 | 164.00 | 2460.00 | 0 | $ - |
| | | | | | Subtotal: | $ (4,920) |
| | | | | | Total: | **$ (4,920)** |

| | | No. | Weight/Site (ton) | Total Weight (ton) | Scrap Value (ton) | Salvage Amt. |
|---|---|---|---|---|---|---|
| 7.2 | Tap Site | | | | | |
| | Typical Tap Site | 109 | 0.03 | 3.27 | $ 164.00 | $ (536) |
| | | | | | Subtotal: | **$ (536)** |
| | | | | | Total: | **$ (536)** |
| | | | | | Total Salvage Amount: | **$ (5,456)** |

# ANR Pipeline Company
## Jointly Owned Assets and Cost Distribution

1 Jointly Owned Transmission Linepipe

| 2 | Transmission Line | Cost / Mile | Total Miles | Total |
|---|---|---|---|---|
| 3 | 1-1 - <24" Pipeline Clean and Purge | $ 38,608 | 86.9 | $ 3,355,048 |
| 4 | 1-1A - >26" Pipeline Clean and Purge | $ 43,688 | 60.50 | $ 2,643,118 |
| 5 | 1-2 - Trench Excavation | $ 96,769 | 3.15 | $ 305,243 |
| 6 | 1-3 - Pipe Removal | $ 201,427 | 3.15 | $ 635,372 |
| 7 | 1-4 - Trench Backfill | $ 115,816 | 3.15 | $ 365,326 |
| 8 | 1-5 - Trench Restoration | $ 10,806 | 3.15 | $ 34,086 |
| 9 | | | * | $ 6,858,722 |
| 10 | | | | |

| 11 | Transmission Line Description | Miles | % Owned by NWP | % Owned by Others | $ Owed by NWP | $ Owed by Others |
|---|---|---|---|---|---|---|
| 12 | Lebanon Lateral | 60.5 | 50.0% | 50.0% | $ 1,407,574 | $ 1,407,574 |
| 13 | Litchfield Lateral | 29.1 | 34.0% | 66.0% | $ 17,844 | $ 34,638 |
| 14 | Delhi Perryville | 30 | 50.0% | 50.0% | $ 27,053 | $ 27,053 |
| 15 | Eagle Point Lateral | 8.9 | 50.0% | 50.0% | $ 207,065 | $ 207,065 |
| 16 | Line | 18.9 | 50.0% | 50.0% | $ 439,721 | $ 439,721 |
| 17 | | | | | | |
| 18 | Total Linepipe Mileage | 147.4 | | Total: | $ 2,099,256 | **$ 2,116,050** |
| 19 | | | | | | |

20 Jointly Owned Storage Linepipe

| 21 | Transmission Line | Cost / Mile | Total Miles | Total |
|---|---|---|---|---|
| 22 | 1-1 - <24" Pipeline Clean and Purge | $ 36,281 | 0 | $ - |
| 23 | 1-1A - >26" Pipeline Clean and Purge | $ 43,688 | 15.60 | $ 681,531 |
| 24 | 1-2 - Trench Excavation | $ 100,050 | 0.33 | $ 33,401 |
| 25 | 1-3 - Pipe Removal | $ 91,881 | 0.33 | $ 30,674 |
| 26 | 1-4 - Trench Backfill | $ 96,572 | 0.33 | $ 32,240 |
| 27 | 1-5 - Trench Restoration | $ 10,806 | 0.33 | $ 3,607 |
| 28 | | | * | $ 730,393 |
| 29 | | | | |

| 30 | Storage Line Description | Miles | % Owned by NWP | % Owned by Others | $ Owed by NWP | $ Owed by Others |
|---|---|---|---|---|---|---|
| 31 | ANR Storage | 15.6 | 47.1% | 52.9% | $ 344,234 | $ 386,159 |
| 32 | | | | | | |
| 33 | Total Linepipe Mileage | 15.6 | | Total: | $ 344,234 | **$ 386,159** |
| 34 | | | | | | |

35 * City Cost Index Adjustment Factor Used = 0.9347

36 0.9347 is the Average City Cost Index Adjustment Factor of locations found within ANR's Market Locations

# ANR Pipeline Company
## City Cost Index Factor Determination

| Line No. | | (A) State | (B) City | (C)[1] CCI | (D)[2] Total Mi/State | (E) Weighting Factor (D) / 8881.7 | (F) % of Weighted Ave. (C) / (E) |
|---|---|---|---|---|---|---|---|
| 1 | 1. | Wisconsin | Wausau | 91.5 | 1831.9 | 0.21 | 19.89 |
| 2 | | | Rhinelander | 95.9 | | | |
| 3 | | | Green Bay | 95.7 | | | |
| 4 | | | Madison | 103.7 | | | |
| 5 | | | Milwaukee | 95.3 | | | |
| 6 | | | Ave. | 96.4 | | | |
| 7 | | | | | | | |
| 8 | 2. | Michigan | Iron Mountain | 89.0 | 905.3 | 0.10 | 9.06 |
| 9 | | | Gaylord | 80.2 | | | |
| 10 | | | Detroit | 101.8 | | | |
| 11 | | | Grand Rapids | 89.5 | | | |
| 12 | | | Kalamazoo | 83.8 | | | |
| 13 | | | Ave. | 88.9 | | | |
| 14 | | | | | | | |
| 15 | 3. | Ohio | Toledo | 91.8 | 377.5 | 0.04 | 3.92 |
| 16 | | | Lima | 88.7 | | | |
| 17 | | | Dayton | 91.5 | | | |
| 18 | | | Ave. | 92.2 | | | |
| 19 | | | | | | | |
| 20 | 4. | Indiana | South Bend | 96.8 | 974.8 | 0.11 | 10.44 |
| 21 | | | Fort Wayne | 90.9 | | | |
| 22 | | | Indianapolis | 95.5 | | | |
| 23 | | | Bloomington | 85.8 | | | |
| 24 | | | Evansville | 106.4 | | | |
| 25 | | | Ave. | 95.1 | | | |
| 26 | | | | | | | |
| 27 | 5. | Illinois | Chicago | 101.7 | 627.4 | 0.07 | 6.86 |
| 28 | | | Peoria | 94.5 | | | |
| 29 | | | Rockford | 95.0 | | | |
| 30 | | | Ave. | 97.1 | | | |
| 31 | | | | | | | |
| 32 | 6. | Iowa | Davenport | 94.6 | 600.5 | 0.07 | 6.18 |
| 33 | | | Ottumwa | 88.2 | | | |
| 34 | | | Ave. | 91.4 | | | |
| 35 | | | | | | | |
| 36 | 7. | Missouri | St. Joseph | 88.3 | 272.3 | 0.03 | 2.64 |
| 37 | | | Kirksville | 83.6 | | | |
| 38 | | | Ave. | 86.0 | | | |
| 39 | | | | | | | |
| 40 | 8. | Nebraska | Lincoln | 96.2 | 8.6 | 0.00 | 0.09 |
| 41 | | | | | | | |
| 42 | 9. | Kansas | Topeka | 97.4 | 831.9 | 0.09 | 8.80 |
| 43 | | | Salina | 91.5 | | | |
| 44 | | | Wichita | 97.6 | | | |
| 45 | | | Hutchinson | 88.8 | | | |
| 46 | | | Dodge City | 94.6 | | | |
| 47 | | | Ave. | 94.0 | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 10. | Kentucky | Owensboro | 106.5 | 278.2 | 0.03 | 3.34 |
| 11. | Tennessee | Jackson | 94.0 | 328.9 | 0.04 | 3.42 |
| | | Memphis | 90.9 | | | |
| | | Ave. | 92.5 | | | |
| 12. | Mississippi | Clarksdale | 87.5 | 373.1 | 0.04 | 3.94 |
| | | Greenville | 90.6 | | | |
| | | Ave. | 93.8 | | | |
| 13. | Arkansas | Pine Bluff | 82.7 | 64.2 | 0.01 | 0.60 |
| 14. | Louisiana | Monroe | 89.2 | 902.2 | 0.10 | 9.09 |
| | | Alexandria | 89.2 | | | |
| | | Lafayatte | 89.7 | | | |
| | | Lake Charles | 89.7 | | | |
| | | Ave. | 89.5 | | | |
| 15. | Oklahoma | Guymon | 90.9 | 356.1 | 0.04 | 3.63 |
| | | Woodward | 90.3 | | | |
| | | Ave. | 90.6 | | | |
| 16. | Texas | Amarillo | 94.2 | 139.9 | 0.02 | 1.48 |
| 17. | New Jersey | Vineland | 97.1 | 8.9 | 0.00 | 0.10 |
| | | | Average CCI | Total Mileage | | Total % Weighted Ave.* |
| | | | 93.2 | 8881.7 | | 93.47 |

* National Average = 100%

(C)[1] Data developed within cost estimating software package

## ANR Pipeline Company
## Per Diem Determination

| Line No. | | (A) State | (B) City | (C)[1] Per Diem ($) | (D)[2] Total Mi/State | (E) Weighting Factor (D) / 3878.5 | (F) % of Weighted Ave. (C) / (E) |
|---|---|---|---|---|---|---|---|
| 1 | 1. | Wisconsin | Wausau | 128.0 | 1831.9 | 0.21 | 26.40 |
| 2 | | | Milwaukee | 128.0 | | | |
| 3 | | | Ave. | 128.0 | | | |
| 4 | | | | | | | |
| 5 | 2. | Michigan | Iron Mountain | 118.0 | 905.3 | 0.10 | 11.95 |
| 6 | | | Detroit | 133.0 | | | |
| 7 | | | Grand Rapids | 114.0 | | | |
| 8 | | | Kalamazoo | 104.0 | | | |
| 9 | | | Ave. | 117.3 | | | |
| 10 | | | | | | | |
| 11 | 3. | Ohio | Dayton | 109.0 | 377.5 | 0.04 | 4.63 |
| 12 | | | | | | | |
| 13 | 4. | Indiana | Bloomington | 106.0 | 974.8 | 0.11 | 12.48 |
| 14 | | | Fort Wayne | 108.0 | | | |
| 15 | | | Indianapolis | 127.0 | | | |
| 16 | | | Ave. | 113.7 | | | |
| 17 | | | | | | | |
| 18 | 5. | Illinois | Chicago | 218.0 | 627.4 | 0.07 | 15.40 |
| 19 | | | | | | | |
| 20 | 6. | Iowa | | 96.0 | 600.5 | 0.07 | 6.49 |
| 21 | | | | | | | |
| 22 | 7. | Missouri | | 96.0 | 272.3 | 0.03 | 2.94 |
| 23 | | | | | | | |
| 24 | 8. | Nebraska | | 96.0 | 8.6 | 0.00 | 0.09 |
| 25 | | | | | | | |
| 26 | 9. | Kansas | Kansas City | 123.0 | 831.9 | 0.09 | 10.58 |
| 27 | | | Wichita | 103.0 | | | |
| 28 | | | Ave. | 113.0 | | | |
| 29 | | | | | | | |
| 30 | 10. | Kentucky | Louisville | 131.0 | 278.2 | 0.03 | 4.10 |
| 31 | | | | | | | |
| 32 | 11. | Tennessee | Memphis | 123.0 | 328.9 | 0.04 | 4.55 |
| 33 | | | | | | | |
| 34 | 12. | Mississippi | | 96.0 | 373.1 | 0.04 | 4.03 |
| 35 | | | | | | | |
| 36 | 13. | Arkansas | | 96.0 | 64.2 | 0.01 | 0.69 |
| 37 | | | | | | | |
| 38 | 14. | Louisiana | Baton Rouge | 99.0 | 902.2 | 0.10 | 11.94 |
| 39 | | | New Orleans | 136.0 | | | |
| 40 | | | Ave. | 117.5 | | | |
| 41 | | | | | | | |
| 42 | 15. | Oklahoma | | 96.0 | 356.1 | 0.04 | 3.85 |
| 43 | | | | | | | |
| 44 | 16. | Texas | | 96.0 | 139.9 | 0.02 | 1.51 |
| 45 | | | | | | | |
| 46 | 17. | New Jersey | | 6.0 | 8.9 | 0.00 | 0.01 |
| 47 | | | | | | | |
| 48 | | | | | | | Total |
| 49 | | | | Average | Total Mileage | | Weighted Ave. |

| | | | | | | |
|---|---|---|---|---|---|---|
| 50 | | $ | 109 | 8881.7 | $ | 122 |
| 51 | | | | | | |
| 52 | (C)[1] https://www.gsa.gov/travel/plan-book/per-diem-rates | | | | | |
| 53 | (D)[2] ANR Pipeline Company Form 2 Data | | | | | |

# ANR PIPELINE COMPANY

# MATERIAL TAKEOFF PACKET

Celestine Compressor Station

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Markup Summary

| Subject | Color | Page | Comment | Count | Length | Area | Volume | Surface Area |
|---|---|---|---|---|---|---|---|---|
| Perimeter Fence (1 items) | | | | | 4275 | | | |
| | | | | | | | | |
| Surface Pipe (28 items) | | | | | 3181 | | | |
| | | | | | | | | |
| Bldg (9 items) | | | | | 2009 | 30149 | 1055215 | 70298 |
| | | | | | | | | |
| Compressor (8 items) | | | | 8 | | | | |
| Cooler (19 items) | | | | 19 | | | | |
| Exhaust (16 items) | | | | 16 | | | | |
| Tank (18 items) | | | | 18 | | | | |
| | | | | 61 | | | | |
| Tower (1 items) | | | | 1 | | | | |
| | | | | | | | | |
| Valve (33 items) | | | | 33 | | | | |
| | | | | | | | | |
| 3' Concrete (2 items) | | | | | 832 | 15736 | 47209 | 2495 |
| 6" Concrete (7 items) | | | | | 6121 | 59295 | 233039 | 25674 |
| | | | | | | 6588 | 10380 | |
| Unsuitable Material (6 items) | | | | | 9102 | 354472 | 1063415 | 27307 |
| | | | | | | 39386 | 39386 | |
| Well Water (2 items) | | | | 2 | | | | |

C:\Users\PhuongMai_Nguyen\Downloads\8001_SHT_01_25.tif

Defiance Compressor Station

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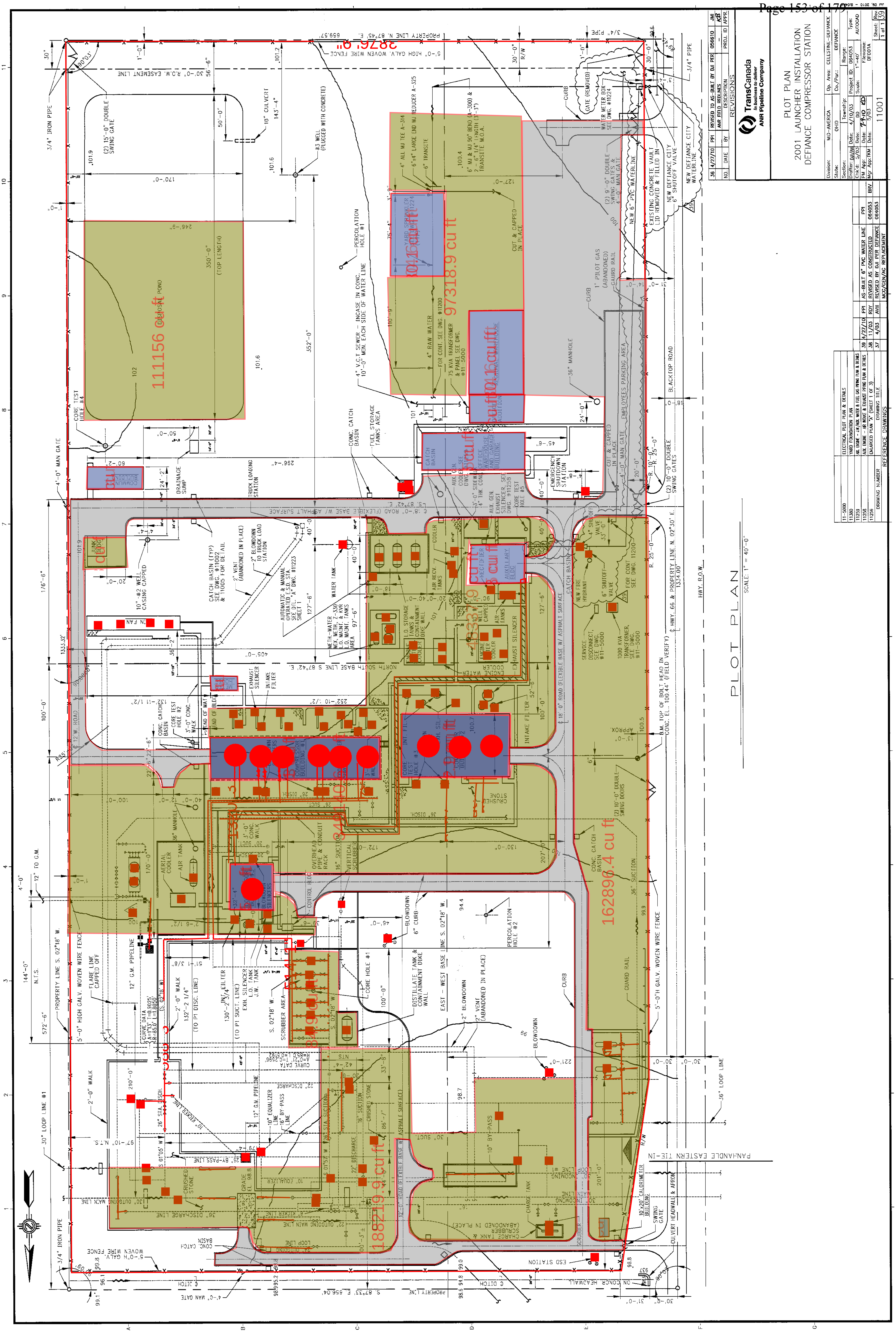
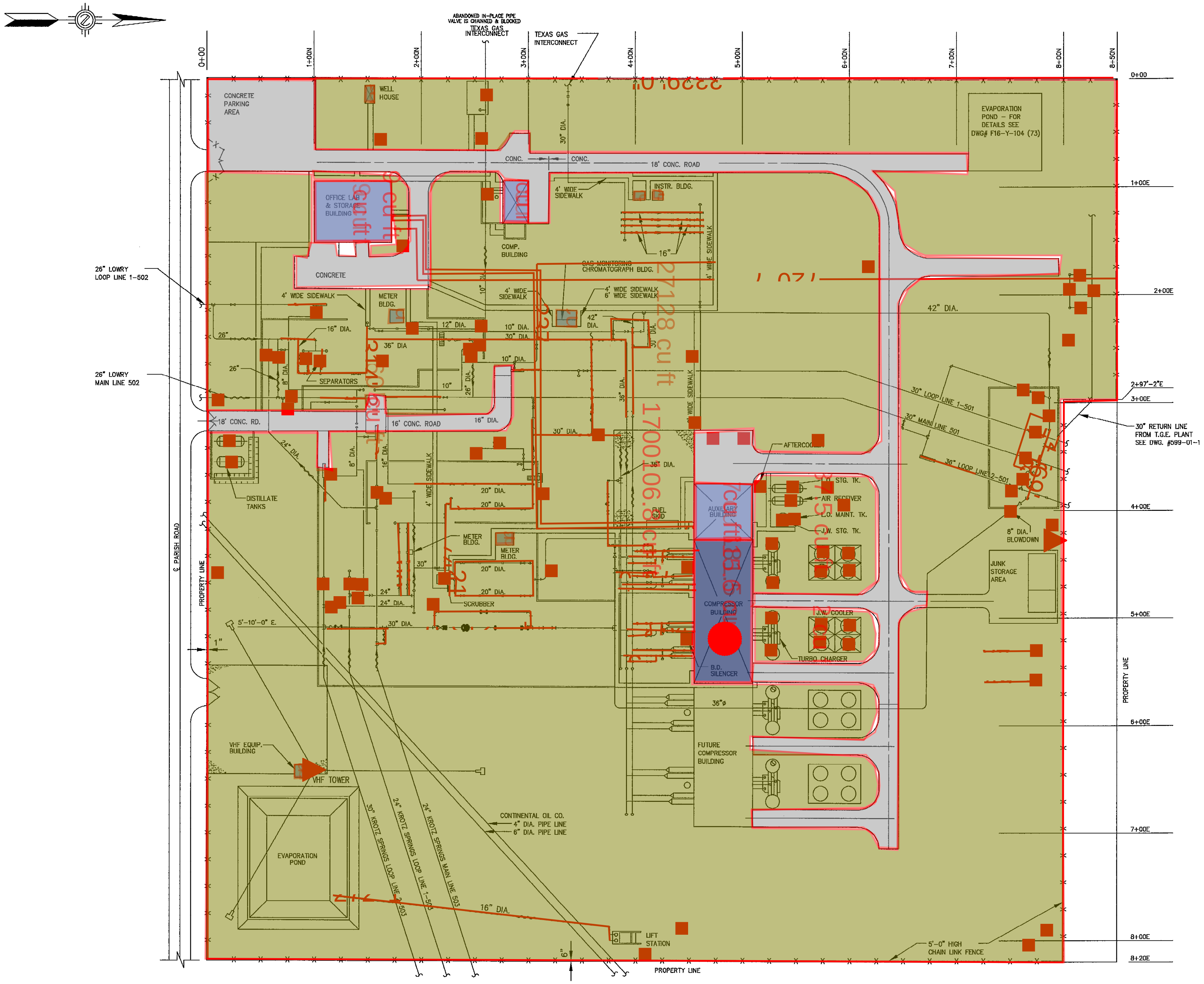
Markup Summary

| Subject | Color | Page | Comment | Count | Length | Area | Volume | Surface Area |
|---|---|---|---|---|---|---|---|---|
| Perimeter Fence (1 items) | | | | | 3877 | | | |
| Surface Pipe (47 items) | | | | | 4466 | | | |
| Bldg (11 items) | | | | | 2621 | 40090 | 1403166 | 91725 |
| Tank (32 items) | | | | 32 | | | | |
| Exhaust (35 items) | | | | 35 | | | | |
| Cooler (16 items) | | | | 16 | | | | |
| Compressor (10 items) | | | | 10 | | | | |
| | | | | 93 | | | | |
| Valve (26 items) | | | | 26 | | | | |
| Transformer (1 items) | | | | 1 | | | | |
| 3' Concrete (3 items) | | | | | 1018 | 18505 | 55516 | 3053 |
| 6" Concrete (8 items) | | | | | 8217 | 118068 | 59034 | 4109 |
| | | | | | | 13119 | 4243 | |
| Unsuitable Material (7 items) | | | | | 9010 | 310830 | 932491 | 27030 |
| | | | | | | 34537 | 34537 | |
~~~~~~~~


PLOT PLAN
2001 LAUNCHER INSTALLATION
DEFIANCE COMPRESSOR STATION
TransCanada
In business to deliver
ANR Pipeline Company
36 4/27/10 PPI REVISED TO AS-BUILT BY DJI PER ANR FIELD REDLINES 056610 JMI KB
NO. DATE BY DESCRIPTION PROJ. ID APPR.
REVISIONS
Division: MID-AMERICA
Op. Area: CELESTINE-DEFIANCE
State: OHIO
Co./Par.: DEFIANCE
Section:
Township:
Range:
Drafter: DJI/AII Date: 4/10/03
Project ID: 064053
Chk'd: DD Date: 5/03
Scale: 1"=40'
Type: AUTOCAD
PM App: Date: 7-9-10
Mgr App: TKM Date: 5/03
Filename: DF001A
Sheet: 1 of 1
Rev. 39
11001
Jul 09, 2010 - 8:04AM
PLOT PLAN
SCALE: 1" = 40'
REFERENCE DRAWINGS
DRAWING NUMBER
DRAWING TITLE
3876.0'
111156 cu ft
97318.9 cu ft
162896.4 cu ft
188219.9 cu ft
DISPOSAL POND
NEW DEFIANCE CITY WATERLINE
PROPERTY LINE N. 87°45' E. 659.57'
PROPERTY LINE S. 02°18' W.
HWY. 66 & PROPERTY LINE N. 02°30' E. 1334.00'
HWY. R.O.W.
PANHANDLE EASTERN TIE-IN
EMPLOYEES PARKING AREA
BLACKTOP ROAD
18'-0" ROAD (FLEXIBLE BASE W/ ASPHALT SURFACE)
NORTH SOUTH BASE LINE S 87°42' E.
EAST - WEST BASE LINE S. 02°18' W.
36" LOOP LINE
30" LOOP LINE #1
5'-0" HIGH GALV. WOVEN WIRE FENCE
ESD STATION
SCRUBBER AREA
CHARGE TANK
COMPRESSOR BUILDING
WATER TANK
FUEL STORAGE TANKS AREA
TRUCK LOADING STATION
CATCH BASIN
CORE TEST HOLE #4
PERCOLATION HOLE #1
PERCOLATION HOLE #2
36" MANHOLE
GUARD RAIL
CURB

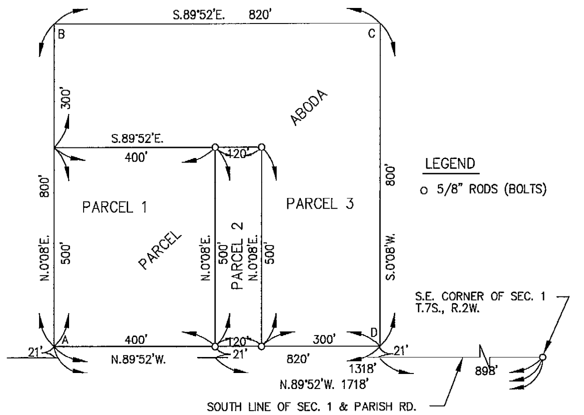
Eunice Compressor Station

|  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|
| ~~~~~~~~ | ~~~~~~~~ | ~~~~~~~~ | ~~~~~~~~ | ~~~~~~~~ | ~~~~~~~~ | ~~~~~~~~ | ~~~~~~~~ | ~~~~~~~~ |
| Markup Summary |  |  |  |  |  |  |  |  |
| Subject | Color | Page | Comment | Count | Length | Area | Volume | Surface Area |
| Perimeter Fence (1 items) |  |  |  |  | 3329 |  |  |  |
| Surface Pipe (56 items) |  |  |  |  | 6041 |  |  |  |
| Bldg (11 items) |  |  |  |  | 1305 | 16029 | 561027 | 45689 |
| Compressor (1 items) |  |  |  | 1 |  |  |  |  |
| Cooler (11 items) |  |  |  | 11 |  |  |  |  |
| Exhaust (6 items) |  |  |  | 6 |  |  |  |  |
| Tank (17 items) |  |  |  | 17 |  |  |  |  |
| Tower (2 items) |  |  |  | 2 |  |  |  |  |
| Utility Pole (18 items) |  |  |  | 18 |  |  |  |  |
| Valve (33 items) |  |  |  | 33 |  |  |  |  |
| 3' Concrete (1 items) |  |  |  |  | 374 | 7205 | 21616 | 1123 |
| 6" Concrete (10 items) |  |  |  |  | 6577 | 69150 | 34575 | 3288 |
|  |  |  |  |  |  | 7683 | 2081 |  |
| Unsuitable Material (4 items) |  |  |  |  | 9137 | 585787 | 1757362 | 27411 |
|  |  |  |  |  |  | 65087 | 65087 |  |



PLOT PLAN
SCALE: 1" = 50'-0"

A MAP OF SURVEY
SHOWING PARCEL ABCDA CONTAINING 15.06 ACRES
FROM THE PROPERTY OF THE ESTATE OF M.R. JENKINS, MABEL COXJENKINS, et.al.
LOCATED IN THESE 1/4 OF SECTION 1, T.7S., R.2W.,
ACADIA PARISH, LOUISIANA



PARCEL A B C D A

A PARCEL OF LAND SITUATED IN PART OF THE SE–1/4 OF SECTION 1, T.7S., R.2W., OF THE LOUISIANA, MERIDIAN, ACADIA PARISH, LOUISIANA BEING MORE PARTICULARYLY AS FOLLOWS:

COMMENCE AT THE SE CORNER OF SECTION 1, T.7S., R.2W., OF THE LOUISIANA MERIDIAN, ACADIA PARISH, LOUISIANA, THENCE PROCEED N.89°52'W. 1718 FT., ALONG THE SOUTH LINE OF SAID SECTION 1, THENCE N.0°08"E. 21 FT. TO THE POINT OF BEGINNING; THENCE PROCEED N.0°08E. 800 FT.; THENCE N.0S.89°52'E 820 FT.; THENCE S.0°08'W. 800 FT.; THENCE N.89° 52'W. 820 FT. TO THE POINT OF BEGINNING, CONTAINING 15.06 ACRES OF LAND, MORE OR LESS.

PARCEL 1 (LEASED 1956)

A CERTAIN TRACT OR PARCEL OF LAND, SITUATED IN THE SOUTHEAST QUARTER (SE–1/4) OF SECTION ONE (1), TOWNSHIP (7) SOUTH, RANGE TWO (2) WEST OF THE LOUISIANA MERIDIAN IN ACADIA PARISH, LOUISIANA, CONTAINING FOUR AND 59/100 (4.59) ACRES, SAID TRACT OF LAND BEING MORE PARTICULARLY DESCRIBED AS BEGINING AT A POINT WHICH POINT IS NORTH 89°52'W. 1318 FT. AND NORTH 0°8' EAST, A DISTANCE OF 21 FT. FROM THE SOUTHEAST (SE) CORNER OF SAID SECTION ONE (1); THENCE RUNNING NORTH 89°52' WEST, A DISTANCE OF 400 FT.; THENCE RUNNING NORTH 8° EAST (SHOULD READ NORTH 0°8'E.) A DISTANCE OF 500 FT.; THENCE RUNNING SOUTH 89°52'E. A DISTANCE OF 400 FT.; THENCE RUNNING SOUTH 0°8'W., A DISTANCE OF 500 FT. TO POINT OF BEGINNING; SAID TRACT OF LAND HAVING A FRONTAGE OF 400 FT. ON GRAVELED ROAD BY DEPTH OF 500 FT. RUNNING NORTH BETWEEN PARALLEL LINES.

PARCEL 2 (LEASED 1957)

FROM A 5/8" BOLT LOCATED A SOUTHEAST CORNER OF SECTION 1, TOWNSHIP 7 SOUTH, RANGE 2 WEST OF THE LOUISIANA MERIDIAN, ACADIA PARISH, LOUISIANA, GO N.89°52'W 1318 FT. TO A RAILROAD SPIKE; THENCE N.00°08'E., 21 FT. TO A 5/8" ROD LOCATED AT THE POINT OF BEGINNING; THENCE N.00°08'E., 500 FT. TO A 5/8" ROD; THENCE S.89°52'E. 120 FT. TO A 5/8" ROD; THENCE S.00°08'W. 500 FT. TO A 5/8" ROD; THENCE N.89°52'W. 120 FT. TO THE POINT OF BEGINNING.

PARCEL 3 (LEASED 1972)

A PARCEL OF LAND, SITUATED IN PART OF THE SE–1/4 OF SECTION 1, T.7S., R.2W., OF THE LOUISIANA MERIDIAN, ACADIA PARISH, LOUISIANA BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCE AT THE SE CORNER OF SECTION 1, T.7S., R.2W., OF THE LOUISIANA MERIDIAN, ACADIA PARISH, LOUISIANA, THENCE PROCEED N.89°52' W.898 FT. ALONG THE SOUTH LINE OF SAID SECTION 1, THENCE N.0°08'E. 21 FT. TO THE POINT OF BEGINNING; THENCE PROCEED N.89°52'W. 300 FT., THENCE N.0°08'E. 500 FT.; THENCE N.89°52'W. 520 FT.; THENCE N.0°08'E. 300 FT.; THENCE S.89°52'E. 820 FT.; THENCE S.0°08'W. 800 FT. TO THE POINT OF BEGINNING, CONTAINING 9.09 ACRES OF LAND, MORE OR LESS.

REFERENCE DRAWINGS

| DRAWING No | TITLE |
|---|---|
| F16-Y-102 | CURBS, PAVING & WALKS PLAN & DETAILS |
| F16-Y-901(73) | COMPRESSOR BLDG PIPING PLAN AND DRAWING INDEX |
| F16-Y-901 | PIPING PLOT PLAN – DRAWING INDEX |
| F16-Y-918 | 36" LOOP TIE-IN PIPING |
| F16-Y-401 | FOUNDATION & PAVING PLOT PLAN AREA |
| F16-Y-501 | ELECTRICAL PLOT PLAN DRAWING INDEX |

TC_UD_BR.DWG 22X34

| REVISION | | | APPROVAL | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| REV No | DATE | DESCRIPTION | PROJECT CODE | DRAFTER | DRAFTING CHECKER | DESIGNER | DESIGN CHECKER | PROJECT MANAGER | COMPANY |
| 1 | 4/23/96 | REDRAWN BY RASSEY | | GSC | CDW | | | | ANR |
| 2 | 6/14/96 | ADDED 20" AND 36" DISCHARGE TIE-IN PIPING | C-08-96 | EG | AJG | | | GAP | ANR |
| 3 | 4/4/97 | ADDED VLV PC-505 (AS-BUILT) | 2323-94-03 | KAK | MAD | | | | ANR |
| 4 | 5/30/97 | AS-BUILT | C-08-96 | CDW | AJG | | | | DSI |
| 5 | 4/04 | AS-BUILT | 83033 | AW | | | | | ANR |
| 6 | 2/13/13 | MODIFIED AND CORRECTION INFO. FOR THE WHOLE DRAWING | 2095266 | PMN | PgC | | | SB | TC |

| PROFESSIONAL ENGINEER/RPT | PERMIT/ ENG. APPROVAL | |
|---|---|---|
| | | DATE |
| REV. NO. \| DATE | PERMIT NUMBER: | |

CADD DRAWING: DO NOT MAKE MANUAL REVISIONS

TransCanada
In business to deliver

EUNICE COMPRESSOR STATION

FIA # 2739
CHAINAGE:
DISCIPLINE # 03

AREA PLOT PLAN
EUNICE COMPRESSOR STATION
ACADIA PARISH, LOUISIANA

SCALE 1"=50'-0"
DRAWING No F16-Y-101
REV 6

PLOTTED SIZE: ANSI D (22x34)

TIME
DESIGNFILE

Greensburg Compressor Station

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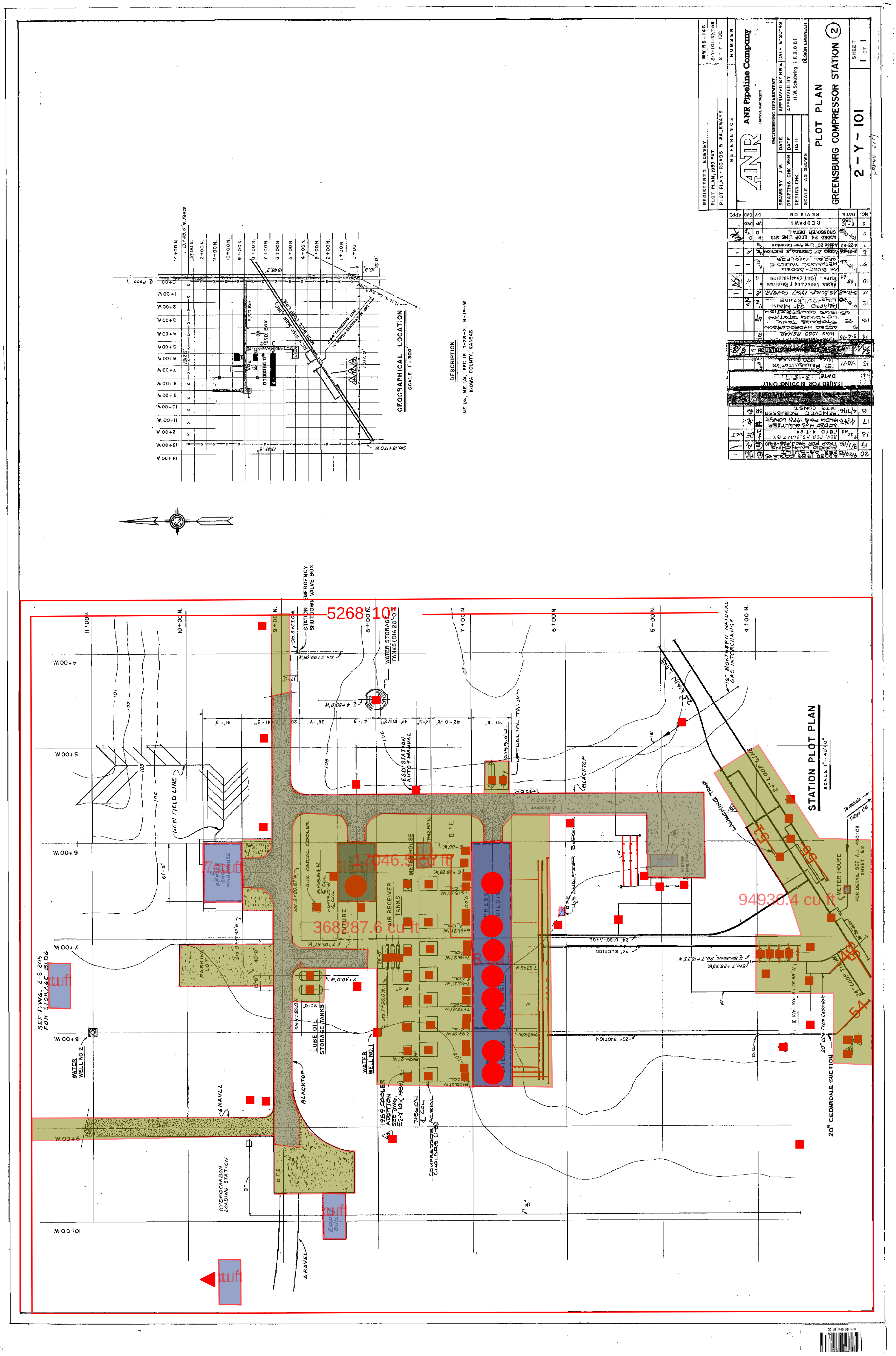
Markup Summary

| Subject | Color | Page | Comment | Count | Length | Area | Volume | Surface Area |
|---|---|---|---|---|---|---|---|---|
| Perimeter Fence (1 items) | | | | | 5269 | | | |
| Surface Pipe (41 items) | | | | | 2382 | | | |
| Bldg (10 items) | | | | | 1857 | 25002 | 875081 | 65012 |
| Compressor (9 items) | | | | 9 | | | | |
| Cooler (17 items) | | | | 17 | | | | |
| Exhaust (20 items) | | | | 20 | | | | |
| Tank (15 items) | | | | 15 | | | | |
| Tower (1 items) | | | | 1 | | | | |
| Utility Pole (9 items) | | | | 9 | | | | |
| Valve (18 items) | | | | 18 | | | | |
| 3' Concrete (2 items) | | | | | 892 | 16431 | 49294 | 2676 |
| 6" Concrete (6 items) | | | | | 3348 | 42083 | 21041 | 1674 |
| | | | | | | 4676 | 2605 | |
| Unsuitable Material (2 items) | | | | | 5476 | 154406 | 463218 | 16428 |
| | | | | | | 17156 | 17156 | |
| Well Water (1 items) | | | | 1 | | | | |
~~~~~~~~


REGISTERED SURVEY
MW RS - 146
PLOT PLAN, 1959 EXT.
2-Y-101-EXT59
PLOT PLAN - ROADS & WALKWAYS
2 - Y - 102
REFERENCE
NUMBER
ANR Pipeline Company
Detroit, Michigan
ENGINEERING DEPARTMENT
DRAWN BY J.W.
DATE
APPROVED BY H.W.S.
DATE 6-20-49
DRAFTING CHK. WEB
APPROVED BY
H.W. Schubring (F.B.&D.)
DESIGN CHK.
DESIGN ENGINEER
SCALE AS SHOWN
PLOT PLAN
GREENSBURG COMPRESSOR STATION (2)
2 - Y - 101
SHEET 1 OF 1
NO.
DATE
REVISION
BY
CKD
APPD.
5
6-10 1959
REDRAWN
6
10/10/59
ADDED 24 LOOP LINE AND CROSSOVER DETAIL
7
4-23-63
Added 20" Line From Cedardale
8
ADDED 20" CEDARDALE SUCTION
9
AS BUILT - ADDED METHANOL TANKS & AERIAL COOLERS
10
Added Launching & Receiving Traps - 1961 Construction
11
AS BUILT - 1967 CONST.
ISSUED FOR BIDDING ONLY
DATE 3-13-71
REMOVED SCRUBBER 1976 CONST.
ADDED H2O ANALYZER 1976 CONST.
REV. PER AS BUILT BY
TRAP FOR PROJ.
GEOGRAPHICAL LOCATION
SCALE 1" = 300'
DESCRIPTION
NE 1/4, NE 1/4, SEC. 16, T-28-S, R-19-W.
KIOWA COUNTY, KANSAS
E.S.D. Box
STATION PLOT PLAN
SCALE 1" = 40'-0"
24" MAIN LINE
24" LOOP LINE
16" NORTHERN NATURAL GAS INTERCHANGE
LAUNCHING TRAP
METER HOUSE
FOR DETAIL SEE A.L. 450-03 SHEET 1 & 2
24" DISCHARGE
24" SUCTION
20" SUCTION
20" CEDARDALE SUCTION
20" Line From Cedardale
METHANOL TANKS
BLACKTOP
GRAVEL
NEW FIELD LINE
PARKING LOT
AUX. AERIAL COOLER
AIR RECEIVER TANKS
METER HOUSE
LUBE OIL STORAGE TANKS
WATER WELL NO. 1
WATER WELL NO. 2
SEE DWG. 2-S-205 FOR STORAGE BLDG.
HYDROCARBON LOADING STATION
WATER STORAGE TANKS (DIA 20'-0")
STATION EMERGENCY SHUTDOWN VALVE BOX
ESD STATION AUTO & MANUAL
COMPRESSOR COOLERS (1-8) AERIAL
1989 COOLER ADDITION SEE DWG. 2-Y-101(1989)
COMPRESSOR BUILDING
5268.10 ft
17046.5 cu ft
368287.6 cu ft
94930.4 cu ft
11+00N.
10+00N.
9+00N.
8+00N.
7+00N.
6+00N.
5+00N.
4+00N.
4+00W.
5+00W.
6+00W.
7+00W.
8+00W.
9+00W.
10+00W.

Jena Compressor Station

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Markup Summary

| Subject | Color | Page | Comment | Count | Length | Area | Volume | Surface Area |
|---|---|---|---|---|---|---|---|---|
| Perimeter Fence (1 items) | | | | | 3542 | | | |
| | | | | | | | | |
| Surface Pipe (23 items) | | | | | 3148 | | | |
| | | | | | | | | |
| Bldg (6 items) | | | | | 1835 | 30564 | 1069730 | 64209 |
| | | | | | | | | |
| Compressor (7 items) | | | | 7 | | | | |
| Cooler (14 items) | | | | 14 | | | | |
| Exhaust (6 items) | | | | 6 | | | | |
| Tank (24 items) | | | | 24 | | | | |
| | | | | | | | | |
| Tower (1 items) | | | | 1 | | | | |
| Utility Pole (11 items) | | | | 11 | | | | |
| | | | | | | | | |
| Valve (14 items) | | | | 14 | | | | |
| | | | | | | | | |
| 3' Concrete (3 items) | | | | | 1162 | 21130 | 63389 | 3485 |
| 6" Concrete (4 items) | | | | | 5987 | 87770 | 43885 | 2994 |
| | | | | | | 9752 | 3973 | |
| Unsuitable Material (7 items) | | | | | 8489 | 272282 | 816846 | 25466 |
| | | | | | | 30254 | 30254 | |
| Well Water (2 items) | | | | 2 | | | | |
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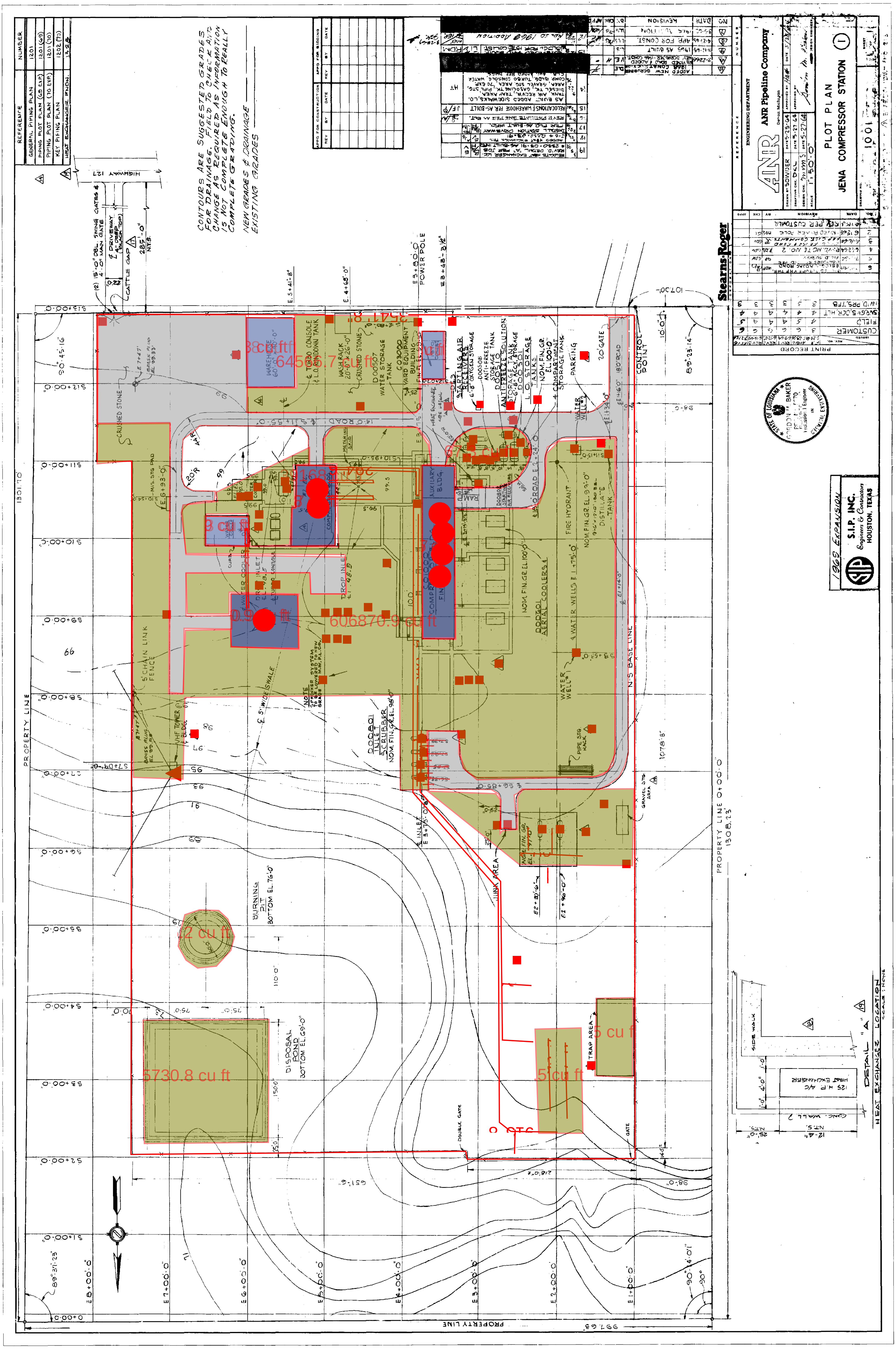
ANR Pipeline Company
ENGINEERING DEPARTMENT
Detroit, Michigan
DRAWN BY SOWDER DATE 5-25-64
DRAFTING CHK. DKL DATE 5-27-64
DESIGN CHK. DATE 5-27-64
SCALE 1" = 50'-0"
PLOT PLAN
JENA COMPRESSOR STATION ①
DRAWING NO. 1001
Stearns-Roger
S.I.P. INC.
Engineers & Contractors
HOUSTON, TEXAS
1969 EXPANSION
[redacted]
[redacted]
CONTOURS ARE SUGGESTED GRADES FOR DRAINAGE. FIELD TO CHECK AND CHANGE AS REQUIRED AS INFORMATION IS NOT COMPLETE ENOUGH TO REALLY COMPLETE GRADING.
NEW GRADES & DRAINAGE
EXISTING GRADES
HIGHWAY 127
PROPERTY LINE
AUXILIARY BLDG.
WAREHOUSE
DISPOSAL POND BOTTOM EL. 69'-0"
BURNING PIT BOTTOM EL. 76'-0"
JUNK AREA
TRAP AREA
WATER WELL
PARKING
CONTROL POINT
N-S BASE LINE
5' CHAIN LINK FENCE
DETAIL "A" HEAT EXCHANGER LOCATION
645086.7 cu ft
606870.9 cu ft
5730.8 cu ft

Joliet Compressor Station

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Markup Summary

| Subject | Color | Page | Comment | Count | Length | Area | Volume | Surface Area |
|---|---|---|---|---|---|---|---|---|
| Perimeter Fence (1 items) | | | | | 3242 | | | |
| Surface Pipe (20 items) | | | | | 3140 | | | |
| Bldg (4 items) | | | | | 1026 | 20236 | 708248 | 35918 |
| Compressor (2 items) | | | | 2 | | | | |
| Cooler (10 items) | | | | 10 | | | | |
| Exhaust (4 items) | | | | 4 | | | | |
| Tank (15 items) | | | | 15 | | | | |
| Utility Pole (5 items) | | | | 5 | | | | |
| Valve (14 items) | | | | 14 | | | | |
| 3' Concrete (1 items) | | | | | 526 | 14679 | 44038 | 1578 |
| 6" Concrete (4 items) | | | | | 4515 | 66127 | 33064 | 2258 |
| | | | | | | 7347 | 2856 | |
| Unsuitable Material (2 items) | | | | | 7540 | 403618 | 1210853 | 22621 |
| | | | | | | 44846 | 44846 | |
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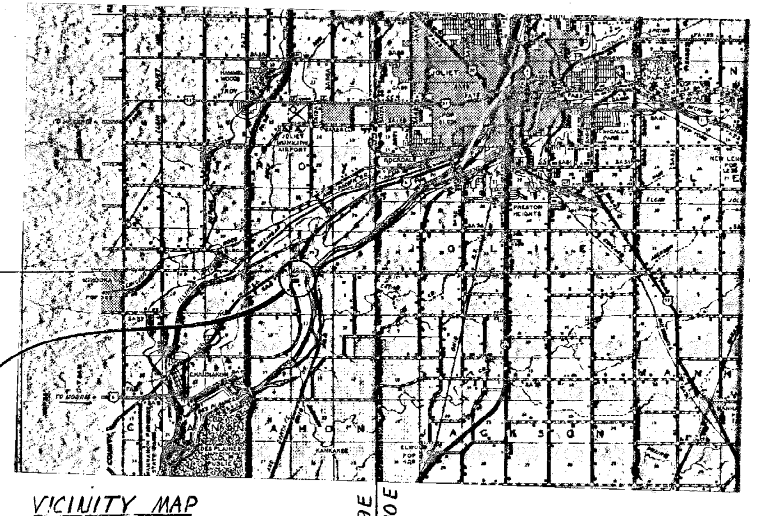
T.35N, R.9E
T.34N, R.9E

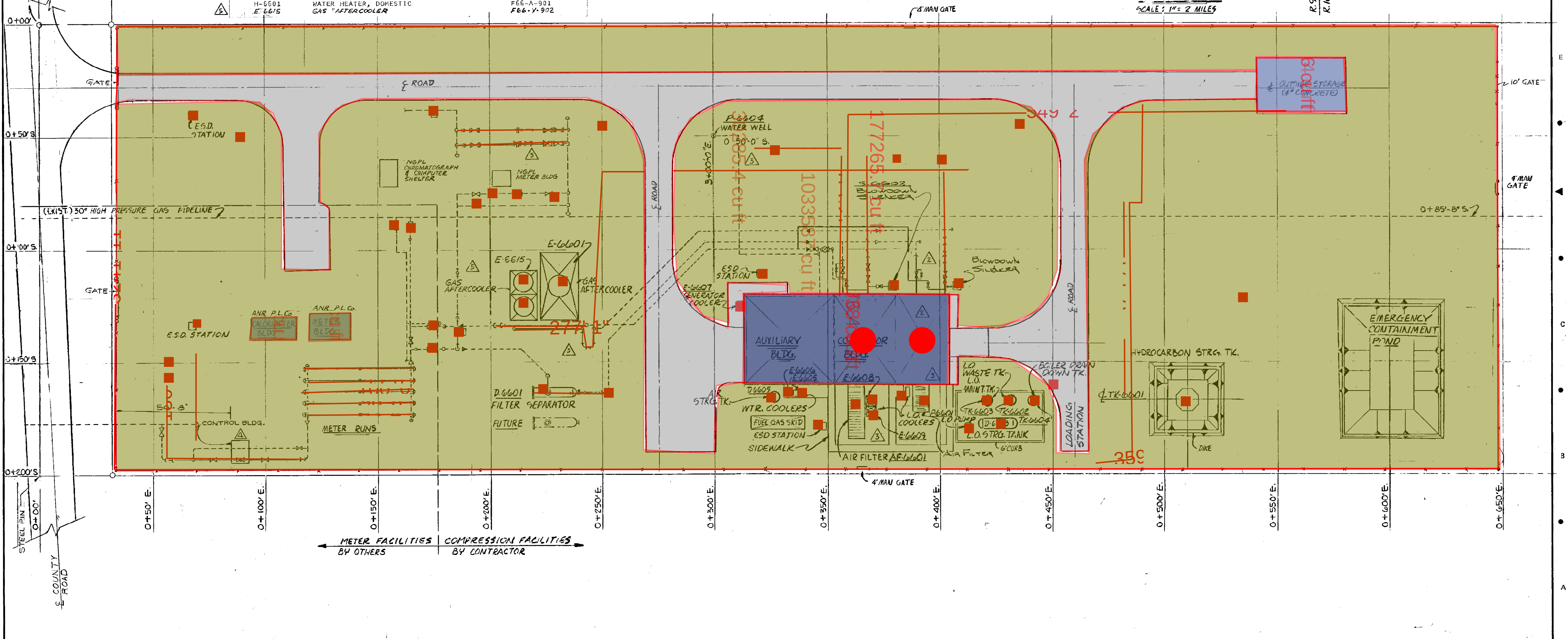
| | | EQUIPMENT NOS. AND DESCRIPTION | DWG. NO. |
|---|---|---|---|
| | AC-6601 | ROOM AIR CONDITIONER | F66-A-901 |
| ⌘ | C-6601 | GAS COMPRESSOR, SKID MOUNTED | F66-A-901 |
| ⌘ | C-6602 | AIR COMPRESSOR, SKID MOUNTED | F66-A-901 |
| ⌘ | C-6603 | AIR COMPRESSOR, SKID MOUNTED | F66-A-901 |
| ⌘ | D-6601 | HYDROCARBON FILTER/SEPARATOR | F66-Y-903 |
| ⌘ | D-6602 | FUEL SURGE DRUM, SKID MOUNTED | F66-Y-907 |
| ⌘ | D-6603 | LUBE OIL STORAGE TANK | F66-Y-908 |
| ⌘ | D-6605 | AIR STORAGE TANK | F66-Y-907 |
| | D-6607 | DOMESTIC WATER TANK | F66-A-901 |
| | D-6608 | COMPRESSION TANK, WATER BOILER | F66-A-901 |
| | D-6609 | SEPARATOR, WATER BOILER | F66-A-901 |
| | D-6610 | FILTER, LUBE OIL | F66-Y-908 |
| ⌘ | D-6611 | FILTER, FUEL, SKID MOUNTED | F66-Y-907 |
| ⌘ | E-6601 | GAS AFTERCOOLER | F66-Y-902 |
| ⌘ | E-6602 | FUEL GAS HEATER, SKID MOUNTED | F66-Y-907 |
| ⌘ | E-6603 | AFTERCOOLER, A-C SKID MOUNTED | F66-A-901 |
| ⌘ | E-6604 | AFTERCOOLER, A-C SKID MOUNTED | F66-A-901 |
| ⌘ | E-6605 | WATER COOLER, A-C SKID MOUNTED | F66-Y-907 |
| ⌘ | E-6606 | WATER COOLER, A-C SKID MOUNTED | F66-Y-907 |
| ⌘ | E-6607 | WATER COOLER, GENERATOR, SKID MOUNTED | F66-Y-904 |
| ⌘ | E-6608 | LUBE OIL COOLER | F66-Y-907 |
| ⌘ | E-6609 | LUBE OIL COOLER | F66-Y-907 |
| | E-6610 | MAKE UP HEATER | F66-A-901 |
| | E-6611 | HEATER | F66-A-901 |
| | E-6612 | HEATER | F66-A-901 |
| | E-6613 | HEATER | F66-A-901 |
| | E-6614 | HEATER | F66-A-901 |
| | F-6601 | FAN, EXHAUST (ITEM 3) | F66-A-201 |
| ⌘ | F-6602 | FAN, EXHAUST (ITEM 2) | F66-A-201 |
| ⌘ | F-6603 | FAN, EXHAUST (ITEM 2) | F66-A-201. |
| ⌘ | G-6601 | GENERATOR, SKID MOUNTED | F66-A-901 |
| | HD-6603 | TANK HEATER | F66-Y-908 |
| | HTK-6603 | TANK HEATER | F66-Y-908 |
| | H-6601 | WATER HEATER, DOMESTIC | F66-A-901 |
| 5 | E-6615 | GAS AFTERCOOLER | F66-Y-902 |

| | | EQUIPMENT NOS. AND DESCRIPTION | DWG. NO. |
|---|---|---|---|
| * | H-6602 | HOT WATER BOILER, SKID MOUNTED | F66-A-901 |
| * | M-6601 | FAN, DRIVER, E-6601 | F66-Y-902 |
| * | M-6602 | DRIVER, C-6602, A-C SKID MOUNTED | F66-A-901 |
| * | M-6603 | DRIVER, C-6603, A-C SKID MOUNTED | F66-A-901 |
| | M-6604 | DRIVER, P-6601 | F66-Y-908 |
| | M-6605 | DRIVER, P-6602 | F66-A-901 |
| | M-6606 | DRIVER, P-6603 | F66-A-901 |
| | M-6607 | DRIVER, P-6604 | F66-Y-102 |
| | P-6601 | LUBE OIL PUMP | F66-Y-908 |
| | P-6602 | HWS PUMP | F66-A-901 |
| | P-6603 | HWS PUMP | F66-A-901 |
| | P-6604 | WATER WELL PUMP | F66-Y-102 |
| * | S-6601 | TURBINE EXHAUST SILENCER | F66-A-901 |
| * | S-6602 | BLOWDOWN SILENCER | F66-Y-905 |
| * | TK-6601 | HYDROCARBON STORAGE TANK | F66-Y-908 |
| * | TK-6602 | WASTE OIL TANK | F66-Y-908 |
| * | TK-6603 | LUBE OIL MAINTENANCE TANK | F66-Y-908 |
| * | TK-6604 | BOILER DRAINDOWN TANK | F66-Y-908 |
| * | T-6601 | GAS TURBINE, SKID MOUNTED | F66-A-901 |
| * | S-6603 | STANDBY GEN. MUFFLER | F66-A-901 |
| * | MCC-6601 | MOTOR CONTROL CENTER | F66-A-901 |
| * | | BUILDING, ERECTION BY OTHERS | F66-A-201 |
| * | AF-6601 | TURBINE AIR FILTER | F66-Y-907 |
| * | | TURBINE AIR INLET DUCT | F66-A-901 |
| | | INTERIOR PARTITIONS | F66-A-201 |

* ITEMS FURNISHED BY MICHIGAN WISCONSIN PIPELINE COMPANY



VICINITY MAP
SCALE: 1" = 2 MILES



66Y1Φ2A

| REFERENCE | NUMBER | REFERENCE | NUMBER |
|---|---|---|---|
| PIPING DWG INDEX | F66-Y-901 | | |
| EMERG. SHUTDOWN SYS. | F66-Y-911 | | |
| GRADING & DRAINAGE PLAN | F66-Y-103 | | |
| FOUNDATION LOCATION PLAN | F66-Y-401 | | |
| ROADS, SIDEWALKS, & FENCING PLAN | F66-Y-104 | | |

| NO. | DATE | REVISION | BY | CHK | APPD |
|---|---|---|---|---|---|
| 5 | 6-15-92 | REVISED BY ZEI FOR ANR REQUIRES ADDED GAS AFTERCOOLER, REV YARD PIPING, & REV EQUIP. LEGEND | CJ | JW | |

| NO. | DATE | REVISION | BY | CHK | APPD |
|---|---|---|---|---|---|
| 4 | 8-20-86 | ADDED CONTROL BUILDING LOCATION PER FIELD AS-BUILT | TH | JM | - |
| 3 | 11-12-82 | REVISE WALKWAYS, COMP BLDG. & WATER WELL LINE PER AS BUILT BY ZINDER ENGINEERING | CJI | JM | |
| 2 | 11-2-81 | ADDED 1982 CONST. PER JOB #81-2260 | | | |
| 1 | 1-80 | REVISED TO AS BUILT BY WILLIAMS BROS. ENG. | AI | | |
| 0 | 7-5-79 | ISSUE FOR CONSTRUCTION | | | |

| APPD FOR CONSTRUCTION | | | APPD FOR BIDDING | | |
|---|---|---|---|---|---|
| REV | BY | DATE | REV | BY | DATE |
| 0 | mm | 7-12-79 | 0 | mm | 4-19-79 |
| 2 | mm | 7-23-82 | 2 | CAP | 11-11-81 |

| ENGINEERING APPROVAL | DATE |
|---|---|
| DRAFTING CHK. | 7-5-79 |
| DESIGN CHK. | 7-5-79 |
| APPROVED BY JRB | 7-5-79 |
| APPROVED BY 7-13-79 | |

DO NOT SCALE THIS DRAWING
USE DIMENSIONS ONLY

ANR Pipeline Company
Detroit, Michigan
ENGINEERING DEPARTMENT

S.I.P. INC.
Engineers & Contractors
HOUSTON, TEXAS

E 439

DRAWING TITLE
PLOT PLAN
JOLIET COMPRESSOR STATION
WILL COUNTY, ILLINOIS

| DRAWN BY | DATE | DRAWING NUMBER | REV | SHEET |
|---|---|---|---|---|
| KCC | 12-20-78 | F66-Y-102 | 5 | 1 OF 1 |
| SCALE 1" = 20'-0" | | | | JOB NO. |

ENGINEERS SEAL
APPROVED

Marshfield Compressor Station

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Markup Summary

| Subject | Color | Page | Comment | Count | Length | Area | Volume | Surface Area |
|---|---|---|---|---|---|---|---|---|
| Perimeter Fence (1 items) | | | | | 3757 | | | |
| Surface Pipe (25 items) | | | | | 1618 | | | |
| Bldg (8 items) | | | | | 1433 | 17921 | 627246 | 50147 |
| Compressor (6 items) | | | | 6 | | | | |
| Cooler (13 items) | | | | 13 | | | | |
| Exhaust (12 items) | | | | 12 | | | | |
| Tank (17 items) | | | | 17 | | | | |
| Tower (1 items) | | | | 1 | | | | |
| Utility Pole (5 items) | | | | 5 | | | | |
| Tank Septic (1 items) | | | | 1 | | | | |
| Valve (6 items) | | | | 6 | | | | |
| 3' Concrete (1 items) | | | | | 482 | 8510 | 25529 | 1445 |
| 6" Concrete (8 items) | | | | | 5625 | 59002 | 29501 | 2813 |
| | | | | | | 6556 | 2038 | |
| Unsuitable Material (3 items) | | | | | 2661 | 88733 | 266198 | 7983 |
| | | | | | | 9859 | 9859 | |
| Well Water (2 items) | | | | 2 | | | | |
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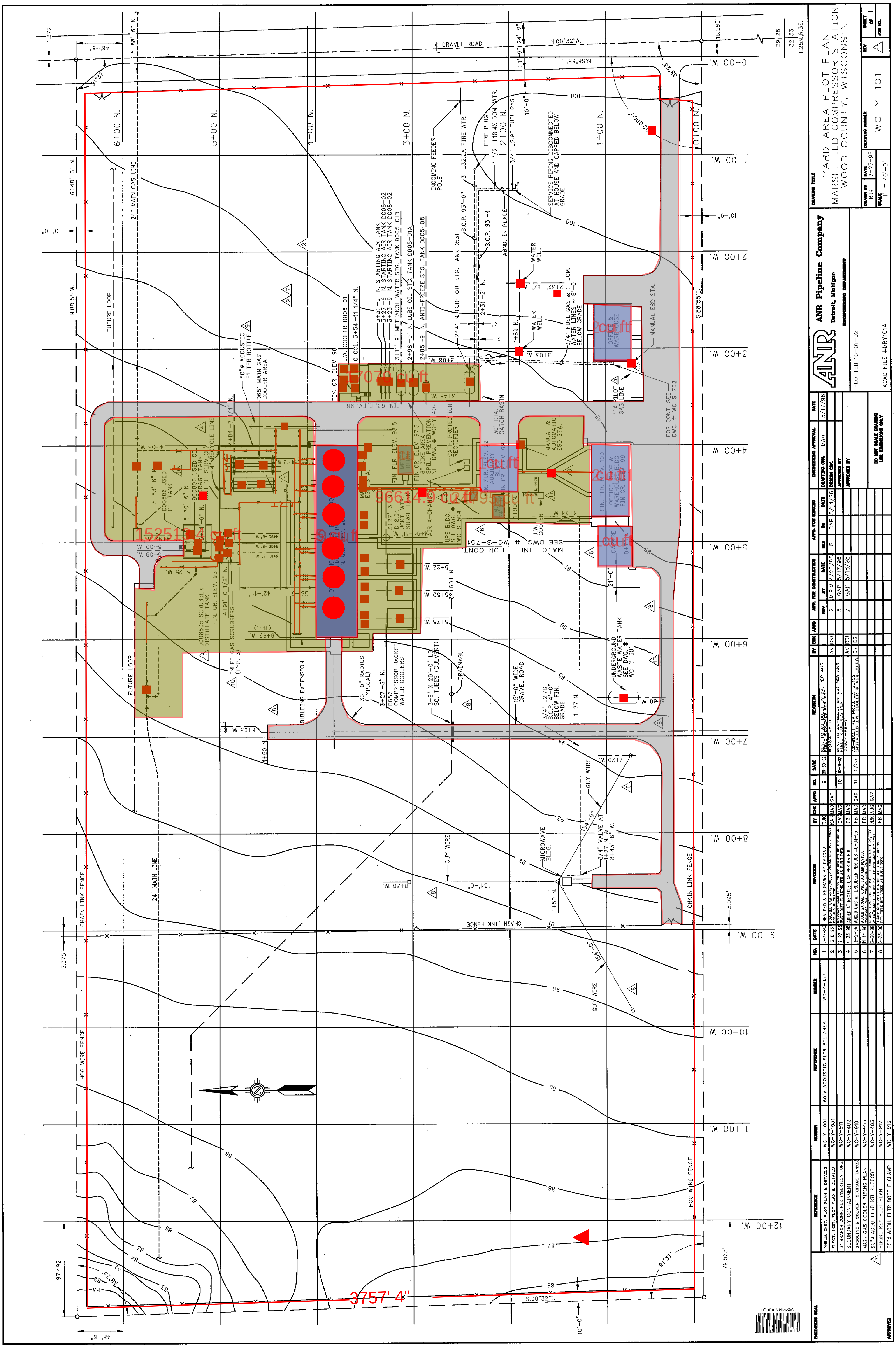
YARD AREA PLOT PLAN
MARSHFIELD COMPRESSOR STATION
WOOD COUNTY, WISCONSIN
ANR Pipeline Company
Detroit, Michigan
ENGINEERING DEPARTMENT
DRAWING TITLE
DRAWN BY RJK
DATE 2-27-95
SCALE 1" = 40'-0"
DRAWING NUMBER WC-Y-101
REV 11
SHEET 1 OF 1
JOB NO.
PLOTTED 10-01-02
ACAD FILE #MRY101A
DO NOT SCALE DRAWING USE DIMENSIONS ONLY
ENGINEERING APPROVAL
DRAFTING CHK. MAD 5/17/96
T.25N.,R.3E.
GRAVEL ROAD
24" MAIN GAS LINE
24" MAIN LINE
FUTURE LOOP
CHAIN LINK FENCE
HOG WIRE FENCE
GUY WIRE
MICROWAVE BLDG.
MANUAL ESD STA.
UNDERGROUND WASTE WATER TANK
WATER WELL
INCOMING FEEDER POLE
BUILDING EXTENSION
COMPRESSOR JACKET WATER COOLERS
60"Ø ACOUSTIC FILTER BOTTLE
D651 MAIN GAS COOLER AREA
INLET GAS SCRUBBERS
D00505 SCRUBBER DISTILLATE TANK
D00506 USED OIL TANK
15'-0" WIDE GRAVEL ROAD
30" DIA. CATCH BASIN
CATH. PROTECTION RECTIFIER
MATCHLINE - FOR CONT. SEE DWG. # WC-S-701
3757' 4"

Meade Compressor Station

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Markup Summary

| Subject | Color | Page | Comment | Count | Length | Area | Volume | Surface Area |
|---|---|---|---|---|---|---|---|---|
| Perimeter Fence (1 items) | | | | | 5309 | | | |
| Surface Pipe (39 items) | | | | | 1992 | | | |
| Bldg (8 items) | | | | | 1964 | 27403 | 959088 | 68754 |
| Compressor (9 items) | | | | 9 | | | | |
| Cooler (21 items) | | | | 21 | | | | |
| Exhaust (10 items) | | | | 10 | | | | |
| Tank (16 items) | | | | 16 | | | | |
| Tower (1 items) | | | | 1 | | | | |
| Utility Pole (3 items) | | | | 3 | | | | |
| Valve (15 items) | | | | 15 | | | | |
| 3' Concrete (1 items) | | | | | 648 | 11691 | 35072 | 1943 |
| 6" Concrete (8 items) | | | | | 4564 | 48704 | 24352 | 2282 |
| | | | | | | 5412 | 2201 | |
| Unsuitable Material (5 items) | | | | | 2852 | 68195 | 204586 | 8557 |
| | | | | | | 7577 | 7577 | |
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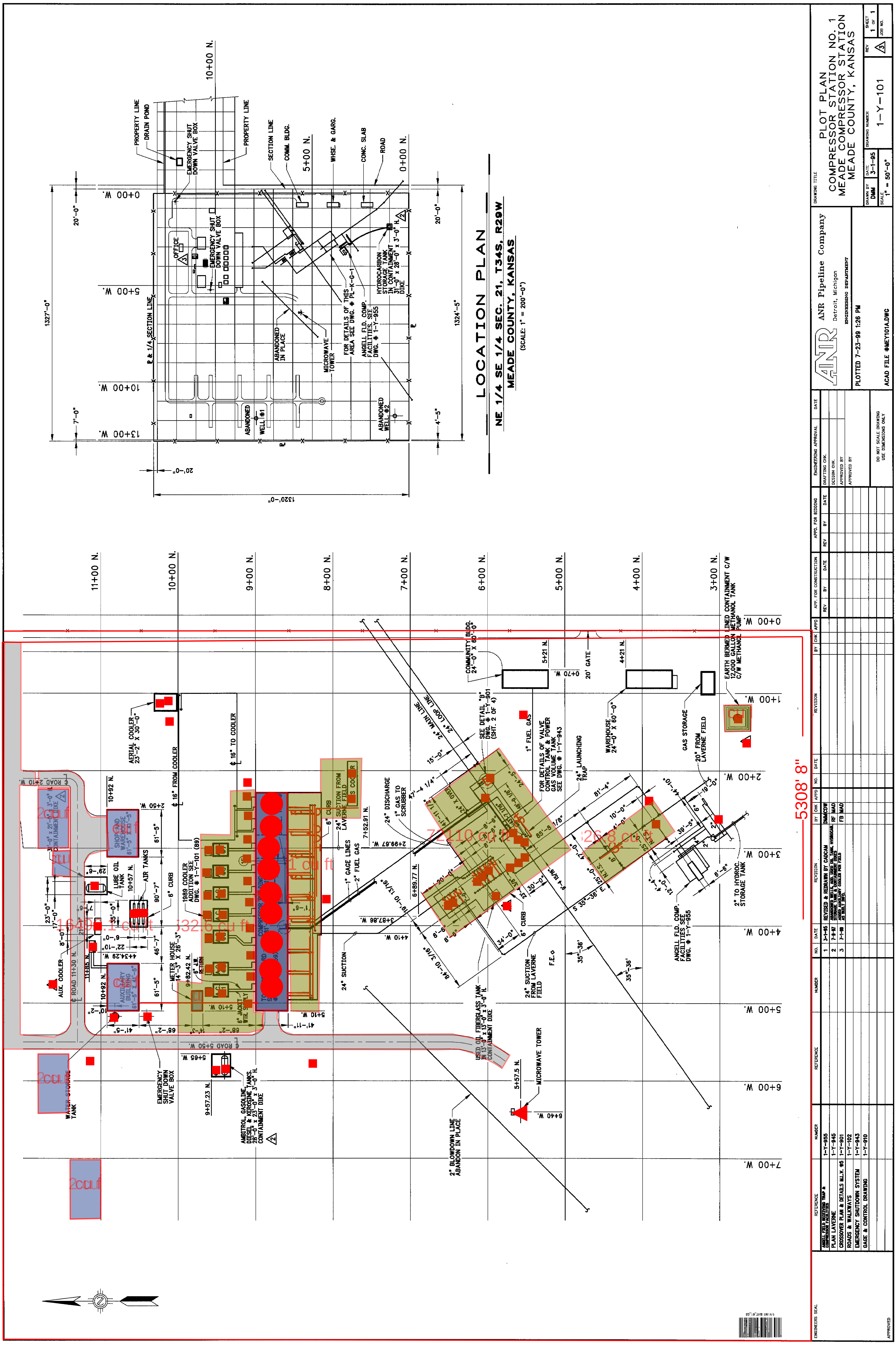
LOCATION PLAN
NE 1/4 SE 1/4 SEC. 21, T34S, R29W
MEADE COUNTY, KANSAS
(SCALE: 1" = 200'-0")
PROPERTY LINE
DRAIN POND
EMERGENCY SHUT DOWN VALVE BOX
SECTION LINE
COMM. BLDG.
WHSE. & GARG.
CONC. SLAB
ROAD
OFFICE
ABANDONED IN PLACE
MICROWAVE TOWER
HYDROCARBON STORAGE TANK IN CONTAINMENT 31'-0" x 28'-0" x 3'-0" H. DIKE
ABANDONED WELL #1
ABANDONED WELL #2
1327'-0"
1324'-5"
1320'-0"
5308' 8"
COMMUNITY BLDG. 24'-0" X 60'-0"
WAREHOUSE 24'-0" X 60'-0"
GAS STORAGE
EARTH BERMED LINED CONTAINMENT C/W 12,000 GALLON METHANOL TANK C/W METHANOL PUMP
20" GATE
24" LAUNCHING TRAP
24" MAIN LINE
24" LOOP LINE
1" FUEL GAS
24" DISCHARGE
24" SUCTION
24" SUCTION FROM LAVERNE FIELD
2" BLOWDOWN LINE ABANDON IN PLACE
MICROWAVE TOWER
USED OIL FIBERGLASS TANK IN 13'-0" x 13'-0" x 3'-0" H. CONTAINMENT DIKE
AMBITROL, GASOLINE, DIESEL & KEROSENE TANKS, 28'-0" x 23'-0" x 3'-0" H. CONTAINMENT DIKE
EMERGENCY SHUT DOWN VALVE BOX
WATER STORAGE TANK
AUX. COOLER
AUXILIARY BUILDING
LUBE OIL TANK
AIR TANKS
METER HOUSE 14'-3" X 26'-3"
1989 COOLER ADDITION SEE DWG. # 1-Y-101 (89)
AERIAL COOLER 23'-2" X 30'-0"
16" TO COOLER
16" FROM COOLER
ANGELL FLD. COMP. FACILITIES SEE DWG. # 1-Y-955
2" TO HYDROC. STORAGE TANK
ROAD 5+50 W.
ROAD 11+30 N.
PLOT PLAN
COMPRESSOR STATION NO. 1
MEADE COMPRESSOR STATION
MEADE COUNTY, KANSAS
ANR Pipeline Company
Detroit, Michigan
ENGINEERING DEPARTMENT
PLOTTED 7-23-99 1:26 PM
ACAD FILE #MEY101A.DWG
DO NOT SCALE DRAWING USE DIMENSIONS ONLY
DRAWN BY DMM
DATE 3-1-95
SCALE 1" = 50'-0"
DRAWING NUMBER 1-Y-101
REV 3
SHEET 1 OF 1
1 3-1-95 REVISED & REDRAWN BY CADCAM
2 7-8-97
3 7-1-98
1-Y-955
1-Y-945
1-Y-901
1-Y-102
1-Y-943
1-Y-910
PLAN LAVERNE
CROSSOVER PLAN & DETAILS M.L.V. #5
ROADS & WALKWAYS
EMERGENCY SHUTDOWN SYSTEM
GAGE & CONTROL DRAWING
72410 cu ft
26.8 cu ft
16409.1 cu ft
132.6 cu ft

Mooreland Compressor Station

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Markup Summary

| Subject | Color | Page | Comment | Count | Length | Area | Volume | Surface Area |
|---|---|---|---|---|---|---|---|---|
| Perimeter Fence (1 items) | | | | | 2987 | | | |
| Surface Pipe (40 items) | | | | | 1508 | | | |
| Bldg (8 items) | | | | | 2065 | 29916 | 1047051 | 72272 |
| Compressor (1 items) | | | | 1 | | | | |
| Cooler (21 items) | | | | 21 | | | | |
| Exhaust (5 items) | | | | 5 | | | | |
| Tank (28 items) | | | | 28 | | | | |
| Tower (1 items) | | | | 1 | | | | |
| Utility Pole (11 items) | | | | 11 | | | | |
| Tank Septic (1 items) | | | | 1 | | | | |
| Valve (23 items) | | | | 23 | | | | |
| 3' Concrete (1 items) | | | | | 319 | 5684 | 17052 | 956 |
| 6" Concrete (6 items) | | | | | 4351 | 166917 | 83458 | 2176 |
| | | | | | | 18546 | 3723 | |
| Unsuitable Material (3 items) | | | | | 3985 | 182688 | 548064 | 11954 |
| | | | | | | 20299 | 20299 | |
| Well Water (1 items) | | | | 1 | | | | |
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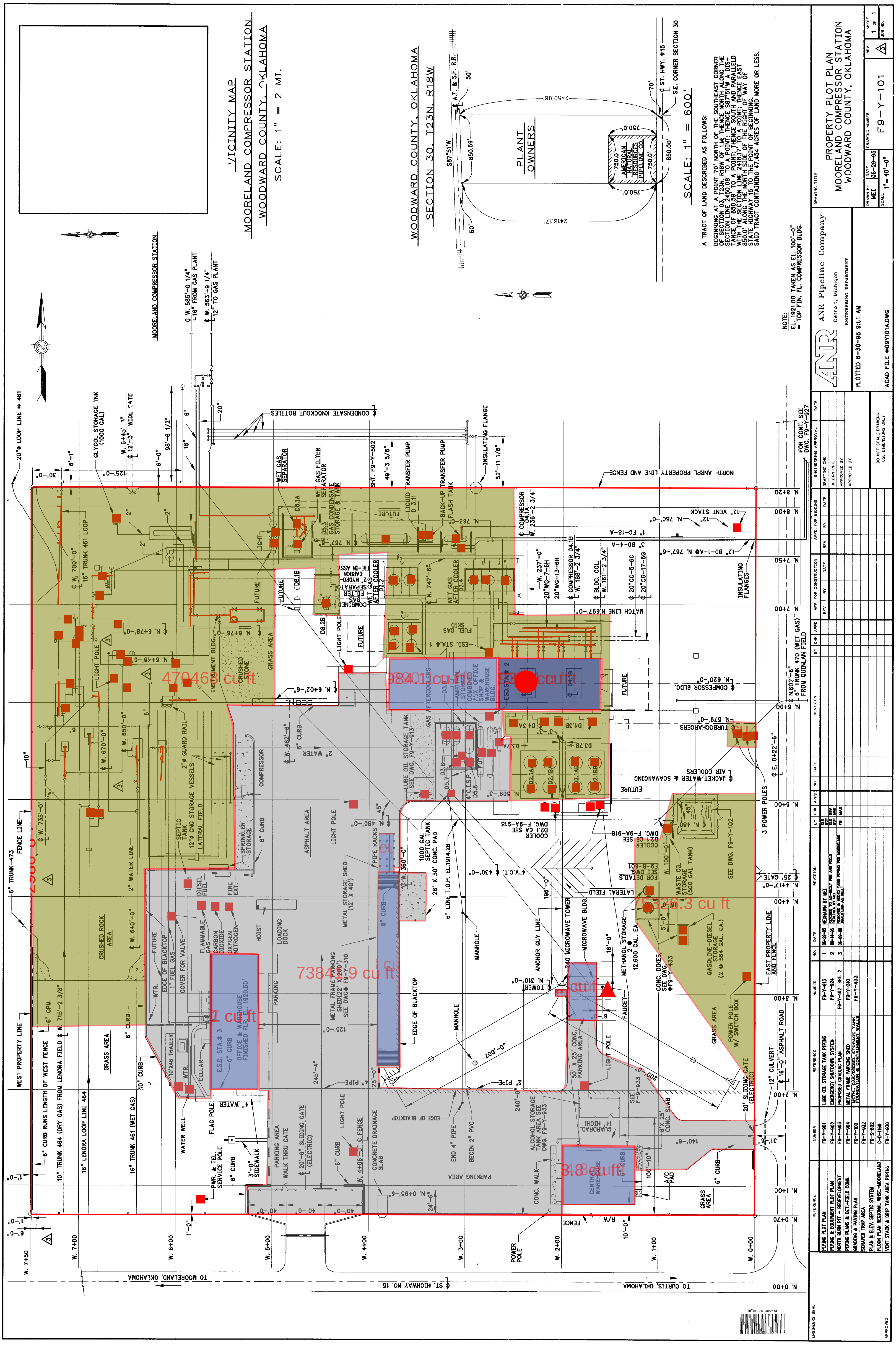
VICINITY MAP
MOORELAND COMPRESSOR STATION
WOODWARD COUNTY, OKLAHOMA
SCALE: 1" = 2 MI.
WOODWARD COUNTY, OKLAHOMA
SECTION 30, T23N, R18W
PLANT OWNERS
AMERICAN NATURAL RESOURCES PIPELINE CO.
SCALE: 1" = 600'
NOTE:
EL. 1921.00 TAKEN AS EL. 100'-0" = TOP FIN. FL. COMPRESSOR BLDG.
ANR Pipeline Company
Detroit, Michigan
ENGINEERING DEPARTMENT
PLOTTED 6-30-98 9:01 AM
ACAD FILE #09Y101A.DWG
PROPERTY PLOT PLAN
MOORELAND COMPRESSOR STATION
WOODWARD COUNTY, OKLAHOMA
F9-Y-101
1" = 40'-0"
06-29-95
WEST PROPERTY LINE
EAST PROPERTY LINE AND FENCE
NORTH ANRPL PROPERTY LINE AND FENCE
ST. HIGHWAY NO. 15
TO MOORELAND, OKLAHOMA
TO CURTIS, OKLAHOMA
COMPRESSOR BLDG.
CENTRAL WAREHOUSE
OFFICE & WAREHOUSE
METAL FRAME PARKING SHED
47046 cu ft
98401 cu ft
7384 cu ft
75320.3 cu ft
DO NOT SCALE DRAWING USE DIMENSIONS ONLY

Mountain Compressor Station

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Markup Summary

| Subject | Color | Page | Comment | Count | Length | Area | Volume | Surface Area |
|---|---|---|---|---|---|---|---|---|
| Perimeter Fence (1 items) | | | | | 2167 | | | |
| Surface Pipe (14 items) | | | | | 589 | | | |
| Bldg (10 items) | | | | | 1211 | 12300 | 430510 | 42387 |
| Compressor (2 items) | | | | 2 | | | | |
| Cooler (13 items) | | | | 13 | | | | |
| Exhaust (3 items) | | | | 3 | | | | |
| Tank (6 items) | | | | 6 | | | | |
| Bollard (4 items) | | | | 4 | | | | |
| Tower (1 items) | | | | 1 | | | | |
| Utility Pole (1 items) | | | | 1 | | | | |
| Valve (3 items) | | | | 3 | | | | |
| 3' Concrete (2 items) | | | | | 441 | 5747 | 17240 | 1324 |
| 6" Concrete (8 items) | | | | | 2063 | 24876 | 12438 | 1031 |
| | | | | | | 2764 | 1099 | |
| Unsuitable Material (1 items) | | | | | 4090 | 140664 | 421992 | 12271 |
| | | | | | | 15629 | 15629 | |
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22Y1Ø1A

## LEGEND

| | |
|---|---|
| 1 | INLET COMPARTMENT |
| 2 | INLET SILENCER |
| 3 | GAS TURBINE |
| 4 | GAS COMPRESSOR |
| 5 | LUBE OIL STORAGE TANK |
| 6 | LUBE OIL TRANSFER PUMP |
| 7 | LUBE OIL MAINTENANCE TANK |
| 8 | ANTIFREEZE STORAGE TANK |
| 9 | ANTIFREEZE TRANSFER PUMP |
| 10 | EXTERNAL COOLER (COOLING WATER) |
| 11 | TURBINE DRAINS TANK |
| 12 | FUEL GAS METER & STARTING GAS HEATING SKID |
| 13 | EXHAUST STACK |
| 14 | EXHAUST SILENCER |
| 15 | REGENERATOR |
| 16 | MAIN GAS PIPING |
| 17 | COMPRESSOR BLDG UNIT NO. 1 |
| 18 | AUXILIARY BLDG |
| 19 | HYDROCARBON STORAGE TANK |
| 20 | WELL |
| 21 | SEPTIC TANK |
| 22 | DRAINS SUMP |
| 23 | LIQUID SEPARATORS |
| 24 | HYDROCARBON TRUCK LOADING STATION |
| 25 | DISTRIBUTION BOX & LEACH FIELD |
| 26 | SHOP & STORAGE BUILDING |
| 27 | COMMUNICATION TOWER |
| 28 | MICROWAVE BUILDING |
| 29 | COMPRESSOR BLDG. UNIT #2 |
| 30 | GAS AFTER COOLER |
| 31 | 15'-0" X 25'-0" STORAGE SHED |

| REFERENCE | NUMBER | REFERENCE | NUMBER |
|---|---|---|---|
| EQUIP ARRGT COMP BLDG | F22A102 | YARD PIPING ARRGT | F22Y901 |
| EQUIP ARRGT AUX. BLDG | F22B102 | SITE WORK | F22Y102 |
| MAIN GAS PIPING DIAG | F22A151 | ARCHITECT. COMP. BLDG | F22A201 |
| FUEL GAS PIPING DIAG | F22A152 | ARCHITECT. AUX. BLDG | F22B201 |
| GAS TURB PIPING DIAG | F22A153 | FOUNDATION LOCATION | F22Y401 |
| HEATING PIPING DIAG | F22A154 | STATION ONE LINE | F22B501 |
| SERVICE AIR PIPING DIAG | F22A155 | UNIT ONE LINE | F22B502 |
| MISC PIPING DIAG | F22A156 | ELECTRICAL YARD ARRGT | F22Y504 |
| MAIN GAS PIPING ARRGT | F22Y904 | FOR CONT. SEE SHT. 2 | |

| NO. | DATE | REVISION | BY | CHK | APPD |
|---|---|---|---|---|---|
| 6 | 8-10-76 | ADDED REGISTERED SURVEY-SHT 2 (DWG WAS 1 SHEET) | | P | — |
| 7 | 9-5-79 | AS BUILT-ADDED SHOP & STORAGE BUILDING. | QB | BE | MEP |
| 8 | 4-15-80 | ADDED MICROWAVE BUILDING & COMMUNICATION TOWER | | | — |
| 9 | 5-29-84 | REV'D. 27&28, AS-BUILT | CJ | | — |
| 10 | 8-15-84 | ADDED UNIT #2 PER JOB #84-2070 | | | mpm |
| 11 | 5-21-85 | REV. STA. & ADDITION OF CONST. NOTES | EW | | mpm |
| 12 | | ~~[illegible]~~ | | | mpm |
| 13 | 10/13/86 | REVISED PER 1985 AS BUILT BY B & C ASSOCIATES | RC | RC | |
| 14 | 7-14-88 | ADD GAS AFTER COOLER & 30" INTERSTAGE PIPING JOB #... | | | |

| NO. | DATE | REVISION | BY | CHK | APPD |
|---|---|---|---|---|---|
| 16 | 5-25-99 | INSTALLED 15'x25' STORAGE SHED FROM GERMANTOWN COMP STA. PER AS-BUILT | KB | | |
| 15 | 10-29-86 | REVISED TO AS BUILT BY BEI - REVISED FENCE, REMOVED NOTES, REV. SEWER | mps | BW | |
| 0 | 7/30/74 | ISSUED FOR APPROVAL/BID | WB | | KKA |
| 1 | 8/5/74 | ISSUED APPD FOR CONST | WB | | KKA |
| 2 | 10/4/74 | RELOCATED # 20, 22 & 24 | WB | WB | KKA |
| 3 | 11/13/74 | RELOCATED # 21 & 24 | | | KKA |
| 4 | 5/7/75 | REVISED LEGEND AS FOLLOWS: 21 WAS WASTE DRAINS HOLDING TANK, 24 WAS SANITARY DRAINS HOLDING TANK, 25 WAS HYDROCARBON TRUCK LOADING STATION, RELOCATED 22, REVISED FENCING AND FILLED AREA, DELETED PROPERTY LINES, ADDED DISTRIBUTION BOX & LEACH FIELD | | | |
| 5 | 10/24/75 | AS BUILT CHANGES | CKY | VB | JRA |

| APPD FOR CONSTRUCTION | | | APPD FOR BIDDING | | |
|---|---|---|---|---|---|
| REV | BY | DATE | REV | BY | DATE |
| 1 | KKA | 8/5/74 | 10 | mpm | 4/29/85 |
| 2 | KKA | 9/24/74 | 12 | mpm | 1/28/85 |
| 3 | KKA | 11/12/74 | 14 | | 7/21/86 |
| 5 | JRA | 10/30/75 | | | |
| 11 | mpm | 5/24/85 | | | |
| 12 | mpm | 7/24/85 | | | |
| 14 | | 8/22/86 | | | |

| ENGINEERING APPROVAL | DATE |
|---|---|
| DRAFTING CHK. | |
| DESIGN CHK. | |
| APPROVED BY | |
| APPROVED BY | |

DO NOT SCALE THIS DRAWING
USE DIMENSIONS ONLY

ENGINEERS SEAL

APPROVED

**ANR Pipeline Company**
Detroit, Michigan
ENGINEERING DEPARTMENT

ENGINEERED BY
GENERAL ELECTRIC
INSTALLATION & SERVICE ENGINEERING DEPT.
PROJECTS ENGINEERING OPERATION
SCHENECTADY, N.Y., U.S.A.
GE DWG. NO. E16-741-M100

DRAWING TITLE
PLOT PLAN
MOUNTAIN COMPRESSOR STATION
OCONTO COUNTY, WISCONSIN

SCALE 1"=40'-0"
DRAWING NUMBER F22-Y-101
REV 16

Portland Compressor Station

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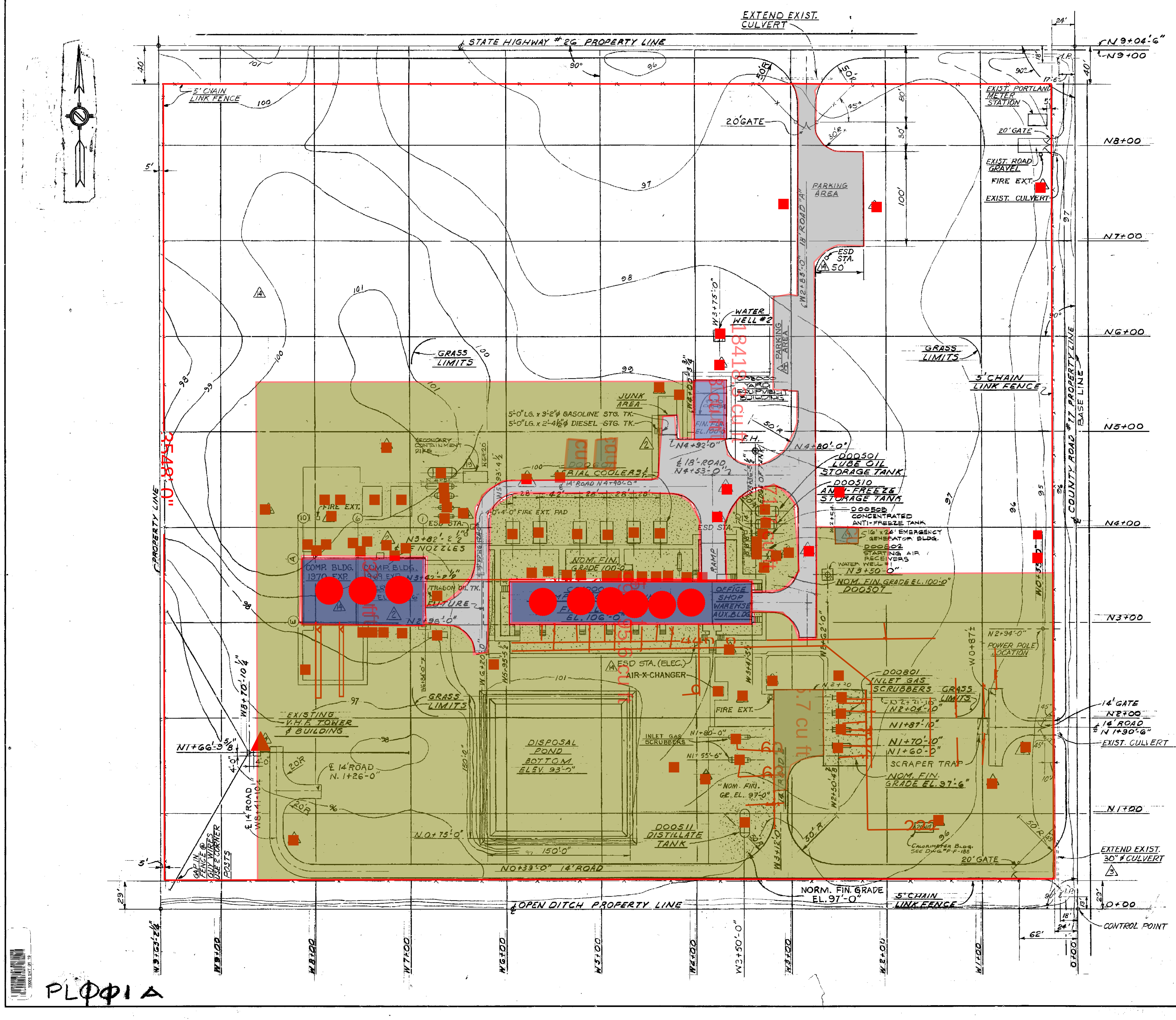
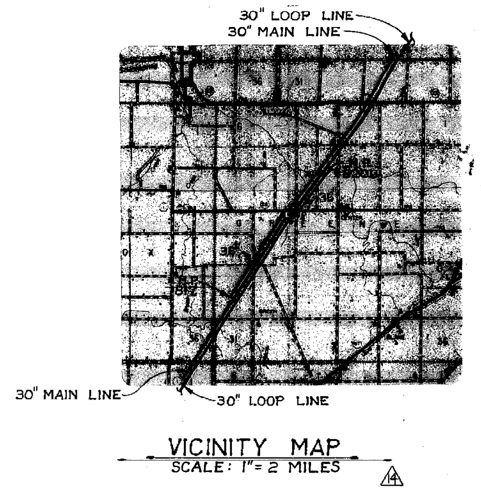
Markup Summary

| Subject | Color | Page | Comment | Count | Length | Area | Volume | Surface Area |
|---|---|---|---|---|---|---|---|---|
| Perimeter Fence (1 items) | | | | | 3548 | | | |
| Surface Pipe (36 items) | | | | | 2938 | | | |
| Bldg (6 items) | | | | | 1492 | 24395 | 853808 | 52232 |
| Compressor (9 items) | | | | 9 | | | | |
| Cooler (10 items) | | | | 10 | | | | |
| Exhaust (25 items) | | | | 25 | | | | |
| Generator (1 items) | | | | 1 | | | | |
| Tank (22 items) | | | | 22 | | | | |
| Tower (1 items) | | | | 1 | | | | |
| Utility Pole (8 items) | | | | 8 | | | | |
| Transformer (1 items) | | | | 1 | | | | |
| Valve (22 items) | | | | 22 | | | | |
| 3' Concrete (1 items) | | | | | 998 | 20466 | 61398 | 2994 |
| 6" Concrete (5 items) | | | | | 3410 | 44649 | 22325 | 1705 |
| | | | | | | 4961 | 3101 | |
| Unsuitable Material (2 items) | | | | | 4938 | 338956 | 1016867 | 14814 |
| | | | | | | 37662 | 37662 | |
| Well Water (1 items) | | | | 1 | | | | |
~~~~~~~~





VICINITY MAP
SCALE: 1" = 2 MILES

PROPERTY KNOWN AS PORTLAND COMPRESSOR STATION ON FILE IN JAY COUNTY, INDIANA IS DESCRIBED AS FOLLOWED:
Part of the northeast quarter of the southeast quarter of Section 17, Township 23 north, range 13 east, beginning at the northeast corner of said quarter, thence south along the east line there of 904.5 feet to the center of an east-west ditch; thence west along said center line 963.18 feet; thence north parallel with the east line of said quarter 904.5 feet to the north line thereof; thence east 963.18 feet to the place of beginning, containing 20 acres, more or less.

PROPERTY DESCRIPTION 14

NOTES:
1. ACTUAL ELEV. 887' = PLANT ELEV. 100'.
2. 30' RADIUS ON CURVED ROAD CURBING UNLESS OTHERWISE SHOWN.
3. USE TOP OF 26" EXISTING PIPE JUST WEST OF DISCH. VALVE AS B.M. EL. 887.49 = 100.49.

13 | 2-7-79 | ADDED CALORIMETER BLDG.

[redacted]

[redacted]

PREPARED UNDER RESPONSIBLE SUPERVISION OF
E.H. LOGAN
AT OFFICES OF
COMMONWEALTH ASSOCIATES INC.
209 E. WASHINGTON AVE. JACKSON, MICH.
JW | T.H. | OA Dodge
APPROVED E. H. Logan DATE 4/29/69

T. F. BUIRGY
REGISTERED No. 11415
INDIANA
RESIDENT OF COLORADO
PROFESSIONAL ENGINEER

Stearns-Roger

PRINT RECORD
ISSUED
CUSTOMER
FIELD
SNR, GMB
HLT, TFB, GAS
PRS, EWC

| NO. | DATE | REVISION | BY | CHK | APPD |
|---|---|---|---|---|---|
| 3 | 7-30-64 | CHANGED & MOVED ROADS | | | |
| 2 | 6-10-64 | CHANGED ROAD GATE COORDINATES | | | |
| 1 | 6-12-64 | MOVED FENCES CHANGED ROADS | | | |

REFERENCE | NUMBER

ANR Pipeline Company
Detroit, Michigan
ENGINEERING DEPARTMENT

| | | | |
|---|---|---|---|
| DRAWN BY G.E.R. | DATE 5-26-64 | APPROVED BY Hall | DATE 6/2/64 |
| DRAFTING CHK. DKL | DATE 6-1-64 | APPROVED BY | |
| DESIGN CHK. MMS | DATE 6-2-64 | T.F. Buirgy CHIEF DESIGN ENGINEER | |
| SCALE 1" = 50'-0" | | | |

PLOT PLAN
PORTLAND COMPRESSOR STATION (19)

DRAWING NO. 10001
SHEET 1 OF 1

DWG NO. 21148 5 B 28510 DWG NO. 21304

St John Compressor Station

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Markup Summary

| Subject | Color | Page | Comment | Count | Length | Area | Volume | Surface Area |
|---|---|---|---|---|---|---|---|---|
| Perimeter Fence (1 items) | | | | | 3917 | | | |
| Surface Pipe (24 items) | | | | | 3186 | | | |
| Bldg (14 items) | | | | | 2584 | 38481 | 1346830 | 90423 |
| Compressor (7 items) | | | | 7 | | | | |
| Cooler (32 items) | | | | 32 | | | | |
| Exhaust (14 items) | | | | 14 | | | | |
| Tank (18 items) | | | | 18 | | | | |
| Utility Pole (10 items) | | | | 10 | | | | |
| Valve (4 items) | | | | 4 | | | | |
| 3' Concrete (2 items) | | | | | 735 | 13049 | 39148 | 2205 |
| 6" Concrete (12 items) | | | | | 7577 | 100906 | 50453 | 3788 |
| | | | | | | 11212 | 3319 | |
| Unsuitable Material (5 items) | | | | | 8470 | 381194 | 1143583 | 25411 |
| | | | | | | 42355 | 42355 | |
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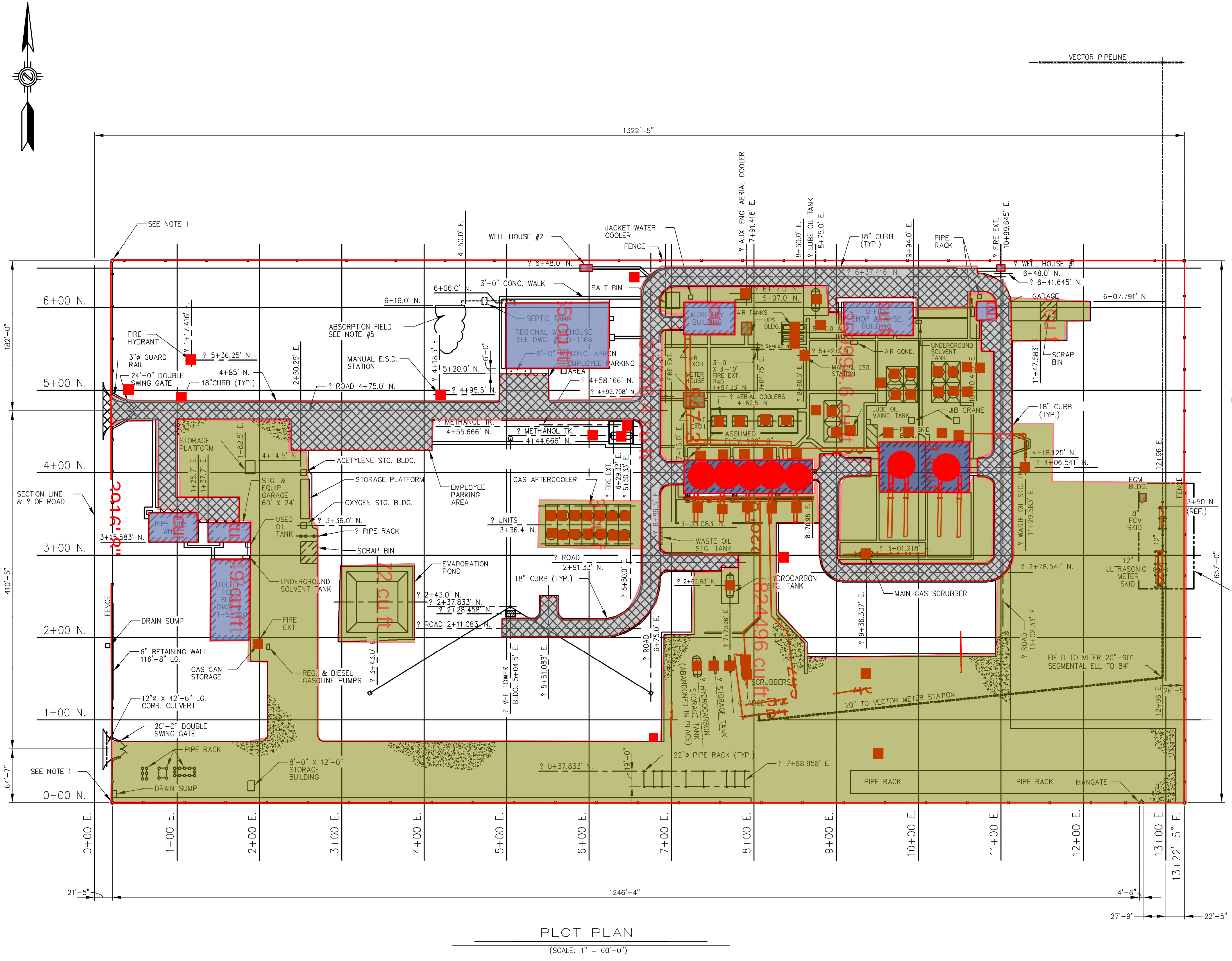
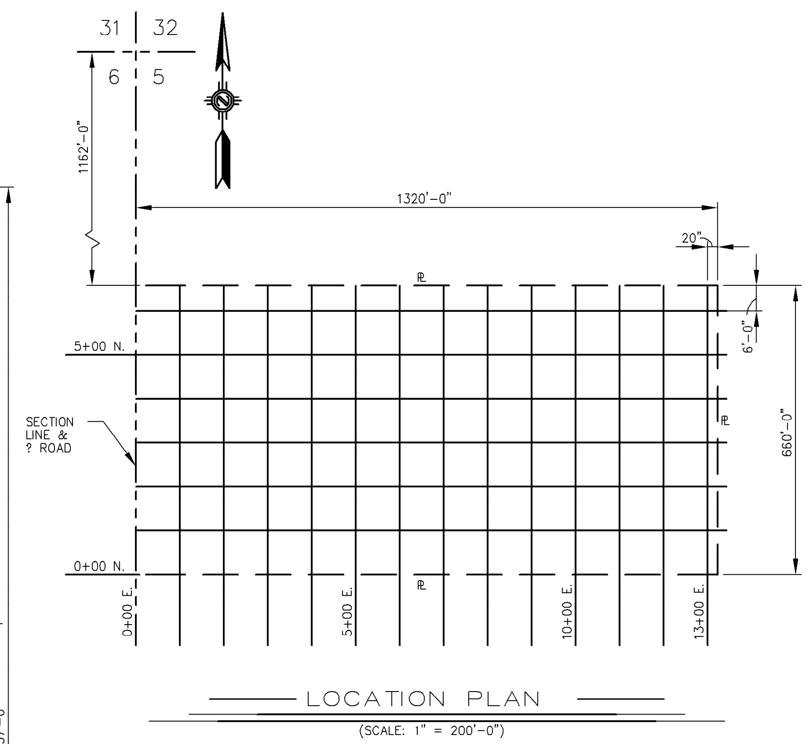


PLOT PLAN
(SCALE: 1" = 60'-0")



LOCATION PLAN
(SCALE: 1" = 200'-0")

FOR METER STATION PIPING SEE DWG. 11-Y-936, SHT. 1 OF 4.

## PROPERTY DESCRIPTION

WARRANTY DEED, DOCUMENT NUMBER 3881, IN THE STATE OF INDIANA, COUNTY OF LAKE, FILED IN RECORD BOOK 846, PAGE 236. THE REAL ESTATE DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE WEST LINE OF SECTION FIVE (5), TOWNSHIP THIRTY-FOUR (34) NORTH, RANGE NINE (9) WEST OF THE SECOND PRINCIPAL MERIDIAN, WHICH POINT IS ONE THOUSAND ONE HUNDRED SIXTY-TWO (1162) FEET SOUTH OF THE NORTHWEST CORNER OF THE NORTHWEST QUARTER (NW 1/4) OF SAID SECTION FIVE (5), RUNNING THENCE EAST ONE THOUSAND THREE HUNDRED TWENTY (1320) FEET, MORE OR LESS, TO THE EAST LINE OF THE WEST HALF (W 1/2) OF SAID NORTHWEST QUARTER SECTION, THENCE SOUTH ON AND ALONG SAID EAST LINE SIX HUNDRED SIXTY (660) FEET, THENCE WEST ONE THOUSAND THREE HUNDRED TWENTY (1320) FEET, MORE OR LESS, TO THE WEST LINE OF SAID NORTHWEST QUARTER SECTION, THENCE NORTH ON AND ALONG SAID WEST LINE SIX HUNDRED SIXTY (660) FEET, TO THE POINT OF BEGINNING.

## NOTES :

1. CONTRACTOR TO BE AWARE OF EXISTING ABANDONED SEPTIC TILE DISPERSIION FIELD LOCATED IN EAST SIDE OF STATION YARD. IF ENCOUNTERED DURING EXCAVATION FOR CONSTRUCTION, CONTRACTOR TO DISREGARD.
2. CONTRACTOR TO AVOID EXCAVATION ON OR AROUND EXISTING GROUNDING GRID AND CATHODIC PROTECTION ANODE BEDS. THESE ARE LOCATED ON EXISTING DWG. NO. 11-Y-504, SHT. 1 OF 1.
3. CONTRACTOR TO FLATTEN EXISTING NORTH/SOUTH BERM IN EAST SIDE OF STATION YARD DOWN TO NATURAL GRADE BEFORE COMPLETING PROJECT.

LEGEND

▨ ASPHALT

░ ROCK

ENGINEERS SEAL

| REFERENCE | NUMBER | REFERENCE | NUMBER |
|---|---|---|---|
| PIPING PLOT PLAN | 11-Y-902 | | |
| ELECTRICAL PLOT PLAN | 11-Y-501 | | |
| ESD PLAN & DETAILS | 11-Y-927 | | |
| TOPOGRAPHICAL PLAN | 11-Y-102 | | |
| DRAINAGE, SIDEWALKS & PAVINGS | 11-Y-103(72) | | |
| FOUNDATION LOCATION PLAN | 11-Y-401(73) | | |
| REGIONAL WAREHOUSE | C-D-1168 | | |

| NO. | DATE | REVISION | BY | CHK | APPD |
|---|---|---|---|---|---|
| 1 | 11/09/93 | REVISED & REDRAWN | CCI | CDW | |
| 2 | 02/28/97 | ADDED GAS AFTERCOOLER PER C-13-96 | EG | AJG | |
| 3 | 11/17/97 | AS-BUILT (BY NEI) | PKN | SR | |
| 4 | 12/27/02 | ADDED NEW 20" LINE, METER & FCV SKIDS FOR VECTOR PIPELINE TIE-IN | BAA | JB | JLD |
| 5 | 12/03 | AS-BUILT PER PROJECT ID 069971 | AW | | |

| ENGINEERING APPROVAL | | DATE |
|---|---|---|
| DRAFTING CHK. | AJG | 12-15-93 |
| DESIGN CHK. | | |
| APPROVED BY | T.E. | 03-03 |
| APPROVED BY | | |

DO NOT SCALE DRAWING
USE DIMENSIONS ONLY

**ANR Pipeline Company**
Detroit, Michigan
ENGINEERING DEPARTMENT

PLOTTED 12-10-98 2:26 PM
ACAD FILE #SJY101A.DWG

CAD CAM, INCORPORATED
FARMINGTON HILLS, MI

DRAWING TITLE
PLOT PLAN
ST. JOHN COMPRESSOR STATION

| DRAWN BY | DATE | DRAWING NUMBER | REV | SHEET |
|---|---|---|---|---|
| DAB | 11-9-93 | 11-Y-101 | 5 | 1 OF 1 |

SCALE 1" = 60'-0"
JOB NO.

THIS DRAWING AUTOMATICALLY GENERATED FROM THE CORRESPONDING CAD FILE AND IS CONSIDERED AS AN APPROVED DRAWING

Meter Station 1

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Markup Summary

| Subject | Color | Page | Comment | Count | Length | Area | Volume | Surface Area |
|---|---|---|---|---|---|---|---|---|
| Perimeter Fence (1 items) | | | | | 661.17 | | | |
| Surface Pipe (13 items) | | | | | 337.71 | | | |
| Bldg (2 items) | | | | | 190.21 | 1352.23 | 47328.12 | 6657.68 |
| Engine (1 items) | | | | 1 | | | | |
| Tank (1 items) | | | | 1 | | | | |
| Utility Pole (1 items) | | | | 1 | | | | |
| Valve (14 items) | | | | 14 | | | | |
| Cut and Cap (28 items) | | | | 28 | | | | |
| 6" Concrete (4 items) | | | | | 167 | 369.36 | 184.7 | 83.5 |
| | | | | | | 41.04 | 6.840741 | |
| Unsuitable Material (1 items) | | | | | 660.71 | 24128.3 | 72384.89 | 1982.14 |
| | | | | | | 2680.922 | 2680.922 | |
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**Columbia**
**Gas Transmission**

PROJECT DELIVERY
PROJECT ENGINEERING
P.O. BOX 1273 CHARLESTON, WV 25325-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

TITLE
RS-7933 BENTON
PLOT PLAN
—

| DRAWN BY: | DATE: | DRAWING NUMBER | ISSUE |
|---|---|---|---|
| RS | 09-19-14 | MD-M204-101 | 1 |
| PROJECT NUMBER: | 19219 | | |
| W.O. NUMBER: | 45283 | | |

| DWG. NO. | REFERENCE |
|---|---|
| — | — |
| — | — |
| MD-M204-CSTD-1C | SLIDE GATE DETAIL<br>— |
| MD-M204-CSTD-1A | FENCE DETAILS AND SPECIFICATIONS SHEET 1<br>— |
| MD-M204-CSTD-1B | FENCE DETAILS AND SPECIFICATIONS SHEET 2<br>— |
| MD-M204-100 | SITE PLAN<br>— |

DESIGN PRESSURE ___ PSIG AT ___ °F ( ___ DESIGN FACTOR). MAXIMUM HOOP STRESS LEVEL
AT ___ PSIG ___ % SMYS. BASED ON ___ .
MAOP OF ___ PSIG AT ___ °F IS LIMITED BY ___ .
MINIMUM TEST PRESSURE ___ PSIG. MAXIMUM TEST PRESSURE ___ PSIG.
TEST LIMITED BY ___ . TEST PERIOD ___ HOURS.
TEST MEDIUM ___ . SERVICE ___ .
NONDESTRUCTIVE INSPECTION REQUIREMENTS ___ .

CERTIFICATE
TO THE BEST OF MY KNOWLEDGE, ALL COMPONENTS OF THIS DRAWING ARE DESIGNED IN ACCORDANCE WITH APPLICABLE COLUMBIA GUIDELINES AND SPECIFICATIONS.

KEVIN BODENHAMER
DESIGN ENGINEER

11/18/2016
DATE

NOTE: ANY CHANGES TO THE DESIGN SHOWN ON THIS DRAWING MUST BE APPROVED BY THE DESIGN ENGINEER.

SCALE: 3/32" = 1'-0"

| NO. | REVISIONS | BY | DATE |
|---|---|---|---|
|  | ISSUED FOR PERMITTING | RWS | 12/22/2016 |
|  |  | REI | 12/22/2016 |
|  |  | EEH/AJP | 12/22/2016 |
|  | ISSUED FOR CONSTRUCTION | RS | 11/18/2016 |
|  |  | REI | 11/18/2016 |
|  |  | EEH/AP | 11/18/2016 |
|  |  | APPROVED | DATE |

| NO. | REVISIONS | BY | DATE |
|---|---|---|---|
|  | AS-BUILT PER FIELD MARKUPS |  |  |
|  |  | APPROVED | DATE |

| NO. | REVISIONS | BY | DATE |
|---|---|---|---|
|  |  | APPROVED | DATE |

Meter Station 5

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Markup Summary

| Subject | Color | Page | Comment | Count | Length | Area | Volume | Surface Area |
|---|---|---|---|---|---|---|---|---|
| Perimeter Fence (1 items) | | | | | 501.52 | | | |
| Surface Pipe (5 items) | | | | | 145.46 | | | |
| Tank (2 items) | | | | 2 | | | | |
| Bollard (8 items) | | | | 8 | | | | |
| Utility Pole (2 items) | | | | 2 | | | | |
| Valve (3 items) | | | | 3 | | | | |
| Cut and Cap (4 items) | | | | 4 | | | | |
| 6" Concrete (2 items) | | | | | 91.04 | 315.71 | 157.85 | 45.51 |
| | | | | | | 35.07889 | 5.846296 | |
| Unsuitable Material (1 items) | | | | | 501.5 | 12380.66 | 37141.99 | 1504.49 |
| | | | | | | 1375.629 | 1375.629 | |
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[redacted]

**SCALE:** 1" = 10'-0"

| NO. | REVISIONS | BY<br>APPROVED | DATE<br>DATE |
|---|---|---|---|
| 1 | AS-BUILT PER FIELD MARKUPS | JDL | 06/22/17 |
|  | ISSUED FOR CONSTRUCTION | WPR | 10-14-2015 |

DESIGN PRESSURE ___ PSIG AT ___ °F ( ___DESIGN FACTOR). MAXIMUM HOOP STRESS LEVEL
AT ___ PSIG ___ % SMYS. BASED ON ______________ .
MAOP OF ___ PSIG AT ___ °F IS LIMITED BY ______________ .
MINIMUM TEST PRESSURE ___ PSIG. MAXIMUM TEST PRESSURE ___ PSIG.
TEST LIMITED BY ______________ . TEST PERIOD ___ HOURS.
TEST MEDIUM ______________ . SERVICE ______ .
NONDESTRUCTIVE INSPECTION REQUIREMENTS ______________ .

CERTIFICATE
TO THE BEST OF MY KNOWLEDGE, ALL COMPONENTS OF THIS DRAWING ARE DESIGNED IN ACCORDANCE WITH APPLICABLE COLUMBIA GUIDELINES AND SPECIFICATIONS.

BILL LARKIN 10-14-2015
DESIGN ENGINEER DATE

NOTE: ANY CHANGES TO THE DESIGN SHOWN ON THIS DRAWING MUST BE APPROVED BY THE DESIGN ENGINEER.

| DWG. NO. | REFERENCE |
|---|---|

PROJECT DELIVERY
PROJECT ENGINEERING
P.O. BOX 1273 CHARLESTON, WV 25325-1273
1700 MACCORKLE AVENUE SE, CHARLESTON, WV 25314

MILLENNIUM PIPELINE

MS-640608 LASER

TITLE
PLOT PLAN
FILTER SEPARATOR INSTALLATION

DRAWN BY: AAS
DATE: 07/21/2015
PROJECT NUMBER: 21118
W.O. NUMBER: 80179
DRAWING NUMBER: MD-6968-101
ISSUE: 1

M:\Adept_scan\JLawson\Laser Station\MD-6968-101.dwg
7/18/2017 10:31 AM Lawson \ James

Meter Station 6

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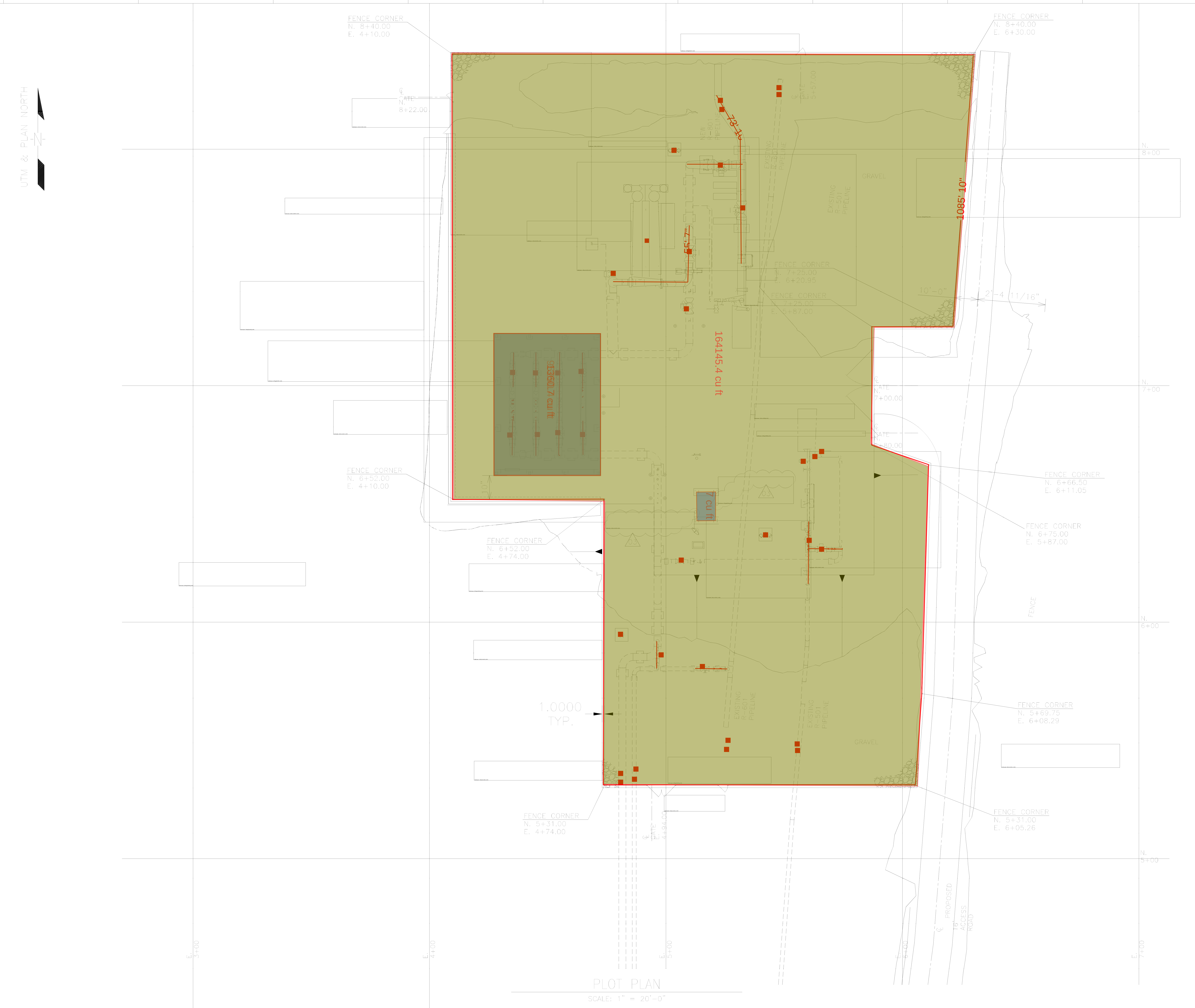
Markup Summary

| Subject | Color | Page | Comment | Count | Length | Area | Volume | Surface Area |
|---|---|---|---|---|---|---|---|---|
| Perimeter Fence (1 items) | | | | | 1085.84 | | | |
| Surface Pipe (11 items) | | | | | 393.6 | | | |
| Bldg (2 items) | | | | | 251.07 | 2818.37 | 98643.01 | 8787.26 |
| Engine (1 items) | | | | 1 | | | | |
| Utility Pole (4 items) | | | | 4 | | | | |
| Valve (20 items) | | | | 20 | | | | |
| Cut and Cap (12 items) | | | | 12 | | | | |
| 6" Concrete (1 items) | | | | | 210.8 | 2721.44 | 1360.72 | 105.4 |
| | | | | | | 302.3822 | 50.39704 | |
| Unsuitable Material (1 items) | | | | | 1087.14 | 54715.13 | 164145.4 | 3261.41 |
| | | | | | | 6079.459 | 6079.459 | |
~~~~~~~~



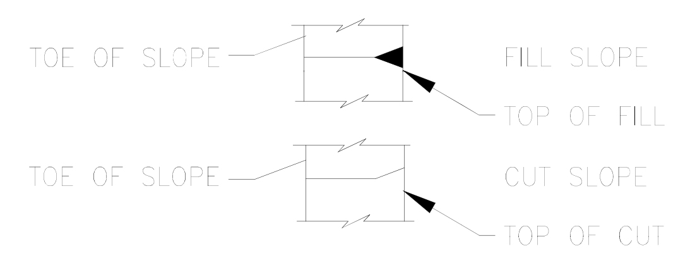
PLOT PLAN
SCALE: 1" = 20'-0"

NOTES:

1. ALL COORDINATES SHOWN ARE PLANT COORDINATES UNLESS OTHERWISE NOTED.
2. SEE DRAWING MD-M206-C-100 FOR LOCATION OF MONUMENTS.

LEGEND:

FENCE
COLUMBIA PIPELINE FOREIGN
PIPELINE
GAS PIPELINE
PROPERTY LINE
OVERHEAD POWER
TREE LINE
MAJOR CONTOUR
MINOR CONTOUR
WATER WELL
LIGHT POLE



REFERENCE DRAWINGS

| DRAWING No | TITLE |
|---|---|
| MD-M206-1201A | ELECTRICAL AREA CLASSIFICATION PLAN |

REVISION

| REV No | DATE | DESCRIPTION | PROJECT CODE | DRAFTER | DRAFTING CHECKER | DESIGNER | DESIGN CHECKER | PROJECT MANAGER | COMPANY |
|---|---|---|---|---|---|---|---|---|---|
| 00 | 11/18/2016 | ISSUED FOR CONSTRUCTION |  | AB | REI | RS |  |  |  |
| 00A | 12/22/2016 | ISSUED FOR PERMITTING |  | EEH/AJP | REI | RWS |  |  |  |
| 01 | 02/21/2017 | REVISED PROPERTY LINES AND MOVED ACCESS DRIVE |  | EEH/AJP | REI | JRD |  |  |  |
| 02 | 05/14/2018 | AS-BUILT PER FIELD MARKUPS |  |  | CHH |  |  |  |  |
| 03 | 2020-06-12 | ISSUED FOR CONSTRUCTION – NETWORK FIELD LIFECYCLE EXECUTION PROJECT (NETFLEX) | C.001086 | JDW | RAM | RAM | JCK | DMH | CEI |

APPROVAL

PROFESSIONAL ENGINEER/RPT
PERMIT/ ENG. APPROVAL
DATE
REV. NO. DATE PERMIT NUMBER:

TC Energy

COFFMAN ENGINEERS
10 N. Post Street, Suite 500
Spokane, WA 99201
ph 509.328.2994
www.coffman.com

MCARTHUR 801 REGULATOR STATION
FACILITY # 74307
ENG STATION:
DISC # 01

PLOT PLAN

REG NO. 007934

SCALE 1"=20'-0"
DRAWING # MD-M206-101
REV 03

TC_UD_BR_24x36.DWG 24X36

CADD DRAWING: DO NOT MAKE MANUAL REVISIONS

PLOTTED SIZE: ARCH D (24x36)

original facilities were installed, and no significant nonjurisdictional facilities would be constructed in association with construction of the interconnection facilities;

(25) Review of natural gas rate filings, including any curtailment plans other than those specified in § 380.5(b)(5), and establishment of rates for transportation and sale of natural gas under sections 4 and 5 of the Natural Gas Act and sections 311 and 401 through 404 of the Natural Gas Policy Act of 1978;

(26) Review of approval of oil pipeline rate filings under Parts 340 and 341 of this chapter;

(27) Sale, exchange, and transportation of natural gas under sections 4, 5 and 7 of the Natural Gas Act that require no construction of facilities;

(28) Abandonment in place of a minor natural gas pipeline (short segments of buried pipe of 6-inch inside diameter or less), or abandonment by removal of minor surface facilities such as metering stations, valves, and taps under section 7 of the Natural Gas Act so long as appropriate erosion control and site restoration takes place;

(29) Abandonment of service under any gas supply contract pursuant to section 7 of the Natural Gas Act;

(30) Approval of filing made in compliance with the requirements of a certificate for a natural gas project under section 7 of the Natural Gas Act or a preliminary permit, exemption, license, or license amendment order for a water power project under Part I of the Federal Power Act;

(31) Abandonment of facilities by sale that involves only minor or no ground disturbance to disconnect the facilities from the system;

(32) Conversion of facilities from use under the NGPA to use under the NGA;

(33) Construction or abandonment of facilities constructed entirely in Federal offshore waters that has been approved by the Minerals Management Service and the Corps of Engineers, as necessary;

(34) Abandonment or construction of facilities on an existing offshore platform;

(35) Abandonment, construction or replacement of a facility (other than compression) solely within an existing building within a natural gas facility (other than LNG facilities), if it does not increase the noise or air emissions from the facility, as a whole; and

(36) Conversion of compression to standby use if the compressor is not moved, or abandonment of compression if the compressor station remains in operation.

(b) *Exceptions to categorical exclusions.* (1) In accordance with 40 CFR 1508.4, the Commission and its staff will independently evaluate environmental information supplied in an application and in comments by the public. Where circumstances indicate that an action may be a major Federal action significantly affecting the quality of the human environment, the Commission:

(i) May require an environmental report or other additional environmental information, and

(ii) Will prepare an environmental assessment or an environmental impact statement.

(2) Such circumstances may exist when the action may have an effect on one of the following:

(i) Indian lands;

(ii) Wilderness areas;

(iii) Wild and scenic rivers;

(iv) Wetlands;

(v) Units of the National Park System, National Refuges, or National Fish Hatcheries;

(vi) Anadromous fish or endangered species; or

(vii) Where the environmental effects are uncertain.

However, the existence of one or more of the above will not automatically require the submission of an environmental report or the preparation of an environmental assessment or an environmental impact statement.

[Order 486, 52 FR 47910, Dec. 17, 1987, as amended at 53 FR 8177, Mar. 14, 1988; Order 486-B, 53 FR 26437, July 13, 1988; 54 FR 48740, Nov. 27, 1989; Order 603, 64 FR 26611, May 14, 1999; Order 609, 64 FR 57392, Oct. 25, 1999; Order 756, 77 FR 4895, Feb. 1, 2012]

## § 380.5 Actions that require an environmental assessment.

(a) An environmental assessment will normally be prepared first for the actions identified in this section. Depending on the outcome of the environmental assessment, the Commission may or may not prepare an environmental impact statement. However, depending on the location or scope of the proposed action, or the resources affected, the Commission may in specific circumstances proceed directly to prepare an environmental impact statement.

(b) The projects subject to an environmental assessment are as follows:

(1) Except as identified in §§ 380.4, 380.6 and 2.55 of this chapter, authorization for the site of new gas import/export facilities under DOE Delegation No. 0204–112 and authorization under section 7 of the Natural Gas Act for the construction, replacement, or abandonment of compression, processing, or interconnecting facilities, onshore and offshore pipelines, metering facilities, LNG peak-shaving facilities, or other facilities necessary for the sale, exchange, storage, or transportation of natural gas;

(2) Prior notice filings under § 157.208 of this chapter for the rearrangement of any facility specified in §§ 157.202 (b)(3) and (6) of this chapter or the acquisition, construction, or operation of any eligible facility as specified in §§ 157.202 (b)(2) and (3) of this chapter;

(3) Abandonment or reduction of natural gas service under section 7 of the Natural Gas Act unless excluded under § 380.4 (a)(21), (28) or (29);

(4) Except as identified in § 380.6, conversion of existing depleted oil or natural gas fields to underground storage fields under section 7 of the Natural Gas Act.

(5) New natural gas curtailment plans, or any amendment to an existing curtailment plan under section 4 of the Natural Gas Act and sections 401 through 404 of the Natural Gas Policy Act of 1978 that has a major effect on an entire pipeline system;

(6) Licenses under Part I of the Federal Power Act and part 4 of this chapter for construction of any water power project—existing dam;

(7) Exemptions under section 405 of the Public Utility Regulatory Policies Act of 1978, as amended, and §§ 4.30(b)(29) and 4.101–4.108 of this chapter for small hydroelectric power projects of 5 MW or less;

(8) Licenses for additional project works at licensed projects under Part I of the Federal Power Act whether or not these are styled license amendments or original licenses;

(9) Licenses under Part I of the Federal Power Act and part 4 of this chapter for transmission lines only;

(10) Applications for new licenses under section 15 of the Federal Power Act;

(11) Approval of electric interconnections and wheeling under section 202(b), 210, 211, and 212 of the Federal Power Act, unless excluded under § 380.4(a)(17);

(12) Regulations or proposals for legislation not included under § 380.4(a)(2);

(13) Surrender of water power licenses and exemptions where project works exist or ground disturbing activity has occurred and amendments to water power licenses and exemptions that require ground disturbing activity or changes to project works or operations; and

(14) Except as identified in § 380.6, authorization to site new electric transmission facilities under section 216 of the Federal Power Act and DOE Delegation Order No. 00–004.00A.

[Order 486, 52 FR 47910, Dec. 17, 1987; Order 486, 53 FR 4817, Feb. 17, 1988, as amended by 53 FR 8177, Mar. 14, 1988; Order 486-B, 53 FR 26437, July 13, 1988; Order 689, 71 FR 69470, Dec. 1, 2006; Order 756, 77 FR 4895, Feb. 1, 2012]

### § 380.6 Actions that require an environmental impact statement.

(a) Except as provided in paragraph (b) of this section, an environmental impact statement will normally be prepared first for the following projects:

(1) Authorization under sections 3 or 7 of the Natural Gas Act and DOE Delegation Order No. 0204–112 for the siting, construction, and operation of jurisdictional liquefied natural gas import/export facilities used wholly or in part to liquefy, store, or regasify liquefied natural gas transported by water;

(2) Certificate applications under section 7 of the Natural Gas Act to develop an underground natural gas storage facility except where depleted oil or natural gas producing fields are used;

(3) Major pipeline construction projects under section 7 of the Natural Gas Act using rights-of-way in which there is no existing natural gas pipeline;

**Existing Code Language:**

(a) Each operator shall conduct abandonment or deactivation of pipelines in accordance with the requirements of this section.

(b) Each pipeline abandoned in place must be disconnected from all sources and supplies of gas; purged of gas; in the case of offshore pipelines, filled with water or inert materials; and sealed at the ends. However, the pipeline need not be purged when the volume of gas is so small that there is no potential hazard.

(c) Except for service lines, each inactive pipeline that is not being maintained under this part must be disconnected from all sources and supplies of gas; purged of gas; in the case of offshore pipelines, filled with water or inert materials; and sealed at the ends. However, the pipeline need not be purged when the volume of gas is so small that there is no potential hazard.

(d) Whenever service to a customer is discontinued, one of the following must be complied with:

- (1) The valve that is closed to prevent the flow of gas to the customer must be provided with a locking device or other means designed to prevent the opening of the valve by persons other than those authorized by the operator.
- (2) A mechanical device or fitting that will prevent the flow of gas must be installed in the service line or in the meter assembly.
- (3) The customer's piping must be physically disconnected from the gas supply and the open pipe ends sealed.

(e) If air is used for purging, the operator shall insure that a combustible mixture is not present after purging.

(f) Each abandoned vault must be filled with a suitable compacted material.

(g) For each abandoned offshore pipeline facility or each abandoned onshore pipeline facility that crosses over, under or through a commercially navigable waterway, the last operator of that facility must file a report upon abandonment of that facility.

- (1) The preferred method to submit data on pipeline facilities abandoned after October 10, 2000 is to the National Pipeline Mapping System (NPMS) in accordance with the NPMS "Standards for Pipeline and Liquefied Natural Gas Operator Submissions." To obtain a copy of the NPMS Standards, please refer to the NPMS homepage at www.npms.rspa.dot.gov or contact the NPMS National Repository at 703-317-3073. A digital data format is preferred, but hard copy submissions are acceptable if they comply with the NPMS Standards. In addition to the NPMS-required attributes, operators must submit the date of abandonment, diameter, method of abandonment, and certification that, to the best of the operator's knowledge, all of the reasonably available information requested was provided and, to the best of the operator's knowledge, the abandonment was completed in accordance with applicable laws. Refer to the NPMS Standards for details in preparing your data for submission. The NPMS Standards also include details of how to submit data. Alternatively, operators may submit reports by mail, fax or e-mail to the Information Officer, Research and Special Programs Administration, Department of Transportation, Room 7128, 400 Seventh Street, SW, Washington DC 20590; fax (202) 366-4566; e-mail, roger.little@rspa.dot.gov. The information in the report must contain all

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| | reasonably available information related to the facility, including information in the possession of a third party. The report must contain the location, size, date, method of abandonment, and a certification that the facility has been abandoned in accordance with all applicable laws.<br>(2) Data on pipeline facilities abandoned before October 10, 2000 must be filed by before April 10, 2000. Operators may submit reports by mail, fax or e-mail to the Information Officer, Research and Special Programs Administration, Department of Transportation, Room 7128, 400 Seventh Street, SW, Washington DC 20590; fax (202) 366-4566; e-mail, roger.little@rspa.dot.gov. The information in the report must contain all reasonably available information related to the facility, including information in the possession of a third party. The report must contain the location, size, date, method of abandonment, and a certification that the facility has been abandoned in accordance with all applicable laws. |
| **Origin of Code** | Original Code Document, 08-19-70 |
| **Last FR Amendment** | 192-89, 08-28-00 |
| **Interpretation Summary** | None provided. |
| **GPTC** | Industry guidance available. |
| **Other Ref. Material & Source** | None noted |
| **New Guidance Material** | - An abandoned pipeline must be physically isolated (does not require an air gap) from active pipelines and disconnected from all sources of gas. (§192.3).<br>- An inactive (idle) pipeline is a pipeline that is being maintained under Part 192 but is not presently being used to transport gas; that may or may not contain pressurized gas.<br>- Deactivation (inactivation) is the process of making the pipeline inactive. |
| **Examples of a Violation** | - An offshore pipeline was abandoned in place and was not disconnected from all sources and supplies of gas; purged of gas; filled with water or inert materials, or sealed at the ends.<br>- A customer has been inactive for an extended period of time, and its connection has not either been locked, blinded or otherwise separated (§192.727(d)).<br>- The operator did not file a report to OPS-NPMS for each abandoned offshore facility, as required by §192.727(g).<br>- The operator did not file a report to OPS-NPMS for each on shore over, under or through a commercially navigable waterway, as required by §192.727(g). |

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| **Evidence Guidance** | - Documentation/Photos/Statements that show the operator did not disconnect the abandoned pipeline from all sources and supplies of gas, and purged of gas.<br>- Operator did not fill an abandoned offshore pipeline with water or inert materials; and sealed at the ends.<br>- If air is used for purging, documentation showing that operator did not insure that a combustible mixture was not present after purging.<br>- Documentation/Photos/Statements that shows an abandoned vault was not filled with a suitable compacted material. |
| **Other Special Notations** | None noted |

| **§192.629** | **Purging of Pipelines** |
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| **Existing Code Language:** | (a) When a pipeline is being purged of air by use of gas, the gas must be released into one end of the line in a moderately rapid and continuous flow. If gas cannot be supplied in sufficient quantity to prevent the formation of a hazardous mixture of gas and air, a slug of inert gas must be released into the line before the gas.<br>(b) When a pipeline is being purged of gas by use of air, the air must be released into one end of the line in a moderately rapid and continuous flow. If air cannot be supplied in sufficient quantity to prevent the formation of a hazardous mixture of gas and air, a slug of inert gas must be released into the line before the air. |
| **Origin of Code** | Original Code Document, 08-19-70 |
| **Last FR Amendment** | None |
| **GPTC** | Industry guidance available. |
| **Other Ref. Material & Source** | AGA XK0101, APurging Principles and Practice@ |
| **New Guidance Material** | - The operator should determine the time required to complete the purge operation to assure that gas-air mixtures are minimized.<br>- Instruments may be used to verify completion of purge.<br>- Selection of gas venting location should not be near electric high voltage lines, or other overhead obstructions. |
| **Examples of a Violation** | - The gas/air was not released into the line in a moderately rapid and continuous flow, resulting in the formation of a hazardous mixture.<br>- The gas/air was not supplied in sufficient quantity, resulting in the formation of a hazardous mixture. |
| **Evidence Guidance** | - Operator=s procedures.<br>- Records and documentation of any pipeline purging operations.<br>- Operator field checklists or procedures used during purging operations.<br>- Documented statements from operator. |
| **Other Special Notations** | None noted |

*Pipeline environment* includes soil resistivity (high or low), soil moisture (wet or dry), soil contaminants that may promote corrosive activity, and other known conditions that could affect the probability of active corrosion.

*Pipeline facility* means new and existing pipelines, rights-of-way, and any equipment, facility, or building used in the transportation of gas or in the treatment of gas during the course of transportation.

*Service line* means a distribution line that transports gas from a common source of supply to an individual customer, to two adjacent or adjoining residential or small commercial customers, or to multiple residential or small commercial customers served through a meter header or manifold. A service line ends at the outlet of the customer meter or at the connection to a customer's piping, whichever is further downstream, or at the connection to customer piping if there is no meter.

*Service regulator* means the device on a service line that controls the pressure of gas delivered from a higher pressure to the pressure provided to the customer. A service regulator may serve one customer or multiple customers through a meter header or manifold.

*SMYS* means specified minimum yield strength is:

(1) For steel pipe manufactured in accordance with a listed specification, the yield strength specified as a minimum in that specification; or

(2) For steel pipe manufactured in accordance with an unknown or unlisted specification, the yield strength determined in accordance with § 192.107(b).

*State* means each of the several States, the District of Columbia, and the Commonwealth of Puerto Rico.

*Supervisory Control and Data Acquisition (SCADA) system* means a computer-based system or systems used by a controller in a control room that collects and displays information about a pipeline facility and may have the ability to send commands back to the pipeline facility.

*Transmission line* means a pipeline, other than a gathering line, that: (1) Transports gas from a gathering line or storage facility to a distribution center, storage facility, or large volume customer that is not down-stream from a distribution center; (2) operates at a hoop stress of 20 percent or more of SMYS; or (3) transports gas within a storage field.

NOTE: A large volume customer may receive similar volumes of gas as a distribution center, and includes factories, power plants, and institutional users of gas.

*Transportation of gas* means the gathering, transmission, or distribution of gas by pipeline or the storage of gas, in or affecting interstate or foreign commerce.

[Amdt. 192–13, 38 FR 9084, Apr. 10, 1973, as amended by Amdt. 192–27, 41 FR 34605, Aug. 16, 1976; Amdt. 192–58, 53 FR 1635, Jan. 21, 1988; Amdt. 192–67, 56 FR 63771, Dec. 5, 1991; Amdt. 192–72, 59 FR 17281, Apr. 12, 1994; Amdt. 192–78, 61 FR 28783, June 6, 1996; Amdt. 192–81, 62 FR 61695, Nov. 19, 1997; Amdt. 192–85, 63 FR 37501, July 13, 1998; Amdt. 192–89, 65 FR 54443, Sept. 8, 2000; 68 FR 11749, Mar. 12, 2003; Amdt. 192–93, 68 FR 53900, Sept. 15, 2003; Amdt. 192–98, 69 FR 48406, Aug. 10, 2004; Amdt. 192–94, 69 FR 54592, Sept. 9, 2004; 70 FR 3148, Jan. 21, 2005; 70 FR 11139, Mar. 8, 2005; Amdt. 192–112, 74 FR 63326, Dec. 3, 2009; Amdt. 192–114, 75 FR 48601, Aug. 11, 2010]

### § 192.5 Class locations.

(a) This section classifies pipeline locations for purposes of this part. The following criteria apply to classifications under this section.

(1) A ''class location unit'' is an onshore area that extends 220 yards (200 meters) on either side of the centerline of any continuous 1- mile (1.6 kilometers) length of pipeline.

(2) Each separate dwelling unit in a multiple dwelling unit building is counted as a separate building intended for human occupancy.

(b) Except as provided in paragraph (c) of this section, pipeline locations are classified as follows:

(1) A Class 1 location is:

(i) An offshore area; or

(ii) Any class location unit that has 10 or fewer buildings intended for human occupancy.

(2) A Class 2 location is any class location unit that has more than 10 but fewer than 46 buildings intended for human occupancy.

(3) A Class 3 location is:

(i) Any class location unit that has 46 or more buildings intended for human occupancy; or

(ii) An area where the pipeline lies within 100 yards (91 meters) of either a building or a small, well-defined outside area (such as a playground, recreation area, outdoor theater, or other place of public assembly) that is occupied by 20 or more persons on at least 5 days a week for 10 weeks in any 12-month period. (The days and weeks need not be consecutive.)

(4) A Class 4 location is any class location unit where buildings with four or more stories above ground are prevalent.

(c) The length of Class locations 2, 3, and 4 may be adjusted as follows:

(1) A Class 4 location ends 220 yards (200 meters) from the nearest building with four or more stories above ground.

(2) When a cluster of buildings intended for human occupancy requires a Class 2 or 3 location, the class location ends 220 yards (200 meters) from the nearest building in the cluster.

[Amdt. 192–78, 61 FR 28783, June 6, 1996; 61 FR 35139, July 5, 1996, as amended by Amdt. 192–85, 63 FR 37502, July 13, 1998]

### § 192.7 What documents are incorporated by reference partly or wholly in this part?

(a) Any documents or portions thereof incorporated by reference in this part are included in this part as though set out in full. When only a portion of a document is referenced, the remainder is not incorporated in this part.

(b) All incorporated materials are available for inspection in the Office of Pipeline Safety, Pipeline and Hazardous Materials Safety Administration, 1200 New Jersey Avenue, SE., Washington, DC, 20590–0001, 202–366–4595, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030 or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.* These materials have been approved for incorporation by reference by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. In addition, the incorporated materials are available from the respective organizations listed in paragraph (c) (1) of this section.

(c) The full titles of documents incorporated by reference, in whole or in part, are provided herein. The numbers in parentheses indicate applicable editions. For each incorporated document, citations of all affected sections are provided. Earlier editions of currently listed documents or editions of documents listed in previous editions of 49 CFR part 192 may be used for materials and components designed, manufactured, or installed in accordance with these earlier documents at the time they were listed. The user must refer to the appropriate previous edition of 49 CFR part 192 for a listing of the earlier listed editions or documents.

(1) *Incorporated by reference (IBR).*

*List of Organizations and Addresses:*

A. Pipeline Research Council International, Inc. (PRCI), c/o Technical Toolboxes, 3801 Kirby Drive, Suite 520, Houston, TX 77098.

B. American Petroleum Institute (API), 1220 L Street, NW., Washington, DC 20005.

C. American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA 19428.

D. ASME International (ASME), Three Park Avenue, New York, NY 10016–5990.

E. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS), 127 Park Street, NE., Vienna, VA 22180.

F. National Fire Protection Association (NFPA), 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269–9101.

G. Plastics Pipe Institute, Inc. (PPI), 1825 Connecticut Avenue, NW., Suite 680, Washington, DC 20009.

H. NACE International (NACE), 1440 South Creek Drive, Houston, TX 77084.

I. Gas Technology Institute (GTI), 1700 South Mount Prospect Road, Des Plaines, IL 60018.

(2) *Documents incorporated by reference.*

| Source and name of referenced material | 49 CFR reference |
|---|---|
| A. Pipeline Research Council International (PRCI): | |

the United States, including the territorial seas, pursuant to section 404 of the Clean Water Act (33 U.S.C. 1344; see 33 CFR part 323) and the transportation of dredged material by vessel for purposes of dumping in ocean waters, including the territorial seas, pursuant to section 103 of the Marine Protection, Research and Sanctuaries Act of 1972, as amended (33 U.S.C. 1413; see 33 CFR part 324). A DA permit will also be required under these additional authorities if they are applicable to structures or work in or affecting navigable waters of the United States. Applicants for DA permits under this part should refer to the other cited authorities and implementing regulations for these additional permit requirements to determine whether they also are applicable to their proposed activities.

### § 322.2 Definitions.

For the purpose of this regulation, the following terms are defined:

(a) The term *navigable waters of the United States* and all other terms relating to the geographic scope of jurisdiction are defined at 33 CFR part 329. Generally, they are those waters of the United States that are subject to the ebb and flow of the tide shoreward to the mean high water mark, and/or are presently used, or have been used in the past, or may be susceptible to use to transport interstate or foreign commerce.

(b) The term *structure* shall include, without limitation, any pier, boat dock, boat ramp, wharf, dolphin, weir, boom, breakwater, bulkhead, revetment, riprap, jetty, artificial island, artificial reef, permanent mooring structure, power transmission line, permanently moored floating vessel, piling, aid to navigation, or any other obstacle or obstruction.

(c) The term *work* shall include, without limitation, any dredging or disposal of dredged material, excavation, filling, or other modification of a navigable water of the United States.

(d) The term *letter of permission* means a type of individual permit issued in accordance with the abbreviated procedures of 33 CFR 325.2(e).

(e) The term *individual permit* means a DA authorization that is issued following a case-by-case evaluation of a specific structure or work in accordance with the procedures of this regulation and 33 CFR part 325, and a determination that the proposed structure or work is in the public interest pursuant to 33 CFR part 320.

(f) The term *general permit* means a DA authorization that is issued on a nationwide or regional basis for a category or categories of activities when:

(1) Those activities are substantially similar in nature and cause only minimal individual and cumulative environmental impacts; or

(2) The general permit would result in avoiding unnecessary duplication of the regulatory control exercised by another Federal, state, or local agency provided it has been determined that the environmental consequences of the action are individually and cumulatively minimal. (See 33 CFR 325.2(e) and 33 CFR part 330.)

(g) The term *artificial reef* means a structure which is constructed or placed in the navigable waters of the United States or in the waters overlying the outer continental shelf for the purpose of enhancing fishery resources and commercial and recreational fishing opportunities. The term does not include activities or structures such as wing deflectors, bank stabilization, grade stabilization structures, or low flow key ways, all of which may be useful to enhance fisheries resources.

### § 322.3 Activities requiring permits.

(a) *General.* DA permits are required under section 10 for structures and/or work in or affecting navigable waters of the United States except as otherwise provided in § 322.4 below. Certain activities specified in 33 CFR part 330 are permitted by that regulation (''nationwide general permits''). Other activities may be authorized by district or division engineers on a regional basis (''regional general permits''). If an activity is not exempted by section 322.4 of this part or authorized by a general permit, an individual section 10 permit will be required for the proposed activity. Structures or work are in navigable waters of the United States if they are within limits defined in 33 CFR part 329. Structures or work outside these limits are subject to the provisions of law cited in paragraph (a) of this section, if these structures or work affect the course, location, or condition of the waterbody in such a manner as to impact on its navigable capacity. For purposes of a section 10 permit, a tunnel or other structure or work under or over a navigable water of the United States is considered to have an impact on the navigable capacity of the waterbody.

(b) *Outer continental shelf.* DA permits are required for the construction of artificial islands, installations, and other devices on the seabed, to the seaward limit of the outer continental shelf, pursuant to section 4(f) of the Outer Continental Shelf Lands Act as amended. (See 33 CFR 320.2(b).)

(c) *Activities of Federal agencies.* (1) Except as specifically provided in this paragraph, activities of the type described in paragraphs (a) and (b) of this section, done by or on behalf of any Federal agency are subject to the authorization procedures of these regulations. Work or structures in or affecting navigable waters of the United States that are part of the civil works activities of the Corps of Engineers, unless covered by a nationwide or regional general permit issued pursuant to these regulations, are subject to the procedures of separate regulations. Agreement for construction or engineering services performed for other agencies by the Corps of Engineers does not constitute authorization under this regulation. Division and district engineers will therefore advise Federal agencies accordingly, and cooperate to the fullest extent in expediting the processing of their applications.

(2) Congress has delegated to the Secretary of the Army in section 10 the duty to authorize or prohibit certain work or structures in navigable waters of the United States, upon recommendation of the Chief of Engineers. The general legislation by which Federal agencies are enpowered to act generally is not considered to be sufficient authorization by Congress to satisfy the purposes of section 10. If an agency asserts that it has Congressional authorization meeting the test of section 10 or would otherwise be exempt from the provisions of section 10, the legislative history and/or provisions of the Act should clearly demonstrate that Congress was approving the exact location and plans from which Congress could have considered the effect on navigable waters of the United States or that Congress intended to exempt that agency from the requirements of section 10. Very often such legislation reserves final approval of plans or construction for the Chief of Engineers. In such cases evaluation and authorization under this regulation are limited by the intent of the statutory language involved.

(3) The policy provisions set out in 33 CFR 320.4(j) relating to state or local certifications and/or authorizations, do not apply to work or structures undertaken by Federal agencies, except where compliance with non-Federal authorization is required by Federal law or Executive policy, e.g., section 313 and section 401 of the Clean Water Act.

### § 322.4 Activities not requiring permits.

(a) Activities that were commenced or completed shoreward of established Federal harbor lines before May 27, 1970 (see 33 CFR 320.4(o)) do not require section 10 permits; however, if those activities involve the discharge of dredged or fill material into waters of the United States after October 18, 1972, a section 404 permit is required. (See 33 CFR part 323.)

(b) Pursuant to section 154 of the Water Resource Development Act of 1976 (Pub. L. 94–587), Department of the Army permits are not required under section 10 to construct wharves and piers in any waterbody, located entirely within one state, that is a navigable water of the United States solely on the basis of its historical use to transport interstate commerce.

### § 322.5 Special policies.

The Secretary of the Army has delegated to the Chief of Engineers the authority to issue or deny section 10 permits. The following additional special policies and procedures shall also be applicable to the evaluation of permit applications under this regulation.

(a) *General.* DA permits are required for structures or work in or affecting navigable waters of the United States. However, certain structures or work

**DOE G 430.1-1**

**03-28-97**

# COST ESTIMATING

# GUIDE

## U.S. DEPARTMENT OF ENERGY

**Associate Deputy Secretary for Field Management**

**Distribution:**
**All Departmental Elements**

**Initiated By:**
**Associate Deputy Secretary**
**for Field Management**

# CHAPTER 11

# CONTINGENCY

---

## 1. INTRODUCTION

The application of contingency for various types of cost estimates covers the entire life cycle of a project from feasibility studies through execution to closeout. The purpose of the contingency guidelines presented in this chapter is to provide for a standard approach to determining project contingency and improve the understanding of contingency in the project management process. These guidelines have been adopted by the DOE estimating community and should be incorporated into the operating procedures of DOE and operating contractor project team members.

## 2. CONTINGENCY DEFINITIONS

### A. General Contingency

Contingency is an integral part of the total estimated costs of a project. It has been defined as—

> [a] specific provision for unforeseeable elements of cost within the defined project scope. [Contingency is] particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur.

This definition has been adopted by the American Association of Cost Engineers. DOE has elected to narrow the scope of this definition and defines contingency as follows.

> Covers costs that may result from incomplete design, unforeseen and unpredictable conditions, or uncertainties within the defined project scope. The amount of the contingency will depend on the status of design, procurement, and construction; and the complexity and uncertainties of the component parts of the project. Contingency is not to be used to avoid making an accurate assessment of expected cost.

It is not DOE practice to set aside contingency for major schedule changes or unknown design factors, unanticipated regulatory standards or changes, incomplete or additions to project scope definition, force majeure situations, or congressional budget cuts. Project and operations estimates will always contain contingency. Estimators should be aware that contingency is an integral part of the estimate.

### B. Buried Contingencies

Some estimators have sought to hide contingency estimates in order to protect the project so that the final project does not go over budget because the contingency has been removed by outside sources. This is affectionately known as buried contingency. All internal and external estimators should refrain from burying extra contingency allowances within the estimate. A culture of honesty should be promoted so that it is not necessary to bury contingency. In addition, estimators should be aware that estimate reviews will identify buried contingency. The estimate reviewer is obligated to remove buried contingency.

## 3. SPECIFICATIONS FOR CONTINGENCY ANALYSIS

Considerable latitude has been reserved for estimators and managers in the following contingency analysis specifications. These guidelines are to be followed by both the operating contractor and the DOE field office cost estimators to ensure a consistent and standard approach by the project team. Each contractor and field office should incorporate these guidelines into their operating procedures.

A written contingency analysis and estimate will be performed on all cost estimates and maintained in the estimate documentation file. This analysis is mandatory.

Estimators may use the ranges provided in this chapter of the cost guide for estimating small projects; however, larger projects require a more detailed analysis, including a cost estimate basis and a written description for each contingency allowance assigned to the various parts of the estimate.

Justification must be documented in writing when guide ranges for contingency are not followed. If extraordinary conditions exist that call for higher contingencies, the rationale and basis will be documented in the estimate. Computer programs, such as Independent Cost Estimating Contingency Analyzer (ICECAN), a Monte Carlo analysis program, are available to estimators and should be used to develop contingency factors. Risk analysis may also be necessary.

### A. Construction Projects

Table 11-1 presents the contingency allowances by type of construction estimate for the seven standard DOE estimate types, and Table 11-2 presents the guidelines for the major components of a construction project.

Estimate types "a" through "e" in Table 11-1 are primarily an indication of the degree of completeness of the design. Type "f," current working estimates, found in Table 11-2, depends upon the completeness of design, procurement, and construction. Contingency is calculated on the basis of remaining costs not incurred. Type "g," the Independent Estimate, may occur at any time, and the corresponding contingency would be used (i.e., "a," "b," etc.).

**Table 11-1. Contingency Allowance Guide By Type of Estimate**

| Type of Estimate | Overall Contingency Allowances % of Remaining Costs Not Incurred |
|---|---|
| PLANNING (Prior to CDR)<br>Standard<br>Experimental/Special Conditions | 20% to 30%<br>Up to 50% |
| BUDGET (Based upon CDR)<br>Standard<br>Experimental/Special Conditions | 15% to 25%<br>Up to 40% |
| TITLE I | 10% to 20% |
| TITLE II DESIGN | 5% to 15% |
| GOVERNMENT (BID CHECK) | 5% to 15% adjusted to suit market conditions |
| CURRENT WORKING ESTIMATES | See Table 11-2 |
| INDEPENDENT ESTIMATE | To suit status of project and estimator's judgment |

The following factors need to be considered to select the contingency for specific items in the estimate while staying within the guideline ranges for each type of estimate.

1. **Project Complexity**

Unforeseen, uncertain, and unpredictable conditions will exist. Therefore, using the DOE cost code of accounts for construction, the following percents are provided for planning and budget estimates. They are listed in order of increasing complexity:

| | |
|---|---|
| • Land and Land Rights | 5% to 10% |
| • Improvements to Land/Standard Equipment | 10% to 15% |

| | |
|---|---|
| • New Buildings and Additions, Utilities, Other Structures | 15% to 20% |
| • Engineering | 15% to 25% |
| • Building Modifications | 15% to 25% |
| • Special Facilities (Standard) | 20% to 30% |
| • Experimental/Special Conditions | Up to 50% |

Considerations that affect the selection in the ranges are: state-of-the-art design, required reliability, equipment complexity, construction restraints due to continuity of operation, security, contamination, environmental (weather, terrain, location), scheduling, and other items unique to the project, such as nuclear and waste management permits and reviews.

### 2. Design Completeness or Status

Regardless of the complexity factors listed above, the degree of detailed design to support the estimate is the more important factor. This factor is the major reason that the ranges in Table 11-1 vary from the high of 20 to 30 percent in the planning estimate to 5 to 15 percent at the completion of Title II design. Again, parts of the estimate may have different degrees of design completion, and the appropriate contingency percent must be used. As can be seen from Figure 11-1, as a project progresses, the contingency range and amount of contingency decreases.

### 3. Market Conditions

Market condition considerations are an addition or a subtraction from the project cost that can be accounted for in contingency. Obviously, the certainty of the estimate prices will have a major impact. The closer to a firm quoted price for equipment or a position of construction work, the less the contingency can be until reaching 1 to 5 percent for the current working type estimate for fixed-price procurement contracts, 3 to 8 percent for fixed-price construction contracts, and 15 to 17.5 percent contingency for cost-plus contracts that have been awarded.

### 4. Special Conditions

When the technology has not been selected for a project, an optimistic-pessimistic analysis can be completed. For each competing technology, an estimate is made. The difference in these estimates of the optimistic and pessimistic alternative can be used as the contingency.

**Table 11-2. Contingency Allowances for Current Working Estimates**

| | **Item Contingency On Remaining Cost Not Incurred** |
|---|---|
| a. ENGINEERING | |
| Before Detailed Estimates: | 15% to 25% |
| After Detailed Estimates: | 10% |
| b. EQUIPMENT PROCUREMENT | |
| Before Bid: | |
| Budget | 15% to 25% |
| Title I | 10% to 20% |
| Title II | 5% to 15% |
| After Award: | |
| Cost Plus Award Fee (CPAF) Contract | 15% |
| Fixed-Price Contract | 1% to 5% |
| After Delivery to Site (if no rework) | 0% |
| c. CONSTRUCTION | |
| Prior to Award: | |
| Budget | 15% to 25% |
| Title I | 10% to 20% |
| Title II | 5% to 15% |
| After Award: | |
| CPAF Contract | 15% to 17-1/2% |
| Fixed-Price Contract | 3% to 8% |
| d. TOTAL CONTINGENCY (CALCULATED) | Total of above item contingencies |

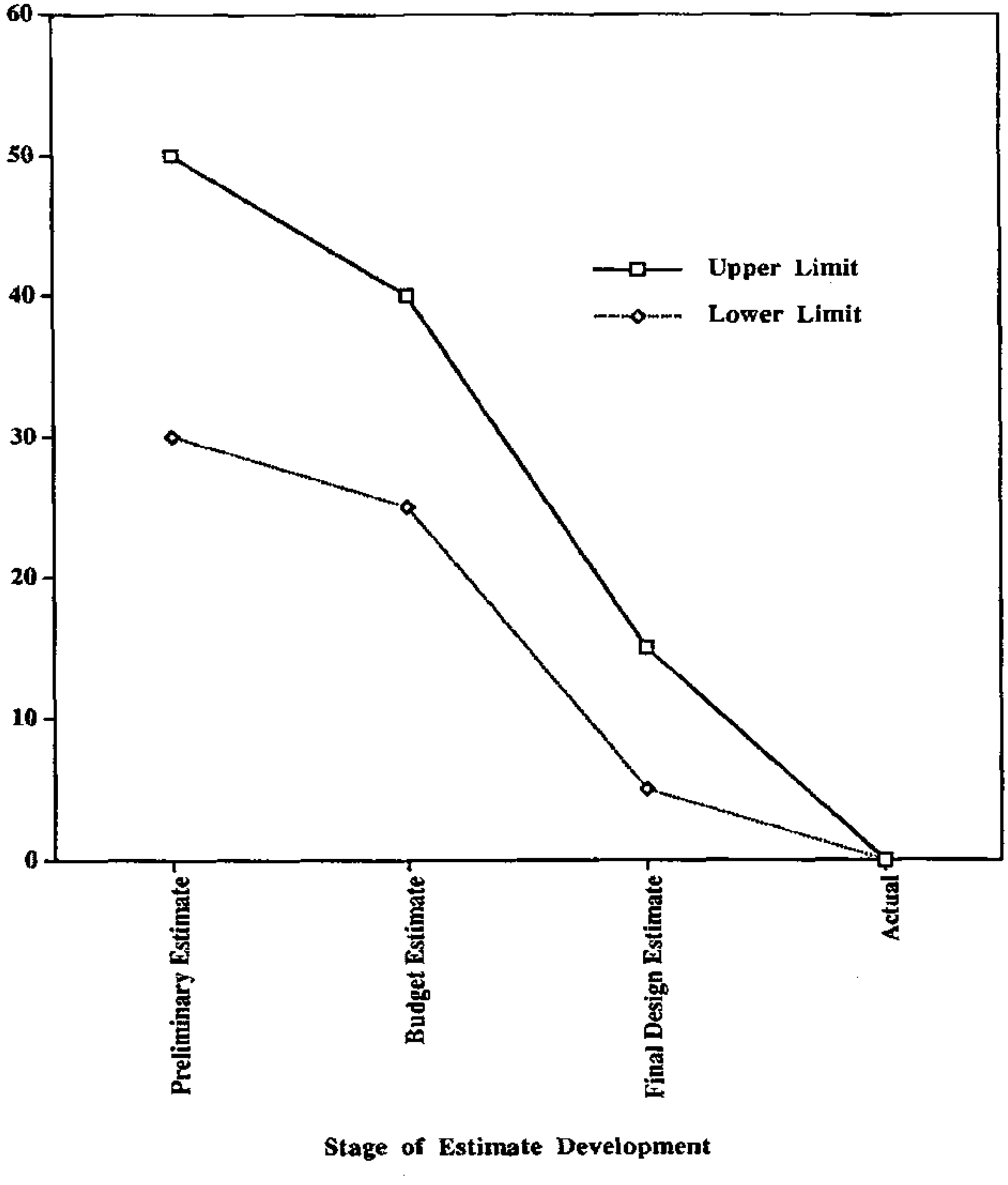


Figure 11-1. Contingency As a Function of Project Life

## B. Environmental Restoration Projects

Environmental restoration projects usually consist of an assessment phase and a remediation/cleanup phase. Contingency plays a major role in the cost estimates for both phases. Recommended contingency guidelines for each phase will be discussed below. Table 11-3 lists contingency guidelines for assessment and remediation/cleanup project phases.

### 1. Assessment Phase

Unlike the remediation phase, the assessment phase does not include the physical construction of a remedy. An assessment determines and evaluates the threat presented by the release and evaluates proposed remedies. As a result, the assessment encompasses such items as field investigations, data analysis, screening and evaluation studies, and the production of reports.

The degree of project definition will depend on how well the scope of the assessment is defined. Higher levels of project definition will correspond to increasing levels of work completed on the assessment. Since the assessment is one of the initial stages of the environmental restoration process, there is a high degree of uncertainty regarding the technical characteristics, legal circumstances, and level of community concern. As a result, the scope of the assessment often evolves into additional operable units, and more than one assessment may be required.

Other considerations that affect the section of contingency ranges are—

- number of alternatives screened and evaluated;
- level and extent of sampling analysis and data evaluation;
- technical and physical characteristics of a site; and
- level of planning required.

Table 11-3 shows the estimate types for the assessment phase of an environmental restoration project and their corresponding expected contingency ranges. No contingency ranges for planning estimates have been provided. The contingencies become smaller as the project progresses and becomes better defined. However, it should be noted that these are only general guidelines based on the level of project definition. A higher or lower contingency may be appropriate depending on the level of project complexity, technical innovation, market innovation, and public acceptance.

**Table 11-3. Contingency Guidelines for Environmental Restoration Projects**

| Activity and Estimate Type | Expected Contingency Range |
|---|---|
| Preliminary Assessment/Site Investigation<br>Planning Estimate for All Assessment Activities | Up to 100% |
| Preliminary Estimate for All Assessment Activities | 30% to 70% |
| Remedial Investigation/Feasibility Study<br>Detailed Estimate for All Assessment Activities | 15% to 55% |
| Planning Estimate for All Cleanup Phase Activities | 20 to 100% |
| **Contingency Guidelines for Remediation/Cleanup Phase** | |
| Pre-Design<br>Preliminary Estimate for All Remediation/Cleanup Phase Activities | Up to 50% |
| Remedial Design and Action<br>Detailed Estimate for All Remediation/Cleanup Phase Activities | 0% to 25% |

## 2. Remediation/Cleanup Phase

For the remediation/cleanup phase, contingency factors are applied to the remaining design work. Remaining design work will use the same contingency factor as established in the ROD, permit, or current baseline for the project. This contingency percentage will depend upon the degree of uncertainty associated with the project, particularly the degree of uncertainty in the scheduled completion dates.

Table 11-3 shows the estimate types for the remediation/cleanup phase and their corresponding contingency ranges. While the ranges are relatively broad, they reflect the amount of contingency that would have been needed for a set of completed projects. The wide variance accounts for differences in project definition when the estimate was generated, project complexity, technical innovation, and other factors.

Other considerations that affect the section of contingency ranges are:

- innovative technology;
- required reliability;
- equipment complexity;
- construction restraints due to continuity of operation security and contamination;
- environmental conditions (weather, terrain, location, etc.);
- scheduling; and
- other unique items to the project such as waste management permits and reviews.

Prior to the completion of a remedial/corrective measure design estimate, the contingency applied to remaining cleanup work will be no more than that established in the ROD, permit, or current baseline for that project. The percent contingency will depend upon the complexity of the work and the degree of uncertainties involved.

When the construction work is defined by definitive design but the cleanup contract has not yet been awarded, a 15 to 20 percent contingency will be provided on the estimated cost. Usually, the cost estimate is based on detailed drawings and bills of material. When the cleanup work is to be performed by a Cost Plus Award Fee contractor, and the contractor has prepared a detailed estimate of the cleanup cost, and it has been reviewed and approved, a contingency of 15 to 18 percent is applied to only that portion of the cost and commitments remaining to be accrued. On fixed-price cleanup contracts where no significant change orders, modifications, or potential claims are outstanding, a contingency of 3 to 8 percent of the uncompleted portion of the work is provided depending upon the type of work involved and the general status of the contract.

## C. Contingency Tools - Monte Carlo Analyses Methodology

Many tools are available to assist estimators with contingency. There is no required tool or program, but Monte Carlo analyses may be performed for all major system acquisitions. Monte Carlo or risk analysis is used when establishing a baseline or baseline change during budget formulation. The contingency developed from the Monte Carlo analyses should fall within the contingency allowance ranges in Table 11-1.

Monte Carlo analyses and other risk assessment techniques use similar methodology to obtain contingency estimates; however, for illustrative purposes, the ICECAN program developed for DOE will be discussed in this section.

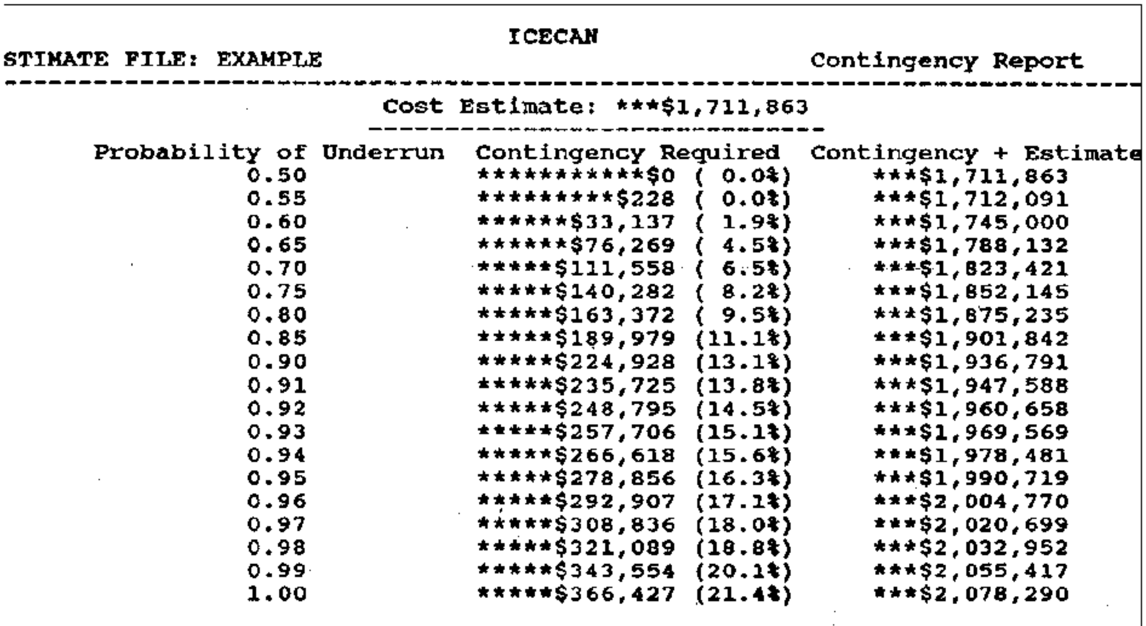
The estimator must subdivide the estimate into separate phases or tasks and assess the accuracy of the cost estimate data in each phase. After the project data have been input and checked, the computer program will calculate various contingencies for the overall project based on the probability project underrun. The random number generator accounts for the known estimate accuracy. Once the program has completed its iterations (usually 1000), it produces an overall contingency for the project with a certain accuracy.

The following information is an example project estimate that was input into the ICECAN program.

| | | |
|---|---|---|
| Base Cost | $1,000,000 | Fixed Price |
| Land Rights | 40% $100,000 to $250,000<br>40% $250,000 to $500,000<br>20% $500,000 to $600,000 | Step-Rectangular Distribution |
| Labor | 50% Less than $100,000<br>20% $100,000 to $200,000<br>30% $200,000 to $220,000 | Discrete Distribution |
| Profit | Mean = $235,000<br>Standard Deviation = $25,000 | Normal Distribution |

The distribution of the ranges is based on the estimator's judgment. For example, the base cost is a fixed price of $1,000,000 with no anticipated change orders. For landrights, there is a 40 percent chance the cost will be between $100,000 and $250,000, a 40 percent chance the cost will be between $250,000 and $500,000, and a 20 percent chance it will be between $500,000 and $600,000. A step-rectangular distribution was chosen.

The ICECAN program uses the mean cost calculated by the iterations as the base estimate. With the base estimate, there is a 50 percent probability that the project will be underrun. The results in Figure 11-2 show the contingency that should be used to achieve various probabilities overrun. For example, a contingency of 11.1 percent should be used to achieve an 85 percent probability of project underrun. Therefore, the total cost estimate would be $1,901,842. If the worst case cost of each variable had been used, the total estimate would be $2,080,000 or 21.5 percent contingency.



```
                                 ICECAN
STIMATE FILE: EXAMPLE                                   Contingency Report
--------------------------------------------------------------------------
                     Cost Estimate: ***$1,711,863
                     -------------------------------
   Probability of Underrun  Contingency Required  Contingency + Estimate
          0.50              ***********$0 ( 0.0%)      ***$1,711,863
          0.55              *********$228 ( 0.0%)      ***$1,712,091
          0.60              ******$33,137 ( 1.9%)      ***$1,745,000
          0.65              ******$76,269 ( 4.5%)      ***$1,788,132
          0.70              *****$111,558 ( 6.5%)      ***$1,823,421
          0.75              *****$140,282 ( 8.2%)      ***$1,852,145
          0.80              *****$163,372 ( 9.5%)      ***$1,875,235
          0.85              *****$189,979 (11.1%)      ***$1,901,842
          0.90              *****$224,928 (13.1%)      ***$1,936,791
          0.91              *****$235,725 (13.8%)      ***$1,947,588
          0.92              *****$248,795 (14.5%)      ***$1,960,658
          0.93              *****$257,706 (15.1%)      ***$1,969,569
          0.94              *****$266,618 (15.6%)      ***$1,978,481
          0.95              *****$278,856 (16.3%)      ***$1,990,719
          0.96              *****$292,907 (17.1%)      ***$2,004,770
          0.97              *****$308,836 (18.0%)      ***$2,020,699
          0.98              *****$321,089 (18.8%)      ***$2,032,952
          0.99              *****$343,554 (20.1%)      ***$2,055,417
          1.00              *****$366,427 (21.4%)      ***$2,078,290
```

**Figure 11-2. Contingency Data Results**

②

# COST-COMPETITIVE CONSTRUCTION MANAGEMENT: A REVIEW OF CORPS OF ENGINEERS CONSTRUCTION MANAGEMENT COSTS

Report AR603R3

June 1990

William B. Moore
Jeffrey A. Hawkins

Prepared pursuant to Department of Defense Contract MDA903-85-C-0139. The views expressed here are those of the Logistics Management Institute at the time of issue but not necessarily those of the Department of Defense. Permission to quote or reproduce any part must – except for Government purposes – be obtained from the Logistics Management Institute.

LOGISTICS MANAGEMENT INSTITUTE
6400 Goldsboro Road
Bethesda, Maryland 20817-5886

## TABLE C-7

## SUMMARY OF CONSTRUCTION MANAGEMENT FEE

(As percent of construction contract)

| Characteristic | Construction management fee | | | Number of projects | Number of companies |
|---|---|---|---|---|---|
| | 25th | Median | 75th | | |
| **Overall** | 2.9% | 4.7% | 7.6% | 196 | 29 |
| **Size of company** | | | | | |
| 1 - 5 | 4.6 | 5.3 | 11.9 | 9 | 2 |
| 6 - 10 | 3.5 | 5.2 | 7.1 | 43 | 8 |
| 11 - 15 | 3.6 | 4.0 | 5.0 | 8 | 2 |
| 16 - 25 | 0.7 | 3.2 | 9.7 | 48 | 5 |
| 26 - 50 | 3.8 | 4.9 | 7.3 | 40 | 5 |
| 51 - 100 | 3.8 | 6.4 | 11.0 | 13 | 2 |
| Over 100 | 2.0 | 4.5 | 6.7 | 35 | 5 |
| **Type of company** | | | | | |
| General contractor (GC) | 2.9 | 2.9 | 2.9 | 1 | 1 |
| CM firm | 2.2 | 4.6 | 8.0 | 113 | 13 |
| Architect engineering firm (AE) | 2.0 | 2.3 | 3.3 | 9 | 1 |
| GC/CM | 3.3 | 4.4 | 6.4 | 47 | 8 |
| CM/AE | 4.4 | 7.0 | 8.4 | 19 | 5 |
| Other | 3.2 | 4.8 | 11.7 | 7 | 1 |
| **Client base** | | | | | |
| Government | 2.3 | 4.8 | 7.4 | 71 | 11 |
| Private sector | 2.8 | 4.5 | 8.0 | 106 | 15 |
| Mixed | 3.6 | 5.0 | 6.7 | 19 | 3 |

May 1994

# U.S. Army Corps of Engineers Military Construction Management Costs

CE309R1

Jordan W. Cassell
Jeffrey A. Hawkins

Prepared pursuant to U.S. Army Corps of Engineers Contract DACW31-90-D-0076. The views expressed here are those of the Logistics Management Institute at the time of issue but not necessarily those of the U.S. Army Corps of Engineers. Permission to quote or reproduce any part except for Government purposes must be obtained from the Logistics Management Institute.

Logistics Management Institute
2000 Corporate Ridge
McLean, Virginia 22102-7805

Table C-6 is a summary of the CM fees for all projects by size of company, type of company, and client base. This analysis supports the earlier statement that the CM fee is not affected by the size of the company. However, this table indicates that the pure CM companies are providing CM services at the least cost regardless of the type of construction project. Also, CM companies providing services primarily for the government are doing so at lower cost than those CM companies providing services primarily for the private sector.

**Table C-6.**
*Summary of Construction Management Fee*
*(as a percentage of construction contract)*

| | CM fee | | | Number of projects | Number of companies |
|---|---|---|---|---|---|
| | 25th | Median | 75th | | |
| Overall | 3.5% | 5.0% | 7.1% | 187 | 33* |
| Size of company (number of employees) | | | | | |
| 1 - 5 | 2.4 | 5.0 | 6.6 | 21 | 4 |
| 6 - 10 | 4.5 | 5.9 | 10.5 | 29 | 5 |
| 11 - 15 | 4.6 | 6.0 | 8.1 | 17 | 5 |
| 16 - 25 | 4.0 | 4.8 | 5.5 | 24 | 4 |
| 26 - 50 | 3.6 | 4.9 | 7.5 | 33 | 6 |
| 51 - 100 | 4.6 | 5.4 | 9.6 | 12 | 2 |
| 101 - 250 | 2.6 | 6.8 | 10.3 | 6 | 1 |
| 251 - 500 | 4.2 | 5.7 | 9.1 | 16 | 2 |
| Over 500 | 1.2 | 2.5 | 6.0 | 29 | 4 |
| Type of company | | | | | |
| CM firm | 3.7 | 5.0 | 7.2 | 108 | 20 |
| GC/CM firm | 4.5 | 5.1 | 8.6 | 30 | 5 |
| A-E/CM firm | 2.2 | 4.5 | 6.7 | 49 | 8 |
| Client base | | | | | |
| Government | 2.8 | 4.6 | 6.1 | 92 | 17 |
| Private sector | 3.6 | 5.0 | 8.3 | 42 | 9 |
| Mixed | 3.8 | 5.7 | 9.9 | 53 | 7 |

*Two companies did not provide fee information.

Table C-7 summarizes the CM services provided during each construction project, by survey participants, for all projects. In addition, the table shows the relative weight associated with each phase of CM as it relates to the total cost of the CM contract. The results indicate that the level of services provided during the CM projects has increased from that provided during a 1989 survey. Since the level of service is a major determinant of the total CM cost, the higher level of services would account for the fact that the CM fee determined by the current survey was slightly higher than that calculated from the 1989 survey.

# Debris Estimating Field Guide

FEMA 329 / September 2010

FEMA

## BUILDINGS AND RESIDENCES

### *General Building Formula*

To estimate the amount of debris generated by a building, multiply the building length, width, and height in feet by a constant of 0.33 to account for the air space in the building, and divide the resulting number by 27 to convert from cubic feet to cubic yards:

$$\frac{\text{Length} \times \text{Width} \times \text{Height} \times 0.33}{27} = \text{CY}$$

### *Single Family Residence Formula*

FEMA conducted an empirical study following Hurricane Floyd in North Carolina in 1999, and developed a formula for estimating debris associated with demolished single family residences:

$$\text{Length} \times \text{Width} \times \text{S} \times 0.20 \times \text{VCM} = \text{CY}$$

Length and Width must be in feet
S = number of stories in the building
0.20 = a constant based on the study data
VCM = a vegetative cover multiplier

The building square footage used in the formula is the total living space at and above ground level and includes attached garages.

If buildings or residences are completely destroyed, square footage can still be calculated by measuring the length and width of the foundation and inquiring about the number of stories that were present before the disaster.

## CONVERSION FACTORS

USACE has developed several conversion factors for converting between tons and cubic yards of debris that FEMA has determined are reasonable:

Construction and demolition debris:
  1 ton = 2 CY

Mixed debris:
  1 ton = 4 CY

Vegetative debris:
  Hardwoods: 1 ton = 4 CY
  Softwoods: 1 ton = 6 CY

**Actual conversion values for a particular disaster may be very different; therefore, field tests coordinated with the State and applicant may be necessary to confirm an appropriate conversion factor.**

## AERIAL ESTIMATES

Applications where debris estimates based on aerial or satellite photography may be appropriate include:

- Rough estimates that must be developed quickly, such as for a PDA
- Validation or extrapolation of debris estimating information obtained through ground measurements or computer models

RBN Energy LLC

# “WOOO – PIG – SOOIE!” - The Business of Pipeline Integrity II

Thursday, 10/31/2013
Published by: Callie Mitchell

The oil and gas pipeline industry depends on “Pigs” (pipeline integrity gauges) to verify pipelines. They help avoid leaks, fractures and costly unscheduled service interruptions. As massive new oil and gas pipeline construction continues in the US and as existing pipelines get older the pig business is becoming more valuable. But like anything else, they aren’t perfect; and pigging experts and pipeline operators are motivated to make them better. Today we continue our analysis of the pig business with a look at what some of the movers and shakers are doing to support new demands and challenges in this booming industry.

In the first part of this series, “**WOOO – PIG – SOOIE!” – The Business of Pipeline Integrity***(http://www.rbnenergy.com/woo-pig-sooie-the-business-of-pipeline-integrity)*” we talked about how oil and gas products have been traveling through pipelines for about 100 years. Pigs have been responsible for keeping pipelines clean and operational since the 1940s, when WWII emergency pipelines (carrying crude and refined products overland to avoid submarine attacks) needed a way to eliminate the buildup of contaminants. Pigs are by far the most dependable pipeline integrity technology today and account for over 90% of all petroleum liquid pipeline inspections (the other 10% is hydro pressure testing and direct assessment). Pigging is big business and while most manufacturers are enjoying the fruits of the current energy boom, they also have plenty of challenges. Companies like TD Williamson, Girard, Enduro, and Inline Services are aggressively competing to provide the best and most effective pig and/or pig support products out there.

## More Big Pig Business

Included in the larger pig industry family are pipe manufacturers, pipeline construction companies, pipeline operators, pipeline service providers, state and federal regulators and pig manufacturers. In recent years, there has been increased scrutiny and regulation of the pipeline business for environmental and public safety reasons. Market players need to pay attention to these concerns at the same time as they keep a tight lid on costs.

In addition to pig cleaning and gauging service, and smart pigging or Inline Inspection (ILI) pigs also require specialty support products and services to make them work. These include pig traps (where the pig goes into and out of the pipe), launching and receiving stations, and pig trackers and signalers. Third party suppliers that are not pig manufacturers typically provide these ancillary services.

Inline Services and Girard are top cleaning and gauge pig manufacturers. T.D. Williamson and Enduro Pipeline Services produce pigs that pretty much cover the gamut; cleaning, gauging, batching, and smart pigs that include varying specialized design and technologies. The latest smart pig technologies include Deformation (DEF) that is specific to finding dents, Magnetic Flux Leakage (MFL) specific to corrosion, and Multi Data Set (MDS) for multiple discoveries like dents, corrosion and seam defects. New ultrasonic tools are proving even better than traditional MFL tools for finding corrosion and cracks. Unfortunately, they can only be run in a liquid medium pipeline such as oil, water or diesel – not in a gas pipeline. TD Williamson and others have also been working on perfecting Electro Magnetic Acoustic Transducer (EMAT) technology, which can be run in gas lines. We should see these in the marketplace soon.

## Top Pigging Challenges

The following are some of the industry's top challenges:

- **Pigging is not cheap:** An industry expert shared this typical example to illustrate: To chemically clean (cleaning pig) a 24" 15 mile gas pipeline would cost between $210,000 - $250,000 plus a disposal fee of $25,000 - $30,000. This cleaning is typically done before an ILI smart pig operation that costs another $100,000. So the total pigging cost on that 15 miles of pipeline would be $335,000 - $380,000 or roughly $35,000 per mile. To get an idea of how much money can be spent on pigging you can extrapolate that $35,000/mile number to arrive at $59 billion to run this standard pigging operation on all US pipelines one time.
- **Pigs are labor intensive:** Each pig can only handle a few miles at a time on average. Also, they can be quite messy and generate problems for downstream equipment if not filtered properly. They are generally used in "in-service" pipelines necessitating lots of careful planning for operations. Each time a pig is launched, it can take two or three man hours of preparation prior to each launch and some pigging projects require 50-60 launches or more. A typical pigging system requires the opening and/or closing of at least three major valves, the draining and venting of a barrel, and the opening and closing of a closure door. In some cases, it can take up to four hours for a single crew to load and launch a single pig (and that doesn't even include the time to receive and remove the pig). Beyond the time and labor constraints, there are also wear and safety considerations. And of course, should there be any problems with the process, all of this must be done again.
- **Pigs do not catch every glitch in every pipe:** While smart pigs do spot corrosion and potential areas of concern, they can miss pinholes and/or corrosion that is less than 1" in size. And if a cleaning pig does not clean the pipe before the smart pig does its thing, those "misses" multiply. Cleaning pigs generally go hand in hand with smart pigging programs.
- **Not all pipes are piggable:** Many pipelines or parts of pipelines out there simply can't accommodate pigs at all. These are often referred to as "unpiggable" or "not-so-piggable" pipe. There are several reasons for a pipe to be considered unpiggable, including: (1) it has no access for the pig; (2) it has multiple diameters; (3) it has impassable valves or fittings, or valve restrictions; (4) the pipe bends; (5) there are external pipe defects, and/or (6) there is a buildup of contaminants preventing the pig from moving. Of the 2.4 million miles of pipeline in the U.S., roughly 30% falls into the unpiggable category and another 10% are considered "difficult to pig".

# 192.727 Abandonment or Deactivation of Facilities

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## 1.0 Purpose

This procedure describes the minimum requirements for in-place abandonment of natural gas pipeline facilities and the requirements for isolating gas containing facilities from a customer's facilities when gas service is discontinued for other than routine operation or maintenance needs. This procedure is used to comply with the Pipeline and Hazardous Materials Safety Administration (PHMSA) 49 CFR §§ 192.727(b), (c), (d), (e) and (g).

## 2.0 Scope

This procedure applies to all natural gas pipeline facilities in the United States that are operated by TC Energy.

## 3.0 References

- 49 CFR 195.450 (Definition of navigable waterways)
- O&M Procedure 191.29 National Pipeline Mapping System
- Deactivation or Abandonment of Pipelines and Related Equipment (EDMS# 1016199526)
- TES-PR-WESTS-G Storage Well Abandonment Specification (CDN-US-MEX) (EDMS# 008372608)

## 4.0 General

1. Abandoned transmission facilities are disconnected from all sources of gas, purged, and removed from service in accordance with this procedure and are handled on an individual basis.
2. Deactivated facilities are inspected and maintained as required by this and other O&M Procedures.
3. Records and necessary field checks are made to ensure that pipelines scheduled for abandonment are disconnected from all sources and supplies of gas such as other pipelines, crossover piping, meter stations, and control lines.
4. Abandonment is not completed until it has been determined that the volume of natural gas or liquid hydrocarbons contained within the abandoned section is of no potential hazard. If air is used as the purging medium, precautions are taken to ensure that a combustible mixture is not present after purging.
5. Abandoned offshore pipelines are filled with water or inert materials and the ends are sealed.
6. All valves left in an abandoned pipeline segment are closed and blinded, if practical.
7. Abandoned pipe left underground has the ends adequately sealed with a cap, foreman's plug, or equivalent after purged of gas or filled with an inert material.
8. Abandoned compressor stations suction and discharge valves are closed and blinded or capped. Vent valves inside the station are left open to prevent the build up of gas vapors.
9. For abandoned pipelines:

- When practical, all above-grade valves, risers, piping, vaults, and valve box covers are removed.
- Each underground pit for valves, pressure relieving/limiting stations which is abandoned is filled with a suitable compacted material.
- For onshore natural gas pipeline facilities that cross over, under, or through a commercially navigable waterway, a report is filed to PHMSA upon abandonment of the facility. Information in the report contains all reasonably available information related to the facility, including information in the possession of a third party. The report contains the location, size, date of abandonment, method of abandonment, and a certification that the facility has been abandoned in accordance with all applicable laws.
    - Submissions are made in accordance with O&M Procedure 191.29 upon the abandonment of the facilities defined above.

10. If practical, all abandoned meter risers and headers are dismantled and removed from the site.
11. When service to a customer is discontinued, one of the following occur:
    - If a valve is closed to prevent flow to the customer, it is locked to prevent unauthorized opening.
    - The customer's piping is physically disconnected from the gas supply and the open ends sealed.
12. All abandonments are conducted in accordance with all environmental procedures.
13. Deactivated facilities are handled as stated in Paragraphs 3 and 4 above, except that if water is used, the water contains a corrosion inhibitor. If the facility is presently cathodically protected, it continues to be cathodically protected while inactive.
14. Local one-call laws may require operators to maintain maps, drawings, diagrams, or other records of underground facility abandoned or out-of-service. In these cases, information about the approximate location of abandoned and out-of-service facilities is provided to an excavator in response to a one-call notification.

## 5.0 Documentation/Reporting Requirements

- Abandonment documentation is retained for five years if TC Energy gives up the right-of-way; this documentation is otherwise kept for the life of the facility or until TC Energy relinquishes rights to the right-of-way.

## 6.0 Definitions

***Commercially navigable waterway*** means a waterway where a substantial likelihood of commercial navigation exists.

## 7.0 Responsibilities

The US Gas Operations or the Project Manager submits proper documentation requesting facilities to be abandoned to the rates and regulatory affairs or legal groups, as applicable.

The Area Manager ensures compliance with this procedure. Project Management and Construction Management are responsible for making, collecting, and retaining records.

The rates and regulatory affairs or legal groups, as applicable, provide authorization to area office(s) and operating departments for abandonment of facilities.

Technical and Operational Services files a report, as required, for the offshore and onshore natural gas pipeline facilities that cross over, under, or through a commercially navigable waterway. The report is submitted to the National Pipeline Mapping System or alternatively to the PHMSA Information Resources Manager.

| TC ENERGY OPERATING PROCEDURE (PROCEDURE) | | | | TC Energy |
|---|---|---|---|---|
| Title: Deactivation or Abandonment of Pipelines and Related Equipment | | | | |
| Revision: 01 | Publish Date: 2021/04/01 | Status Published: | Driver: Regulatory | Page 1 of 15 |

**Document Contact:** Kevin Foreman

## 1.0 PURPOSE

The purpose of this Procedure is to outline the procedures for placing natural gas and liquid (oil) pipelines into an inactive, deactivated, or abandoned state.

For the purposes of this document, *pipeline* means all parts of physical facilities through which product moves in transportation, including pipe, valves and other appurtenances attached to pipe, compressor units, pump stations, metering stations, regulator stations, and fabricated assemblies (49 CFR 192.3 and 49 CFR 195.2 definitions). The pipeline can be in any type of service including transmission, storage, gathering, or production.

Where appropriate contact Measurement Engineering or Engineering Reliability to remove any relevant SCADA or PI System polling and displays related to the affected facilities and to evaluate stations for aboveground assets that need to be removed.

To the extent feasible, the Company must assure that abandoned facilities do not present a hazard to people, property or the environment.

## 2.0 SCOPE

This Procedure applies to assets that are wholly owned and operated by TC Energy in the U.S.

This Procedure applies to the following:

1. Inactive pipelines:
   - isolated from flowing product by closing valves
   - may contain pressure or product
   - may also be referred to as idle, inactive, decommissioned, Shut-Off Left on Premises (SOLOP), or Temporary Out-of-Service (TOS)
   - maintained per TC Energy procedures the same as an active pipeline
2. Deactivated pipelines:
   - removed from service
   - do not contain pressure or product
   - maintained per TC Energy procedures for potential return to service
3. Abandoned pipelines:
   - Permanently disconnected from all sources and supplies of gas or liquids; purged of gas or liquids and sealed at the ends. However, the pipeline need not be purged when the volume of gas is so small that there is no potential hazard.
   - not maintained per TC Energy procedures
   - may be abandoned in place or physically removed

## 3.0 REFERENCES

- All TOP documents can be accessed from the Controlled Document Library.
  **Note:** TOP documents referenced in this document will have their titles underlined and can be opened up by using the hyperlink below or going to the Controlled Document Library using the above link.
- *Technical and Physical Management of Change Procedure (CAN-US-MEX)* (EDMS No. 007728761)
- *Natural Gas Meter Station Change of Status Procedure (US)* (EDMS No. 1014498304)
- *TC Energy Operator Qualification Program* (EDMS No. 004504739)
- *Pipeline Crossing and Encroachment Procedure (US)* (EDMS No. 003858625)
- *Pipeline Right of Way Procedure* (EDMS No. 003864106)
- *Gas Handling Procedures (US)* (EDMS No. 1017976286)
- *Purge, Blow Down and Return to Service Plan Template (US)* (EDMS No. 1019017900)
- *Portable Gas Detection of the Atmosphere* (EDMS No. 003835957)
- *TEP-IN-REP-G Pipeline Repair Procedure (US)* (EDMS No. 1014961618)
- *TEP-ME-PE-G Polyethylene Pipe Installation and Repair Procedure (US)* (EDMS No. 1014217889)
- *TransCanada Signage Procedure* (EDMS No. 003887955)
- *TES-CI-FCRET-GLE Flowable Fill Specification (CAN-US)* (EDMS No. 005848209)
- *TES-CT-GEN-G Pipeline Construction Specification (US-MEX)* (EDMS No. 1013154643)
- *Liquid Pipeline Isolation Procedure* (EDMS No. 003671250)
- *Project Documentation Integrity Requirements Plan (US)* (EDMS No. 1016680973)
- *Pipeline Integrity Record Management Procedure (CDN-US-MEX)* (EDMS No.: 006786463)
- *Operations and Maintenance Manual – US Natural Gas Pipelines and Underground Natural Gas Storage Facilities* (EDMS No. 005404490)

  Natural Gas O&M procedure 191.29 National Pipeline Mapping System

  Natural Gas O&M procedure 192.605(b)(3) Construction Drawings, Maps and Operating History

  Natural Gas O&M procedure 192.614 *Damage Prevention Program*

  Natural Gas O&M procedure 192.727 Abandonment or Deactivation of Facilities
- *Operations and Maintenance Manual – Hazardous Liquid Pipelines U.S.* (EDMS No. 005713585)

  Liquids O&M procedure 195.59 Reporting Abandonment or Deactivation of Facilities

  Liquids O&M procedure 195.402(c)(10) *Abandoning Pipeline Facilities*

  Liquids O&M procedure 195.402(c)(11) Minimizing Likelihood of Accidental Ignition

  Liquids O&M procedure 195.404 *Maps and Records*

**Industry and Regulatory Standards:**

- American Gas Association (AGA) *Gas Pressure Technology Committee (GPTC) Guide Material*
- NPMS *Standards for Pipeline and Liquified Natural Gas Operator Submissions*
- PHMSA Advisory Bulletin ADB-2016-05 *Pipeline Safety: Clarification of Terms Relating to Pipeline Operational Status*

## 4.0 PROCEDURE

| | |
|---|---|
| 4.1 | Regulatory Requirements |
| 4.2 | Planning |
| 4.3 | Isolation, Blowdown, and Blind Flange |
| 4.4 | Deactivation |
| 4.5 | Abandonment |

**Notes:**

1. Each activity should be performed after reviewing the appropriate TOPs (e.g., Safety, Environmental, Health, Hygiene, etc.).
2. When service to a customer is discontinued, the pipe will either be:
    a. deactivated as per section 4.4 of this Procedure
    b. abandoned as per section 4.5 of this Procedure
3. Unless otherwise specified by Integrity Engineering Services (IES), Reliability, Measurement & Regulation, or Compressor, pipelines that have been out of service for more than 12 months will be either:
    a. deactivated as per section 4.4 of this Procedure
    b. abandoned as per section 4.5 of this Procedure

**Hazards:**

The following hazards are related to this Procedure:

- trapped gas
- liquid hydrocarbons
- inadequate isolation of facility

## Qualification Requirement(s):

Employees performing covered tasks under 49 CFR 192 Subpart N or 49 CFR 195 Subpart G must be qualified in accordance with the *Operator Qualification Program* (EDMS No. 004504739). Depending on the project, tasks in the following table may apply:

**Table 4-1: Operator Qualifications (As Applicable)**

| Task # | Title |
|---|---|
| OQ 202 | Monitoring of Welding Process |
| OQ 203 | Visual Inspection of Welds not Non-Destructively Tested |
| VF007 | Operate Valves (Gas Pipeline) |
| VF208 | Plastic Pipe Joining: Butt Fusion |
| VF209 | Plastic Pipe Joining: Mechanical Joining |
| VF214 | Joining of Steel Pipe: Threaded Connections |
| VF215 | Joining of Steel Pipe: Flanged Connections |
| VF216 | Joining of Steel Pipe – Coupling Connections |
| VF602 | Monitor Pipeline Pressure (Gas Pipeline) |
| VF602HL | Monitor Pipeline Pressure (Hazardous Liquids) |
| VF614 | Purge Pipelines Facilities with Air or Inert Gas (Gas Pipeline) |
| VF614HL | Purge Pipeline Facilities with Air or Inert Gas (Hazardous Liquids) |

## Special Resources:

The Document Owner has presently not identified any special resources for stakeholders with respect to this document.

## Safety:

- Prior to beginning work, review the entire Procedure, identify any associated safety hazards, and take appropriate steps to mitigate those hazards using the Job Safety Analysis (JSA).
- Obtain the current Safety Data Sheets (SDS) to determine proper PPE, transportation, and handling requirements for cleaning chemicals and pipeline fluids.
- Use gas detection equipment to check atmosphere inside of facilities.

## Applicable Life Saving Rules:

- We will use the appropriate Personal Protective Equipment.
- We will conduct a pre - Job Safety Analysis (JSA).
- We will work with a valid Work Permit when required.
- We will obtain authorization before entering a confined space.

- We will verify isolation before work begins.
- We will protect ourselves against a fall when working at heights.
- We will control excavations and ground disturbances.

## 4.1 Regulatory Requirements

The following table describes the operations and maintenance requirements for inactive, deactivated, and abandoned in place or removed pipelines.

**Table 1: Regulatory Requirements for Inactive, Deactivated and Abandoned Pipelines**

| Inactive with Gas or Product (Gas only) | Inactive with Inert Gas (Gas only) | Deactivated (Gas & Liquid) | Abandoned in Place (Gas & Liquid) | Abandoned (Pipe Removed) (Gas & Liquid) |
|---|---|---|---|---|
| • patrols<br>• One Call<br>• signage<br>• valve inspections<br>• cathodic protection (CP) readings<br>• atmospheric corrosion inspections<br>• leak surveys | • patrols<br>• One Call<br>• signage<br>• valve inspections<br>• CP readings<br>• atmospheric corrosion inspections<br>• leak survey not required | • patrols<br>• One Call<br>• signage<br>• valve inspections<br>• CP readings<br>• atmospheric corrosion inspections<br>• leak survey not required | • no O&M requirements<br>• disconnect pipeline and related equipment from all sources of supply and delivery<br>• keep most pipeline markers in place<br>• One Call | • no O&M requirements<br>• disconnect pipeline and related equipment from all sources of supply and delivery<br>• pipeline markers not required<br>• One Call not required |

## 4.2 Planning

Depending on the project, determining project-specific deactivation or abandonment requirements may include consultation with the following:

- Project Manager
- Engineering
- Operations
- Health, Safety and Environment
- Environmental Planning and Permitting
- Land
- Commercial Services
- Legal

### 4.2.1 Geotechnical Issues

Geotechnical issues must be examined on a site-specific basis.

### 4.2.2 Right-of-Way Agreement and Legal Restriction Review

The right-of-way (ROW) agreement and other applicable legal documents should be reviewed to determine if there are any contractual agreements regarding removal or abandonment of the facility.

### 4.2.3 Domestic or Commercial Gas Customer Services

4.2.3.1 Service equipment for gas customers such as farm taps are the responsibility of the local distribution company (LDC) in most cases. For facilities operated by the LDC, the LDC is responsible for taking the actions in Section 4.3 before the abandonment of the Company pipeline or tap can take place.

4.2.3.2 If a service to an LDC customer is scheduled to be abandoned, Company personnel must contact the LDC before abandonment and receive approval in writing.

4.2.3.3 Abandonment of farm taps may also require FERC authorization.

4.2.3.4 Abandonment for customer service lines must meet the requirements of 49 CFR 192.727(d) which includes (paraphrased):

(1) The valve closed to prevent the flow of gas to a customer must be provided with a locking device or other means designed to prevent opening of the valve by unauthorized personnel

(2) Installing a mechanical device or fitting to prevent the flow of gas in the service line or meter assembly.

(3) Customer piping must be physically disconnected from the gas supply and the open pipe ends sealed.

Depending on operational responsibility, these may be the responsibility of the LDC or the Company.

4.2.3.5 Abandoned consumer taps must be marked with an approved marker per *TransCanada Signage Procedure* (EDMS No. 003887955) unless an exception is approved by IES.

4.2.3.6 Pipeline taps used for farm taps to be abandoned must be removed or encapsulated unless an exception is approved by IES. See *TEP-IN-REP-G Pipeline Repair Procedure (US)* (EDMS No. 1014961618).

## 4.3 Isolation and Disconnection before Deactivating or Abandoning Pipelines

The following steps will be undertaken for any pipeline to be deactivated or abandoned. This Procedure may be modified for the site-specific situation.

Purging activities require a written purge plan; see *Gas Handling Procedures (US)* (EDMS No. 1017976286), *Purge, Blow Down and Return to Service Plan Template (US)* (EDMS No. 1019017900) and *Liquid Pipeline Isolation Procedure* (Item ID. 003671250).

1. Isolate and blow down, drain the pipeline to be deactivated or abandoned.

2. Purge the pipeline of all combustible gas or other product or liquids.

   **Notes:**

   A natural gas pipeline need not be purged where the volume of gas is so small that there is no potential hazard.

3. If air is the medium used for purging, the purge will continue until any remaining gas/air mixture is below the Lower Explosive Limit (LEL) for natural gas.
4. If there are known liquid or solid residues in the pipe that may combine with air to create a combustible mixture, the pipe will be purged with nitrogen or other inert material prior to capping/blind flanging.
5. Comply with all Environmental and Regulatory requirements.
6. If any modifications are to be made to the facility such as flame cutting, welding on plates or caps, etc., the facility must be purged.
7. Disconnect the pipeline or facility from all sources and supplies of gas or product.
8. Cap or blind flange the adjacent in-service pipeline system connections with pressure-rated fittings commensurate with the MAOP or MOP, and non-destructively inspect welds, as required.

## 4.4 Deactivation

Once the pipeline section has been isolated and disconnected from any operating facility and all sources and supplies of product, the following steps will be undertaken:

1. Clean the pipeline if necessary (i.e., purge with air or non-combustible gas, or use a cleaning pig).
2. If air is used for purging, test with gas detection equipment to ensure that there is no combustible mixture left in the pipe. See *Portable Gas Detection of the Atmosphere* (EDMS No. 003835957).
3. Leave the pipeline in a safe condition.
4. Ensure all open ends are capped.
5. Fill with an inert gas (i.e., nitrogen) to a pressure between 15 to 30 psig, for longer term deactivation if deemed appropriate.
6. Where applicable, install a gauge connection at each end of the deactivated pipe section to monitor inert gas pressure through ongoing maintenance activities.
7. Maintain CP (conduct annual surveys, inspect rectifiers and bonds, etc.).
8. Maintain warning signs and markers as outlined in Procedures *Pipeline Crossing and Encroachment Procedure (US)* (EDMS No. 003858625) and *Pipeline Right of Way Procedure* (EDMS No. 003864106).
9. Treat the same as in-service pipelines for One Call, locating, marking, and excavating.

**Note:**

All mandatory work must continue per the appropriate O&M Manual and documented in SAP until the line is formally abandoned or returned to service.  For pipe sections that will be deactivated for periods greater than 12 months, annually confirm the suitability of the deactivation methods used for corrosion control and other maintenance activities.

## 4.5 Abandonment

The Project Team is responsible for ensuring a written abandonment plan is prepared and implemented. The following will be considered as part of the project approval process:

- In environmentally sensitive areas such as water bodies, cultural resource areas, wetlands, and others, the Environmental Planning and Permitting Team, and Liquids Emergency Management and Environmental Services, must be consulted.
- Confirm whether FERC approval is required before the facility is abandoned.
- Abandoned pipeline facilities do not fall under 49 CFR 192 or 49 CFR 195 maintenance requirements. For pipelines abandoned in place, confirm requirements for line markers and state One Call, including maintaining GIS mapping.

Once a pipeline section has been isolated and disconnected from any operating facility and all sources and supplies of product, the site-specific abandonment requirements (depending on land use, pipe integrity, pipe size, etc.) can include, but are not limited to the following:

### 4.5.1 Cleaning

1. Clean the pipeline as necessary (i.e., using a cleaning pig) to meet all applicable guidelines and regulatory requirements.
2. Contact the Environmental Coordinator for specifics on collecting, sampling, and disposing of material (solids and liquids). Special handling may be required for PCB-contaminated pipelines.

### 4.5.2 Pipeline Abandonment in Place

Pipelines and pipeline facilities may be abandoned in place in the following situations:

- Where allowed by local regulations and ROW easement restrictions.
- Under roads, railroads, and other transportation systems where removal would require disruption of normal traffic. State and local requirements are to be followed.
- In areas where a pipeline segment is not accessible due to an aboveground structure located over or immediately adjacent to the pipeline segment.
- When the pipeline or facility cannot be removed in a safe manner due to terrain and the presence of adjacent in-service facilities.
- In areas where removal would result in significant environmental disruption to an otherwise stabilized area such as clearing of timber or construction of access roads to facilitate the removal.
- In areas where the abandoned pipe is to be used as a CP ground bed.
- In areas where the abandoned pipe is to be used as a casing for inserted pipe. Casing vents may need to be installed.
- In areas where removal would result in significant disturbance or disruption to landscaped or agricultural areas.

- For the Keystone System, refer to the *Pipeline Integrity US Liquid Commitments and Ongoing Conditions Practice (US)* (EDMS No. 006792404).

### 4.5.3 Procedure:

1. Remove all liquids from the line (including drips and appurtenances) before abandonment.
2. Disconnect the line from all sources and supplies of gas or product and purge.
   a. Cap or plug, and encapsulate underground taps or connections, including small diameter tap valves, left in place on an active steel or plastic pipeline unless otherwise specified by IES and according to either:
      - *TEP-IN-REP-G Pipeline Repair Procedure (US)* (EDMS No. 1014961618)
      - *TEP-ME-PE-G Polyethylene Pipe Installation and Repair Procedure (US)* (EDMS No. 1014217889)

      *Note: Location of taps are documented per Section 5.0*

   b. Remove underground taps or connections on an active plastic pipeline and replace with pipe unless otherwise specified by IES.
   c. Taps that are abandoned should be marked with an above ground line marker. Where an above ground line marker is not practical, check with IES for alternate solutions.
3. Remove all above-grade appurtenances and all supporting structures including exposed pipe unless prohibited by environmental permits.
4. Remove piping, valve boxes and other appurtenances from underground structures and backfill with a suitable compacted material.
5. Seal any open ends or other openings made in the pipe during the abandonment procedures. Acceptable methods to seal pipeline openings include:
   - using normal end closures (such as welded or screwed caps, screwed plugs, blind flanges, mechanical joint caps, and plugs)
   - welding steel plates to pipe ends or opening
   - welding the pipe coupon removed from the opening back into the opening
   - using concrete plugs
6. Ensure rail and roadway abandonment crossings comply with the specifications and requirements of the railroad or governmental agencies that have jurisdiction. Unless specified otherwise by the agencies, these crossings will be capped outside of the rail or roadway ROWs and then filled with grout.

   **Note:**

   Grouting abandoned pipelines may be required as part of the permit.
7. Ensure all river crossings, regardless of pipe diameter, are cleaned and filled with water or other approved material before capping.
8. Fill offshore lines with salt water, unless another material has been approved.

### 4.5.4 Pipeline Removal

- In certain cases, the abandoned line pipe must be removed in its entirety and the ROW reclaimed appropriately.
- For the Keystone System, refer to the *Pipeline Integrity US Liquid Commitments and Ongoing Conditions Practice (US)* (EDMS No.: 006792404).

### 4.5.5 Cathodic Protection

1. Disconnect CP from the abandoned pipeline either by de-energizing the CP systems or removing all the connections, bonds, and jumper wires.
2. Contact the power company to cancel service to retired rectifiers. Schedule an appointment to disconnect the service drop.
3. When this has been completed, remove the rectifier, pole, guy wires, groundbed leads, pipe leads, and other attached equipment. Cut off below grade.
4. All test lead posts will be tagged with a weather resistant permanent tag *Abandoned NPS XX Pipeline – For Location Only*.
5. For pipelines with dedicated anode beds for the CP system, the anode bed may be left in place.

### 4.5.6 **Pipeline Markers**

- For the purpose of One Call response, pipelines that are abandoned in place are treated the same as in-service pipelines.
- For pipelines that are completely removed during abandonment, all signage and pipeline markers may also be removed unless otherwise specified by a permit, the ROW Agreement or the *TransCanada Signage Procedure* (EDMS No. 003887955).

## 5.0 DOCUMENTATION/REPORTING REQUIREMENTS

All documentation is to be completed in compliance with TC Energy's Management of Change procedure.

### 5.1 Documentation

1. Follow the as-built and document processes to ensure information is captured in *Project Documentation Integrity Requirements Plan (US)* (EDMS No. 1016680973) and SAP.
2. Document the site-specific procedure used to abandon or deactivate a pipeline.
3. For abandoned pipeline:
   a. Follow Company accounting procedures to retire the physical assets.
   b. Remove or modify SAP maintenance requirements, as required. See Appendix A.

4. For deactivated pipelines:
   a. Document gas medium in pipeline along with pressure level.
   b. Create a work order to periodically monitor the gas pressure.
   c. Maintain existing records pertaining to the pipeline as for an active pipeline (i.e., CP survey reports, construction documents, material records, etc.).
5. Maintain all required records (e.g., patrols, etc.) per established record retention policies.
6. For hazardous liquids pipelines, all maps, facility drawings, and records are to be revised and updated in accordance with O&M procedure 195.404 *Maps and Records.*

## 5.2 Reporting

### 5.2.1 Reporting to FERC

Report to FERC that the abandonment project was completed as permitted.

### 5.2.2 Reporting to PHMSA

Reports are made to the National Pipeline Mapping System (NPMS) upon abandonment of liquids facilities in accordance with Liquids O&M procedure 195.59 *Reporting Abandonment or Deactivation of Facilities* or *Operations and Maintenance Manual – US Natural Gas Pipelines and Underground Natural Gas Storage Facilities* (EDMS No. 005404490) procedures 191.29 *National Pipeline Mapping System* and 192.727 *Abandonment or Deactivation of Facilities.*

### 5.2.3 Reporting Abandoned Navigable Water Crossings

1. Report each abandoned offshore pipeline and each abandoned onshore pipeline that crosses over, under, or through a commercially navigable waterway to the National Pipeline Mapping System (NPMS) in accordance with the NPMS *Standards for Pipeline and Liquified Natural Gas Operator Submissions* (http://www.npms.phmsa.dot.gov).
2. A report will be filed with PHMSA upon abandonment of any of the following gas or product facilities:
   d. Each abandoned onshore pipeline facility that crosses over, under, or through a commercially navigable waterway.
   e. Each abandoned offshore pipeline facility in the Gulf of Mexico and its inlets.

## 6.0 ACRONYMS AND DEFINITIONS

| Acronym | Description |
|---|---|
| AGA | American Gas Association |
| CP | Cathodic Protection |

| Acronym | Description |
|---|---|
| Commercially navigable waterway | A waterway where a substantial likelihood of commercial navigation exists. |
| FERC | Federal Energy Regulatory Commission |
| IES | Integrity Engineering Services |
| JSA | Job Safety Analysis |
| LDC | Local Distribution Company |
| LEL | Lower Explosive Limit |
| NPMS | National Pipeline Mapping System |
| PCB | polychlorinated biphenyl |
| PHMSA | Pipeline and Hazardous Materials Safety Administration. A U.S. Department of Transportation agency having regulatory jurisdiction over hazardous liquids pipelines natural gas pipelines, and natural gas storage facilities. |
| PPE | Personal Protective Equipment |
| ROW | Right-of-Way |
| SDS | Safety Data Sheet |
| SOLOP | Shut-Off Left on Premises. Also, see Inactive or Idle Service. |
| TOS | Temporarily Out-of-Service |

| Term | Definition |
|---|---|
| Abandoned Pipeline | A pipeline permanently removed from service that has been physically separated from its source of gas or hazardous liquid and is no longer maintained under regulation 49 CFR Parts 192 or195, as applicable. |
| Active (or In-Service) | Facility is pressurized and gas is flowing through the facility in the course of transportation. |
| Deactivated Pipeline | A pipeline that is removed from service and maintained for later return to service. The facility is isolated from the gas pressure by blind plates, caps, removing a section of pipe, or other means of physical isolation.<br>Deactivated is the same as abandoned for both PHMSA and FERC purposes. |
| Federal Energy Regulatory Commission (FERC) | An independent federal agency that regulates the interstate transmission of electricity, natural gas and oil. FERC also reviews proposals to build LNG terminals and interstate natural gas pipelines as well as licensing hydropower projects. (Known as the Federal Power Commission or FPC prior to 1979). |

| Term | Definition |
|---|---|
| Inactive (Idle Service, SOLOP, or TOS) | A pipeline that is being maintained under Part 192 but is not presently being used to transport gas. This applies to Part 195 facilities as well. PHMSA does not recognize the term *idle service* in either Part 192 or Part 195.<br>For Company purposes, this term applies to a facility still in Active Service containing gas or product. The facility is isolated and locked out from gas or product transportation by valves being shut and locked or other means. |
| Pipeline | All parts of those physical facilities through which gas moves in transportation, including pipe, valves, and other appurtenance attached to pipe, compressor units, metering stations, regulator stations, delivery stations, holders, and fabricated assemblies (49 CFR 192.3 Definition). |

## 7.0 LATEST REVISION

| | |
|---|---|
| **Description of changes:** | Rev. 01<br>• Updated document references and added liquid pipelines |

## 8.0 APPROVAL

| | Name – Position – Department |
|---|---|
| **Document Contact** | Kevin Foreman, P.E.<br>Engineer<br>USGO Integrity Engineering Services |
| **Document Owner Manager** | Michael Kubincanek<br>Manager of IES<br>USGO Integrity Engineering Services |

## APPENDIX A

| | Active Status | Deactivated Status | Abandoned |
|---|---|---|---|
| **Chart Changing or Index Reading (EM / SCADA not present)** | Active as per schedule<br>Final chart removed when idled, chart changes not required until return to active service | NA | NA |
| **Electronic Measurement (EM)** | Active | Deactivated | NA |
| **FERC Permitted Facilities** | Permits are current<br>For idle, SOLOP (temporary out-of-service) facilities, the facility is available for use | FERC approval for deactivation | FERC approval for abandonment – removed from rate base |
| **Installation** | Connected, pressurized, and flowing gas | Piping depressurized, physically disconnected from all sources of pressure, purged of gas or product | Piping depressurized, physically disconnected from all sources of pressure, purged of gas or product, abandonment plan complete, facility may/not be physically removed |
| **Land** | ROW agreements or easements maintained | ROW agreements or easements maintained | ROW agreements or easements may/not be maintained |
| **Measurement Requirements** | Company required inspections are completed and documented | Company required inspections are discontinued | Regulatory inspections are not required |
| **One Call Response** | Required | Required | May be required |
| **Overpressure Requirements** | Required inspections are completed | Required inspections are discontinued when gas pressure or product is removed | Regulatory inspections are not required |
| **PHMSA Requirements** | Required inspections per 49 CFR 192 or 49 CFR 195 are completed | PHMSA inspections are discontinued | Must be abandoned according to a written plan |
| **Regulatory Requirements** | Required inspections per 49 CFR 192 or 49 CFR 195 are completed | Required inspections are discontinued when gas pressure or product is removed | Regulatory inspections are not required |

| | Active Status | Deactivated Status | Abandoned |
|---|---|---|---|
| **ROW Maintenance** | Active, ROW maintained | Inactive, ROW may or may not be maintained | NA |
| **SAP** | All PMs (preventative maintenance) active<br>For idle, SOLOP, and temporary out-of-service facilities, all regulatory required PMs active, non-regulatory may be turned off | All PMs turned off | All PMs retired |
| **SCADA** | Continuous polling is active | Deactivated | Removed |
| **Signage** | Signage and pipeline markers maintained | Not required | May be required |

# TES-PR-WESTS-G Storage Well Abandonment Specification (CAN-US-MEX)

## PURPOSE

This Specification establishes the requirements for the abandonment of wells. The actions required in this procedure are in addition to applicable requirements in Storage Well Work Planning (EDMS No. 008902959), Well Drilling and Servicing (EDMS No. 008372584), and Storage Well Pressure Control Equipment Requirements and Procedure (EDMS No. 008372555).

## SCOPE/APPLICABILITY

This Specification applies to the abandonment of Company-owned wells in gas storage fields. This Specification applies in all divisions of the Company and its wholly-owned subsidiaries, and all operated entities/facilities in Canada, the United States (U.S.) and Mexico. Local regulatory requirements in the jurisdictions in which the Company operates natural gas storage may impose additional conditions.

Within this Specification, TransCanada is referred to as the Company.

Within this Specification, the following terms and definitions apply for requirements:

Shall—expresses a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard. Shall is not a recommendation but a requirement.

Should—expresses a strong preference, recommendation or that which is advised, but not required; however, the performance goal of the recommendation is to be achieved and documented as to how it is achieved, or, if not applicable, why it is not applicable.

Must—denotes a requirement of the Company, for which no deviation or variance would be granted.

May—expresses an option or that which is permissible within the limits of the standard.

Consider—assumes that a competent person will evaluate options to fulfill the intent of the requirement and make a documented decision supported by evidence to aid in the protection of people, equipment and the environment by achieving the appropriate level of functional integrity.

Where the Manufacturer’s literature, governmental or regulatory requirements conflict with this Specification, the more stringent requirement shall govern.

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## List of Tables

## List of Figures

No table of figures entries found.

## List of Appendices

No table of contents entries found.

# 1 GLOSSARY

**API**

American Petroleum Institute

**CSA**

Canadian Standards Association

**Enform**

Safety association for Canada’s upstream oil and gas industry

**AER**

Alberta Energy Regulator

**EPA**

Environmental Protection Agency

**PHMSA**

Pipeline and Hazardous Materials Safety Administration

**BOP**

Blowout preventer

**MAOP**

Maximum absolute operating pressure

**MDEQ**

Michigan Department of Environmental Quality

**NYSDEC**

New York State Department of Environmental Conservation

**OAC**

Ohio Administrative Code

**PADEP**

Pennsylvania Departments of Environmental Protection

**W. Va**

West Virginia

**Storage zone**

The interval of a specific rock formation in which natural gas is stored, and it should include the completed interval, whether perforated casing or open hole, and the top of the gas-filled porous interval and the base of the gas-filled porous interval, and a minimum vertical interval to be defined in site or field-specific applications above the top of gas filled porosity and below the base of gas filled porosity.

# 2 REQUIREMENTS

## 2.1 Plugging Requirements

2.1.1 Wells shall be plugged and abandoned to facilitate long-term hydraulic isolation of the storage zone, prevent the migration of fluids and gas within the wellbore and annular spaces, and protect usable water sources. [API 1171 6.7.1]

Note: See API E3 [18] for guidance on well abandonment practices and procedures.

2.1.2 During planning for well plugging, the engineer shall determine the location of groundwater and hydrocarbon bearing zones (in addition to the storage zone) penetrated by the well to be abandoned and the condition of the well's casing and cement across those zones, to prevent communication between any of those zones during and after plugging of the well. Special provisions may be necessary to isolate formations behind un-cemented casing. The engineer should evaluate the condition of the well to be abandoned for any issue that would limit access to the wellbore or hinder placing plugs across the storage zone and other critical zones in order to establish conditions for long-term plug sealing reliability across and against the storage zone. [API 1171 6.7.2]

2.1.3 The engineer shall verify that the casing-borehole cement seals the storage interval in the well being abandoned in order to achieve annular isolation and prevent communication.

2.1.4 Hydraulic isolation shall be achieved utilizing mechanical and cement barriers, including but not limited to casing, tubing, mechanical plugs and packers, and cement. The use of water, mud, or high-viscosity fluid as a permanent means of hydraulic isolation is not allowed. Note: Research indicates that the most effective long-term isolation might be achieved by a combination of mechanical barriers with cementitious barriers. [API 1171 6.7.2]

2.1.5 The engineer should select appropriate barriers based on review of well depth, pressure and temperature, condition of the wellbore, integrity of wellbore tubulars and hardware, competency of annular seals, formation rock properties, and reservoir/wellbore fluid chemistry.

2.1.6 Integrity of wellbore should be assessed prior to commencement of plugging operations. Tubulars and hardware should be evaluated based on material records, mechanical properties, testing, and/or pipe inspection measurements. Existing annular barriers (i.e. mechanical and cement) should be assessed to determine competency based on type and configuration of hardware, cement bond log evaluation techniques, and/or testing.

2.1.7 Cement composition used for hydraulic isolation should meet or exceed the quality standards in API 10A and/or ASTM C150/C150M. Installation of cement barriers is achieved by utilizing good practices that include but are not limited to: circulation, balanced plug, cement squeeze, or dump bailer. The well should be in a static condition prior to setting of a cement plug and during the curing process. Volume-extending additives should not be used in cement plugs. After allowing for the appropriate curing time for cement to gain mechanical strength, the location and competency of the cement shall be verified by tagging, cement bond log quality measurements, or by pressure testing. A cement barrier that does not meet designed criteria shall be replaced or additional measures implemented to provide for isolation objectives. A failed mechanical plug shall be replaced or repaired. A well that shows a leak indication suggestive of a lack of isolation of the storage reservoir shall be entered to replace or repair faulty mechanical or cement plugs.

The engineer should assess the long-term viability of the plug design to achieve and maintain the required isolation.

Note: The US Bureau of Safety and Environmental Enforcement, Report RLS0116 [19] contains observations on cement plug viability.

A cement plug should be of a length that, whether by itself or in conjunction with a mechanical plug, achieves isolation of the storage zone.

The well should be in a static condition prior to setting of a cement plug, and during the curing of, a cement plug process.

Volume-extending additives should not be used in cement plugs.

2.1.8 Borehole fluid left in spaces between cemented intervals should be non-corrosive and have physical properties providing hydraulic sealing potential

## 2.2 Protection of Fresh Water

2.2.1 The surface casing shoe is a critical interval because it is the last level of protection against fluid migration into the fresh water aquifer. If cement has been circulated in the production casing annulus to a depth of at least 100 feet above the surface shoe then setting a 100 foot balanced plug in the production string opposite the behind pipe shoe will isolate the shoe interval in accordance with API Bull E3 2.4.4.3. When the production casing annulus has not been cemented to within 100 feet above the surface casing shoe, then one of the methods described in API Bull E3 2.4.4.2 should be used to isolate the un-cemented annulus across the surface casing shoe.

2.2.2 All fresh water aquifers shall be isolated to prevent contamination from any upward fluid migration. API Bull E3 2.4.4.4 states that a 100 foot balanced cement plug set from below the lowermost fresh water aquifer to the base of the lower most fresh water aquifer will isolate this critical interval if there is casing with cement behind the pipe. For casing without cement behind pipe, squeezing cement should be utilized to isolate the base of the lowermost fresh water aquifer. Another method for isolating the lowermost fresh water aquifer when the production casing is un-cemented is to cut and pull the casing and cement the casing stub in accordance with API Bull E3 2.4.3. If practical, the hole above the casing stub should be completely filled with cement. [API 1171 6.7.2]

## 2.3 Storage Zone Isolation

2.3.1 Gas storage zones should be isolated in accordance with API Bull E3 standards for plugging a hydrocarbon production zone in order to prevent migration between zones. Note: API Bull E3 specifies different methods for various types of completions.

2.3.2 For cased-hole completions, a mechanical device should be set above (and below if applicable) the storage interval to hydraulically isolate horizons above and below the storage zone. Mechanical devices include but are not limited to bridge plugs, packers, or cement retainers.

2.3.3 When designing a cement plug to isolate the storage zone in an uncased hole (that is, an open-hole completion) a cement plug should be installed from total depth to above the storage interval. For extended intervals where long cement plugs are not practical, or for storage zones up hole from the total depth, a heavy weight pill or heavy mud should be pumped prior to spotting the plug to prevent the cement at the bottom of the plug from separating and falling out due to differences in fluid densities. NOTE: API Bull E3 2.2 specifies requirements for isolating open hole completions and API Bull E3 2.3 specifies requirement for isolating uncased holes.

2.3.4 The integrity of the primary hydraulic barriers/plugs sealing the storage zone should be verified by cement bond log quality measurements, tagging cement plugs, and/or pressure testing.

### 2.4 Monuments and Site Restoration

2.4.1 Monuments, markers, and/or final abandonment surface configurations shall be installed in compliance with Federal, State, and local regulations and at a minimum include a surface plug and cap with the API well number or other form of identification. The well's exact location should be recorded and retained. [API 1171 6.7.3]

2.4.2 Sites shall be reclaimed in accordance with Federal, State, and local regulations.

### 2.5 Recordkeeping

2.5.1 Well plans, Management of Change records, equipment removed, equipment left in well, plug setting records, electric logs, tests, daily progress and rig operation reports, and other records as applicable, shall be retained in a permanent well file and retained per the retention schedule outline in the Storage Integrity Records Management Procedure. [API 1171 6.11.1]

2.5.2 Regular inspections of abandoned well sites should be performed for the duration of operation of the storage facility to maintain awareness of encroachments over abandoned wells. Frequency of inspection should include an initial inspection and subsequent inspections as determined using the Well Integrity Assessment Procedure for plugged wells, but at a minimum the site should be inspected annually. Plugging records should be reviewed to augment the plugged well site inspections. Operations and the Land department should be informed of the status change upon completion of the abandonment activity. The well location identification should be maintained on Company maps and symbolized as plugged and abandoned for the duration of ownership of the storage facility.

### 2.6 Safety Requirements

2.6.1.1 This work procedures developed in conformance to this specification must include applicable requirements of the Storage Well Work Planning (EDMS No. 008902959), Well Drilling and Servicing (EDMS No. 008372584), and Storage Well Pressure Control Equipment Requirements and Procedure (EDMS No. 008372555). Safety requirements associated with well work activities include a number of common elements all of which are outlined within these three procedures. These procedures should be referenced when performing storage well abandonment work.

## 3 VARIANCES

Deviations must follow the appropriate TransCanada Management of Change (MOC) Variance Procedure.

Changes in scope that require regulatory approval, introduction of new hazards for which additional safety measures must be employed, modifications to wellbore configuration, revisions to steps in job plan, and/or impacts to financial exposure, at the discretion of WE&T Manager or designee, require adherence to the procedures defined in the Management of Change for Storage Well Lifecycle (EDMS No. 1013823382).

## 4 ROLES AND RESPONSIBILITIES

Table 4-1 below outlines the roles and responsibilities required for the use of this Specification.

**Table 4-1: Roles and Responsibilities**

| Role | Responsibilities |
|---|---|
| Drilling Engineer or Well Specialist | • Complete the planning and design specifications or provide the necessary information for a third party to make the design specifications, Section 2 REQUIREMENTS.<br>• Determines necessary equipment or assist a third party in equipment selection. |
| Well Engineering and Technology Manager | • Review and approve third party designs and proposals.<br>• Review and approve management of change requests |

## 5 REFERENCES

This document relies on a number of references to regulation, industry codes and standards, general industry guidance as well as internal references. These documents are detailed below in Table 5-1, Table 5-2 and Table 5-3. Use the latest document revision, unless otherwise approved by TransCanada.

**Table 5-1: Regulatory References**

| Organization/Document No. | Title |
|---|---|
| AER Oil and Gas Conservation Rules (AR 151/1971) in Alberta and associated AER Directives, Bulletins, Guidelines, and other rules and guidance documents. (Alberta only) | |
| United States Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA), 49 CFR Parts 191 and 192, Docket No. PHMSA–2016–0016; Amdt. Nos.191–24; 192–122, RIN 2137–AF2 – Pipeline Safety: Safety of Underground Natural Gas Storage Facilities (U.S. Only) | |
| Environmental Protection Agency (EPA) Underground Injection Control (UIC) Program in the U.S. (title 40 of the Code of Federal Regulations) (Brine disposal wells only) | |
| PADEP Code Chapter 78 Oil and Gas Wells | |

| Organization/Document No. | Title |
|---|---|
| OAC 1501:9 Oil and Gas Wells | |
| NYSDEC Oil and Gas, Mining and Reclamation Laws, Article 23 Mineral Resources | |
| W. Va Code 22 Environmental Resources | |
| MDEQ Part 615 Oil and Gas Operations | |

**Table 5-2: External Industry References**

| Organization/Document No. | Title |
|---|---|
| API RP 1171 Recommended Practice for Functional Integrity of Natural Gas Storage in Depleted Hydrocarbon Reservoirs and Aquifers | |
| API Bulletin E3 Environmental Guidance Document: *Well Abandonment and Inactive Well Practices for U.S. Exploration and Production Operations* | |
| American Petroleum Institute (API) 10A Specifications for Cements and Materials for Well Cementing | |
| Canadian Standards Association (CSA) Z341.1 Storage of Hydrocarbons in Underground Formations (Canada Only) | |

**Table 5-3: Internal References**

| Document No. | Title |
|---|---|
| EDMS No. 003671854 | Active Control Procedure |
| EDMS No. 008372555 | Storage Well Pressure Control Equipment Requirements and Procedure |
| EDMS No. 008372584 | Well Drilling and Servicing |
| EDMS No. 008902959 | Storage Well Work Planning |
| EDMS No. 1013823382 | Management of Change for the Storage Well Life Cycle |

## 6 DOCUMENTATION AND RECORDKEEPING

Record management and retention details can be found in Storage Integrity Records Management Procedure.

## 7 DOCUMENT HISTORY

| Rev. | | |
|---|---|---|
| 01 | Description | Effective Date |
| | Revised document. | 2018-September-01 |

| Rev. | | |
|---|---|---|
| | Rationale Statement | Responsible Engineer |
| | Standard updated to reflect responsible Company restructuring, content changes, and addressing PHMSA rulemaking. | Jason Martin and A Radtke; |
| | Impact Assessment Summary | Document Owner |
| | The impact of implementing this standard is positive in terms of providing uniform guidance and consistent requirements across all TransCanada's storage assets, and implementation of this standard provides compliance with PHMSA Docket 2016-0016 which requires adherence to API 1171. | Jason Martin |

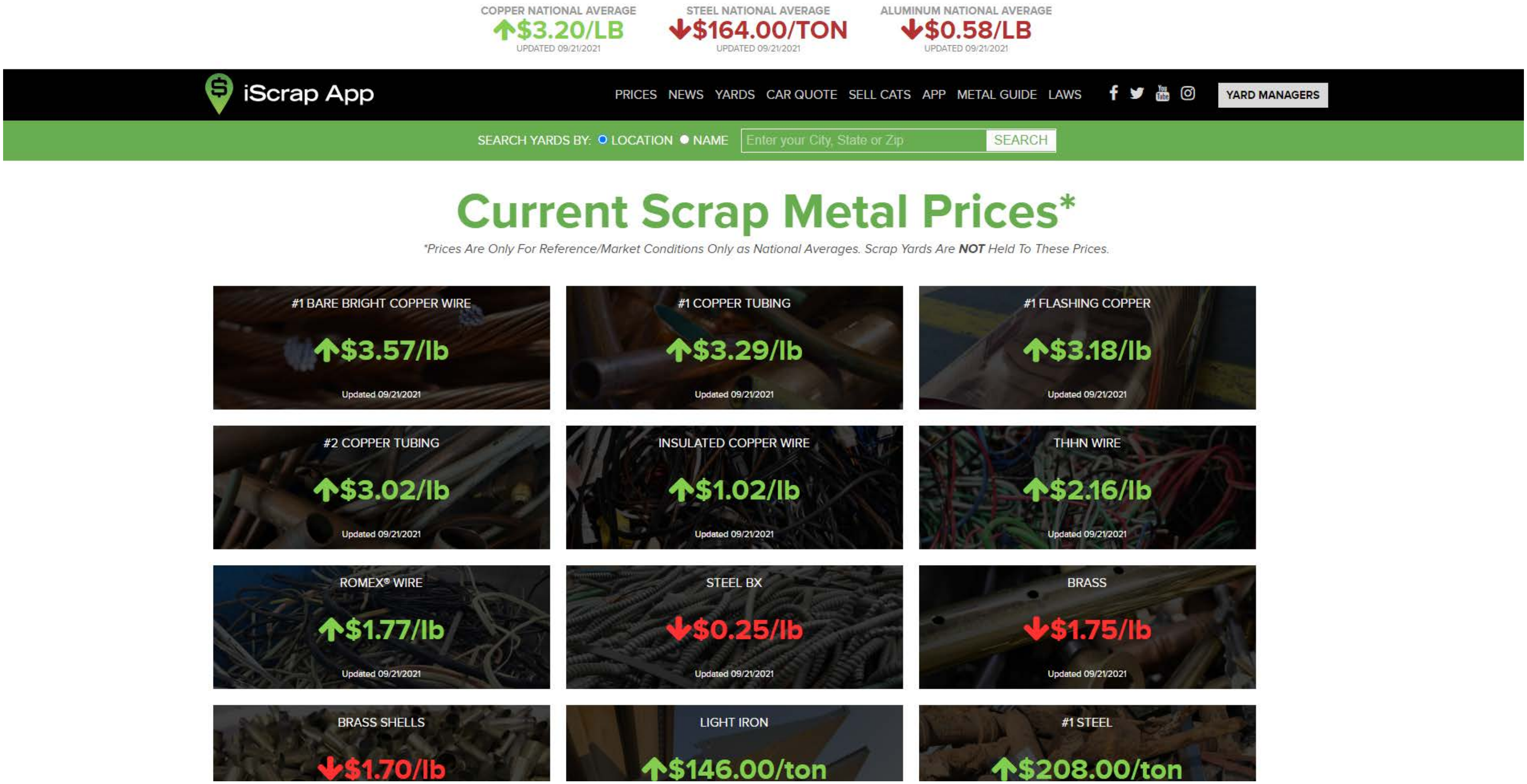
## 8 DESCRIPTION OF CHANGE

| Section | Description of Change |
|---|---|
| Regulatory | |
| | Includes reference to PHMSA Docket 2016-0016, API 1171 and for Canada to CSA Z341.1 |
| Industry Standards | |
| | Includes reference to API 1171 and for Canada to CSA Z341.1 |
| General | |
| | This is the first revision and includes broader language to integrate TransCanada facilities in the US and Canada. |

## 9 APPROVALS

| APPROVALS | |
|---|---|
| **Document Contact** | Ryan Zerwas, Engineer<br>Storage Compliance, Integrity, and Projects; Storage Technical Services |
| **Document Owner Manager** | Stephen Nowaczewski, Director<br>Storage Technical Services |
| **Reviewer** | Tim Weipert, Well Specialist<br>Well Engineering and Technology; Storage Technical Services |
| **Reviewer** | James Amos, Well Specialist<br>Well Engineering and Technology; Storage Technical Services |
| **Reviewer** | Jason Martin, Manager<br>Well Engineering and Technology; Storage Technical Services |

| | |
|---|---|
| **Authenticating Engineer** | Andrew Radtke, P.E, Principal Engineer<br>Storage Compliance, Integrity, and Projects; Storage Technical Services |



COPPER NATIONAL AVERAGE
↑$3.20/LB
UPDATED 09/21/2021

STEEL NATIONAL AVERAGE
↓$164.00/TON
UPDATED 09/21/2021

ALUMINUM NATIONAL AVERAGE
↓$0.58/LB
UPDATED 09/21/2021

# Current Scrap Metal Prices*

*Prices Are Only For Reference/Market Conditions Only as National Averages. Scrap Yards Are **NOT** Held To These Prices.

#1 BARE BRIGHT COPPER WIRE
↑$3.57/lb
Updated 09/21/2021

#1 COPPER TUBING
↑$3.29/lb
Updated 09/21/2021

#1 FLASHING COPPER
↑$3.18/lb
Updated 09/21/2021

#2 COPPER TUBING
↑$3.02/lb
Updated 09/21/2021

INSULATED COPPER WIRE
↑$1.02/lb
Updated 09/21/2021

THHN WIRE
↑$2.16/lb
Updated 09/21/2021

ROMEX® WIRE
↑$1.77/lb
Updated 09/21/2021

STEEL BX
↓$0.25/lb
Updated 09/21/2021

BRASS
↓$1.75/lb
Updated 09/21/2021

BRASS SHELLS
↓$1.70/lb

LIGHT IRON
↑$146.00/ton

#1 STEEL
↑$208.00/ton

Docket No. RP22-___-000
Exhibit No. ANR-0035

# UNITED STATES OF AMERICA
# BEFORE THE
# FEDERAL ENERGY REGULATORY COMMISSION

ANR Pipeline Company ) Docket No. RP22-___-000

# PREPARED DIRECT TESTIMONY OF PATRICK R. CROWLEY ON BEHALF OF ANR PIPELINE COMPANY

**January 28, 2022**

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

| | | |
|---|---|---|
| | § | |
| ANR Pipeline Company | § | Docket No. RP22-____-000 |
| | § | |

# Summary of Prepared Direct Testimony of
# PATRICK R. CROWLEY
# ON BEHALF OF
# ANR Pipeline Company

Mr. Patrick Crowley is employed by Brown, Williams, Moorhead and Quinn, Inc., a nationally recognized energy consulting firm, as a depreciation expert in regulated oil and natural gas pipelines. He provides Prepared Direct Testimony in this proceeding on behalf of ANR Pipeline Company ("ANR") regarding the proper and adequate depreciation and amortization rates for ANR's facilities based on a reasonable remaining life. Mr. Crowley explains the key concepts behind his depreciation analysis, such as the survivor curve theory and the Simulated Plant Record analysis. Mr. Crowley establishes the average service lives of the assets of the utility, the retirement decline curve, and the interim retirements that set the average remaining life for each account. Mr. Crowley also calculates a negative salvage rate for interim retirements and a terminal decommissioning cost recovery rate.

## Table of Contents

# UNITED STATES OF AMERICA

# BEFORE THE

# FEDERAL ENERGY REGULATORY COMMISSION

| | | |
|---|---|---|
| ANR Pipeline Company | §<br>§<br>§ | Docket No. RP22-____-000 |

# PREPARED DIRECT TESTIMONY OF
# PATRICK R. CROWLEY
# ON BEHALF OF ANR PIPELINE COMPANY

## I. INTRODUCTION

**Q. Please state your name and business address.**

A. My name is Patrick R. Crowley. I am a Vice President of Brown, Williams, Moorhead & Quinn, Inc. ("BWMQ"), an energy consulting firm in Washington, DC.

**Q. On whose behalf are you submitting testimony in this proceeding?**

A. I am submitting testimony on behalf of ANR Pipeline Company ("ANR").

**Q. What is the purpose of your Prepared Direct Testimony?**

A. The purpose of my testimony is to present my recommendation regarding 1) the proper and adequate depreciation rates applicable to the ANR natural gas pipeline system based on appropriate remaining life factors, and 2) the recovery rate for negative salvage associated with interim retirements. The overall economic life is supported by the Prepared Direct Testimony of Mr. Alex Kirk (Exhibit No. ANR-0017). The estimated terminal decommissioning costs are supported by the Prepared Direct Testimony of Mr. Steven Fall (Exhibit No. ANR-0031).

**Q. Please state your professional experience and qualifications.**

A. I graduated from DePaul University in Chicago, Illinois with a Bachelor of Arts degree in economics in 1976 and a Master of Arts degree in economics in 1978, with a concentration in mathematical economics. Upon graduation from DePaul University in 1978, I joined the Chicago, Rock Island & Pacific Railroad Company for a short time working in the general manager's office before I joined the Federal Energy Regulatory Commission ("FERC" or "Commission") in 1979. I was employed at FERC for 28 years. For 24 of those 28 years, I was employed in the litigation division of the Office of Pipeline and Producer Regulation and its successor offices. I retired to form my own consulting firm, Crowley Energy Consulting, in February 2007, where I provided energy litigation support for clients in the natural gas and oil pipeline industries. I joined BWMQ in 2013.

**Q. Have you previously testified before FERC?**

A. I filed testimony before FERC in the dockets listed in Exhibit No. ANR-0036.

**Q. Have you provided any exhibits with your testimony?**

A. Yes. I have included the following exhibits with my testimony:

Exhibit No. ANR-0036 – Curriculum Vitae Patrick R. Crowley
Exhibit No. ANR-0037 – Depreciation Workpapers
Exhibit No. ANR-0038 – Production & Gathering Facilities Survivor Curve Study
Exhibit No. ANR-0039 – Storage Survivor Curve Study
Exhibit No. ANR-0040 – Transmission Survivor Curve Study

**Q. What materials are included in your Exhibit No. ANR-0037?**

A. Exhibit No. ANR-0037 consists of the workpapers supporting my depreciation and negative salvage rate and amortization rate recommendations for the ANR pipeline system. The schedules included in Exhibit No. ANR-0037 present each step of the process of developing the proper and adequate depreciation rates given ANR's current operations and the recovery of its investment in plant over the remaining useful life of those assets:

Schedule No. 1 - Proposed Depreciation Rates
Schedule No. 2 - Plant Balances and Reserves
Schedule No. 3 – Near Term Capital Additions
Schedule No. 4 – Gas Turbine Service Lives
Schedule No. 5 - Depreciation Model Parameters
Schedule No. 6 – Average Remaining Lives – Production Plant
Schedule No. 7 - Average Remaining Lives – Storage Plant
Schedule No. 8 - Average Remaining Lives – Transmission Plant
Schedule No. 9a – General Plant Service Lives
Schedule No. 9b – Intangible Plant Service Lives
Schedule No. 10 – Depreciation Rate Calculations
Schedule No. 11 – Negative Salvage on Interim Retirements
Schedule No. 12 – Terminal Decommissioning Recovery Rates
Schedule No. 13 –Iowa Curve Table Sampling

**Q. How were ANR's current depreciation and negative salvage rates set?**

A. ANR's current depreciation and amortization rates are the result of a settlement of ANR's last rate case.

**Q. Please summarize your recommended depreciation rates and negative salvage rates in this case?**

A. My recommended depreciation and negative salvage rates are shown below and on Schedule No. 1 of Exhibit No. ANR-0037, on page 3 and 4.

| | | Current Approved Rates | | Proposed Rates | | | |
|---|---|---|---|---|---|---|---|
| Acct # | Acct Name | Depreciation Rates | Negative Salvage Rates | Depreciation Rates | Negative Salvage Rates | Terminal Decomm. | Total Rate |
| | | (A) | (B) | (C) | (D) | (E) | (F) |
| **Intangible Plant** | | | | | | | |
| 301.00 | Organization Costs | 0.00% | | | | | |
| 303.00 | Misc Intangible Plan | 10.00% | | 4.59% | | | 4.59% |
| 303.02 | Cygnet Assets | | | 17.50% | | | 17.50% |
| 303.10 | Intangibles 10 yr * | 10.00% | | | | | |
| 303.15 | Intangibles 15 yr * | 6.67% | | | | | |
| 303.19 | Intangibles 20 yr | 5.00% | | 2.96% | | | 2.96% |
| 303.20 | Intangibles 2 yr * | 50.00% | | | | | |
| 303.20 | Intangibles 20 yr | 5.00% | | | | | |
| 303.20 | Intangibles 24 yr * | 4.17% | | | | | |
| 303.50 | Intangibles 5 yr * | 20.00% | | | | | |
| 303.60 | Intangibles 6 yr | | | | | | |
| 303.80 | Intangibles 8 yr * | 12.50% | | | | | |
| 303.90 | Intangible 11.5 yr | 8.72% | | 2.34% | | | 2.34% |
| | *Fully accrued | | | | | | |

| | | Current Approved Rates | | Proposed Rates | | | |
|---|---|---|---|---|---|---|---|
| Acct # | Acct Name | Depreciation Rates | Negative Salvage Rates | Depreciation Rates | Negative Salvage Rates | Terminal Decomm. | Total Rate |
| | | (A) | (B) | (C) | (D) | (E) | (F) |
| **Gathering Plant** | | 0.49% | | 1.16% | 0.00% | 1.19% | 2.35% |
| | | | | | | | |
| **Underground Storage Plant** | | | | | | | |
| | Mainline | 1.91% | 0.35% | 2.24% | 0.23% | 0.85% | 3.32% |
| | | | | | | | |
| | Cold Springs | 1.91% | 0.35% | 2.24% | 0.23% | 0.85% | 3.32% |
| | | | | | | | |
| **Transmission Plant** | | 2.18% | 0.17% | 2.59% | 0.35% | 1.06% | 4.00% |
| 370.02 | Communication Equip | 8.50% | | 3.84% | | | |

| General Plant | | Current Rates | Proposed Rates |
|---|---|---|---|
| 389.00 | Land | | |
| 390.00 | Structures & Improve | 1.30% | 6.12% |
| 390.10 | Other Structures | 3.175% | 6.67% |
| 390.11 | L/H Improve BOA 11th Floor | 6.49% | 6.67% |
| 390.12 | L/H 12th Floor - Exl GC | 6.45% | 6.67% |
| 390.13 | L/H Improve 13 Yr (BOA 9th, 16th & 22nd Floors) | 7.690% | 7.69% |
| 390.14 | L/H Improve 13.2 Yr (BOA 8th & 13th Floors) | 7.575% | 7.58% |
| 390.20 | L/H Improve 10 Yr * | 10.000% | 10.00% |
| 390.30 | L/H Improve 5 Yr * | 20.000% | 20.00% |
| 390.40 | Leaseholds | | 0.00% |
| 390.50 | L/H Improve 10 Yr (1301 Fannin) * | 10.000% | 10.00% |
| 390.60 | L/H 717 Texas 14th F | | 0.00% |
| 390.70 | L/H Improve 17.2 Yr (BOA 14th Floor) | 5.800% | 5.81% |
| 390.80 | L/H Improve 15.9 Yr (BOA 7th, 10th, 15th Floors) | 6.280% | 6.29% |
| 390.90 | L/H Improve BOA 12th Floor | 6.45% | 6.67% |
| 391.00 | Office Furn & Equip | 6.667% | 6.70% |
| 391.1 | Computer Equipment | 20.00% | 20.00% |
| 392.0 | Cars & Trucks | 9.47% | 9.50% |
| 392.1 | Patrol Plane | 5.00% | 3.30% |
| 394.0 | Tools, Shop & Gar Eq | 5.71% | 6.80% |
| 396.0 | Power Operated Equip | 5.71% | 5.30% |

## II. DEPRECIATION THEORY

### a. Defining Terms

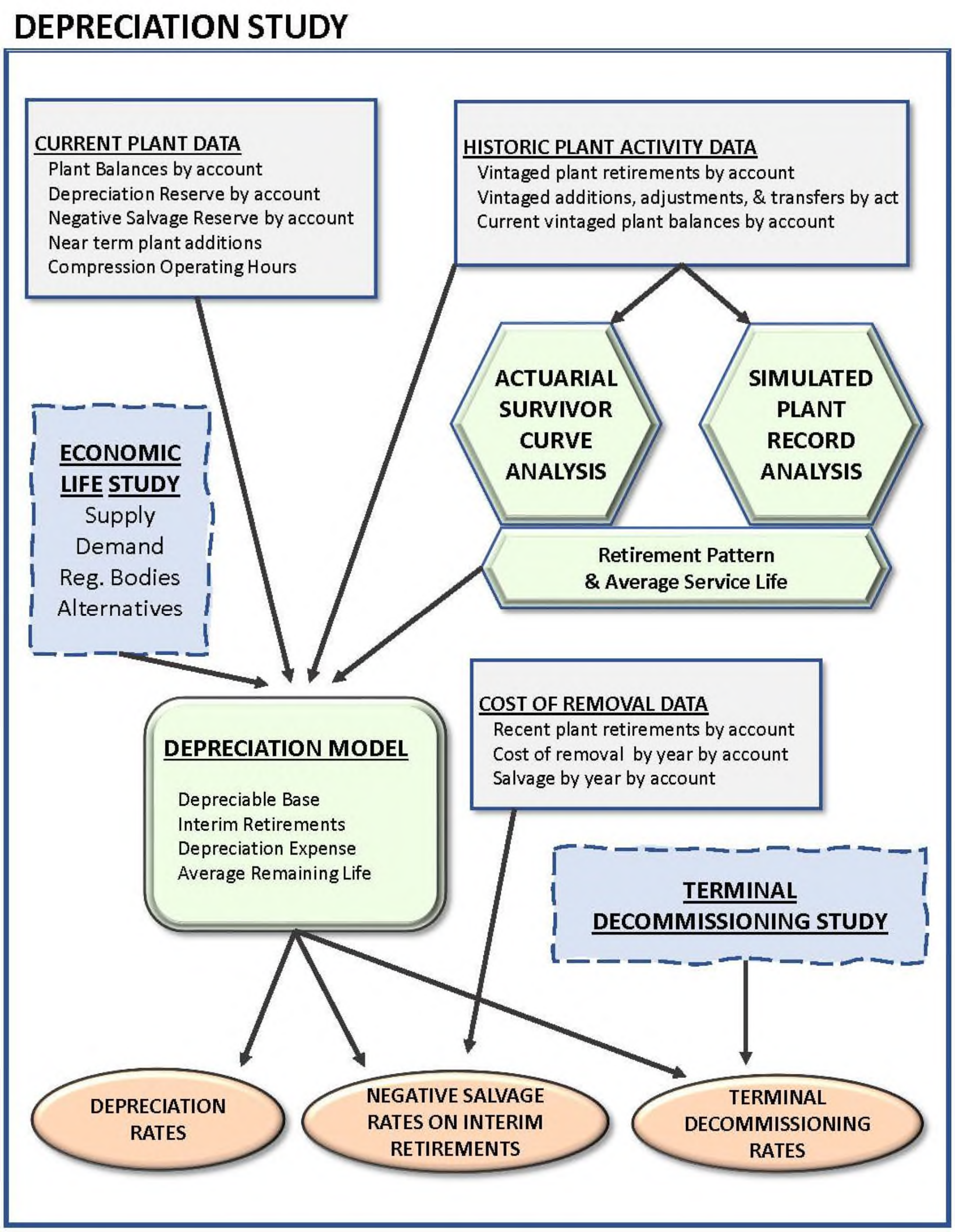
**Q. Please describe depreciation theory.**

A. "Depreciation" is a term used in accounting, economics, and finance to convey the concept of the inherent loss of value in an entity's capital assets over time and the associated allocation of that loss in capital value over some defined period. To set depreciation rates, we need to know two things: what are the dollars to be recovered and over what period of time should they be recovered? Simple questions with not so simple answers.

Pipeline systems are complex operations that include many types of investment. Some costs are depreciable, some are not – land, for example, does not lose value (theoretically) and thus does not depreciate. Some costs are incurred for assets that do not lose value over time but do have a limited lifespan, such as intangible plant, and are thus amortized rather than depreciated. Still other costs relate to assets not covered by the FERC-regulated tariffs and thus are not jurisdictional costs viz-a-viz the rate case at hand. Further, some assets can become fully depreciated yet remain in service and are thus carved out of the depreciation rate derivation. Some assets are included in the rate derivation because they will be added in the near-term future and will constitute the plant balance in service during the period the proposed depreciation rates are most likely to be in effect. Another category of costs to be considered is the cost of removal of those depreciable assets. This includes the routine costs associated with swapping out old plant for upgraded plant and the costs of decommissioning the system at the end of its useful life. Both of these are estimations of costs not yet incurred.

The time frame for recovery of costs presents its own complexities. Some costs are tied to licensing agreements and are thus term-defined regarding the useful life of the assets. Some assets remain useful only so long as other assets are in use. The recovery period for the lion’s share of costs is capped by the economic horizon for the foreseeable useful life of the pipeline system. The physical lifespan of most pipeline assets is far greater than the probable actual useful life of the assets. Further, some assets will fall out of service before the capped economic life so that the average lifespan, over which the depreciable assets are to be recovered, is shorter than the economic life. The estimation of the average service life and the average remaining life of pipeline assets requires a deep dive into actuarial accounting estimation theory.

The general flow from data to models to depreciation rates is summarized below.



**Q. How does the Commission define "depreciation"?**

A. The Commission defines "depreciation" as:

> [T]he loss in service value not restored by current maintenance, incurred in connection with the consumption or prospective retirement of gas plant in the course of service from causes which are known to be in current operation and against which the utility is not protected by insurance. Among the causes to be given consideration are wear and tear, decay, action of the elements, inadequacy, obsolescence, changes in the art, changes in demand and requirements of public authorities, and in the case of natural gas companies, the exhaustion of natural resources.

18 C.F.R. Part 201, Definitions, 12.B (2020).

**Q. What does "loss in service value" mean?**

A. "Loss in service value" is the diminishment of the ability of an asset to provide useful service to the utility. Loss in service value occurs broadly from two sources: first, physical causes (*e.g.*, wear and tear, decay, and action of the elements), and, second, economic causes (*e.g.*, inadequacy, technological or economic obsolescence, changes in the art, changes in demand, requirements of public authorities, and the exhaustion of natural resources).

**Q. What are "interim retirements" and how do they affect depreciation rates?**

A. "Interim retirements" are the routine retirements of plant and equipment that will occur each year between the study date and the terminal closing of the pipeline system. The importance of interim retirements, for depreciation study purposes, is that such retirements shorten the *average* depreciable life of the assets. If some units are retired prior to the end of the planned service life, the associated depreciation accruals will not have fully recovered the invested cost in the assets. Depreciation rates must capture the average life expectancy of the assets in the accounts, which is estimated through the survivor curve analysis of interim retirements. This is more fully explained in the survivor curve discussion later in this section.

**Q. What depreciation methodology did you use for ANR?**

A. I used the broad group, straight-line, average remaining life method of depreciation. Under this method, which is the standard method for FERC-regulated pipelines, all the assets within a group are considered to be homogeneous units of plant used and treated alike across the system regardless of the age, construction techniques, or retirement rate. In practice, there are two levels of grouping – by FERC account and by function. Generally, all assets within a FERC account are considered as one group and a depreciation *expense* is derived. Then the FERC accounts are combined into a larger functional group, such as storage or transmission, with one depreciation *rate* for the whole function. Where operational considerations warrant, assets within a given FERC account are grouped in a different function, such as off-shore transmission versus on-shore transmission, to reflect the distinctive use and depreciable life expectations for those assets.

### b. Depreciable Plant Balances

**Q. What plant balances have you used to derive the depreciation rates in your study?**

A. The plant balances incorporated into my workpapers are as of the end of the Base Period, as reported in Statement C-1 of this filing and copied over to Schedule No. 2 of Exhibit No. ANR-0037, pages 5 to 8. These figures are then augmented by the estimate of near-term capital additions to plant, as shown in Schedule No. 3 of Exhibit No. ANR-0037, page 9 to 12. Further, some groups of fully depreciated assets have been carved out of the depreciation rate determination process. These are shown on Exhibit No. ANR-0037, Schedule No. 2 on page 6, lines 21 through 33 within the storage functions assets and Account 370 Communication Equipment assets on Exhibit No. ANR-0037, Schedule No. 2 on page 7, line 25 and 26.

**Q. Why is it important to include near-term additions in the derivation of depreciation rates?**

A. Just as future plant retirements are taken into consideration in developing the depreciation rates via the survivor curve analyses, so too should plant additions be forecast so that the depreciation rates can recover the investment over its useful life span. It is important to have a holistic approach, based on development of depreciation rates that cover the reasonable range of time over which the tariff rates and embedded depreciation rates will be in effect. The plant in service will continuously expand and contract as upgrades replace old technology, larger facilities replace smaller facilities, plant is retired, and customers are connected or leave the system. Plant in service should be seen in the context of the evolution of the pipeline's response to safety, market needs, federal, state, and local environmental regulations, new technology, and operational efficiencies.

**Q. Are near-term plant additions too speculative to be included in the derivation of depreciation rates?**

A. No. It is not speculative to assume the pipeline will continue to engage in capital maintenance replacements, install upgraded equipment, and respond to safety improvements. These near-term additions can be estimated by looking back to recent actual plant activity. The estimate of near term-additions reflects the actual needs of the pipeline system and is the best estimate of plant balances most likely to be in place.

**Q. Are there limits on what should be acceptable near-term additions?**

A. Yes, there are limits. The Commission rejected a proposal for a seventeen-year projection in *Indiana & Michigan Municipal Distributors Ass'n v. Indiana Michigan Power Co.*, 59 FERC ¶ 61,260 (1992). That case addressed a proposal that incorporated 17 years of plant additions (1992 through 2009). My testimony, in contrast, deals with very near-term plant additions based on three years of historical Form 2 data with an eye toward estimating the average plant balance that will be in service while the depreciation rates and tariff rates are in effect. It is certain that there will be near-term additions within a three-year timeframe.

**Q. Is the inclusion of near-term plant balances consistent with current depreciation theory and practice?**

A. Yes, the concept of using the average plant balance is inherent in the use of survivor curves to develop the average remaining life. It is a long-accepted depreciation concept that depreciation rates are calculated using the *average* plant balance over the remaining life of the assets to ensure the proper rate of recovery of the plant investment. Long-term retirements are already incorporated in the depreciation rates via the derivation of the average plant balances used to calculate the average remaining life. Incorporating only the estimated reductions in plant balances (via the survivor curve) but ignoring known and measurable near-term additions results in an under-recovery and results in intergenerational inequities. For the period the rates are in effect, the depreciation recorded on the books should reflect the plant that will be in service during that period.

### c. Survivor Curve Theory

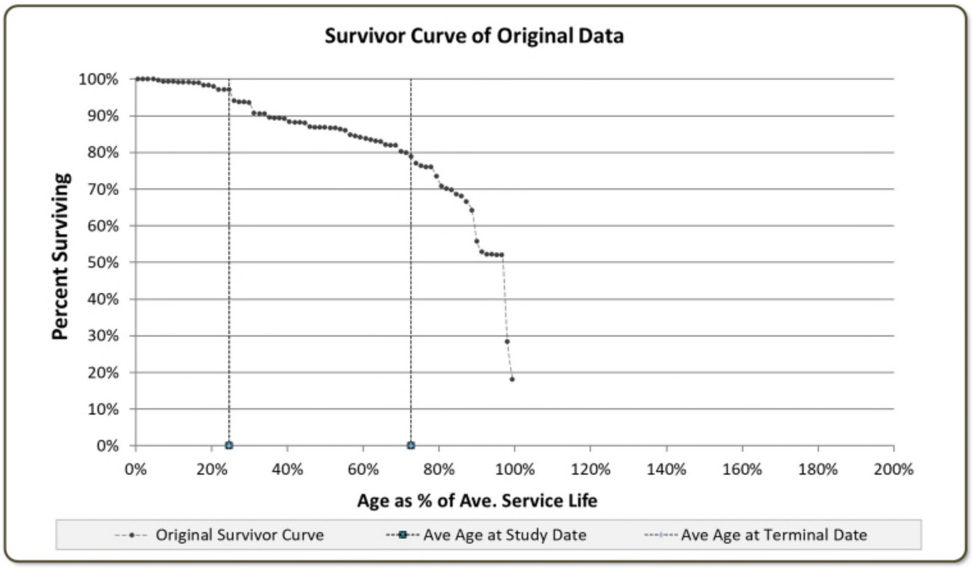
**Q. What is a "survivor curve"?**

A. A “survivor curve” is the pictorial result of an actuarial analysis of hundreds of thousands of transactions that make up the ‘life story’ of industrial property accounts. With each passing year, the retirements of property, if any, leave a smaller percentage of the original installation in place. If retirements were uniform in size and regularity, a simple straight-line projection would provide an adequate forecast of future retirements, and, in turn, allow the calculation of the average remaining life of the assets.

But the retirement patterns of industrial property do not follow a straight line. The retirement patterns of industrial property are characterized by a complex life trajectory which includes a transition point where survivorship takes a dramatic downward turn. The retirement rate and survivorship rate are inversely-related phenomena. The upside-down bell curve shape of retirement frequency distribution creates the ski slope-shaped survivorship curve. After a period of substantial retirements, the retirement pattern passes through another transition point where retirements fall off, leaving a long tail of lingering survivorship.

The overall lifespan survivorship trajectory for most industrial property follows this ski slope pattern seen in Graph No. 1 below, that, despite an appearance of simplicity, requires complex mathematical formulae to replicate. Adding to the complexity, additions to plant, transfers between accounts, and various adjustments to plant accounts over time, can obscure the patterns of retirements, making it difficult to discern the physical life expectancy of plant and equipment. Survivor curve analysis translates the hundreds of thousands of data points into recognizable patterns, enabling an analysis and forecast of future life expectancies.

### Graph No. 1 – Survivor Curve of Original Data



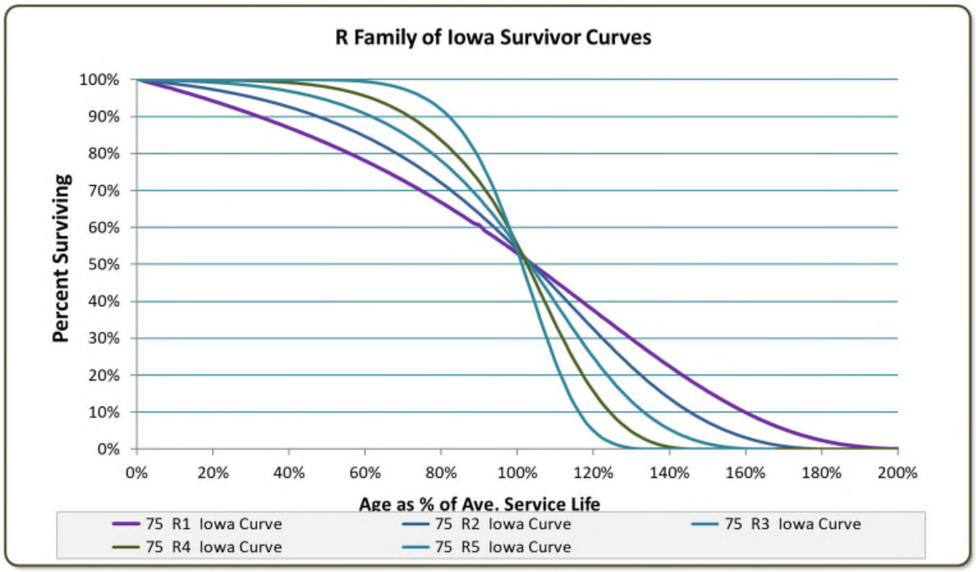
**Q. How does survivor curve analysis work?**

A. The survivor curve analysis primarily deals with two survivor curves: one being a curve that traces the actual surviving dollars from each iteration of plant additions and the other a prototypical Iowa Curve selected to carry the trend of the actual data out into the future for forecasting purposes. Once the original data is synthesized into an original experience survival curve (see Graph No. 1 above), the curve is compared to hundreds of prototypical curves (see Graph No. 2) to find one that will best forecast the most likely experience of future interim retirements.

**Q. What are Iowa Curves?**

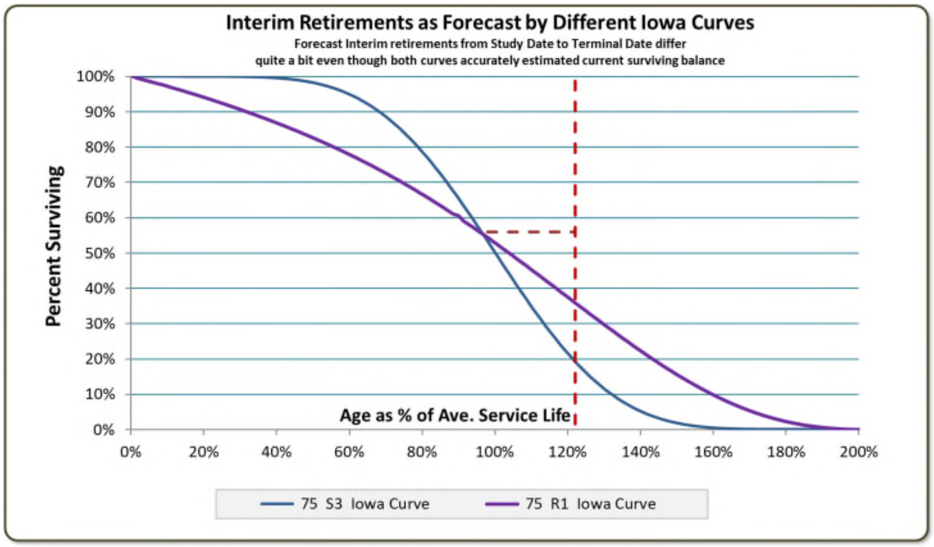
A. Iowa Curves represent standardized retirement patterns of industrial property developed from actuarial studies conducted in the 1930s. The Iowa Curves consist of families of curves that reflect left-modal, symmetrical-modal, and right-modal frequency distributions, called simply L, S, and R curves. Each family of curves includes four to five curve sets within the family, labeled $R_1$, $R_2$, $R_3$, and so on, each with slightly different slope configurations (see Graph No. 2 below). Further, each curve has representatives from each average service life age group from five years to 120 years. The modality of the curves simply reflects whether the most frequently occurring retirement age is younger than the average retirement age – an L Curve (i.e., to the left of the average service life on a graph) – or older than the average retirement age – an R Curve (i.e., to the right of the average service life) – or equal to the average retirement age – an S Curve (i.e., symmetrical to the average service life). Graph No. 2 below also illustrates the wide variety of retirement patterns that can occur within each family of curves, from plant that experiences retirements almost immediately after installation (as in the $R_1$ type curve) to plant that may go a very long time before any significant retirements take place (as in the $R_5$ type curve).

**Graph No. 2 – R Family of Iowa Curves**



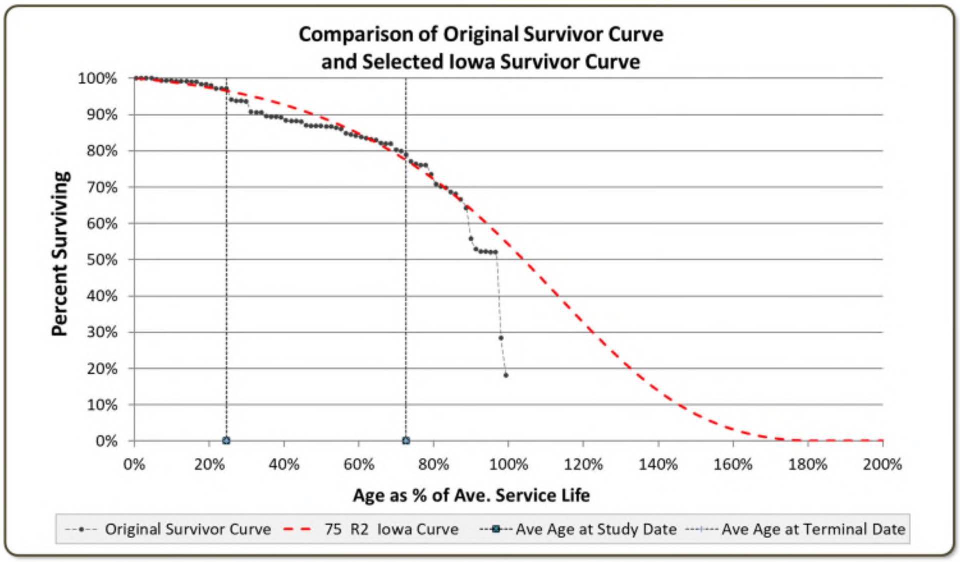
Graph No. 3 below illustrates the impact of different curves on the percent retiring between the study date and the termination date. Although both curves accurately estimated the current surviving balance, their trajectories result in far different forecasted retirements, which affects the derivation of the average remaining life, which in turn sets the depreciation rate. (Compare the area below the curves as fenced off by the horizontal and vertical dotted lines. The $S_3$ curve will experience a larger drop in survivorship over the period, resulting in a lower average remaining life than the $R_1$ curve.)

**Graph No. 3 – Comparison of Curves**



Graph No. 4 below illustrates the fitting of an Iowa Survivor Curve to the Original Survivor Curve depicted in Graph No. 1.

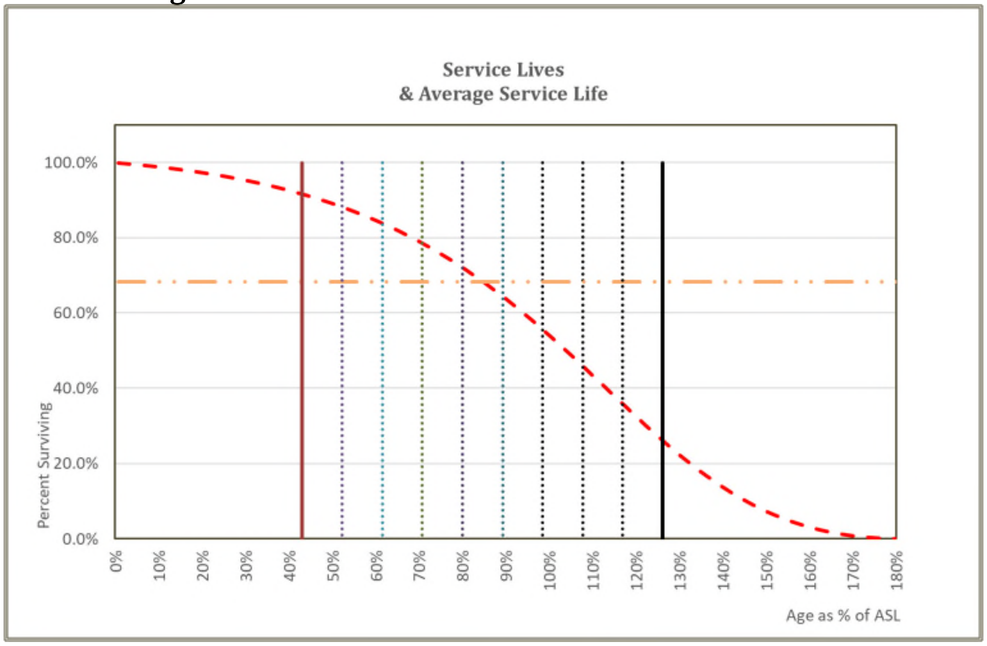
### Graph No. 4 – Iowa Curves Represent the Original Data



**Q. Describe the concept of the "average service life."**

A. The physical plant of large industrial entities like pipelines is made up of thousands of units of property. For example, the pipeline itself is not one long pipe. Rather, it consists of thousands of sections of pipe of various lengths installed over decades as the system expanded, or as portions of the system were replaced due to damage or wear and tear. While the usefulness and longevity of each section of pipe depends on the conditions associated with its use, eventually the retirement experience begins to reveal how long an average section of pipe can be expected to remain in service. The average service life ("ASL") is derived by calculating the percent surviving at each age interval, summing the surviving dollars, and dividing by the original balance. In Graph No. 5 below, the red dotted line represents the service lives of plant surviving in each period. The horizontal orange line represents the average service life over the whole period.

**Graph No. 5 Average Service Lives**



**Q. Why is the ASL important?**

A. The importance of using survivor curves is that by using them, we can avoid under-recovery of depreciation due to interim retirements between the study date and the termination date. In general, depreciation rates recover the cost of the plant over its life expectancy. The application of a straight-line depreciation rate to the annual rate base builds the depreciation reserves through annual accruals in equal installments. By the truncation date the plant should be fully depreciated. However, if the rate base is declining because of interim retirements, the annual accruals will not add up to the full amount needed for recovery by the truncation date, leaving a shortfall. Survivor curves allow us to mitigate that shortfall.

### d. Simulated Plant Record Analysis

**Q. Please describe the Simulated Plant Record Analysis**

A. Simulated Plant Record Analysis (SPR) is a methodology used to estimate the appropriate average service life and retirement patterns that allow us to accurately forecast the average remaining life of industrial assets. The SPR method is based on the same theories and principles as the Survivor Curve Methodology. The advantage of the SPR method is that the data required is simply plant additions by year and the actual surviving plant balance as of the study date. That data is readily available in a FERC-regulated pipeline's annually filed FERC Form No. 2. The SPR model applies a prototype Iowa Curve to each annual plant addition and calculates a final balance for the account, assuming all the plant will retire in a pattern similar to that of one of the Iowa Curves. The selected curve is used to forecast future retirements, which provides the average remaining life and ultimately the depreciation rate.

**Q. How does the SPR model represent the actual plant activity?**

A. As plant ages, the surviving plant ratio falls as it moves along and down the survivor curve. The average age of the plant in each account determines where the account is, vis-à-vis the survivor curve, at the study date. The SPR method calculates a theoretical retirement trajectory that it applies to each iteration of additions. The curve that best forecasts a plant balance closest to the actual plant balance is deemed, generally, to be the best representative pattern for all ages of plant. That declining survival ratio determines the interim retirements expected to take place between the study date and the terminal date. These retirements, in turn, are the foundation for determining the average remaining life for depreciation purposes.

### e. Testing Goodness of Fit

**Q. Is there a goodness-of-fit measurement to gauge the accuracy of the predicted survivorship?**

A. Yes, I use two measures of the goodness of fit to gage whether the forecasted annual retirements and survivorship levels match the actual trends in retirements and survivorship. The traditional measure is called the Conformance Index (CI), which measures how close the forecast of survivorship matches the actual surviving balance at the study date. The Retirement Index (RI) measures how well the forecast of annual retirements matches recent experience of the pipeline.

**Q. Please describe the Conformance Index.**

A. The traditional goodness-of-fit measurement is called the Conformance Index ("CI"). The CI is derived by dividing the actual ending balance by the absolute value of the difference between the actual ending balance and the predicted ending balance.

$$\text{CI} = \frac{\text{Actual Surviving Balance}}{|\text{ Predicted Surviving Balance -Actual Surviving Balance }|}$$

The predicted ending value is squared to eliminate negative numbers and then the square root is taken to hold the predicted value as close to the actual value as possible. If the difference between the predicted and actual ending balances is high, then the CI ratio will be low. Conversely, if the difference between the predicted and actual ending balances is low, then the CI ratio will be high. The rule of thumb for ranking CIs is:

| | |
|---|---|
| Over 75 | Excellent fit |
| 50 to 75 | Good fit |
| 25 to 50 | Fair fit |
| Under 25 | Poor fit |

The rationale for the CI valuation is that in order for the CI to reach a value of 75, the difference between the actual ending balance and the predicted ending balance must be within 1.5 percent of the actual ending balance. A CI value of 50 indicates a differential of only two percent. This ranking system thus requires the forecasted values to fall close to the actual values to be considered even a “fair” fitting of a hypothetical Iowa Survivor curve to the actual data.

**Q. Does the Conformance Index provide a unique best fit curve?**

A. Not always. A CI value above 100 indicates a forecast fit that is within 1 percent of the actual data; larger values for the CI over 100 do not indicate a significantly better fitting curve. As the difference between the predicted ending balance and the actual ending balance gets smaller, the CI value increases. As the difference approaches zero, the CI approaches infinity. It is often the case that several curves are statistically excellent fits for the data. If more than one curve has a CI beyond 100, the analyst incorporates other factors to select an appropriate curve.

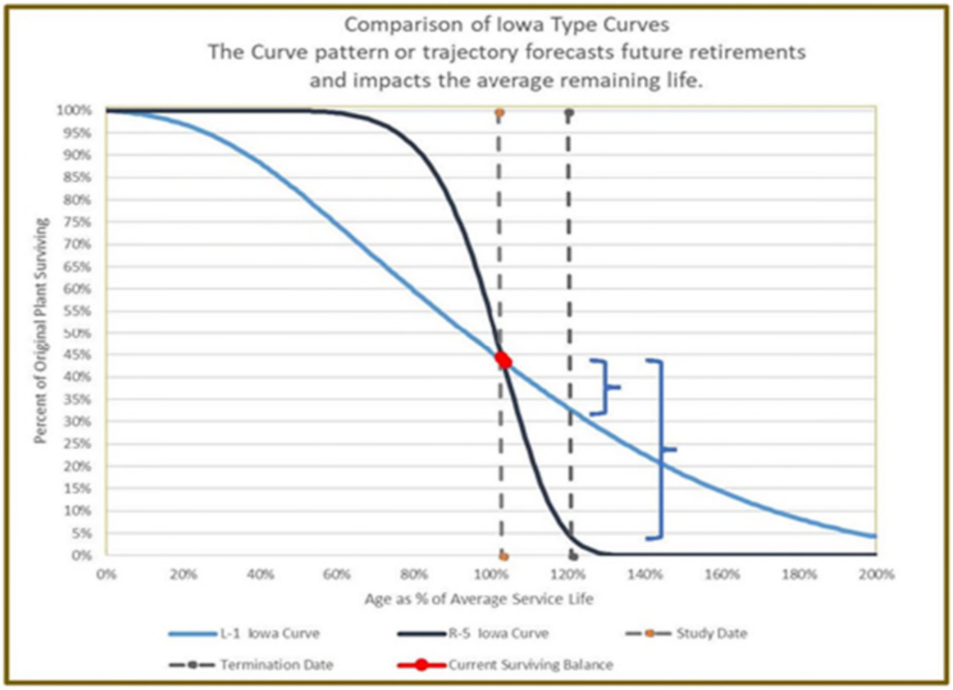
**Q. Is the Conformance Index a reliable basis for determining a best fit curve?**

A. Not always. In fact, the Conformance Index often can calculate a fit for an Iowa Curve that significantly misrepresents the likely survivor pattern of a category of property. The CI calculates the closeness of fit that each prototype Iowa Curve achieves in forecasting the actual surviving plant balance, *i.e.*, a specific dollar value at a point in time. However, for depreciation purposes we need more than a forecast of the surviving balance at one point in time; it is also important to glean the trajectory of the decline curve and the amount of annual retirements.

**Q. Does the Retirement Index test address the question of the trajectory of the retirement distribution curve?**

A. Yes, I believe it does. A good forecast should reflect actual experience as much as possible, but it is often the case that the "best fit" curve and service life pair come from a survivor curve pattern that predicts near-term retirements that are wildly divergent from the pipeline's actual recent experience. For example, Graph No. 6 below shows that both survivor curves accurately predict the current surviving balance and would thus have high CIs but take very different trajectories to get there. The $L_1$ Curve has a shallower curvature and forecasts modest retirements over the remaining life of the asset. The $R_5$ Curve has a steep declining curvature and forecasts the retirement of almost all the plant over the remaining life. In such cases I try to select an Iowa Curve that forecasts near term retirements as close as possible to the actual experience of retirements so that the resulting depreciation rate reflects the actual average remaining life of the plant. The RI is simply the comparison of the average level of annual plant retirements over the last five years to the forecasted level of annual average plant retirements for the next five years.

**Graph No. 6 – Curve Trajectories**



Q. **On several accounts in Exhibits Nos. ANR-0039 and ANR-0040 the test results for the Retirement Index indicate an error term "#DIV/0!" – what does this signify?**

A. The error indicator in the Retirement Index test results indicates that the test is attempting to divide by zero, meaning that there were no retirements in the five years covered by the test and that the Retirement Index is an unsuitable test for that account.

Q. **On several accounts in Exhibits Nos. ANR-0039 and ANR-0040 the test results for the Retirement Index indicate a negative result – what does this signify?**

A. A negative Retirement Index test result indicates that the service life and Iowa Curve pair giving rise to the negative figure is a poor predictor of future retirements. The RI test is calculated as follows:

*1 – ABS[(actual retirements less forecast retirements)/actual retirements]*

As the difference between the actual average retirements and the predicted average retirements narrows, the RI index moves to a value of 1 or 100% (ABS of 1 minus a zero difference). When the forecast retirements exceed the actual retirements, the Index begins to shrink back to 0 or 0% (ABS of 1 minus a difference of 100%). When the forecast exceeds the actual by greater than 200%, the index goes negative, *i.e.*, the absolute value is greater than 1.

## III. AVERAGE REMAINING LIFE

**Q. Describe the concept of truncation.**

A. Most pipelines and the Commission incorporate a truncation date in their derivations of depreciation rates to reflect the fact that the average actual useful lifespan of the assets is often significantly shorter than the physical average service life. The incorporation of a truncation date is often unrelated to the physical characteristics of the asset itself but due to reasons such as the loss of reserves supporting its use, technical obsolescence bringing about replacement, or the requirements of public authorities that may lead to economic obsolescence of certain facilities. The truncation may cause the remaining life of the assets to be less than the average physical life.

**Q. What economic life have you selected?**

A. Upon the recommendation of ANR witness Kirk, I have utilized a 2050 termination date.

**Q. Describe the concept of the "average remaining life."**

A. The average remaining life ("ARL") calculation is restricted to the time between the study date and the termination date, the period over which the company's remaining net plant will be depreciated. At the end of that period it is assumed there will be no further opportunity to recover the plant investment. Some plant will expire within a few years; other assets will last the entire remaining economic life – depreciation is recovered over the average lifespan. Dividing the sum of the surviving balances as calculated by the survivor curve by the starting balance provides the ARL, which is used in the depreciation calculations.

**Q. What does the term "average age" mean within the survivor curve model?**

A. The term "average age" is generally interpreted to mean the average age of the existing plant in service. It is calculated by multiplying the surviving balance from each vintage by its age, and then dividing the sum of weighted balances by the sum of surviving balances. Within survivor curve theory, the survivorship percentages are based on percent of the original investment that continues to survive at each age interval. So, using the survivor curve tables, one could estimate the amount of plant surviving for every year after installation. Similarly, using the survivor curve tables, one could estimate the amount of plant retiring every year, given any specific average age. In the tables used in these studies, the forecasts of future retirements are based on the application of the survivor curve percentages against the average age of the original dollars invested in each specific property account.

### a. Intangible Plant

**Q. Please provide your assessment of Account No. 301.**

A. Account 301 represents organizational costs which are not depreciable assets.

**Q. Please provide your assessment of Account No. 303.**

A. Account 303 is an account that represents primarily software licenses for various operating systems at ANR. Many of these licenses have specific contract terms. I have incorporated the contract terms in the account names of the assets list in

Exhibit No. ANR-0037, Schedule No. 2, page 5. Two subaccounts within Account 303 represent wider groupings of software assets, 303.0 Miscellaneous plant and 303.90 contributions in aid of construction (RCIAC). I assigned 303.00 an ASL of 5.1 years which reflects the average age at which assets retire from this specific account (see Schedule No. 9b, page 27 of Exhibit No. ANR-0037). Account 303.01 is assigned a 3.22-year ASL reflecting the average age at which these assets retire (see Schedule 9b, page 27 of Exhibit No. ANR-0037). I assigned 303.90 an ARL of 8 years reflecting the approximate average service life of other termed-assets in the account. Many of the other subaccounts in 303 are fully accrued. The final depreciation rates for these accounts are shown in Schedule No. 1 of Exhibit No. ANR-0037.

### b. Gathering Plant

**Q. Please provide your assessment of the Gathering Plant accounts.**

A. ANR's Gathering plant accounts 325 through 337 are grouped together here because most of the accounts have experienced little or no activity in recent years, viz-a-viz plant additions or retirements. The average age of plant invested in gathering facilities as of the study date was 20.65 years. The survivor curve assessment of ANR Gathering facilities is shown in Exhibit No. ANR-0038. As seen on pages 2 through 5 of the Exhibit, an 40-$R_2$ Iowa Curve has a retirement pattern which best matches the last five years of actual activity in the facilities. The result is an ARL of 20.49. See also, Exhibit No. ANR-0037, Schedule No. 6 on page 16.

### c. Storage Plant

**Q. Please provide your assessment of Account No. 350.12.**

A. Account No. 350.12 is a storage function account for leased land used in storage operations. The average age for the leased lands is 37.33 years. There is no separate FERC Form 2 data base for leased land versus owned land, hence a survivor curve assessment could not be made directly. Instead, I used Account 352 Wells as a proxy for the leased land. Using a 95-$L_4$ curve generated a 27.27-year ARL. See Exhibit No. ANR-0037, Schedule No. 7, center box, on page 17.

**Q. Please provide your assessment of Account No. 350.2.**

A. Account No. 350.2 is a storage function Right-of-Way account which holds the costs of acquiring the right to use the land in which the line is buried. The average age of total plant invested in Right-of-Way as of the study date is 21.92 years. The lack of retirement experience in recent years renders the RI fitness test inappropriate, so I relied on the CI fitness test. The highest CI among the top ten alternatives was a 40-$R_1$, which results in a 19.79-year ARL. Reference Exhibit No. ANR-0039 pages 4 through 8, and Schedule No. 7, right-hand box, on page 17 of Exhibit No. ANR-0037.

**Q. Please provide your assessment of Account No. 351.**

A. Account No. 351 is a storage function Structures and Improvements account which holds the costs of housing and protecting the buildings and landscape on which pipeline metering, regulating, and compression take place. The average age of total plant invested in Structures and Improvements as of the study date was 20.94 years. The 60-$S_4$ Iowa Curve is the best fitting curve under a 100-year ASL viz-a-viz the

RI test measure. As applied to the Account 351 plant composite balance the 60-S4 results in a 27.04-year ARL. Reference Exhibit No. ANR-0039 pages 9 through 13, and Schedule No. 7, left-hand box, on page 18 of Exhibit No. ANR-0037.

**Q. Please provide your assessment of Account No. 352.**

A. Account No. 352 is a storage function Wells account which holds the costs of drilling and maintaining storage wells. The average age of total plant invested in the wells account as of the study date would be 27.69 years. The RI test measure indicates the 95-$L_4$ curve is the best fit vis-à-vis retirement prediction under a 100-year ASL. The 10 and 20-year service lives are not reasonable service lives for storage wells. As applied to the Account No. 352 plant composite balance the 95-$L_4$ results in a 27.69-year ARL. Reference Exhibit No. ANR-0039 pages 14 through 18, and Schedule No. 7, center box, on page 18 of Exhibit No. ANR-0037.

**Q. Please provide your assessment of Account No. 352.1.**

A. Account No. 352.1 is a storage function account that holds the costs for leaseholds and mineral rights for storage wells. The average age of total plant invested in leaseholds as of the study date was 34.57 years. The lack of retirement experience in recent years renders the RI fitness test inappropriate, so I relied on the CI fitness test. Among the top ten pairings as suggested by the CI fitness test, the 45-S0 pairing had the highest CI test measure . As applied to the Account No. 352.1 plant composite balance the 45-$S_0$ results in a 18.61-year ARL. Reference Exhibit No. ANR-0039 pages 19 through 23, and Schedule No. 7, right-hand box, on page 18 of Exhibit No. ANR-0037.

**Q. Please provide your assessment of Account No. 353.**

A. Account No. 353 is a storage function account that holds the costs for line pipe connecting the wells and the trunklines. The average age of total plant invested in line pipe as of the study date would be 21.26 years. The best-scoring RI under a 100-year ASL is a 85-$L_2$, which results in a 26.21 ARL. Reference Exhibit No. ANR-0039 pages 24 through 28, and Schedule No. 7, left-hand box, on page 19 of Exhibit No. ANR-0037.

**Q. Please provide your assessment of Account No. 354.**

A. Account No. 354 is a storage function account that holds the costs for compressor station equipment. The average age of total plant invested in compression as of the study date would be 14.92 years. Among the top ten pairings with less than a 100-year ASL as suggested by the RI fitness test, the 75-$R_2$ pairing had the best-fitting RI test measure. As applied to the Account No. 354 plant composite balance the 75-$R_2$ results in a 26.44-year ARL. Reference Exhibit No. ANR-0039 pages 29 through 33, and Schedule No. 7, center box, on page 19 of Exhibit No. ANR-0037.

**Q. Please provide your assessment of Account No. 355.**

A. Account No. 355 is a storage function account that holds the costs for measuring and system regulating equipment. The average age of total plant invested in this account as of the study date would be 27.91 years. The lack of retirement experience in recent years renders the RI fitness test inappropriate, so I relied on the CI fitness test. Among the top ten pairings as suggested by the CI fitness test, the 65-$L_1$ pairing had the highest test measure resulting in a 22.58-year ARL. Reference Exhibit No. ANR-0039 pages 34 through 38, and Schedule No. 7, right-hand box, on page 19 of Exhibit No. ANR-0037.

**Q. Please provide your assessment of Account No. 356.**

A. Account No. 356 is a storage function account that holds the costs for leaseholds and mineral rights for storage wells. The average age of total plant invested in purification equipment as of the study date would be 19.49 years. Among the top ten pairings as suggested by the RI fitness test, the 75-$L_4$ pairing had the best-fitting RI test measure within a zone of reasonableness. As applied to the mainline plant, it results in a 27.45-year ARL. Reference Exhibit No. ANR-0039 pages 39 through 43, and Schedule No. 7, left-hand box, on page 20 of Exhibit No. ANR-0037.

**Q. Please provide your assessment of Account No. 357.**

A. Account No. 357 is a storage function account that holds the costs for assets not readily included in other accounts. The average age of total plant invested in purification equipment as of the study date was 11.06 years. Among the top ten pairings as suggested by the RI fitness test, the 25-$S_4$ pairing had the best-fitting CI test measure within a zone of reasonableness. As applied to Account No. 357, it results in a 13.06 year ARL. Reference Exhibit No. ANR-0039 pages 44 through 47, and Schedule No. 7, center box, on page 20 of Exhibit No. ANR-0037.

**Q. How did you derive the rates for the Cold Springs storage facility?**

A. The depreciation rates for the whole storage function were based on the composite FERC Form 2 data balances which comingle the mainline and Cold Springs facilities. Therefore, I assigned the same depreciation rates to both mainline and Cold Springs storage plant. ANR's fully depreciated storage plant has been excluded from the derivation of the depreciation rate.

### d. Transmission Plant

**Q. Please provide your assessment of Account 356.1.**

A. Account 365.1 is a transmission function account for land used under easement rights for pipeline operations. Since there is no separate FERC Form 2 data base for land easements versus land, a survivor curve analysis cannot be done directly. Instead, I used Account No. 367 as a proxy for the easement assets. Using a 95-$R_4$ curve generated a 27.88 year ARL.

**Q. Please provide your assessment of Account No. 365.2.**

A. Account No. 365.2 is a transmission function Right-of-Way account which holds the costs of acquiring the right to use the land in which the line is buried. The average age of total plant invested in Right-of-Way as of the study date would be 33.17 years. The lack of retirement experience in recent years renders the RI fitness test inappropriate, so I relied on the CI fitness test. The highest CI among the under-100 years ASL curves was an 85-$S_3$ which results in an ARL of 26.78 years (Exhibit No. ANR-0040, page 4 through 8 and Schedule No. 8 right-hand box on page 21 of Exhibit No. ANR-0037).

**Q. Please provide your assessment of Account No. 366.**

A. Account No. 366 is a transmission function Structures and Improvements account which holds the costs of housing and protecting the buildings and landscape on which pipeline metering, regulating, and compression take place. The average age of total plant invested in Structures and Improvements as of the study date would be 13.88 years. Given the nature of assets in this account (fencing, parking space, security systems, fire suppression systems, management offices), an ASL of between 45 and 65 years is a reasonable lifespan. I selected the 65-$R_2$ pairing which results in an ARL of 26.09 years (Exhibit No. ANR-0040, page 9 through 13 and Schedule No. 8 left-hand box on page 22 of Exhibit No. ANR-0037).

**Q. Please provide your assessment of Account No. 367.**

A. Account No. 367 is a transmission function mains line pipe account which holds the costs of building the pipeline itself. The average age of total plant invested in the mains account as of the study date would be 29.82 years. The RI test measure indicates the 95-$R_4$ curve is the best fit vis-à-vis retirement prediction. The highest rated RI tested curve suggests an ASL of 150 years which is outside a zone of reasonableness for line pipe. The 95-$R_4$ pairing results in an ARL of 27.49 years. Reference Exhibit No. ANR-0040, page 14 through 18 and Schedule No. 8, center box on page 22 of Exhibit No. ANR-0037).

**Q. Please provide your assessment of Account No. 368.**

A. Account No. 368 is a transmission function compression equipment account which holds the costs of equipment used to move gas through the system. The average age of total plant invested in compressor stations as of the study date would be 13.66 years. I selected instead the 65-$L_1$ curve with a service life of 65 years and ARL of 24.57. Reference Exhibit No. ANR-0040, page 19 through 23 and Schedule No. 8, right-hand box on page 22 of Exhibit No. ANR-0037.

**Q. How did you assess the gas turbine engines in Account 368?**

A. ANR has approximately $101 million in gas turbine engines powering various compressor stations on its system. The gas turbine engines have a significantly shorter life expectancy compared to the rest of Account No. 368 which is factored into the function-wide depreciation rate derivation. Turbines have a high-efficiency power output that comes as a trade-off in the number of operating hours capacity. Most gas turbines are removed for overhaul at 30,000 operating hours in contrast to reciprocating engines that may run 50,000 to 60,000 hours before a major overhaul. I would note here that an "overhaul" is used here to mean the removal of the engine from service for refurbishment. ANR provided several years of operating data for its turbines, as shown in Exhibit No. ANR-0037, Schedule No. 4 at page 13. Engines that run less than 100 hours in a given year were considered inactive for that year. The composite annual average operating hours are divided into the 30,000 average hours-to-overhaul to determine ANR's 13.57 ASL for its turbine engines.

**Q. How did you assess the salvage on turbine retirements?**

A. There is no salvage on gas turbine engines. When gas turbines reach the 30,000-hour operating hour threshold, the engines are not retired per se, but swapped out for a new or like-new refurbished engine. The pipeline is then charged a fired-hour based refurbishment charge to overhaul the removed turbine. The refurbishment charge is capitalized.

**Q. How do the gas turbines impact the terminal decommissioning costs?**

A. At the end of the pipeline's useful life, the last turbines will be removed for refurbishment, and the refurbishment charged to the pipeline. The rest of the Account 368 machinery will be scrapped as indicated by ANR witness Fall.

**Q. Please provide your assessment of Account No. 369.**

A. Account No. 369 is a transmission function measuring and regulating equipment account which holds the costs of equipment needed to manage the system. The average age of total plant invested in metering and regulation as of the study date was 13.61 years. The RI test measure indicates the 70-$S_2$ is most representative of the retirement pattern, which results in an ARL of 27.02 years (Exhibit No. ANR-0040, pages 24 through 28 and Schedule No. 8, left-hand box on page 23 of Exhibit No. ANR-0037).

**Q. Please provide your assessment of Account No. 370.**

A. Account No. 370 is a transmission function account which holds the costs of communications equipment. This account is broken into 370.00 for fully depreciated communication assets and 370.20 for not-fully depreciated communications assets. The average age of total plant invested in the account as of the study date would be 19.49 years. The RI test measure indicates the 45-$R_5$ curve is the best fit vis-à-vis retirement prediction, which results in a 22.30-year ARL (Exhibit No. ANR-0040, page 29 through 33, and page 23 right-hand box, of Exhibit No, ANR-0037).

**Q. Please provide your assessment of Account No. 371.**

Account No. 371 is a transmission function account which holds the costs of assets not readily placed in other accounts. The average age of total plant invested in this account as of the study date would be 6.94 years. The RI test measure indicates the 75-$S_1$ curve is the best fit vis-à-vis retirement prediction results in an ARL of 26.87 (Exhibit No. ANR-0040, page 34 through 36, and Schedule No. 8, center box, on page 23 of and Exhibit No. ANR-0037).

### e. General Plant

**Q. How did you estimate the depreciable lives for general plant?**

A. General plant assets provide service across all operating functions of the pipeline system and are characterized by either a higher turnover rate than other plant or a high number of interchangeable units, such as automobiles. Most pipelines opt to use the "vintage plant" depreciation method in which plant is retired from service at specific age mileposts rather than under a condition assessment approach. ANR provided 20 years of general plant retirement data showing how its vintage plant depreciation works. See Exhibit No. ANR-0037, Schedule No. 9, at page 24 - 27. The successive account charts show the installation vintages across the top and the retirement transaction years along the vertical axis. Across the middle of each chart is the age at which plant from each vintage was retired. The average retirement age, shown in the lower righthand corner of each chart, indicates the average service life for each account.

## IV. NEGATIVE SALVAGE

**Q. What is "negative salvage"?**

A. "Negative salvage" – also called "net salvage" – is the cost of taking plant out of service where the costs of removal exceed the salvage value of the plant removed from service. In many instances the cost is *de minimis* and treated as maintenance expense but in other instances substantial costs can be incurred. When these costs become sizable, they are treated as part of the recovery of capital costs and debited to the accumulated reserve for depreciation. Similarly, the salvage value of assets removed from service represents a recovery of some of the cost of acquiring the asset and are thus also treated as part of the depreciation of capital costs, in this case a credit to the accumulated reserve for depreciation. Where the cost of removal exceeds the salvage value of the retired asset, the excess cost is termed "net salvage" or "negative salvage" and debited to the accumulated reserve for depreciation.

**Q. Does ANR currently have negative salvage rates?**

A. Yes, ANR does have negative salvage rates for its jurisdictional facilities as indicated on Schedule No. 1 of Exhibit No. ANR-0037. The negative salvage balance is built up by accruals generated by the application of the negative salvage rate and by salvage earned on the sale of retired assets. The negative salvage balance is reduced by the costs incurred to remove assets year by year. In the development of negative salvage rates in this depreciation study, all negative salvage balances are deemed associated with terminal decommissioning costs to avoid double counting the reduction in costs to be recovered for interim and terminal removal costs due to the reserve.

**Q. How does interim retirement negative salvage differ from terminal decommissioning negative salvage?**

A. Assets removed from service during the pipeline's on-going service life are known as interim retirements – the "interim" being the time between being placed in service and the end of the pipeline's economic service life. Interim retirements are undertaken to maintain system reliability, upgrade or improve plant, expand the system, remove plant no longer needed, or carryout government required activities. The net cost of removing the old assets is considered an interim retirement negative salvage and is part of on-going operations. The cost of removal expenses are charged to Account 108, Reserve for Depreciation.

Upon reaching the end of its economic service life, the pipeline will be decommissioned, the services abandoned, the line purged and cleaned, the aboveground facilities at meter stations and compressor stations removed, rail and road crossings secured and grouted, and the land reclaimed. The cost of returning the right of way to pre-build condition is, like the construction of the system, an obligation that should be borne by all generations of customers who benefitted from those assets to the extent of ANR's ability to estimate and allocate those costs. The cost for the terminal abandonment and decommissioning are covered by ANR witness Fall. The conversion of costs into recovery rates are provided in my testimony Exhibit No. ANR-0037, Schedule No. 12 at page 35. Because both the interim retirements and terminal retirements rates are based on costs divided by the plant in service (not the retired amount), the rates can be added together when estimating negative salvage costs.

Q. **So, to be clear, are you recommending one rate for costs related to interim retirements and one rate related to terminal decommissioning?**

A. Yes, I am. The rates are calculated using the same common denominator (*i.e.*, plant in service) and thus can be simply added together if desired but I would make clear they derive from different cost drives.

a. Negative Salvage on Interim Retirements

**Q. What is your recommendation regarding ANR's negative salvage on interim retirements?**

I recommend that ANR apply a 0.23% negative salvage recovery rate for interim retirements on its storage facility assets, inclusive of fully depreciated plant, non-fully depreciated plant, and Cold Springs storage plant; a 0.17% negative salvage recovery rate on its transmission plan; and no negative salvage on its gathering plant

Q. **How did you calculate that rate?**

A. The negative salvage rate on interim retirements is based on the last six years of data reporting annual plant retirements from FERC Form 2, and associated costs of removal and salvage provided by ANR. See Exhibit No. ANR-0037, Schedule No. 11, at page 31-34. Using this data, I calculated the average net salvage ratio per dollar retired over the five-year range of retirements. This ratio is then multiplied by the forecasted interim retirements from Schedules 6, 7, and 8, to arrive at the estimated net cost of removal. This figure is then divided by the average remaining life for the function from Schedule 10 to obtain the annual negative salvage expense. This expense, in turn, divided by the plant in service from Schedule 2, to arrive at the negative salvage rate.

### b. Terminal Decommissioning Cost recovery

**Q. What is your recommendation regarding ANR's terminal decommissioning costs proposed by Mr. Fall?**

A. I recommend that ANR apply a 0.85% terminal decommissioning rate to its storage facilities assets, inclusive of its fully depreciated assets, non-fully depreciated assets, and its Cold Springs storage facilities; a 1.06% rate for its transmission facility assets; and a 1.19% rate for its gathering facility assets. These rates are based on a Full Recovery Model as described below.

**Q. How did you calculate the terminal decommissioning rates?**

A. The terminal decommissioning costs were estimated by ANR witness Fall. I am presenting the recovery mechanism for these costs in two models. The first is the more traditional Partial Recovery Model in which the terminal costs estimated by Mr. Fall are reduced by the proportion of plant forecast to be retired in the interim period. The Partial Recovery Model recovers only the costs associated with current plant that will remain in service to the terminal date. These costs are shown, by FERC account responsibility, in Exhibit No. ANR-0037, Schedule No. 12, at page 35. These account-by-account assignments are carried to page 36 and prorated by the percent of current plant expected to survive to the terminus date to derive the allowed terminal decommissioning costs. These are then divided by the ARLs as derived in Schedules 7 and 8. These annual accrual forecasts are then summed and divided by the current gross plant to derive the terminal decommissioning cost recovery rate.

The Full Recovery Model derives a rate that will recover all the costs estimated by Mr. Fall. It simply divides the full cost by the average remaining lives reported from Schedule Nos. 7 and 8, and then divides by the depreciable plant in service to develop the rate. Exhibit No. ANR-0037, Schedule No. 12, page 37.

**Q. Does this conclude your testimony?**

A. Yes, it does.

## UNITED STATES OF AMERICA
## BEFORE THE
## FEDERAL ENERGY REGULATORY COMMISSION

**ANR Pipeline Company** ) **Docket No. RP22-___-000**

## AFFIDAVIT OF
## PATRICK R. CROWLEY

Patrick R. Crowley, being first duly sworn, on oath states that he is the witness whose testimony appears on the preceding pages entitled "Prepared Direct Testimony of Patrick R. Crowley on Behalf of ANR Pipeline Company" that, if asked the questions which appear in the text of said testimony, he would give the answers that are therein set forth; and that affiant adopts the aforesaid testimony as Patrick R. Crowley's sworn testimony in this proceeding.

Patrick R. Crowley

Subscribed and sworn to before me, a Notary Public in and for District of Columbia, this 21st day of January 2022.

STEPHANIE J. WILKERSON
EXP. 9-14-24

Notary Public

My Commission expires:

STEPHANIE J. WILKERSON
NOTARY PUBLIC DISTRICT OF COLUMBIA
My Commission Expires September 14, 2024

# UNITED STATES OF AMERICA
# BEFORE THE
# FEDERAL ENERGY REGULATORY COMMISSION

| | | |
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| | ) | |
| ANR Pipeline Company | ) | Docket No. RP22-___-000 |
| | ) | |

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## Curriculum Vitae
## OF PATRICK R. CROWLEY
## ON BEHALF OF
## ANR Pipeline Company

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Patrick R Crowley
Vice President/Consultant, Suite 1004
Brown Williams Moorhead & Quinn, Inc.
202-775-8994

BA Economics – DePaul University, Chicago, IL 1976
MA Economics – DePaul University, Chicago, IL 1978

Patrick Crowley is a regulatory energy consultant with over 36 years' experience as an economist and expert witness in energy litigation as an independent consultant and an analyst with the Federal Energy Regulatory Commission in Washington, D.C.

Mr. Crowley joined the Federal Energy Regulatory Commission in 1979 where he held various positions within the FERC, gaining proficiency at long-term natural resource discovery & production forecasting, actuarial analysis of physical plant life span expectancies, depreciation accounting, regulatory cost-of-service rate making, rate base composition, cost allocation methodologies, partnership income tax allowance, energy market bidding platforms and strategies, pipeline rate design, master limited partnership income allocation structures, market power analysis, and market anomalies investigation. While an employee at FERC, Mr. Crowley filed written testimony and was cross-examined in numerous rate case proceedings, participated in hundreds of settlement negotiations, prepared and reviewed discovery for litigation, prepared and filed supporting exhibits and documentation in litigated rate cases, and led multi-disciplinary teams in rate case analysis and the investigation of energy market abuses.

He left the FERC to create Crowley Energy Consulting in 2007, offering technical analysis and expert testimony in energy litigation involving natural gas pipeline, oil pipeline, and electric transmission matters before federal and state regulatory commissions. Mr. Crowley prepared and filed written testimony, affidavits, and comments before FERC, and provided oral testimony supporting his filed positions in numerous rate case proceedings.

Mr. Crowley joined BWMQ in 2013 to head up the depreciation studies work for this comprehensive energy regulatory firm. He has engaged in many such studies to date and filed testimony in numerous FERC rate cases as noted on the following pages.

***Brown, Williams, Moorhead & Quinn, Inc.***

Eastern Gas Transmission & Storage Inc., Docket No. 22-

Texas Eastern Transmission, LP, Docket No. RP22-18-000;

Texas Eastern Transmission, LP, Docket No. RP21-1001-000;

Columbia Gas Transmission, LLC, Docket No. RP20-1060-000;

East Tennessee Natural Gas Company, Docket No. RP20-980-000;

Maritimes & Northeast Pipeline, LLC, Docket No. RP20-921-000;

Alliance Pipeline LP, Docket No. RP20-908-000;

Dominion Energy Cove Point LNG, Docket No. RP20-467-000;

Panhandle Eastern Pipe Line Company, Docket No. RP19-1523-000;

Panhandle Eastern Pipe Line Company, Docket No. RP19-78-000;

National Fuel Gas Supply Corporation, Docket No. RP19-1426-000;

San Mateo Black River Oil Pipeline, Docket No. DO19-16-000;

Texas Eastern Transmission, Inc., Docket No. RP19-343-000;

WBI Energy Transmission, Inc., Docket No. RP19-165-000;

Transcontinental Gas Pipe Line Company, Docket No. RP18-1126-000;

Saltville Storage Company, Docket No. RP18-1115-000;

Trailblazer Pipeline Company, Docket No. RP18-922-000;

Enable Mississippi River Transmission, LLC, Docket No. RP18-923-000;

Empire Pipeline, Inc., Docket No. RP18-940-000;

MoGas Pipeline LLC, Docket No. 18-877-000;

Shell Pipeline Company, LP, Docket No. DO18-11-000;

Zydeco Pipeline Company, LLC, Docket No. DO18-10-000;

Mars Oil Pipeline Company, LLC, Docket No. DO18-09-000;

Ship Shoal Pipeline Company, Docket No. DO18-07-000;

Great Lakes Gas Transmission, LP, RP17-598-000;

Eastern Shore Natural Gas Company, Docket No. RP17-363-000;

Dominion Cove Point LNG, L.P., Docket No. RP17-197-000;

ANR Pipeline Company, Docket No. RP16-440-000;

ANR Storage Company, Docket No. RP16-877-000;

Tallgrass Interstate Gas Transmission, Docket No. RP16-137-000;

Sabine Pipe Line, LLC, Docket No. RP15-1322-000;

Gulf South Pipeline Company, LP, Docket No. RP15-65-000;

Southern Star Central Gas Pipeline Company, Inc., Docket RP13-941-000;

Trailblazer Pipeline Company, Docket No. RP13-1013-000.

***Crowley Energy Consulting***

Florida Gas Transmission, Docket No. RP10-21-000;

SFPP, L.P. General Rate Application (PLC-9 Oil), CPUC Application No. 09-05-014;

Belle Fourche Pipeline Co. Docket No. IS09-92;

Bridger Pipeline, LLC, Docket No. IS09-93;

Rockies Express Shippers v Northern Natural Gas Company, Docket No. RP08-29-000;

BP West Coast Products v CalNev Pipe Line, LLC, Docket No. OR07-22-000;

Assessment of Information Requirements for FERC Financial Forms, Docket No. RM07-2-000;

Composition of Proxy Groups for Pipeline ROE, Docket No. PL07-2-000.

***Crowley Testimony as Employee of FERC***

Northern Border Pipeline Company, RP06-72-000;

SFPP, LP, Docket No. IS05-230-000;

Enron Power Marketing Inc., Docket No. EL03-180-000, et al.;

Sinclair Oil Corporation v Rocky Mountain Pipeline System, LLC
& BP Pipelines (North America), Inc., Docket No. OR02-6-000;

Ameren Services Company, Docket No. ER02-929-000;

PowerEx Corporation, Docket Nos. EL03-166-000 & EL03-199-000;

Avista Corporation & Avista Energy, Docket No. EL02-115-000;

Big West Oil Co. & Chevron Products Co. v Frontier Pipeline Inc.

        & Express Pipeline Partnership, Docket No. OR02-2-000 & OR02-4-000;

Big West Oil Co. & Chevron Products Co. v Anschutz Ranch East Pipeline Co.
& Express Pipeline Partnership, Docket No. OR02-1-000 & OR02-3-000;

Boston Edison Company, Docket No. ER01-890-000;

Montana Power Company, Docket No. ER98-2382-000;

San Diego Gas & Electric Company v Public Service Co. of New Mexico,
Docket Nos. EL97-54-002 & EL99-21-000;

***Crowley Depreciation Testimony as Employee of FERC***:

Natural Gas Pipeline Company of America, Docket No. RP93-36-000;

Tarpon Transmission Company, Docket No. RP92-164-00;

Mississippi River Transmission Corporation, Docket Nos. RP89-248-000 & RP90-75-000;

U-T Offshore System, Docket No. RP89-38-000;

High Island Offshore System, Docket No. RP89-37-000;

Transcontinental Gas Pipeline Co., Docket No. RP87-7-000;

Southwest Gas Storage Company, Docket No. RP89-60-000;

Paiute Pipeline Company, Docket No. RP88-227-000;

Natural Gas Pipeline Company of America, Docket No. RP88-209-000;

Sea Robin Pipeline Company, Docket No. RP88-181-000;

Pacific Gas Transmission Company, Docket No. RP87-62-000;

National Fuel Gas Supply Corporation, Docket No. RP86-136-000;

Tarpon Transmission Company, Docket No. RP84-82-000;

Black Marlin Pipeline Company, Docket No. RP81-67-000.

***Non-Litigated Oil Pipeline Cost of Service Analyses at FERC***:

Olympic Pipe Line Company Docket No. IS03-218-000;

Platte Pipeline Docket No. IS02-384-000;

Express Pipeline Docket No. IS02-81-000;

Chevron Products, Inc. v Anschutz Ranch East Pipeline Co. Docket No. OR02-03-000;

Conoco Pipe Line Co., Docket Nos. IS01-444-000 & IS01-445-000;

Olympic Pipe Line Company, Docket No. IS01-441-000;

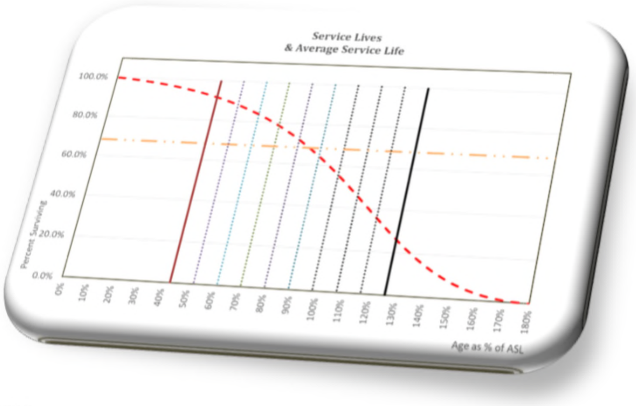
EOTT Energy Operating Ltd. v Conoco P/L Corp, Docket No. OR00-11.

# United States of America
# before the
# Federal Energy Regulatory Commission

§
ANR Pipeline Company § Docket No. RP 22-____-000
§

## Depreciation & Negative Salvage Workpapers

Prepared in Conjunction with
Prepared Direct Testimony of
Patrick R. Crowley
on Behalf of ANR Pipeline Company



BROWN, WILLIAMS, MOORHEAD & QUINN, INC.
ENERGY CONSULTANTS

# ANR Pipeline Company
# Depreciation Workpapers
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# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 1 - Proposed Depreciation Rates

| | | | Current Approved Rates | | Proposed Rates | | | |
|---|---|---|---|---|---|---|---|---|
| Line # | Acct # | Acct Name | Depreciation Rates | Negative Salvage Rates | Depreciation Rates | Negative Salvage Rates | Terminal Decommissioning | Total Rate |
| | | | (A) | (B) | (C) | (D) | (E) | (F) |
| 1 | **Intangible Plant** | | | | | | | |
| 2 | 301.00 | Organization Costs | 0.00% | | | | | |
| 3 | 303.00 | Misc Intangible Plan | 10.00% | | 4.59% | | | 4.59% |
| 4 | 303.02 | Cygnet Assets | | | 17.50% | | | 17.50% |
| 5 | 303.10 | Intangibles 10 yr * | 10.00% | | | | | |
| 6 | 303.15 | Intangibles 15 yr * | 6.67% | | | | | |
| 7 | 303.19 | Intangibles 20 yr | 5.00% | | 2.96% | | | 2.96% |
| 8 | 303.20 | Intangibles 2 yr * | 50.00% | | | | | |
| 9 | 303.20 | Intangibles 20 yr | 5.00% | | | | | |
| 10 | 303.20 | Intangibles 24 yr * | 4.17% | | | | | |
| 11 | 303.50 | Intangibles 5 yr * | 20.00% | | | | | |
| 12 | 303.60 | Intangibles 6 yr | | | | | | |
| 13 | 303.80 | Intangibles 8 yr * | 12.50% | | | | | |
| 14 | 303.90 | Intangible 11.5 Yr | 8.72% | | 2.34% | | | 2.34% |
| 15 | | * Fully accrued | | | | | | |
| 16 | | | | | | | | |
| 17 | **Gathering Plant** | | 0.49% | | 1.16% | 0.00% | 1.19% | 2.35% |
| 18 | | | | | | | | |
| 19 | **Underground Storage Plant** | | | | | | | |
| 20 | | Mainline | 1.91% | 0.35% | 2.24% | 0.23% | 0.85% | 3.32% |
| 21 | | | | | | | | |
| 22 | | Cold Springs | 1.91% | 0.35% | 2.24% | 0.23% | 0.85% | 3.32% |
| 23 | | | | | | | | |
| 24 | | | | | | | | |
| 25 | **Transmission Plant** | | 2.18% | 0.17% | 2.59% | 0.35% | 1.06% | 4.00% |
| 26 | 370.02 | Communication Equip | 8.50% | | 3.84% | | | |
| 27 | | | | | | | | |
| 28 | | | | | | | | |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 1 - Proposed Depreciation Rates

| | | | Current Approved Rates | | Proposed Rates | | | |
|---|---|---|---|---|---|---|---|---|
| Line # | Acct # | Acct Name | Depreciation Rates | Negative Salvage Rates | Depreciation Rates | Negative Salvage Rates | Terminal Decommissioning | Total Rate |
| | | | (A) | (B) | (C) | (D) | (E) | (F) |
| | **General Plant** | | | | | | | |
| 1 | 389.00 | Land | | | | | | |
| 2 | 390.00 | Structures & Improve | 1.30% | 41,215.19 | 6.12% | | | 6.12% |
| 3 | 390.10 | Other Structures | 3.175% | 25,371.84 | 6.67% | | | 6.67% |
| 4 | 390.11 | L/H Improve BOA 11th Floor | 6.49% | 88,078.25 | 6.67% | | | 6.67% |
| 5 | 390.12 | L/H 12th Floor - Exl GC | 6.45% | 206,724.03 | 6.67% | | | 6.67% |
| 6 | 390.13 | L/H Improve 13 Yr (BOA 9th, 16th | 7.690% | 165,259.76 | 7.69% | | | 7.69% |
| 7 | 390.14 | L/H Improve 13.2 Yr (BOA 8th & 1 | 7.575% | 132,113.38 | 7.58% | | | 7.58% |
| 8 | 390.20 | L/H Improve 10 Yr * | 10.000% | 1,380.30 | 10.00% | | | 10.00% |
| 9 | 390.30 | L/H Improve 5 Yr * | 20.000% | 25,364.84 | 20.00% | | | 20.00% |
| 10 | 390.40 | Leaseholds | | - | 0.00% | | | 0.00% |
| 11 | 390.50 | L/H Improve 10 Yr (1301 Fannin) * | 10.000% | 51,600.00 | 10.00% | | | 10.00% |
| 12 | 390.60 | L/H 717 Texas 14th F | | - | 0.00% | | | 0.00% |
| 13 | 390.70 | L/H Improve 17.2 Yr (BOA 14th Fl | 5.800% | 185,202.27 | 5.81% | | | 5.81% |
| 14 | 390.80 | L/H Improve 15.9 Yr (BOA 7th, 10 | 6.280% | 624,746.24 | 6.29% | | | 6.29% |
| 15 | 390.90 | L/H Improve BOA 12th Floor | 6.45% | 34,997.02 | 6.67% | | | 6.67% |
| 16 | 391.00 | Office Furn & Equip | 6.667% | 884,310.15 | 6.70% | | | 6.70% |
| 17 | 391.1 | Computer Equipment | 20.00% | 7,465,399.48 | 20.00% | | | 20.00% |
| 18 | 392.0 | Cars & Trucks | 9.47% | 2,187,006.54 | 9.50% | | | 9.50% |
| 19 | 392.1 | Patrol Plane | 5.00% | 234,998.00 | 3.30% | | | 3.30% |
| 20 | 394.0 | Tools, Shop & Gar Eq | 5.71% | 1,338,942.62 | 6.80% | | | 6.80% |
| 21 | 396.0 | Power Operated Equip | 5.71% | 316,059.82 | 5.30% | | | 5.30% |
| 22 | | | | | | | | |
| 23 | | | | | | | | |

## ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 2 - Plant Balances and Reserves

| | | | Base Period | | | Test Period | | |
|---|---|---|---|---|---|---|---|---|
| Line # | Acct # | Acct Name | Plant in Service | Reserve for Depreciation | Reserve for Negative Salvage | Plant in Service | Reserve for Depreciation | Reserve for Negative Salvage |
| | | | (A) | (B) | (C ) | (D) | (E ) | (F) |
| | | | 9/30/2021 | 9/30/2021 | | 7/31/2022 | 7/31/2022 | |
| 1 | **Intangible Plant** | | | | | | | |
| 2 | 301.00 | Organization Costs | 4,394.81 | - | | | | |
| 3 | 303.00 | Misc Intangible Plan | 87,524,472.00 | 75,517,203.77 | | | 82,810,909.77 | |
| 4 | 303.01 | Cygnet Assets | 20,805,400.49 | 8,975,220.20 | | | 8,975,220.20 | |
| 5 | 303.10 | Intangibles 10 yr * | 24,234,542.64 | 24,234,542.64 | | | - | |
| 6 | 303.15 | Intangibles 15 yr * | 145,487.93 | 145,487.93 | | | - | |
| 7 | 303.19 | Intangibles 20 yr | 712,553.11 | 311,741.85 | | | 341,431.56 | |
| 8 | 303.20 | Intangibles 2 yr * | 221,763.71 | 221,763.71 | | | - | |
| 9 | 303.20 | Intangibles 20 yr | 6,895,763.49 | 6,895,763.49 | | | - | |
| 10 | 303.30 | Intangibles 24 yr * | - | - | | | - | |
| 11 | 303.50 | Intangibles 5 yr * | 11,780,597.22 | 11,780,597.22 | | | - | |
| 12 | 303.60 | Intangibles 6 yr | - | - | | | - | |
| 13 | 303.80 | Intangibles 8 yr * | 19,318,162.39 | 19,318,162.39 | | | - | |
| 14 | 303.90 | Intangible 11.5 Yr | 22,017,096.99 | 9,810,114.89 | | | 11,415,528.21 | |
| 15 | | Subtotal | 193,660,234.78 | 157,210,598.09 | | | 103,543,089.75 | |
| 16 | | | | | | | | |
| 17 | **Gathering Plant** | | | | | | | |
| 18 | 325.50 | Land | 580,397.72 | - | | | | |
| 19 | 325.40 | Rights of Way | 198,618.08 | 192,829.02 | | | 193,640.04 | |
| 20 | 327.00 | Field Comp Stn Struc | 0.50 | - | | | 0.00 | |
| 21 | 328.00 | Field Meas & Reg Stn | 118,525.74 | 105,825.86 | | | 106,309.84 | |
| 22 | 329.00 | Other Structures | 16,467.14 | 4,859.01 | | | 4,926.25 | |
| 23 | 332.00 | Field Lines | 5,532,780.78 | 4,811,705.00 | | | 4,834,297.19 | |
| 24 | 333.00 | Field Comp Stn Equip | | - | | | - | |
| 25 | 334.00 | Field M & RStn Equip | 1,142,068.59 | 812,612.21 | | | 817,275.66 | |
| 26 | 336.00 | Purification Equip | - | - | | | - | |
| 27 | | Subtotal | 7,588,858.55 | 5,927,831.10 | | | 5,956,448.98 | |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 2 - Plant Balances and Reserves

| | | | Base Period | | | Test Period | | |
|---|---|---|---|---|---|---|---|---|
| Line # | Acct # | Acct Name | Plant in Service | Reserve for Depreciation | Reserve for Negative Salvage | Plant in Service | Reserve for Depreciation | Reserve for Negative Salvage |
| | | | (A)<br>9/30/2021 | (B)<br>9/30/2021 | (C ) | (D)<br>7/31/2022 | (E )<br>7/31/2022 | (F) |
| 1 | **Underground Storage Plant** | | | | | | | |
| 2 | **Depreciable Storage Plant** | | | | | | | |
| 3 | 350.11 | Land (ANRS) | 318,886.94 | - | | | | |
| 4 | 350.12 | Land (Leased) | 2,806,038.42 | - | | | | |
| 5 | 350.13 | Land (Owned) | 2,778,758.89 | - | | | | |
| 6 | 350.20 | Rights of Way | 1,131,360.25 | 904,522.94 | | | 922,530.42 | |
| 7 | 351.10 | Well Structures | 1,338,754.18 | 632,045.69 | | | 653,354.19 | |
| 8 | 351.20 | Comp Stn Structures | 16,175,808.90 | 9,168,925.39 | | | 9,426,390.35 | |
| 9 | 351.30 | Meas & Reg Structure | 711,171.83 | 578,496.24 | | | 589,815.72 | |
| 10 | 351.40 | Other Structures | 2,896,015.95 | 1,460,774.74 | | | 1,506,869.66 | |
| 11 | 352.00 | Wells | 55,870,664.43 | 37,730,401.88 | | | 38,619,676.62 | |
| 12 | 352.10 | Storage Leaseholds | 9,989,392.16 | 5,829,771.84 | | | 5,988,769.67 | |
| 13 | 352.20 | Reservoirs | 3,210,715.44 | 3,079,033.09 | | | 3,130,136.98 | |
| 14 | 353.00 | Lines | 96,948,110.76 | 46,064,974.50 | | | 47,608,065.26 | |
| 15 | 354.00 | Compressor Equipment | 222,065,008.32 | 74,311,658.06 | | | 77,846,192.78 | |
| 16 | 355.00 | Meas & Reg Stn Equip | 16,151,448.51 | 9,986,231.54 | | | 10,243,308.76 | |
| 17 | 356.00 | Purification Equip | 16,888,606.94 | 9,469,955.66 | | | 9,738,765.99 | |
| 18 | 357.00 | Other Equipment | 573,230.86 | 188,083.56 | | | 197,207.48 | |
| 19 | | | 449,853,972.78 | 199,404,875.13 | 3,340,116.27 | | | |
| 20 | | | | | | | | |
| 21 | **Fully Depreciated Storage Plant** | | | | | | | |
| 22 | 350.22 | Rights of Way | 103,288.57 | 103,288.57 | | | - | |
| 23 | 351.22 | Comp Stn Structures | 2,026,566.77 | 2,026,566.77 | | | - | |
| 24 | 351.31 | Meas & Reg Structure | 436,802.75 | 436,802.75 | | | - | |
| 25 | 351.42 | Other Structures | 487,369.80 | 487,369.80 | | | - | |
| 26 | 352.05 | Wells | 32,337,945.22 | 32,337,945.22 | | | - | |
| 27 | 352.15 | Storage Leaseholds | 1,336,599.06 | 1,336,599.06 | | | - | |
| 28 | 352.4 | NR Natural Gas | 3,756,424.14 | 3,756,424.14 | | | - | |
| 29 | 353.05 | Lines | 17,903,912.65 | 17,903,912.65 | | | - | |
| 30 | 354.05 | Compressor Equipment | 25,175,326.26 | 25,175,326.26 | | | - | |
| 31 | 355.05 | Meas & Reg Stn Equip | 1,715,609.61 | 1,715,609.61 | | | - | |
| 32 | 356.05 | Purification Equip | 7,575,501.94 | 7,575,501.94 | | | - | |
| 33 | 357.05 | Other Equipment | 804,348.39 | 804,348.39 | | | - | |
| 34 | | | 93,659,695.16 | 93,659,695.16 | | | | |

### ANR Pipeline Company
### Depreciation Workpapers
### Schedule No. 2 - Plant Balances and Reserves

| | | | Base Period | | | Test Period | | |
|---|---|---|---|---|---|---|---|---|
| Line # | Acct # | Acct Name | Plant in Service | Reserve for Depreciation | Reserve for Negative Salvage | Plant in Service | Reserve for Depreciation | Reserve for Negative Salvage |
| | | | (A)<br>9/30/2021 | (B)<br>9/30/2021 | (C ) | (D)<br>7/31/2022 | (E )<br>7/31/2022 | (F) |
| 1 | **Cold Springs Storage Plant** | | | | | | | |
| 2 | 350.00 | Rights of Way | 419,728.58 | 142,885.07 | | | 149,565.75 | |
| 3 | 351.00 | Structures & Improvements | 7,469,209.59 | 2,537,696.76 | | | 2,537,696.76 | |
| 4 | 352.00 | Wells | 15,806,034.27 | 5,377,133.93 | | | 5,377,133.93 | |
| 5 | 352.10 | Storage Leaseholds | 5,517,974.37 | 2,046,473.62 | | | 2,046,473.62 | |
| 6 | 353.00 | Lines | 16,227,123.15 | 5,944,991.06 | | | 5,944,991.06 | |
| 7 | 354.00 | Compressor Equipment | 36,758,819.20 | 12,155,388.66 | | | 12,155,388.66 | |
| 8 | 357.00 | Other Equipment | 150,976.63 | 12,606.53 | | | 12,606.53 | |
| 9 | | Subtotal | 82,349,865.79 | 28,217,175.63 | 1,407,358.38 | | 28,223,856.31 | |
| 10 | | | | | | | | |
| 11 | | | | | | | | |
| 12 | | | | | | | | |
| 13 | **Transmission Plant** | | | | | | | |
| 14 | 365.10 | Land Easements | 520,036.44 | 187,407.41 | | | 196,854.74 | |
| 15 | 365.11 | Land in Fee | 15,164,646.93 | - | | | 275,491.09 | |
| 16 | 365.20 | Land ROW | 51,337,596.12 | 35,454,255.42 | | | 36,386,888.42 | |
| 17 | 366.00 | Structures & Improvements | 238,472,172.78 | 76,345,436.71 | | | 80,677,681.18 | |
| 18 | 367.00 | Mains | 2,077,195,052.02 | 1,295,281,516.57 | | | 1,333,017,226.68 | |
| 19 | 368.00 | Compressor Stn Equip | 1,655,572,538.96 | 469,969,184.97 | | | 500,045,419.43 | |
| 20 | 368.20 | Gas Turbine Engines | 101,820,228.09 | 24,718,024.05 | | | 26,567,758.19 | |
| 21 | 369.00 | Measure & Reg Equip | 290,513,908.92 | 84,398,410.32 | | | 89,676,079.67 | |
| 22 | 371.00 | Other Tran Plant Equ | 2,873,504.77 | 1,707,979.08 | | | 1,760,181.08 | |
| 23 | | Subtotal | 4,433,469,685.03 | 1,988,062,214.53 | 17,361,780.57 | | 2,068,603,580.47 | |
| 24 | | | | | | | | |
| 25 | 370.00 | Communication Equip - fully depr | 40,561,155.12 | 40,561,155.12 | | | - | |
| 26 | 370.20 | Communication Equip - | 38,909,448.22 | 6,236,564.82 | | | 6,943,419.80 | 79,470,603.34 |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 2 - Plant Balances and Reserves

| | | | Base Period | | | Test Period | | |
|---|---|---|---|---|---|---|---|---|
| Line # | Acct # | Acct Name | Plant in Service | Reserve for Depreciation | Reserve for Negative Salvage | Plant in Service | Reserve for Depreciation | Reserve for Negative Salvage |
| | | | (A)<br>9/30/2021 | (B)<br>9/30/2021 | (C ) | (D)<br>7/31/2022 | (E )<br>7/31/2022 | (F) |
| 1 | **General Plant** | | | | | | | |
| 2 | 389.0 | Land | - | - | | | | |
| 3 | 390.00 | Structures & Improve | 3,170,398.98 | 793,925.36 | | | 828,271.35 | |
| 4 | 390.10 | Other Structures | 799,112.93 | 172,929.05 | | | 194,072.25 | |
| 5 | 390.11 | L/H Improve BOA 11th Floor | 1,357,137.95 | 540,935.53 | | | 614,334.07 | |
| 6 | 390.12 | L/H 12th Floor - Exl GC | 3,205,023.73 | 1,245,420.12 | | | 1,417,690.15 | |
| 7 | 390.13 | L/H Improve 13 Yr (BOA 9th, 16th & 22n | 2,149,021.61 | 557,783.37 | | | 695,499.84 | |
| 8 | 390.14 | L/H Improve 13.2 Yr (BOA 8th & 13th Flc | 1,744,071.00 | 244,725.99 | | | 354,820.47 | |
| 9 | 390.20 | L/H Improve 10 Yr * | 13,802.95 | 13,802.95 | | | - | |
| 10 | 390.30 | L/H Improve 5 Yr * | 126,824.19 | 126,824.19 | | | - | |
| 11 | 390.40 | Leaseholds | - | - | | | - | |
| 12 | 390.50 | L/H Improve 10 Yr (1301 Fannin) * | 516,000.00 | 516,000.00 | | | - | |
| 13 | 390.60 | L/H 717 Texas 14th F | - | - | | | - | |
| 14 | 390.70 | L/H Improve 17.2 Yr (BOA 14th Floor) | 3,193,142.67 | 1,430,562.00 | | | 1,584,897.23 | |
| 15 | 390.80 | L/H Improve 15.9 Yr (BOA 7th, 10th, 15t | 9,948,188.50 | 3,944,769.68 | | | 4,465,391.54 | |
| 16 | 390.90 | L/H Improve BOA 12th Floor | 542,589.43 | 220,194.51 | | | 249,358.69 | |
| 17 | 391.00 | Office Furn & Equip | 13,263,989.08 | 6,875,776.91 | | | 7,612,702.04 | |
| 18 | 391.10 | Computer Equipment | 37,326,997.39 | 21,827,995.91 | | | 28,049,162.14 | |
| 19 | 392.00 | Cars & Trucks | 23,094,050.04 | 16,986,768.95 | | | 18,809,274.40 | |
| 20 | 392.10 | Patrol Plane | 4,699,959.98 | 2,623,055.16 | | | 2,818,886.83 | |
| 21 | 394.00 | Tools, Shop & Gar Eq | 23,449,082.62 | 12,416,285.04 | | | 13,532,070.55 | |
| 22 | 396.00 | Power Operated Equip | 5,535,198.21 | 3,255,238.31 | | | 3,518,621.49 | |
| 23 | | | 134,134,591.26 | **73,792,993.03** | | | 84,745,053.04 | |
| 24 | | | | | | | | |
| 25 | | Grand Total | 5,474,634,419.44 | 2,593,343,053.75 | 22,109,255.22 | 446,912.75 | 2,298,462,361.10 | |
| 26 | | | | | | | | |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 3 - Near Term Capital Additions

| | | | Base Period | | Test Period | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Line # | Acct # | Acct Name | Plant in Service | Reserve for Depreciation | Plant in Service | 2022 | 2023 | 2024 | Average Plant in Service 2022 - 2024 |
| | | | (A) | (B) | (C ) | (E ) | (F) | (G) | (H) |
| | | | 9/30/2021 | 9/30/2021 | 7/1/2022 | | | | |
| 1 | Intangible Plant | | | | | | | | |
| 2 | 301.00 | Organization Costs | 4,394.81 | - | | 301,461.29 | | | 155,125.46 |
| 3 | 303.00 | Misc Intangible Plan | 87,524,472.00 | 75,517,203.77 | - | 21,312,834.05 | 660,000.00 | | 98,400,889.03 |
| 4 | 303.01 | Cygnet Assets | 20,805,400.49 | 8,975,220.20 | - | | | | 20,805,400.49 |
| 5 | 303.10 | Intangibles 10 yr * | 24,234,542.64 | 24,234,542.64 | - | | | | 24,234,542.64 |
| 6 | 303.15 | Intangibles 15 yr * | 145,487.93 | 145,487.93 | - | | | | 145,487.93 |
| 7 | 303.19 | Intangibles 20 yr | 712,553.11 | 311,741.85 | - | | | | 712,553.11 |
| 8 | 303.20 | Intangibles 2 yr * | 221,763.71 | 221,763.71 | - | | | | 221,763.71 |
| 9 | 303.20 | Intangibles 20 yr | 6,895,763.49 | 6,895,763.49 | - | | | | 6,895,763.49 |
| 10 | 303.30 | Intangibles 24 yr * | - | - | - | | | | - |
| 11 | 303.50 | Intangibles 5 yr * | 11,780,597.22 | 11,780,597.22 | - | | | | 11,780,597.22 |
| 12 | 303.60 | Intangibles 6 yr | - | - | - | | | | - |
| 13 | 303.80 | Intangibles 8 yr * | 19,318,162.39 | 19,318,162.39 | - | | | | 19,318,162.39 |
| 14 | 303.90 | Intangible 11.5 Yr | 22,017,096.99 | 9,810,114.89 | - | | | | 22,017,096.99 |
| 15 | | Subtotal | 193,660,234.78 | 157,210,598.09 | - | 103,543,089.75 | - | - | 204,687,382.45 |
| 16 | | | | | - | 53% | | | |
| 17 | Gathering Plant | | | | - | | | | |
| 18 | 325.5 | Land | 580,397.72 | - | - | | | | 580,397.72 |
| 19 | 325.4 | Rights of Way | 198,618.08 | 192,829.02 | - | | | | 198,618.08 |
| 20 | 327 | Field Comp Stn Struc | 0.50 | - | - | | | | 0.50 |
| 21 | 328 | Field Meas & Reg Stn | 118,525.74 | 105,825.86 | - | | | | 118,525.74 |
| 22 | 329 | Other Structures | 16,467.14 | 4,859.01 | - | | | | 16,467.14 |
| 23 | 332 | Field Lines | 5,532,780.78 | 4,811,705.00 | - | | | | 5,532,780.78 |
| 24 | 333 | Field Comp Stn Equip | - | - | - | | | | - |
| 25 | 334 | Field M & RStn Equip | 1,142,068.59 | 812,612.21 | - | | | | 1,142,068.59 |
| 26 | 336 | Purification Equip | - | - | - | | | | - |
| 27 | | Subtotal | 7,588,858.55 | 5,927,831.10 | - | - | - | - | 7,588,858.55 |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 3 - Near Term Capital Additions

| | | | Base Period | | Test Period | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Line # | Acct # | Acct Name | Plant in Service | Reserve for Depreciation | Plant in Service | 2022 | 2023 | 2024 | Average Plant in Service 2022 - 2024 |
| | | | (A) | (B) | (C ) | (E ) | (F) | (G) | (H) |
| | | | 9/30/2021 | 9/30/2021 | 7/1/2022 | | | | |
| 1 | Depreciable Storage Plant | | | | | | | | - |
| 2 | 350.11 | Land (ANRS) | 318,886.94 | - | | | | | 318,886.94 |
| 3 | 350.12 | Land (Leased) | 2,806,038.42 | - | - | | | | 2,806,038.42 |
| 4 | 350.13 | Land (Owned) | 2,778,758.89 | - | | | | | 2,778,758.89 |
| 5 | 350.20 | Rights of Way | 1,131,360.25 | 904,522.94 | - | | | | 1,131,360.25 |
| 6 | 351.10 | Well Structures | 1,338,754.18 | 632,045.69 | - | | | | 1,338,754.18 |
| 7 | 351.20 | Comp Stn Structures | 16,175,808.90 | 9,168,925.39 | - | | | | 16,175,808.90 |
| 8 | 351.30 | Meas & Reg Structure | 711,171.83 | 578,496.24 | - | | | | 711,171.83 |
| 9 | 351.40 | Other Structures | 2,896,015.95 | 1,460,774.74 | - | | | | 2,896,015.95 |
| 10 | 352.00 | Wells | 55,870,664.43 | 37,730,401.88 | - | 1,575,567.97 | | | 56,658,448.42 |
| 11 | 352.10 | Storage Leaseholds | 9,989,392.16 | 5,829,771.84 | - | | | | 9,989,392.16 |
| 12 | 352.20 | Reservoirs | 3,210,715.44 | 3,079,033.09 | - | | | | 3,210,715.44 |
| 13 | 353.00 | Lines | 96,948,110.76 | 46,064,974.50 | - | | | | 96,948,110.76 |
| 14 | 354.00 | Compressor Equipment | 222,065,008.32 | 74,311,658.06 | - | 37,072,522.55 | | | 240,601,269.60 |
| 15 | 355.00 | Meas & Reg Stn Equip | 16,151,448.51 | 9,986,231.54 | - | 2,441,742.48 | - | - | 17,372,319.75 |
| 16 | 356.00 | Purification Equip | 16,888,606.94 | 9,469,955.66 | - | | | | 16,888,606.94 |
| 17 | 357.00 | Other Equipment | 573,230.86 | 188,083.56 | - | | | | 573,230.86 |
| 18 | | | 449,853,972.78 | 199,404,875.13 | - | 41,089,833.00 | | | 470,398,889.28 |
| 19 | | | | | | 9.13% | | | 0.05 |
| 20 | Fully Depreciated Storage Plant | | | | | | | | - |
| 21 | 350.22 | Rights of Way | 103,288.57 | 103,288.57 | - | | | | 103,288.57 |
| 22 | 351.22 | Comp Stn Structures | 2,026,566.77 | 2,026,566.77 | - | | | | 2,026,566.77 |
| 23 | 351.31 | Meas & Reg Structure | 436,802.75 | 436,802.75 | - | | | | 436,802.75 |
| 24 | 351.42 | Other Structures | 487,369.80 | 487,369.80 | - | | | | 487,369.80 |
| 25 | 352.05 | Wells | 32,337,945.22 | 32,337,945.22 | - | | | | 32,337,945.22 |
| 26 | 352.15 | Storage Leaseholds | 1,336,599.06 | 1,336,599.06 | | | | | 1,336,599.06 |
| 27 | 352.40 | NR Natural Gas | 3,756,424.14 | 3,756,424.14 | | | | | 3,756,424.14 |
| 28 | 353.05 | Lines | 17,903,912.65 | 17,903,912.65 | - | | | | 17,903,912.65 |
| 29 | 354.05 | Compressor Equipment | 25,175,326.26 | 25,175,326.26 | - | | | | 25,175,326.26 |
| 30 | 355.05 | Meas & Reg Stn Equip | 1,715,609.61 | 1,715,609.61 | | | | | 1,715,609.61 |
| 31 | 356.05 | Purification Equip | 7,575,501.94 | 7,575,501.94 | | | | | 7,575,501.94 |
| 32 | 357.05 | Other Equipment | 804,348.39 | 804,348.39 | | | | | 804,348.39 |
| 33 | | | 93,659,695.16 | 93,659,695.16 | - | - | - | - | 93,659,695.16 |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 3 - Near Term Capital Additions

| | | | Base Period | | Test Period | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Line # | Acct # | Acct Name | Plant in Service | Reserve for Depreciation | Plant in Service | 2022 | 2023 | 2024 | Average Plant in Service 2022 - 2024 |
| | | | (A)<br>9/30/2021 | (B)<br>9/30/2021 | (C )<br>7/1/2022 | (E ) | (F) | (G) | (H) |
| | | | | | | | | | - |
| 1 | Cold Springs Storage Plant | | | | | | | | - |
| 2 | 350.000 | Rights of Way | 419,728.58 | 142,885.07 | | | | | 419,728.58 |
| 3 | 351.000 | Structures & Improvemer | 7,469,209.59 | 2,537,696.76 | | | | | 7,469,209.59 |
| 4 | 352.000 | Wells | 15,806,034.27 | 5,377,133.93 | | | | | 15,806,034.27 |
| 5 | 352.100 | Storage Leaseholds | 5,517,974.37 | 2,046,473.62 | | | | | 5,517,974.37 |
| 6 | 353.000 | Lines | 16,227,123.15 | 5,944,991.06 | | | | | 16,227,123.15 |
| 7 | 354.000 | Compressor Equipment | 36,758,819.20 | 12,155,388.66 | | | | | 36,758,819.20 |
| 8 | 357.000 | Other Equipment | 150,976.63 | 12,606.53 | | | | | 150,976.63 |
| 9 | | Subtotal | 82,349,865.79 | 28,217,175.63 | | | | | 82,349,865.79 |
| 10 | | | | | | | | | |
| 11 | | | | | | | | | |
| 12 | Transmission Plant | | | | | | | | |
| 13 | 365.10 | Land Easements | 520,036.44 | 187,407.41 | | | | | 520,036.44 |
| 14 | 365.11 | Land in Fee | 15,164,646.93 | - | | 610,894.69 | 4,539.93 | | 15,471,607.59 |
| 15 | 365.20 | Land ROW | 51,337,596.12 | 35,454,255.42 | | | | | 51,337,596.12 |
| 16 | 366.00 | Structures & Improvemer | 238,472,172.78 | 76,345,436.71 | | 112,796,902.62 | 485,005.80 | | 295,032,292.69 |
| 17 | 367.00 | Mains | 2,077,195,052.02 | 1,295,281,516.57 | | 101,694,053.00 | 84,503,501.61 | 237,130,361.09 | 2,195,731,639.24 |
| 18 | 368.00 | Compressor Stn Equip | 1,655,572,538.96 | 469,969,184.97 | | 796,051,301.48 | 267,232,729.41 | 68,726,172.05 | 2,154,130,128.18 |
| 19 | 368.20 | Gas Turbine Engines | 101,820,228.09 | 24,718,024.05 | | | | | 101,820,228.09 |
| 20 | 369.00 | Measure & Reg Equip | 290,513,908.92 | 84,398,410.32 | | 29,324,239.57 | 270,740.00 | | 305,266,275.37 |
| 21 | 371.00 | Other Tran Plant Equ | 2,873,504.77 | 1,707,979.08 | - | | | | 2,873,504.77 |
| 22 | | Subtotal | 4,433,469,685.03 | 1,988,062,214.53 | - | 1,040,477,391.36 | 352,496,516.75 | 305,856,533.14 | 5,122,183,308.48 |
| 23 | | | | | | | | | |
| 24 | 370.00 | Communication Equip - fu | 40,561,155.12 | 40,561,155.12 | - | | | | 40,561,155.12 |
| 25 | 370.20 | Communication Equip - | 38,909,448.22 | 6,236,564.82 | | 4,306,495.62 | 4,455,430.16 | 5,463,071.16 | 43,458,351.28 |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 3 - Near Term Capital Additions

| Line # | Acct # | Acct Name | Base Period | | Test Period | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Plant in Service | Reserve for Depreciation | Plant in Service | | 2022 | 2023 | 2024 | Average Plant in Service 2022 - 2024 |
| | | | (A) | (B) | (C ) | | (E ) | (F) | (G) | (H) |
| | | | 9/30/2021 | 9/30/2021 | 7/1/2022 | | | | | |
| 1 | General Plant | | | | | | | | | |
| 2 | 389.00 | Land | | | | | | | | |
| 3 | 390.00 | Structures & Improve | 3,170,398.98 | 793,925.36 | | | | | | 3,170,398.98 |
| 4 | 390.10 | Other Structures | 799,112.93 | 172,929.05 | | | | | | 799,112.93 |
| 5 | 390.11 | L/H Improve BOA 11th Fl | 1,357,137.95 | 540,935.53 | | | | | | 1,357,137.95 |
| 6 | 390.12 | L/H 12th Floor - Exl GC | 3,205,023.73 | 1,245,420.12 | | | | | | 3,205,023.73 |
| 7 | 390.13 | L/H Improve 13 Yr (BOA | 2,149,021.61 | 557,783.37 | | | | | | 2,149,021.61 |
| 8 | 390.14 | L/H Improve 13.2 Yr (BOA | 1,744,071.00 | 244,725.99 | | | | | | 1,744,071.00 |
| 9 | 390.20 | L/H Improve 10 Yr * | 13,802.95 | 13,802.95 | | | | | | 13,802.95 |
| 10 | 390.30 | L/H Improve 5 Yr * | 126,824.19 | 126,824.19 | | | | | | 126,824.19 |
| 11 | 390.40 | Leaseholds | - | - | | | | | | - |
| 12 | 390.50 | L/H Improve 10 Yr (1301 | 516,000.00 | 516,000.00 | | | | | | 516,000.00 |
| 13 | 390.60 | L/H 717 Texas 14th F | - | - | | | | | | - |
| 14 | 390.70 | L/H Improve 17.2 Yr (BOA | 3,193,142.67 | 1,430,562.00 | | | | | | 3,193,142.67 |
| 15 | 390.80 | L/H Improve 15.9 Yr (BOA | 9,948,188.50 | 3,944,769.68 | | | | | | 9,948,188.50 |
| 16 | 390.90 | L/H Improve BOA 12th Fl | 542,589.43 | 220,194.51 | | | | | | 542,589.43 |
| 17 | 391.00 | Office Furn & Equip | 13,263,989.08 | 6,875,776.91 | | | | | | 13,263,989.08 |
| 18 | 391.10 | Computer Equipment | 37,326,997.39 | 21,827,995.91 | | | | | | 37,326,997.39 |
| 19 | 392.00 | Cars & Trucks | 23,094,050.04 | 16,986,768.95 | | | | | | 23,094,050.04 |
| 20 | 392.10 | Patrol Plane | 4,699,959.98 | 2,623,055.16 | | | | | | 4,699,959.98 |
| 21 | 394.00 | Tools, Shop & Gar Eq | 23,449,082.62 | 12,416,285.04 | | | | | | 23,449,082.62 |
| 22 | 396.00 | Power Operated Equip | 5,535,198.21 | 3,255,238.31 | | | | | | 5,535,198.21 |
| 23 | | | 134,134,591.26 | 73,792,993.03 | - | - | - | - | - | 134,134,591.26 |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 4 - Gas Turbine Service Lives

| | | (A) | (B) | (C ) | (D) | (E ) | (F) | (G) | | (H) | (I) | (J) | (K) | (L) | (M) | (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **Operating Hours** | | | | | | | **Operating Units** | | | | | | |
| Line # | **Station Name** | **Number** | **2015** | **2016** | **2017** | **2018** | **2019** | **2020** | | **2015** | **2016** | **2017** | **2018** | **2019** | **2020** | **Total** |
| 1 | Bridgman | 6 | 4,581.41 | 1,345.00 | 3,074.75 | 4,423.50 | 2,485.00 | 4,584.00 | | 1 | 1 | 1 | 1 | 1 | 1 | 6.00 |
| 2 | Bridgman | 7 | 0.00 | 0.00 | 3,352.83 | 4,572.33 | 3,279.00 | 4,257.00 | | 0 | 0 | 1 | 1 | 1 | 1 | 4.00 |
| 3 | Bridgman | 8 | 4,740.75 | 489.17 | 3,202.58 | 4,426.33 | 2,619.00 | 3,499.00 | | 1 | 1 | 1 | 1 | 1 | 1 | 6.00 |
| 4 | Brownsville | 9 | | - | 2,008.67 | 5,154.84 | 7,399.00 | 7,970.00 | | 0 | 0 | 1 | 1 | 1 | 1 | 4.00 |
| 5 | Buttermilk | 1 | 3,747.08 | 1,648.92 | 1,642.50 | 4,656.00 | 4,955.00 | 1,254.00 | | 1 | 1 | 1 | 1 | 1 | 1 | 6.00 |
| 6 | Buttermilk | 2 | | 0.25 | 1,073.00 | 3,770.92 | 1,413.00 | 415.00 | | 0 | 0 | 1 | 1 | 1 | 1 | 4.00 |
| 7 | Collierville | 1 | | - | - | 751.25 | 2,241.00 | 1,473.00 | | 0 | 0 | 0 | 1 | 1 | 1 | 3.00 |
| 8 | Delhi (ANR) | 8 | | 23.25 | 2,677.50 | 5,175.17 | 6,606.00 | 7,305.00 | | 0 | 0 | 1 | 1 | 1 | 1 | 4.00 |
| 9 | Gageby Creek | 1 | | - | - | - | 4.00 | 131.00 | | 0 | 0 | 0 | 0 | 0 | 1 | 1.00 |
| 10 | Goodman | 1 | 856.67 | 866.33 | 448.00 | 485.58 | 935.00 | 866.00 | | 1 | 1 | 1 | 1 | 1 | 1 | 6.00 |
| 11 | Goodman | 2 | 73.58 | 92.08 | 597.50 | 1,231.25 | 1,293.00 | 1,306.00 | | 0 | 0 | 1 | 1 | 1 | 1 | 4.00 |
| 12 | Goodwell | 1 | 1,654.50 | 826.00 | 1,386.25 | 1,021.75 | 678.00 | 268.00 | | 1 | 1 | 1 | 1 | 1 | 1 | 6.00 |
| 13 | Goodwell | 2 | 949.75 | 583.00 | 531.00 | 1,678.92 | 1,273.00 | 792.00 | | 1 | 1 | 1 | 1 | 1 | 1 | 6.00 |
| 14 | Hamilton | 6 | 328.42 | 197.92 | 18.50 | 1.25 | 2,530.00 | 443.00 | | 1 | 1 | 0 | 0 | 1 | 1 | 4.00 |
| 15 | Hamilton | 7 | 330.00 | 128.58 | 85.00 | 6.25 | 2,426.00 | 375.00 | | 1 | 1 | 0 | 0 | 1 | 1 | 4.00 |
| 16 | Hamilton | 8 | 328.75 | 128.92 | 18.58 | 1.25 | 2,550.00 | 469.00 | | 1 | 1 | 0 | 0 | 1 | 1 | 4.00 |
| 17 | Hamilton | 9 | 296.17 | 137.59 | 7.75 | 0.00 | 2,560.00 | 157.00 | | 1 | 1 | 0 | 0 | 1 | 1 | 4.00 |
| 18 | Hamilton | 10 | 5,371.08 | 2,999.33 | 4,808.25 | 4,889.58 | 2,700.00 | 2,766.00 | | 1 | 1 | 1 | 1 | 1 | 1 | 6.00 |
| 19 | Jena | 8 | | - | 5,017.67 | 7,745.08 | 8,221.00 | 8,357.00 | | 0 | 0 | 1 | 1 | 1 | 1 | 4.00 |
| 20 | Joliet | 1 | 4,320.33 | 3,893.67 | 2,917.83 | 206.17 | 816.00 | 596.00 | | 1 | 1 | 1 | 1 | 1 | 1 | 6.00 |
| 21 | Joliet | 2 | 868.58 | 877.00 | 871.50 | 929.42 | 1,752.00 | 1,309.00 | | 1 | 1 | 1 | 1 | 1 | 1 | 6.00 |
| 22 | Kewaskum | 5 | 3,459.92 | 1,171.50 | 313.00 | 197.25 | 329.00 | 500.00 | | 1 | 1 | 1 | 1 | 1 | 1 | 6.00 |
| 23 | Kewaskum | 6 | 4,938.83 | 3,957.50 | 3,723.67 | 4,327.67 | 6,677.00 | 8,176.00 | | 1 | 1 | 1 | 1 | 1 | 1 | 6.00 |
| 24 | LaGrange | 4 | | - | 348.75 | 785.50 | 753.00 | 2,514.00 | | 0 | 0 | 1 | 1 | 1 | 1 | 4.00 |
| 25 | Mountain | 1 | 1,027.25 | 1,648.09 | 1,350.42 | 1,543.67 | 2,196.00 | 1,960.00 | | 1 | 1 | 1 | 1 | 1 | 1 | 6.00 |
| 26 | Mountain | 2 | 362.08 | 341.08 | 1,249.33 | 1,699.92 | 1,863.00 | 1,979.00 | | 1 | 1 | 1 | 1 | 1 | 1 | 6.00 |
| 27 | Sandwich | 10 | | | | 955.00 | 6,499.00 | 1,985.00 | | 0 | 0 | 0 | 1 | 1 | 1 | 3.00 |
| 28 | Sardis | 7 | 681.92 | 33.08 | 1,204.25 | 2,894.33 | 3,598.00 | 4,305.00 | | 1 | 0 | 1 | 1 | 1 | 1 | 5.00 |
| 29 | Stevens Point | 1 | 1,310.33 | 2,563.00 | 1,367.75 | 3,335.42 | 3,329.00 | 1,857.00 | | 1 | 1 | 1 | 1 | 1 | 1 | 6.00 |
| 30 | Sulphur Spring | 3 | 1,021.84 | 4,201.64 | 5,850.42 | 2,675.83 | 441.00 | 2,698.00 | | 1 | 1 | 1 | 1 | 1 | 1 | 6.00 |
| 31 | Weyauwega | 1 | 95.17 | 22.17 | 346.75 | 18.00 | 1,190.00 | 3,742.00 | | 0 | 0 | 1 | 0 | 1 | 1 | 3.00 |
| 32 | Weyauwega | 2 | 128.75 | 40.08 | 609.00 | 18.42 | 3,352.00 | 4,433.00 | | 1 | 0 | 1 | 0 | 1 | 1 | 4.00 |
| 33 | Woodstock | 10 | 2,083.25 | 3,617.29 | 2,055.84 | 2,756.99 | 3,416.00 | 3,535.00 | | 1 | 1 | 1 | 1 | 1 | 1 | 6.00 |
| 34 | Woodstock | 11 | 1,663.13 | 289.52 | 346.13 | 111.30 | 940.00 | 3,021.00 | | 1 | 1 | 1 | 1 | 1 | 1 | 6.00 |
| 35 | Woodstock | 12 | 163.60 | 216.87 | 927.08 | 1,449.19 | 1,213.00 | 755.00 | | 1 | 1 | 1 | 1 | 1 | 1 | 6.00 |
| 36 | | | | | | | | | | | | | | | | |
| 37 | | Sum | 45,383.14 | 32,338.82 | 53,432.05 | 73,895.30 | 94,531.00 | 90,052.00 | 64,939 | 24 | 22 | 28 | 28 | 34 | 35 | 28.50 |
| 38 | | Oper Units | 24.00 | 22.00 | 28.00 | 28.00 | 34.00 | 35.00 | 28.50 | | | | | | | |
| 39 | | Annual Op H | 1,890.96 | 1,469.95 | 1,908.29 | 2,639.12 | 2,780.32 | 2,572.91 | 2,210.26 | | | | | | | |
| 40 | | | | | | | | | | | | | | | | |
| 41 | | Oper hrs to Overhaul | 30,000.00 | | | | | **Avg Service Life** | **13.57** | | | | | | | |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 5 - Depreciation Model Parameters

| | | | Original Balance | Age | Avg Serv Life | Iowa Curve | Avg Remaining Life |
|---|---|---|---|---|---|---|---|
| | | | (A) | (B) | (C ) | (D) | (E ) |
| | | | | Discovery | | | |
| 1 | **Intangible Plant** | | **Sch. 2** | | **Sch. 9b** | | |
| 2 | 301.00 | Organization Costs | 155,125.46 | | | | |
| 3 | 303.00 | Misc Intangible Plan | 98,400,889.03 | | 5.1 | | |
| 4 | 303.01 | Cygnet Assets | 20,805,400.49 | | 3.22 | | |
| 5 | 303.10 | Intangibles 10 yr * | 24,234,542.64 | | 10 | | |
| 6 | 303.15 | Intangibles 15 yr * | 145,487.93 | | 15 | | |
| 7 | 303.19 | Intangibles 20 yr | 712,553.11 | | 19 | | |
| 8 | 303.20 | Intangibles 2 yr * | 221,763.71 | | 2 | | |
| 9 | 303.20 | Intangibles 20 yr | 6,895,763.49 | | 20 | | |
| 10 | 303.30 | Intangibles 24 yr * | - | | 3 | | |
| 11 | 303.50 | Intangibles 5 yr * | 11,780,597.22 | | 5 | | |
| 12 | 303.60 | Intangibles 6 yr | - | | 6 | | |
| 13 | 303.80 | Intangibles 8 yr * | 19,318,162.39 | | 8 | | |
| 14 | 303.90 | Intangible 11.5 Yr | 22,017,096.99 | | 8 | | |
| 15 | | * fully recovered | | | | | |
| 16 | | | | | | | |
| 17 | **Gathering Plant** | | | Gathering Survivor Curve Study | | | **Sch. 6** |
| 18 | 325 - 337 | P&G Plant | 8,019,477 | 20.65 | 40 | R2 | 20.49 |
| 19 | | | | | | | |
| 20 | | | | | | | |
| 21 | **Depreciable Storage Plant** | | | Storage Survivor Curve Study | | | **Sch. 7** |
| 22 | 350.11 | Land (ANRS) | 318,887 | | | | |
| 23 | 350.12 | Land (Leased) | 2,806,038 | 37.33 | 95 | L4 | 27.27 |
| 24 | 350.13 | Land (Owned) | 2,778,759 | | | | |
| 25 | 350.20 | Rights of Way | 2,047,373 | 21.92 | 40 | R1 | 19.79 |
| 26 | 351.00 | Structures & Improvements | 32,564,886 | 20.94 | 60 | S4 | 27.04 |
| 27 | 352.00 | Wells | 93,375,814 | 27.69 | 95 | L4 | 27.69 |
| 28 | 352.10 | Storage Leaseholds | 25,685,194 | 34.57 | 45 | S0 | 18.61 |
| 29 | 352.20 | Reservoirs | 3,210,715 | | | | |
| 30 | 353.00 | Lines | 133,147,351 | 21.26 | 85 | L2 | 26.21 |
| 31 | 354.00 | Compressor Equipment | 309,168,740 | 14.92 | 75 | R2 | 26.44 |
| 32 | 355.00 | Meas & Reg Stn Equip | 21,053,351 | 27.91 | 65 | L1 | 22.58 |
| 33 | 356.00 | Purification Equip | 27,082,945 | 19.49 | 75 | L4 | 27.45 |
| 34 | 357.00 | Other Equipment | 754,737 | 11.06 | 25 | S4 | 13.06 |
| 35 | | | 653,994,790 | | | | |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 5 - Depreciation Model Parameters

| | | | Original Balance<br>(A) | Age<br>(B)<br>Discovery | Avg Serv Life<br>(C ) | | Iowa Curve<br>(D) | Avg Remaining Life<br>(E ) |
|---|---|---|---|---|---|---|---|---|
| 1 | **Transmission Plant** | | Transmission Survivor Curve Study | | | | | **Sch. 8** |
| 2 | 365.10 | Land Easements | 520,036 | 16.18 | 95 | | R4 | 27.88 |
| 3 | 365.11 | Land in Fee | 15,164,647 | | | | | |
| 4 | 365.20 | Land ROW | 52,008,448 | 33.17 | 85 | | S3 | 26.78 |
| 5 | 366.00 | Structures & Improvements | 316,815,382 | 13.88 | 65 | | R2 | 26.09 |
| 6 | 367.00 | Mains | 2,644,165,375 | 29.82 | 95 | | R4 | 27.49 |
| 7 | 368.00 | Compressor Stn Equip | 2,317,529,018 | 13.66 | 65 | | L1 | 24.57 |
| 8 | 368.20 | Gas Turbine Eq. (ASL from Sch. 4) | 101,820,228 | 8.06 | 13.57 | | | 5.51 |
| 9 | 369.00 | Measure & Reg Equip | 326,307,927 | 13.61 | 70 | | S2 | 27.02 |
| 10 | 371.00 | Other Tran Plant Equ | 3,507,188 | 6.94 | 75 | | S1 | 26.87 |
| 11 | | | | | | | | |
| 12 | 370.00 | Communication Equip - fully depr | | | | | | |
| 13 | 370.20 | Communication Equip - | 117,274,323 | 19.49 | 45 | | R5 | 22.30 |
| 14 | | | | | | | | |
| 15 | **General Plant** | | **Sch. 2** | | | | | |
| 16 | 389.00 | Land | | | | | | **Depr. Rate** |
| 17 | 390.00 | Structures & Improve | 3,170,398.98 | 17.55 | 16.3 | * | | 6.12% |
| 18 | 390.10 | Other Structures | 799,112.93 | 6.89 | 15.0 | | | 6.67% |
| 19 | 390.11 | L/H Improve BOA 11th Floor | 1,357,137.95 | 5.44 | 15.0 | | | 6.67% |
| 20 | 390.12 | L/H 12th Floor - Exl GC | 3,205,023.73 | 6.89 | 15.0 | | | 6.67% |
| 21 | 390.13 | L/H Improve 13 Yr (BOA 9th, 16th & | 2,149,021.61 | 3.49 | 13.0 | | | 7.69% |
| 22 | 390.14 | L/H Improve 13.2 Yr (BOA 8th & 13t | 1,744,071.00 | 1.00 | 13.2 | | | 7.58% |
| 23 | 390.20 | L/H Improve 10 Yr * | 13,802.95 | 13.40 | 10.0 | | | 10.00% |
| 24 | 390.30 | L/H Improve 5 Yr * | 126,824.19 | 13.40 | 5.0 | | | 20.00% |
| 25 | 390.40 | Leaseholds | - | | | | | |
| 26 | 390.50 | L/H Improve 10 Yr (1301 Fannin) * | 516,000.00 | 13.00 | 10.0 | | | 10.00% |
| 27 | 390.60 | L/H 717 Texas 14th F | - | | | | | |
| 28 | 390.70 | L/H Improve 17.2 Yr (BOA 14th Floo | 3,193,142.67 | 7.58 | 17.2 | | | 5.81% |
| 29 | 390.80 | L/H Improve 15.9 Yr (BOA 7th, 10th | 9,948,188.50 | 2.73 | 15.9 | | | 6.29% |
| 30 | 390.90 | L/H Improve BOA 12th Floor | 542,589.43 | | 15.0 | | | 6.67% |
| 31 | 391.00 | Office Furn & Equip | 13,263,989.08 | 6.73 | 14.9 | * | | 6.70% |
| 32 | 391.10 | Computer Equipment | 37,326,997.39 | 3.42 | 5.0 | * | | 20.00% |
| 33 | 392.00 | Cars & Trucks | 23,094,050.04 | 2.8 | 10.5 | * | | 9.50% |
| 34 | 392.10 | Patrol Plane | 4,699,959.98 | 10.99 | 30.8 | * | | 3.30% |
| 35 | 394.00 | Tools, Shop & Gar Eq | 23,449,082.62 | 2.57 | 14.8 | * | | 6.80% |
| 36 | 396.00 | Power Operated Equip | 5,535,198.21 | 6.39 | 18.7 | * | | 5.30% |
| 37 | | | 134,134,591.26 | | | * = Sch 9a | | |

# ANR Pipeline Company
# Depreciation Workpapers
# Schedule No. 6 - Average Remaining Lives
# Gathering Plant

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | *How to read this chart* | | | | | |
| | | Acct # | Acct Name | | 325 - 337 | P&G Plant | |
| | | Ave Age Plt | Original Investment | | 20.65 | $8,019,477 | |
| | | Ave Serv Life | Curve Type | 5 yr retires | 40.00 | R2 | 481,240 |
| | | Age % ASL | Ave Rem Life | Interim Retires | 51.6% | 20.49 | 4,627,544 |
| | | (A) | (B) | (C ) | (D) | (E ) | (F) |
| Yrs | Year | Age | % Surviving | Plant Balance | Age | % Surviving | Plant Balance |
| 0 | 2022 | 62% | 84% | $35,023 | 51.63% | 88.45% | 7,588,859 |
| 1 | 2023 | Plant average | 84% | $35,023 | 54.13% | 87.39% | 7,503,596 |
| 2 | 2024 | age as a | 84% | $35,023 | 56.63% | 86.26% | 7,413,070 |
| 3 | 2025 | percent of | Reference to | $34,279 | 59.13% | 85.07% | 7,317,051 |
| 4 | 2026 | proposed | Iowa Curve | $34,279 | 61.63% | 83.80% | 7,215,310 |
| 5 | 2027 | service life | Table for | $34,279 | 64.13% | 82.45% | 7,107,619 |
| 6 | 2028 | 72% | % Surviving | Plant | 66.63% | 81.03% | 6,993,759 |
| 7 | 2029 | 73% | at each age | surviving | 69.13% | 79.53% | 6,873,520 |
| 8 | 2030 | 75% | interval | at each age | 71.63% | 77.95% | 6,746,708 |
| 9 | 2031 | 77% | 75% | interval | 74.13% | 76.29% | 6,613,147 |
| 10 | 2032 | 78% | 73% | $30,652 | 76.63% | 74.54% | 6,472,690 |
| 11 | 2033 | 80% | 72% | $30,151 | 79.13% | 72.70% | 6,325,222 |
| 12 | 2034 | 82% | 71% | $29,601 | 81.63% | 70.77% | 6,170,670 |
| 13 | 2035 | 83% | 70% | $29,034 | 84.13% | 68.75% | 6,009,008 |
| 14 | 2036 | 85% | 68% | $28,485 | 86.63% | 66.65% | 5,840,271 |
| 15 | 2037 | 87% | 67% | $27,885 | 89.13% | 64.46% | 5,664,562 |
| 16 | 2038 | 88% | 65% | $27,268 | 91.63% | 62.18% | 5,482,058 |
| 17 | 2039 | 90% | 64% | $26,673 | 94.13% | 59.83% | 5,293,024 |
| 18 | 2040 | 92% | 62% | $26,024 | 96.63% | 57.39% | 5,097,821 |
| 19 | 2041 | 93% | 61% | $25,360 | 99.13% | 54.89% | 4,896,909 |
| 20 | 2042 | 95% | 59% | $24,721 | 101.63% | 52.32% | 4,690,857 |
| 21 | 2043 | 97% | 58% | $24,027 | 104.13% | 49.69% | 4,480,348 |
| 22 | 2044 | 98% | 56% | $23,320 | 106.63% | 47.02% | 4,266,173 |
| 23 | 2045 | 100% | 54% | $22,643 | 109.13% | 44.32% | 4,049,236 |
| 24 | 2046 | 102% | 54% | $22,343 | 111.63% | 41.59% | 3,830,545 |
| 25 | 2047 | 103% | 52% | $21,607 | 114.13% | 38.85% | 3,611,200 |
| 26 | 2048 | 105% | 50% | $20,861 | 116.63% | 36.13% | 3,392,382 |
| 27 | 2049 | 107% | 48% | $20,151 | 119.13% | 33.42% | 3,175,329 |
| 28 | 2050 | 108% | 46% | $19,388 | 121.63% | 30.75% | 2,961,314 |
| 29 | | 28-Yr Economic Lif | ARL | Sum of Survivors | | 20.49 | 155,493,398 |
| 30 | | | | Interim Retirements | | | 4,627,544 |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 7 - Average Remaining Lives
## Storage

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *How to read this chart* | | | | | | | | |
| | | Acct # | Acct Name | | 350.12 | Land (Leased) | | 350.20 | Rights of Way | |
| | | Ave Age Plt | Original Investment | | 37.33 | $2,806,038 | 6.00 | 21.92 | $2,047,373 | 9.00 |
| | | Ave Serv Life | Curve Type | 5 yr retires | 95.00 | L4 | 8,820 | 40.00 | R1 | 130,097 |
| | | Age % ASL | Ave Rem Life | Interim Retires | 39.3% | 27.27 | 214,999 | 54.8% | 19.79 | 956,760 |
| | | (A) | (B) | (C ) | (D) | (E ) | (F) | (G) | (H) | (I) |
| Yrs | Year | Age | % Surviving | Plant Balance | Age | % Surviving | Plant Balance | Age | % Surviving | Plant Balance |
| 0 | 2022 | 62% | 84% | $35,023 | 39.29% | 99.85% | 2,806,038 | 54.81% | 80.70% | 1,551,089 |
| 1 | 2023 | Plant average | 84% | $35,023 | 40.35% | 99.80% | 2,804,767 | 57.31% | 79.51% | 1,526,590 |
| 2 | 2024 | age as a | 84% | $35,023 | 41.40% | 99.76% | 2,803,384 | 59.81% | 78.27% | 1,501,354 |
| 3 | 2025 | percent of | Reference to | $34,279 | 42.45% | 99.69% | 2,801,583 | 62.31% | 77.00% | 1,475,356 |
| 4 | 2026 | proposed | Iowa Curve | $34,279 | 43.51% | 99.62% | 2,799,458 | 64.81% | 75.70% | 1,448,575 |
| 5 | 2027 | service life | Table for | $34,279 | 44.56% | 99.54% | 2,797,219 | 67.31% | 74.35% | 1,420,992 |
| 6 | 2028 | 72% | % Surviving | Plant | 45.61% | 99.43% | 2,794,385 | 69.81% | 72.96% | 1,392,593 |
| 7 | 2029 | 73% | at each age | surviving | 46.66% | 99.33% | 2,791,447 | 72.31% | 71.53% | 1,363,370 |
| 8 | 2030 | 75% | interval | at each age | 47.72% | 99.20% | 2,787,785 | 74.81% | 70.07% | 1,333,315 |
| 9 | 2031 | 77% | 75% | interval | 48.77% | 99.07% | 2,784,039 | 77.31% | 68.56% | 1,302,428 |
| 10 | 2032 | 78% | 73% | $30,652 | 49.82% | 98.90% | 2,779,429 | 79.81% | 67.01% | 1,270,713 |
| 11 | 2033 | 80% | 72% | $30,151 | 50.87% | 98.74% | 2,774,768 | 82.31% | 65.42% | 1,238,180 |
| 12 | 2034 | 82% | 71% | $29,601 | 51.93% | 98.53% | 2,769,096 | 84.81% | 63.79% | 1,204,842 |
| 13 | 2035 | 83% | 70% | $29,034 | 52.98% | 98.33% | 2,763,418 | 87.31% | 62.12% | 1,170,719 |
| 14 | 2036 | 85% | 68% | $28,485 | 54.03% | 98.09% | 2,756,573 | 89.81% | 60.42% | 1,135,835 |
| 15 | 2037 | 87% | 67% | $27,885 | 55.08% | 97.84% | 2,749,782 | 92.31% | 58.68% | 1,100,222 |
| 16 | 2038 | 88% | 65% | $27,268 | 56.14% | 97.56% | 2,741,662 | 94.81% | 56.91% | 1,063,914 |
| 17 | 2039 | 90% | 64% | $26,673 | 57.19% | 97.27% | 2,733,668 | 97.31% | 55.10% | 1,026,954 |
| 18 | 2040 | 92% | 62% | $26,024 | 58.24% | 96.93% | 2,724,177 | 99.81% | 53.27% | 989,387 |
| 19 | 2041 | 93% | 61% | $25,360 | 59.29% | 96.60% | 2,714,893 | 102.31% | 51.41% | 951,265 |
| 20 | 2042 | 95% | 59% | $24,721 | 60.35% | 96.21% | 2,703,937 | 104.81% | 49.52% | 912,647 |
| 21 | 2043 | 97% | 58% | $24,027 | 61.40% | 95.83% | 2,693,277 | 107.31% | 47.61% | 873,594 |
| 22 | 2044 | 98% | 56% | $23,320 | 62.45% | 95.38% | 2,680,756 | 109.81% | 45.69% | 834,175 |
| 23 | 2045 | 100% | 54% | $22,643 | 63.51% | 94.91% | 2,667,369 | 112.31% | 43.75% | 794,461 |
| 24 | 2046 | 102% | 54% | $22,343 | 64.56% | 94.45% | 2,654,418 | 114.81% | 41.80% | 754,530 |
| 25 | 2047 | 103% | 52% | $21,607 | 65.61% | 93.91% | 2,639,272 | 117.31% | 39.84% | 714,463 |
| 26 | 2048 | 105% | 50% | $20,861 | 66.66% | 93.39% | 2,624,643 | 119.81% | 37.88% | 674,347 |
| 27 | 2049 | 107% | 48% | $20,151 | 67.72% | 92.78% | 2,607,549 | 122.31% | 35.92% | 634,271 |
| 28 | 2050 | 108% | 46% | $19,388 | 68.77% | 92.19% | 2,591,040 | 124.81% | 33.97% | 594,329 |
| 29 | | | | | | | | | | |
| 30 | | | | | | | | | | |
| 31 | | 28-Yr Economic Lif | ARL | Sum of Survivors | | 27.27 | 76,533,794 | | 19.79 | 30,703,423 |
| 32 | | | | Interim Retirements | | | 214,999 | | | 956,760 |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 7 - Average Remaining Lives
## Storage

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 351.00 | Structures & Improvements | | 352.00 | Wells | | 352.10 | Storage Leaseholds | |
| | | 20.94 | $32,564,886 | 19.00 | 27.69 | $93,375,814 | 6.00 | 34.57 | $25,685,194 | |
| | | 60.00 | S4 | 5,191 | 95.00 | L4 | 31,299 | 45.00 | S0 | 1,934,409 |
| | | 34.9% | 27.04 | 4,828,663 | 29.1% | 27.69 | 2,982,668 | 76.8% | 18.61 | 10,782,932 |
| | | (J) | (K) | (L) | (M) | (N) | (O) | (P) | (Q) | (R ) |
| Yrs | Year | Age | % Surviving | Plant Balance | Age | % Surviving | Plant Balance | Age | % Surviving | Plant Balance |
| 0 | 2022 | 34.91% | 100.00% | 28,590,960 | 29.15% | 100.00% | 72,464,483 | 76.82% | 65.88% | 16,843,966 |
| 1 | 2023 | 36.57% | 100.00% | 28,590,722 | 30.20% | 99.99% | 72,462,162 | 79.05% | 64.40% | 16,465,514 |
| 2 | 2024 | 38.24% | 100.00% | 28,590,254 | 31.25% | 99.99% | 72,458,190 | 81.27% | 62.92% | 16,084,321 |
| 3 | 2025 | 39.91% | 99.99% | 28,589,415 | 32.30% | 99.98% | 72,452,237 | 83.49% | 61.43% | 15,700,680 |
| 4 | 2026 | 41.57% | 99.99% | 28,588,083 | 33.36% | 99.98% | 72,444,612 | 85.71% | 59.86% | 15,297,299 |
| 5 | 2027 | 43.24% | 99.98% | 28,585,769 | 34.41% | 99.96% | 72,433,184 | 87.94% | 58.35% | 14,909,557 |
| 6 | 2028 | 44.91% | 99.97% | 28,582,064 | 35.46% | 99.95% | 72,419,438 | 90.16% | 56.83% | 14,520,249 |
| 7 | 2029 | 46.57% | 99.96% | 28,576,721 | 36.51% | 99.93% | 72,399,897 | 92.38% | 55.31% | 14,129,664 |
| 8 | 2030 | 48.24% | 99.93% | 28,568,243 | 37.57% | 99.90% | 72,377,423 | 94.60% | 53.72% | 13,720,270 |
| 9 | 2031 | 49.91% | 99.89% | 28,555,763 | 38.62% | 99.87% | 72,346,689 | 96.82% | 52.19% | 13,327,962 |
| 10 | 2032 | 51.57% | 99.84% | 28,539,068 | 39.67% | 99.83% | 72,312,513 | 99.05% | 50.66% | 12,935,246 |
| 11 | 2033 | 53.24% | 99.76% | 28,514,358 | 40.72% | 99.79% | 72,267,145 | 101.27% | 49.13% | 12,542,408 |
| 12 | 2034 | 54.91% | 99.66% | 28,480,318 | 41.78% | 99.73% | 72,218,000 | 103.49% | 47.60% | 12,149,731 |
| 13 | 2035 | 56.57% | 99.53% | 28,437,421 | 42.83% | 99.66% | 72,154,278 | 105.71% | 46.00% | 11,739,688 |
| 14 | 2036 | 58.24% | 99.34% | 28,377,402 | 43.88% | 99.59% | 72,086,690 | 107.94% | 44.48% | 11,348,230 |
| 15 | 2037 | 59.91% | 99.10% | 28,299,076 | 44.93% | 99.50% | 72,000,713 | 110.16% | 42.96% | 10,957,802 |
| 16 | 2038 | 61.57% | 98.81% | 28,205,117 | 45.99% | 99.40% | 71,911,084 | 112.38% | 41.45% | 10,568,691 |
| 17 | 2039 | 63.24% | 98.43% | 28,079,660 | 47.04% | 99.28% | 71,798,862 | 114.60% | 39.87% | 10,163,613 |
| 18 | 2040 | 64.91% | 97.95% | 27,923,213 | 48.09% | 99.16% | 71,683,559 | 116.82% | 38.37% | 9,778,092 |
| 19 | 2041 | 66.57% | 97.40% | 27,743,226 | 49.15% | 99.01% | 71,541,111 | 119.05% | 36.87% | 9,394,767 |
| 20 | 2042 | 68.24% | 96.69% | 27,512,319 | 50.20% | 98.85% | 71,396,547 | 121.27% | 35.39% | 9,013,931 |
| 21 | 2043 | 69.91% | 95.84% | 27,235,450 | 51.25% | 98.66% | 71,219,987 | 123.49% | 33.92% | 8,635,876 |
| 22 | 2044 | 71.57% | 94.89% | 26,928,297 | 52.30% | 98.45% | 71,024,064 | 125.71% | 32.39% | 8,243,933 |
| 23 | 2045 | 73.24% | 93.73% | 26,547,806 | 53.36% | 98.24% | 70,828,318 | 127.94% | 30.95% | 7,872,494 |
| 24 | 2046 | 74.91% | 92.37% | 26,107,107 | 54.41% | 97.99% | 70,592,713 | 130.16% | 29.52% | 7,504,746 |
| 25 | 2047 | 76.57% | 90.92% | 25,633,772 | 55.46% | 97.74% | 70,359,334 | 132.38% | 28.10% | 7,140,994 |
| 26 | 2048 | 78.24% | 89.17% | 25,065,523 | 56.51% | 97.44% | 70,080,678 | 134.60% | 26.64% | 6,765,315 |
| 27 | 2049 | 79.91% | 87.21% | 24,427,604 | 57.57% | 97.15% | 69,806,700 | 136.82% | 25.26% | 6,410,701 |
| 28 | 2050 | 81.57% | 85.17% | 23,762,298 | 58.62% | 96.80% | 69,481,815 | 139.05% | 23.90% | 6,061,033 |
| 29 | | | | | | | | | | |
| 30 | | | | | | | | | | |
| 31 | | | 27.04 | 773,046,066 | | 27.69 | 2,006,557,943 | | 18.61 | 313,382,809 |
| 32 | | | | 4,828,663 | | | 2,982,668 | | | 10,782,932 |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 7 - Average Remaining Lives
## Storage

| | | 353.00 | Lines | | 354.00 | Compressor Equipment | | 355.00 | Meas & Reg Stn Equip | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 21.26 | $133,147,351 | | 14.92 | $309,168,740 | | 27.91 | $21,053,351 | |
| | | 85.00 | L2 | 1,464,205 | 75.00 | R2 | 4,014,546 | 65.00 | L1 | 1,092,123 |
| | | 25.0% | 26.21 | 18,726,321 | 19.9% | 26.44 | 35,287,705 | 42.9% | 22.58 | 6,559,516 |
| | | (S) | (T) | (U) | (V) | (W) | (X) | (Y) | (Z) | (AA) |
| Yrs | Year | Age | % Surviving | Plant Balance | Age | % Surviving | Plant Balance | Age | % Surviving | Plant Balance |
| 0 | 2022 | 25.01% | 98.53% | 113,175,234 | 19.89% | 97.40% | 277,360,089 | 42.94% | 86.44% | 17,372,320 |
| 1 | 2023 | 26.19% | 98.35% | 112,933,657 | 21.22% | 97.14% | 276,584,801 | 44.48% | 85.48% | 17,169,977 |
| 2 | 2024 | 27.36% | 98.14% | 112,651,052 | 22.56% | 96.90% | 275,835,722 | 46.02% | 84.43% | 16,948,092 |
| 3 | 2025 | 28.54% | 97.91% | 112,348,308 | 23.89% | 96.65% | 275,057,694 | 47.56% | 83.41% | 16,734,854 |
| 4 | 2026 | 29.72% | 97.67% | 112,025,215 | 25.22% | 96.37% | 274,186,457 | 49.10% | 82.38% | 16,517,036 |
| 5 | 2027 | 30.89% | 97.43% | 111,711,029 | 26.56% | 96.10% | 273,345,543 | 50.64% | 81.25% | 16,280,197 |
| 6 | 2028 | 32.07% | 97.16% | 111,348,463 | 27.89% | 95.81% | 272,472,985 | 52.18% | 80.18% | 16,054,485 |
| 7 | 2029 | 33.25% | 96.87% | 110,964,358 | 29.22% | 95.50% | 271,496,871 | 53.71% | 79.02% | 15,810,419 |
| 8 | 2030 | 34.42% | 96.57% | 110,556,717 | 30.56% | 95.19% | 270,555,656 | 55.25% | 77.92% | 15,579,092 |
| 9 | 2031 | 35.60% | 96.27% | 110,160,113 | 31.89% | 94.88% | 269,579,933 | 56.79% | 76.82% | 15,345,911 |
| 10 | 2032 | 36.78% | 95.92% | 109,699,659 | 33.22% | 94.53% | 268,489,449 | 58.33% | 75.63% | 15,095,793 |
| 11 | 2033 | 37.95% | 95.55% | 109,207,183 | 34.56% | 94.19% | 267,438,935 | 59.87% | 74.51% | 14,860,623 |
| 12 | 2034 | 39.13% | 95.16% | 108,679,604 | 35.89% | 93.83% | 266,350,871 | 61.41% | 73.32% | 14,609,640 |
| 13 | 2035 | 40.31% | 94.73% | 108,113,981 | 37.22% | 93.44% | 265,135,937 | 62.94% | 72.20% | 14,374,419 |
| 14 | 2036 | 41.48% | 94.32% | 107,559,744 | 38.56% | 93.06% | 263,966,579 | 64.48% | 71.09% | 14,139,339 |
| 15 | 2037 | 42.66% | 93.83% | 106,913,842 | 39.89% | 92.67% | 262,756,449 | 66.02% | 69.90% | 13,888,824 |
| 16 | 2038 | 43.84% | 93.31% | 106,222,795 | 41.22% | 92.24% | 261,406,391 | 67.56% | 68.78% | 13,654,264 |
| 17 | 2039 | 45.01% | 92.76% | 105,484,822 | 42.56% | 91.82% | 260,108,092 | 69.10% | 67.67% | 13,420,065 |
| 18 | 2040 | 46.19% | 92.22% | 104,765,914 | 43.89% | 91.38% | 258,765,623 | 70.64% | 66.48% | 13,170,730 |
| 19 | 2041 | 47.36% | 91.59% | 103,934,386 | 45.22% | 90.90% | 257,269,180 | 72.18% | 65.38% | 12,937,502 |
| 20 | 2042 | 48.54% | 90.93% | 103,052,881 | 46.56% | 90.43% | 255,831,307 | 73.71% | 64.20% | 12,689,364 |
| 21 | 2043 | 49.72% | 90.23% | 102,121,089 | 47.89% | 89.95% | 254,345,699 | 75.25% | 63.10% | 12,457,408 |
| 22 | 2044 | 50.89% | 89.56% | 101,222,806 | 49.22% | 89.42% | 252,691,064 | 76.79% | 62.00% | 12,226,174 |
| 23 | 2045 | 52.07% | 88.78% | 100,195,060 | 50.56% | 88.90% | 251,102,495 | 78.33% | 60.83% | 11,980,398 |
| 24 | 2046 | 53.25% | 87.98% | 99,118,112 | 51.89% | 88.37% | 249,462,484 | 79.87% | 59.74% | 11,750,875 |
| 25 | 2047 | 54.42% | 87.13% | 97,992,954 | 53.22% | 87.78% | 247,637,380 | 81.41% | 58.58% | 11,507,079 |
| 26 | 2048 | 55.60% | 86.32% | 96,920,291 | 54.56% | 87.22% | 245,886,594 | 82.94% | 57.50% | 11,279,555 |
| 27 | 2049 | 56.78% | 85.41% | 95,706,507 | 55.89% | 86.63% | 244,080,560 | 84.48% | 56.43% | 11,053,102 |
| 28 | 2050 | 57.95% | 84.47% | 94,448,913 | 57.22% | 85.98% | 242,072,384 | 86.02% | 55.28% | 10,812,804 |
| 29 | | | | | | | | | | |
| 30 | | | | | | | | | | |
| 31 | | | 26.21 | 2,966,059,455 | | 26.44 | 7,333,913,137 | | 22.58 | 392,348,022 |
| 32 | | | | 18,726,321 | | | 35,287,705 | | | 6,559,516 |

# ANR Pipeline Company
# Depreciation Workpapers
# Schedule No. 7 - Average Remaining Lives
# Storage

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 356.00 | Purification Equip | | 357.00 | Other Equipment | | |
| | | 19.49 | $27,082,945 | | 11.06 | $754,737 | | |
| | | 75.00 | L4 | 4,929 | 25.00 | S4 | 13,723 | |
| | | 26.0% | 27.45 | 1,354,935 | 44.2% | 13.06 | 724,207 | Sum of Interim Retirements |
| Yrs | Year | (AB) Age | (AC) % Surviving | (AD) Plant Balance | (AB) Age | (AC) % Surviving | (AD) Plant Balance | |
| 0 | 2022 | 25.98% | 100.00% | 16,888,607 | 44.24% | 99.98% | 724,207 | |
| 1 | 2023 | 27.32% | 100.00% | 16,888,437 | 48.24% | 99.93% | 723,847 | |
| 2 | 2024 | 28.65% | 100.00% | 16,888,057 | 52.24% | 99.81% | 722,958 | |
| 3 | 2025 | 29.98% | 99.99% | 16,887,309 | 56.24% | 99.56% | 721,023 | |
| 4 | 2026 | 31.32% | 99.99% | 16,885,867 | 60.24% | 99.05% | 717,238 | |
| 5 | 2027 | 32.65% | 99.98% | 16,883,678 | 64.24% | 98.16% | 710,485 | |
| 6 | 2028 | 33.98% | 99.97% | 16,880,378 | 68.24% | 96.69% | 699,375 | |
| 7 | 2029 | 35.32% | 99.95% | 16,875,203 | 72.24% | 94.43% | 682,370 | |
| 8 | 2030 | 36.65% | 99.93% | 16,868,500 | 76.24% | 91.20% | 657,997 | |
| 9 | 2031 | 37.98% | 99.89% | 16,859,555 | 80.24% | 86.85% | 625,102 | |
| 10 | 2032 | 39.32% | 99.85% | 16,846,913 | 84.24% | 81.28% | 583,128 | |
| 11 | 2033 | 40.65% | 99.79% | 16,831,887 | 88.24% | 74.55% | 532,325 | |
| 12 | 2034 | 41.98% | 99.72% | 16,813,199 | 92.24% | 66.81% | 473,859 | |
| 13 | 2035 | 43.32% | 99.63% | 16,788,398 | 96.24% | 58.32% | 409,775 | |
| 14 | 2036 | 44.65% | 99.53% | 16,760,478 | 100.24% | 49.44% | 342,798 | |
| 15 | 2037 | 45.98% | 99.40% | 16,727,314 | 104.24% | 40.59% | 276,017 | |
| 16 | 2038 | 47.32% | 99.25% | 16,685,129 | 108.24% | 32.18% | 212,497 | |
| 17 | 2039 | 48.65% | 99.08% | 16,639,392 | 112.24% | 24.55% | 154,895 | |
| 18 | 2040 | 49.98% | 98.89% | 16,586,806 | 116.24% | 17.95% | 105,150 | |
| 19 | 2041 | 51.32% | 98.65% | 16,521,937 | 120.24% | 12.54% | 64,315 | |
| 20 | 2042 | 52.65% | 98.39% | 16,453,530 | 124.24% | 8.33% | 32,531 | |
| 21 | 2043 | 53.98% | 98.11% | 16,376,772 | 128.24% | 5.23% | 9,151 | |
| 22 | 2044 | 55.32% | 97.77% | 16,284,254 | 132.24% | 3.09% | | |
| 23 | 2045 | 56.65% | 97.42% | 16,188,732 | 136.24% | 1.70% | - | |
| 24 | 2046 | 57.98% | 97.03% | 16,083,526 | 140.24% | 0.87% | - | |
| 25 | 2047 | 59.32% | 96.57% | 15,958,929 | 144.24% | 0.40% | - | |
| 26 | 2048 | 60.65% | 96.10% | 15,832,299 | 148.24% | 0.17% | - | |
| 27 | 2049 | 61.98% | 95.59% | 15,694,693 | 152.24% | 0.06% | - | |
| 28 | 2050 | 63.32% | 95.00% | 15,533,672 | 156.24% | 0.02% | - | |
| 29 | | | | | | | | |
| 30 | | | | | | | | |
| 31 | | | 27.45 | 463,524,844 | | 13.06 | 9,456,834 | |
| 32 | | | | 1,354,935 | | | 724,207 | $82,418,705 |

# ANR Pipeline Company
# Depreciation Workpapers
# Schedule No. 8 - Average Remaining Lives
# Transmission

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *How to read this chart* | | | | | | | | |
| | | Acct # | Acct Name | | 365.10 | Land Easements | | 365.20 | Land ROW | |
| | | Ave Age Plt | Original Investment | | 16.18 | $520,036 | 12.00 | 33.17 | $52,008,448 | 18.00 |
| | | Ave Serv Life | Curve Type | 5 yr retires | 95.00 | R4 | 280 | 85.00 | S3 | 286,870 |
| | | Age % ASL | Ave Rem Life | Interim Retires | 17.0% | 27.88 | 7,234 | 39.0% | 26.78 | 6,630,349 |
| | | (A) | (B) | (C ) | (D) | (E ) | (F) | (G) | (H) | (I) |
| Yrs | Year | Age | % Surviving | Plant Balance | Age | % Surviving | Plant Balance | Age | % Surviving | Plant Balance |
| 0 | 2022 | 62% | 84% | $35,023 | 17.03% | 99.95% | 520,036 | 39.02% | 99.62% | 51,337,596 |
| 1 | 2023 | Plant average age as a percent of proposed service life | 84% | $35,023 | 18.08% | 99.94% | 519,995 | 40.20% | 99.54% | 51,298,615 |
| 2 | 2024 | | 84% | $35,023 | 19.14% | 99.93% | 519,943 | 41.38% | 99.45% | 51,249,310 |
| 3 | 2025 | | Reference to Iowa Curve Table for % Surviving at each age interval | $34,279 | 20.19% | 99.92% | 519,890 | 42.55% | 99.34% | 51,192,137 |
| 4 | 2026 | | | $34,279 | 21.24% | 99.91% | 519,824 | 43.73% | 99.21% | 51,126,241 |
| 5 | 2027 | | | $34,279 | 22.29% | 99.89% | 519,757 | 44.91% | 99.07% | 51,050,726 |
| 6 | 2028 | 72% | | Plant surviving at each age interval | 23.35% | 99.88% | 519,674 | 46.08% | 98.92% | 50,972,258 |
| 7 | 2029 | 73% | | | 24.40% | 99.86% | 519,589 | 47.26% | 98.73% | 50,875,671 |
| 8 | 2030 | 75% | | | 25.45% | 99.84% | 519,485 | 48.44% | 98.52% | 50,766,657 |
| 9 | 2031 | 77% | 75% | | 26.51% | 99.82% | 519,368 | 49.61% | 98.29% | 50,644,203 |
| 10 | 2032 | 78% | 73% | $30,652 | 27.56% | 99.80% | 519,250 | 50.79% | 98.05% | 50,519,267 |
| 11 | 2033 | 80% | 72% | $30,151 | 28.61% | 99.77% | 519,105 | 51.96% | 97.75% | 50,368,163 |
| 12 | 2034 | 82% | 71% | $29,601 | 29.66% | 99.74% | 518,959 | 53.14% | 97.43% | 50,200,588 |
| 13 | 2035 | 83% | 70% | $29,034 | 30.72% | 99.71% | 518,780 | 54.32% | 97.08% | 50,015,500 |
| 14 | 2036 | 85% | 68% | $28,485 | 31.77% | 99.67% | 518,600 | 55.49% | 96.72% | 49,829,567 |
| 15 | 2037 | 87% | 67% | $27,885 | 32.82% | 99.63% | 518,382 | 56.67% | 96.29% | 49,608,035 |
| 16 | 2038 | 88% | 65% | $27,268 | 33.87% | 99.59% | 518,162 | 57.85% | 95.83% | 49,366,027 |
| 17 | 2039 | 90% | 64% | $26,673 | 34.93% | 99.54% | 517,895 | 59.02% | 95.32% | 49,102,579 |
| 18 | 2040 | 92% | 62% | $26,024 | 35.98% | 99.48% | 517,628 | 60.20% | 94.82% | 48,841,460 |
| 19 | 2041 | 93% | 61% | $25,360 | 37.03% | 99.42% | 517,305 | 61.38% | 94.23% | 48,534,374 |
| 20 | 2042 | 95% | 59% | $24,721 | 38.08% | 99.36% | 516,983 | 62.55% | 93.59% | 48,203,287 |
| 21 | 2043 | 97% | 58% | $24,027 | 39.14% | 99.29% | 516,594 | 63.73% | 92.91% | 47,847,434 |
| 22 | 2044 | 98% | 56% | $23,320 | 40.19% | 99.21% | 516,207 | 64.91% | 92.17% | 47,466,114 |
| 23 | 2045 | 100% | 54% | $22,643 | 41.24% | 99.12% | 515,742 | 66.08% | 91.46% | 47,093,667 |
| 24 | 2046 | 102% | 54% | $22,343 | 42.29% | 99.03% | 515,279 | 67.26% | 90.63% | 46,661,868 |
| 25 | 2047 | 103% | 52% | $21,607 | 43.35% | 98.93% | 514,725 | 68.44% | 89.75% | 46,203,021 |
| 26 | 2048 | 105% | 50% | $20,861 | 44.40% | 98.82% | 514,176 | 69.61% | 88.81% | 45,716,760 |
| 27 | 2049 | 107% | 48% | $20,151 | 45.45% | 98.69% | 513,519 | 70.79% | 87.91% | 45,246,709 |
| 28 | 2050 | 108% | 46% | $19,388 | 46.51% | 98.56% | 512,803 | 71.96% | 86.87% | 44,707,247 |
| 29 | | | | | | | | | | |
| 30 | | 28-Yr Economic Life | ARL | Sum of Survivors | | 27.88 | 14,497,619 | | 26.78 | 1,374,707,487 |
| 31 | | | | Interim Retirements | | | 7,234 | | | 6,630,349 |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 8 - Average Remaining Lives
## Transmission

| | | 366.00 | Structures & Improvements | | 367.00 | Mains | | 368.00 | Compressor Stn Equip | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 13.88 | $316,815,382 | 10.00 | 29.82 | $2,644,165,375 | 12.00 | 13.66 | $2,317,529,018 | 3.00 |
| | | 65.00 | R2 | 5,010,449 | 95.00 | R4 | 6,345,322 | 65.00 | L1 | 63,278,279 |
| | | 21.4% | 26.09 | 47,011,560 | 31.4% | 27.49 | 115,839,514 | 21.0% | 24.57 | 586,433,386 |
| Yrs | Year | (J) Age | (K) % Surviving | (L) Plant Balance | (M) Age | (N) % Surviving | (O) Plant Balance | (P) Age | (Q) % Surviving | (R ) Plant Balance |
| 0 | 2022 | 21.35% | 97.13% | 295,032,293 | 31.39% | 99.69% | 2,195,731,639 | 21.02% | 96.69% | 2,154,130,128 |
| 1 | 2023 | 22.89% | 96.85% | 294,141,379 | 32.44% | 99.64% | 2,194,660,531 | 22.55% | 96.23% | 2,143,536,219 |
| 2 | 2024 | 24.43% | 96.53% | 293,147,209 | 33.49% | 99.60% | 2,193,584,507 | 24.09% | 95.74% | 2,132,116,192 |
| 3 | 2025 | 25.97% | 96.22% | 292,172,618 | 34.55% | 99.55% | 2,192,278,301 | 25.63% | 95.17% | 2,119,008,513 |
| 4 | 2026 | 27.51% | 95.88% | 291,086,058 | 35.60% | 99.51% | 2,190,969,943 | 27.17% | 94.60% | 2,105,841,129 |
| 5 | 2027 | 29.05% | 95.54% | 290,021,844 | 36.65% | 99.45% | 2,189,386,317 | 28.71% | 93.96% | 2,090,851,849 |
| 6 | 2028 | 30.58% | 95.19% | 288,912,042 | 37.71% | 99.38% | 2,187,638,602 | 30.25% | 93.31% | 2,075,913,007 |
| 7 | 2029 | 32.12% | 94.80% | 287,676,324 | 38.76% | 99.31% | 2,185,895,603 | 31.78% | 92.63% | 2,060,119,643 |
| 8 | 2030 | 33.66% | 94.42% | 286,467,538 | 39.81% | 99.23% | 2,183,794,969 | 33.32% | 91.86% | 2,042,340,328 |
| 9 | 2031 | 35.20% | 94.03% | 285,208,476 | 40.86% | 99.15% | 2,181,705,817 | 34.86% | 91.11% | 2,024,810,578 |
| 10 | 2032 | 36.74% | 93.58% | 283,808,261 | 41.92% | 99.06% | 2,179,194,945 | 36.40% | 90.32% | 2,006,464,344 |
| 11 | 2033 | 38.28% | 93.15% | 282,440,192 | 42.97% | 98.97% | 2,176,704,598 | 37.94% | 89.43% | 1,986,019,433 |
| 12 | 2034 | 39.82% | 92.67% | 280,919,938 | 44.02% | 98.85% | 2,173,719,645 | 39.48% | 88.57% | 1,966,059,025 |
| 13 | 2035 | 41.35% | 92.20% | 279,435,730 | 45.07% | 98.74% | 2,170,767,015 | 41.02% | 87.62% | 1,943,956,899 |
| 14 | 2036 | 42.89% | 91.72% | 277,892,676 | 46.13% | 98.61% | 2,167,237,383 | 42.55% | 86.69% | 1,922,512,641 |
| 15 | 2037 | 44.43% | 91.18% | 276,179,892 | 47.18% | 98.48% | 2,163,755,171 | 44.09% | 85.74% | 1,900,408,001 |
| 16 | 2038 | 45.97% | 90.65% | 274,509,569 | 48.23% | 98.32% | 2,159,603,379 | 45.63% | 84.69% | 1,876,150,118 |
| 17 | 2039 | 47.51% | 90.06% | 272,656,883 | 49.28% | 98.16% | 2,155,518,003 | 47.17% | 83.69% | 1,852,820,331 |
| 18 | 2040 | 49.05% | 89.49% | 270,851,448 | 50.34% | 97.98% | 2,150,659,665 | 48.71% | 82.59% | 1,827,365,461 |
| 19 | 2041 | 50.58% | 88.90% | 268,977,748 | 51.39% | 97.80% | 2,145,891,306 | 50.25% | 81.54% | 1,803,023,397 |
| 20 | 2042 | 52.12% | 88.25% | 266,901,732 | 52.44% | 97.59% | 2,140,235,259 | 51.78% | 80.47% | 1,778,275,683 |
| 21 | 2043 | 53.66% | 87.61% | 264,880,857 | 53.49% | 97.38% | 2,134,698,046 | 53.32% | 79.31% | 1,751,496,674 |
| 22 | 2044 | 55.20% | 86.95% | 262,785,785 | 54.55% | 97.13% | 2,128,146,634 | 54.86% | 78.22% | 1,726,097,512 |
| 23 | 2045 | 56.74% | 86.22% | 260,467,048 | 55.60% | 96.89% | 2,121,748,991 | 56.40% | 77.11% | 1,700,477,448 |
| 24 | 2046 | 58.28% | 85.50% | 258,212,414 | 56.65% | 96.60% | 2,114,198,544 | 57.94% | 75.93% | 1,672,977,375 |
| 25 | 2047 | 59.82% | 84.72% | 255,719,005 | 57.71% | 96.29% | 2,106,081,599 | 59.48% | 74.81% | 1,647,102,809 |
| 26 | 2048 | 61.35% | 83.95% | 253,296,435 | 58.76% | 96.00% | 2,098,185,239 | 61.02% | 73.62% | 1,619,474,653 |
| 27 | 2049 | 62.89% | 83.16% | 250,789,634 | 59.81% | 95.64% | 2,088,901,353 | 62.55% | 72.50% | 1,593,578,969 |
| 28 | 2050 | 64.43% | 82.29% | 248,020,732 | 60.86% | 95.30% | 2,079,892,125 | 64.09% | 71.38% | 1,567,696,742 |
| 29 | | | | | | | | | | |
| 30 | | | 26.09 | 7,697,579,469 | | 27.49 | 60,355,053,491 | | 24.57 | 52,936,494,972 |
| 31 | | | | 47,011,560 | | | 115,839,514 | | | 586,433,386 |

# ANR Pipeline Company
# Depreciation Workpapers
## Schedule No. 8 - Average Remaining Lives
## Transmission

| | | 369.00 | Measure & Reg Equip | | 371.00 | Other Tran Plant Equ | | 370.20 | Communication Equip - | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 13.61 | $326,307,927 | 17.00 | 6.94 | $3,507,188 | 16.00 | 19.49 | $117,274,323 | 13.00 |
| | | 70.00 | S2 | 1,018,369 | 75.00 | S1 | 15,433 | 45.00 | R5 | 179,709 |
| | | 19.4% | 27.02 | 33,172,684 | 9.3% | 26.87 | 322,021 | 43.3% | 22.30 | 74,359,914 |
| | | (S) | (T) | (U) | (V) | (W) | (X) | (Y) | (Z) | (AA) |
| Yrs | Year | Age | % Surviving | Plant Balance | Age | % Surviving | Plant Balance | Age | % Surviving | Plant Balance |
| 0 | 2022 | 19.44% | 99.89% | 305,266,275 | 9.25% | 99.87% | 2,873,505 | 43.31% | 100.00% | 84,019,506 |
| 1 | 2023 | 20.87% | 99.85% | 305,138,848 | 10.59% | 99.82% | 2,871,550 | 45.53% | 99.99% | 84,011,749 |
| 2 | 2024 | 22.30% | 99.80% | 304,980,158 | 11.92% | 99.74% | 2,868,926 | 47.76% | 99.98% | 83,996,322 |
| 3 | 2025 | 23.73% | 99.74% | 304,770,248 | 13.25% | 99.66% | 2,865,967 | 49.98% | 99.95% | 83,968,227 |
| 4 | 2026 | 25.16% | 99.66% | 304,532,037 | 14.59% | 99.56% | 2,862,472 | 52.20% | 99.91% | 83,920,539 |
| 5 | 2027 | 26.59% | 99.58% | 304,247,907 | 15.92% | 99.43% | 2,858,072 | 54.42% | 99.84% | 83,839,797 |
| 6 | 2028 | 28.01% | 99.47% | 303,886,711 | 17.25% | 99.30% | 2,853,365 | 56.64% | 99.74% | 83,720,990 |
| 7 | 2029 | 29.44% | 99.35% | 303,491,060 | 18.59% | 99.15% | 2,848,032 | 58.87% | 99.59% | 83,547,193 |
| 8 | 2030 | 30.87% | 99.21% | 303,033,451 | 19.92% | 98.96% | 2,841,562 | 61.09% | 99.38% | 83,301,761 |
| 9 | 2031 | 32.30% | 99.04% | 302,508,517 | 21.25% | 98.77% | 2,834,853 | 63.31% | 99.08% | 82,947,943 |
| 10 | 2032 | 33.73% | 98.85% | 301,865,264 | 22.59% | 98.56% | 2,827,450 | 65.53% | 98.70% | 82,494,499 |
| 11 | 2033 | 35.16% | 98.64% | 301,183,772 | 23.92% | 98.31% | 2,818,678 | 67.76% | 98.19% | 81,904,697 |
| 12 | 2034 | 36.59% | 98.40% | 300,418,513 | 25.25% | 98.06% | 2,809,774 | 69.98% | 97.55% | 81,151,766 |
| 13 | 2035 | 38.01% | 98.12% | 299,499,698 | 26.59% | 97.78% | 2,800,123 | 72.20% | 96.74% | 80,204,179 |
| 14 | 2036 | 39.44% | 97.83% | 298,544,410 | 27.92% | 97.46% | 2,788,879 | 74.42% | 95.68% | 78,963,876 |
| 15 | 2037 | 40.87% | 97.51% | 297,489,677 | 29.25% | 97.14% | 2,777,635 | 76.64% | 94.43% | 77,490,259 |
| 16 | 2038 | 42.30% | 97.15% | 296,330,703 | 30.59% | 96.80% | 2,765,608 | 78.87% | 92.88% | 75,679,005 |
| 17 | 2039 | 43.73% | 96.73% | 294,968,049 | 31.92% | 96.40% | 2,751,770 | 81.09% | 91.00% | 73,465,494 |
| 18 | 2040 | 45.16% | 96.31% | 293,578,774 | 33.25% | 96.01% | 2,738,090 | 83.31% | 88.59% | 70,644,378 |
| 19 | 2041 | 46.59% | 95.85% | 292,071,877 | 34.59% | 95.60% | 2,723,604 | 85.53% | 85.81% | 67,385,659 |
| 20 | 2042 | 48.01% | 95.31% | 290,322,471 | 35.92% | 95.13% | 2,707,098 | 87.76% | 82.51% | 63,510,411 |
| 21 | 2043 | 49.44% | 94.77% | 288,560,071 | 37.25% | 94.67% | 2,690,925 | 89.98% | 78.63% | 58,964,001 |
| 22 | 2044 | 50.87% | 94.19% | 286,669,237 | 38.59% | 94.18% | 2,673,937 | 92.20% | 74.15% | 53,713,861 |
| 23 | 2045 | 52.30% | 93.57% | 284,647,104 | 39.92% | 93.63% | 2,654,728 | 94.42% | 68.83% | 47,471,726 |
| 24 | 2046 | 53.73% | 92.86% | 282,331,983 | 41.25% | 93.10% | 2,636,045 | 96.64% | 63.16% | 40,821,221 |
| 25 | 2047 | 55.16% | 92.16% | 280,030,293 | 42.59% | 92.55% | 2,616,547 | 98.87% | 57.00% | 33,593,095 |
| 26 | 2048 | 56.59% | 91.41% | 277,590,762 | 43.92% | 91.92% | 2,594,643 | 101.09% | 50.46% | 25,922,280 |
| 27 | 2049 | 58.01% | 90.56% | 274,822,491 | 45.25% | 91.32% | 2,573,464 | 103.31% | 43.38% | 17,627,216 |
| 28 | 2050 | 59.44% | 89.72% | 272,093,592 | 46.59% | 90.69% | 2,551,484 | 105.53% | 36.59% | 9,659,592 |
| 29 | | | | | | | | | | |
| 30 | | | 27.02 | 8,249,607,679 | | 26.87 | 77,205,283 | | 22.30 | 1,873,921,737 |
| 31 | | | | 33,172,684 | | | 322,021 | | | 74,359,914 |
| | | | | | | | | Total Interim Retirements | | $863,776,662 |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 9a - General Plant Service Lives

| | (A) | (B) | (C ) | (D) | (E ) | (F) | (G) | (H) | (I) | (J) | (K) | (L) | (M) | (N) | (O) | (P) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **390.0 - Structures & Improve** | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | |
| 3 | Trans\Vint | 1983 | 1984 | 1986 | 1990 | 1994 | 1999 | 2000 | 2003 | 2004 | Grand Total | | | | | |
| 4 | 2010 | 27 | 26 | 24 | 20 | 16 | 11 | 10 | 7 | 6 | 16.33 | | | | | |
| 5 | Grand Total | 27.00 | 26.00 | 24.00 | 20.00 | 16.00 | 11.00 | 10.00 | 7.00 | 6.00 | 16.33 | | | | | |
| 6 | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | |
| 8 | **391.0 - Office Furn & Equip** | | | | | | | | | | | | | | | |
| 9 | Trans\Vint | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | Grand Total | |
| 10 | 2008 | 15 | | | | | | | | | | | | | 15.00 | |
| 11 | 2009 | | 15 | | | | | | | | | | | | 15.00 | |
| 12 | 2010 | | 16 | 15 | | | | | | | | | | | 15.50 | |
| 13 | 2011 | | | | 15 | 14 | | | | | | | | | 14.50 | |
| 14 | 2012 | | | | | 15 | | | | | | | | | 15.00 | |
| 15 | 2013 | | | | | | 15 | | | | | | | | 15.00 | |
| 16 | 2014 | | | | | | | 15 | | | | | | | 15.00 | |
| 17 | 2015 | | | | | | | | 15 | | | | | | 15.00 | |
| 18 | 2016 | | | | | | | | | 15 | | | | | 15.00 | |
| 19 | 2017 | | | | | | | | | | 15 | 14 | | | 14.50 | |
| 20 | 2018 | | | | | | | | | | | 15 | 14 | | 14.50 | |
| 21 | 2019 | | | | | | | | | | 17 | | 15 | 14 | 15.33 | |
| 22 | 2020 | | | | | | | | | | | | | 15 | 15.00 | |
| 23 | Grand Total | 15.00 | 15.36 | 15.00 | 15.00 | 14.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.22 | 14.60 | 14.93 | 14.79 | 14.95 | |
| 24 | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | |
| 26 | **391.1 - Computer Equipment** | | | | | | | | | | | | | | | |
| 27 | Trans\Vint | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Grand Tota |
| 28 | 2008 | | 5 | | | | | | | | | | | | | 5.00 |
| 29 | 2009 | 7 | | 5 | | | | | | | | | | | | 6.00 |
| 30 | 2010 | | | 6 | 5 | | | | | | | | | | | 5.50 |
| 31 | 2011 | | | | | 5 | | | | | | | | | | 5.00 |
| 32 | 2012 | | | | | | 5 | | | | | | | | | 5.00 |
| 33 | 2013 | | | | | | | 5 | | | | | | | | 5.00 |
| 34 | 2014 | | | | | | | | 5 | | | | | | | 5.00 |
| 35 | 2015 | | | | | | | | | 5 | | | | | | 5.00 |
| 36 | 2016 | | | | | | | | | | 5 | | | | | 5.00 |
| 37 | 2017 | | | | | | | | | | | 5 | 4 | | | 4.50 |
| 38 | 2018 | | | | | | | | | | | | | 4 | | 4.00 |
| 39 | 2020 | | | | | | | | | | | | | | 5 | 5.00 |
| 40 | Grand Total | 7.00 | 5.00 | 5.88 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 4.00 | 4.00 | 5.00 | 5.00 |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 9a - General Plant Service Lives

|  | (A) | (B) | (C ) | (D) | (E ) | (F) | (G) | (H) | (I) | (J) | (K) | (L) | (M) | (N) | (O) | (P) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 |  | 392.0 - Cars & Trucks |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 | Trans\Vint | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | Grand Tota |
| 3 | 2008 | 11.0 | 10.0 | 9.0 |  |  |  |  |  |  |  |  |  |  |  | 10.0 |
| 4 | 2009 |  | 11.0 | 10.0 |  |  |  |  |  |  |  |  | 1.0 |  |  | 11.0 |
| 5 | 2010 |  | 12.0 | 11.0 | 10.0 |  |  |  |  |  |  |  |  |  |  | 11.0 |
| 6 | 2011 |  |  | 12.0 | 11.0 |  |  |  |  |  |  |  |  |  |  | 11.5 |
| 7 | 2012 |  |  | 13.0 |  | 11.0 | 10.0 |  |  |  |  |  |  |  |  | 11.3 |
| 8 | 2013 |  |  | 14.0 |  |  | 11.0 | 10.0 |  |  |  |  |  |  |  | 11.7 |
| 9 | 2014 |  |  |  |  |  |  | 11.0 | 10.0 |  |  |  |  |  |  | 10.5 |
| 10 | 2015 |  |  |  |  |  |  |  | 11.0 | 10.0 |  |  |  |  |  | 10.5 |
| 11 | 2016 |  |  |  |  |  |  |  |  | 11.0 | 10.0 |  |  |  |  | 10.5 |
| 12 | 2017 |  |  |  |  |  |  |  |  |  | 11.0 | 10.0 |  |  |  | 10.5 |
| 13 | 2018 |  |  |  |  |  |  |  |  |  |  | 11.0 | 10.0 |  |  | 10.5 |
| 14 | 2019 |  |  |  |  |  |  |  |  |  |  | 12.0 | 11.0 | 10.0 |  | 11.0 |
| 15 | 2020 |  |  |  |  |  |  |  |  |  |  |  |  | 11.0 | 10.0 | 10.5 |
| 16 | Grand Total | 11.0 | 10.8 | 11.2 | 10.6 | 11.0 | 10.6 | 10.8 | 10.7 | 10.6 | 10.7 | 10.9 | 7.9 | 10.7 | 10.0 | 10.5 |
| 17 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|
| 19 |  | **392.1 - Patrol Transport** |  |  |  |  |
| 20 | Trans\Vint | 1974 | 1978 | 1979 | 1986 | Grand Total |
| 21 | 2009 |  |  | 30 |  | 30.00 |
| 22 | 2010 | 36 |  | 31 |  | 33.50 |
| 23 | 2011 |  | 33 | 32 |  | 32.50 |
| 24 | 2013 |  |  |  | 27 | 27.00 |
| 25 | Grand Total | 36.00 | 33.00 | 31.00 | 27.00 | 30.75 |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 9a - General Plant Service Lives

| | (A) | (B) | (C ) | (D) | (E ) | (F) | (G) | (H) | (I) | (J) | (K) | (L) | (M) | (N) | (O) | (P) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | **394.0 - Tools, Shop & Gar Eq** | | | | | | | | | | | | | | |
| 2 | Trans\Vint | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | Grand Total |
| 3 | 2008 | | | | | | | | | | | | | | | - |
| 4 | 2009 | | | | | | 10 | 9 | | | | | | | | 9.50 |
| 5 | 2010 | | | | | | | | | | | | | | | - |
| 6 | 2011 | 17 | 16 | | 14 | | | | | | | | | | | 15.67 |
| 7 | 2012 | 18 | 17 | | | | | | | | | | | | | 17.50 |
| 8 | 2013 | | 18 | 17 | | | | | | | | | | | | 17.50 |
| 9 | 2014 | | | 18 | 17 | | | | | | | | | | | 17.50 |
| 10 | 2015 | | | | 18 | 17 | | | | | | | | | | 17.50 |
| 11 | 2016 | | | | | 18 | 17 | | | | | | | | | 17.50 |
| 12 | 2017 | | | | | | 18 | 17 | | | | | | | 10 | 15.00 |
| 13 | 2018 | | | | | | | 18 | 17 | | | | | | | 17.50 |
| 14 | 2019 | | | | | | | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 15.50 |
| 15 | 2020 | | | | | | | | | 18 | 17 | | | 14 | | 16.33 |
| 16 | Grand Total | 17.06 | 17.56 | 17.96 | 14.19 | 17.57 | 17.42 | 18.14 | 17.86 | 17.55 | 16.99 | 15.00 | 14.00 | 13.50 | 11.50 | 14.75 |
| 17 | | | | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | | | |
| 19 | | **396.0 - Power Operated Equip** | | | | | | | | | | | | | | |
| 20 | Trans\Vint | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | Grand Total | |
| 21 | 2008 | 18 | 17 | | | | | | | 10 | | | | | 15.00 | |
| 22 | 2009 | | 18 | | | | | | | | | | | | 18.00 | |
| 23 | 2010 | | | 18 | 17 | | | | | 12 | | | | | 15.67 | |
| 24 | 2011 | | | | 18 | 17 | | | | | | | | | 17.50 | |
| 25 | 2012 | | | | | 18 | | | | | | | | | 18.00 | |
| 26 | 2013 | | | | | | 18 | | | 15 | | | | | 16.50 | |
| 27 | 2014 | | | | | | | 18 | | | | | | | 18.00 | |
| 28 | 2015 | | | | | | | | 18 | 17 | | | | | 17.50 | |
| 29 | 2016 | | | | | | | | | 18 | 17 | | | | 17.50 | |
| 30 | 2017 | | | | | | | | | | 18 | | | | 18.00 | |
| 31 | 2018 | | | | | | | | | | | | 17 | | 17.00 | |
| 32 | 2019 | | | | | | | | | | | 19 | 18 | 17 | 18.00 | |
| | 2020 | | | | | | | | | | | | | 18 | 18.00 | |
| | Grand Total | 18.00 | 17.80 | 18.00 | 17.80 | 17.11 | 18.00 | 18.00 | 18.00 | 16.54 | 17.59 | 19.00 | 17.67 | 17.17 | 18.72 | |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 9b - Intangible Plant

| | | | | | |
|---|---|---|---|---|---|
| 1 | **Intangible Plant** | | | | |
| 2 | Utility Account | In-Service Yr. | Retirement Yr. | Age | |
| 3 | 303.0 - Misc Intangible Plan | 2002 | 2008 | 6 | |
| 4 | 303.0 - Misc Intangible Plan | 2004 | 2008 | 4 | |
| 5 | 303.0 - Misc Intangible Plan | 2004 | 2009 | 5 | |
| 6 | 303.0 - Misc Intangible Plan | 2001 | 2009 | 8 | |
| 7 | 303.0 - Misc Intangible Plan | 2000 | 2009 | 9 | |
| 8 | 303.0 - Misc Intangible Plan | 2005 | 2009 | 4 | |
| 9 | 303.0 - Misc Intangible Plan | 2006 | 2010 | 4 | |
| 10 | 303.0 - Misc Intangible Plan | 2004 | 2010 | 6 | |
| 11 | 303.0 - Misc Intangible Plan | 2010 | 2010 | 0 | |
| 12 | 303.0 - Misc Intangible Plan | 2005 | 2010 | 5 | |
| 13 | 303.0 - Misc Intangible Plan | 2004 | 2010 | 6 | |
| 14 | 303.0 - Misc Intangible Plan | 2005 | 2010 | 5 | |
| 15 | 303.0 - Misc Intangible Plan | 2011 | 2015 | 4 | |
| 16 | 303.0 - Misc Intangible Plan | 2011 | 2016 | 5 | |
| 17 | | | | 71 | |
| 18 | | | | **5.071** | Average age at retirement |
| 19 | | | | | |
| 20 | 303.01 - US Pipeline Commercial Sys | 2018 | 2020 | 2 | |
| 21 | 303.01 - US Pipeline Commercial Sys | 2020 | 2020 | 0 | |
| 22 | 303.01 - US Pipeline Commercial Sys | 2014 | 2020 | 6 | |
| 23 | 303.01 - US Pipeline Commercial Sys | 2018 | 2020 | 2 | |
| 24 | 303.01 - US Pipeline Commercial Sys | 2018 | 2020 | 2 | |
| 25 | 303.01 - US Pipeline Commercial Sys | 2015 | 2020 | 5 | |
| 26 | 303.01 - US Pipeline Commercial Sys | 2015 | 2020 | 5 | |
| 27 | 303.01 - US Pipeline Commercial Sys | 2015 | 2020 | 5 | |
| 28 | 303.01 - US Pipeline Commercial Sys | 2018 | 2020 | 2 | |
| 29 | | | | 29 | |
| | | | | **3.22** | Average age at retirement |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 10 - Depreciation Rate Calculations

| | | Plant in Service | Reserve for Depreciation | Net Plant | Avg Rem Lives | Depreciation Expence | Depr. Rate |
|---|---|---|---|---|---|---|---|
| | | (A) | (B) | (C ) | (D) | (E ) | (F) |
| | | 9/30/2021 | 9/30/2021 | | | | |
| 1 | **Intangible Plant** | | | | | | |
| 2 | 301.00 Organization Costs | 155,125.46 | - | 155,125.46 | | | |
| 3 | 303.00 Misc Intangible Plan | 98,400,889.03 | 75,517,203.77 | 22,883,685.26 | 5.1 | 4,512,275.97 | 4.59% |
| 4 | 303.01 Cygnet Assets | 20,805,400.49 | 8,975,220.20 | 11,830,180.29 | 3.25 | 3,640,055.47 | 17.50% |
| 5 | 303.10 Intangibles 10 yr * | 24,234,542.64 | 24,234,542.64 | - | | | |
| 6 | 303.15 Intangibles 15 yr * | 145,487.93 | 145,487.93 | - | | | |
| 7 | 303.19 Intangibles 20 yr | 712,553.11 | 311,741.85 | 400,811.26 | 19.0 | 21,095.33 | 2.96% |
| 8 | 303.20 Intangibles 2 yr * | 221,763.71 | 221,763.71 | - | | | |
| 9 | 303.20 Intangibles 20 yr | 6,895,763.49 | 6,895,763.49 | - | | | |
| 10 | 303.30 Intangibles 24 yr * | - | - | - | | | |
| 11 | 303.50 Intangibles 5 yr * | 11,780,597.22 | 11,780,597.22 | - | | | |
| 12 | 303.60 Intangibles 6 yr | - | - | - | | | |
| 13 | 303.80 Intangibles 8 yr * | 19,318,162.39 | 19,318,162.39 | - | | | |
| 14 | 303.90 Intangible 11.5 Yr | 22,017,096.99 | 9,810,114.89 | 12,206,982.10 | 23.66 | 515,992.85 | 2.34% |
| 15 | Subtotal | 204,687,382.45 | 157,210,598.09 | 47,476,784.36 | | 8,689,419.62 | 4.25% |
| 16 | | | | | | | |
| 17 | **Gathering Plant** | | | | | | |
| 18 | 325.50 Land | 580,397.72 | - | 580,397.72 | | | |
| 19 | 325.40 Rights of Way | 198,618.08 | 192,829.02 | 5,789.06 | | | |
| 20 | 327.00 Field Comp Stn Struc | 0.50 | - | 0.50 | | | |
| 21 | 328.00 Field Meas & Reg Stn | 118,525.74 | 105,825.86 | 12,699.88 | | | |
| 22 | 329.00 Other Structures | 16,467.14 | 4,859.01 | 11,608.13 | | | |
| 23 | 332.00 Field Lines | 5,532,780.78 | 4,811,705.00 | 721,075.78 | | | |
| 24 | 333.00 Field Comp Stn Equip | - | - | - | | | |
| 25 | 334.00 Field M & RStn Equip | 1,142,068.59 | 812,612.21 | 329,456.38 | | | |
| 26 | 336.00 Purification Equip | - | - | - | | | |
| 27 | Subtotal | 7,588,858.55 | 5,927,831.10 | 1,661,027.45 | 20.49 | 81,066.48 | 1.16% |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 10 - Depreciation Rate Calculations

| | | | Plant in Service<br>(A)<br>9/30/2021 | Reserve for Depreciation<br>(B)<br>9/30/2021 | Net Plant<br>(C ) | Avg Rem Lives<br>(D) | Depreciation Expence<br>(E ) | Depr. Rate<br>(F) |
|---|---|---|---|---|---|---|---|---|
| 1 | **Underground Storage Plant** | | *Composite Mainline Depreciable Plant & Cold Springs Plant* | | | | | |
| | 350.11 | Land (ANRS) | 318,886.94 | | | | | |
| 2 | 350.12 | Land (Leased) | 2,806,038.42 | - | 2,806,038.42 | 27.27 | 102,880.72 | 3.67% |
| 3 | 350.13 | Land (Owned) | 2,778,758.89 | - | 2,778,758.89 | | | |
| 4 | 350.20 | Rights of Way | 1,551,088.83 | 1,047,408.01 | 503,680.82 | 19.79 | 25,445.17 | 1.64% |
| 5 | 351.00 | Structures & Improvement: | 28,590,960.45 | 14,377,938.82 | 14,213,021.63 | 27.04 | 525,665.88 | 1.84% |
| 6 | 352.00 | Wells | 72,464,482.69 | 43,107,535.81 | 29,356,946.88 | 27.69 | 1,060,191.65 | 1.46% |
| 7 | 352.10 | Storage Leaseholds | 15,507,366.53 | 7,876,245.46 | 7,631,121.07 | 18.61 | 410,163.98 | 2.64% |
| 8 | 352.20 | Reservoirs | 3,210,715.44 | 3,079,033.09 | 131,682.35 | | | |
| 9 | 353.00 | Lines | 113,175,233.91 | 52,009,965.56 | 61,165,268.35 | 26.21 | 2,333,868.78 | 2.06% |
| 10 | 354.00 | Compressor Equipment | 277,360,088.80 | 86,467,046.72 | 190,893,042.08 | 26.44 | 7,219,353.45 | 2.60% |
| 11 | 355.00 | Meas & Reg Stn Equip | 17,372,319.75 | 9,986,231.54 | 7,386,088.21 | 22.58 | 327,039.97 | 1.88% |
| 12 | 356.00 | Purification Equip | 16,888,606.94 | 9,469,955.66 | 7,418,651.28 | 27.45 | 270,299.83 | 1.60% |
| 13 | 357.00 | Other Equipment | 724,207.49 | 200,690.09 | 523,517.40 | 13.06 | 40,091.14 | 5.54% |
| 14 | | | 552,748,755.07 | 227,622,050.76 | 324,807,817.37 | 26.37 | 12,315,000.55 | 2.24% |
| 15 | | | | | | | | |
| 16 | **Transmission Plant** | | | | | | | |
| 17 | 365.10 | Land Easements | 520,036.44 | 187,407.41 | 332,629.03 | 27.88 | 11,931.56 | 2.29% |
| 18 | 365.11 | Land in Fee | 15,471,607.59 | - | 15,471,607.59 | 0.00 | | |
| 19 | 365.20 | Land ROW | 51,337,596.12 | 35,454,255.42 | 15,883,340.70 | 26.78 | 593,153.48 | 1.16% |
| 20 | 366.00 | Structures & Improvement: | 295,032,292.69 | 76,345,436.71 | 218,686,855.98 | 26.09 | 8,381,814.67 | 2.84% |
| 21 | 367.00 | Mains | 2,195,731,639.24 | 1,295,281,516.57 | 900,450,122.67 | 27.49 | 32,758,596.17 | 1.49% |
| 22 | 368.00 | Compressor Stn Equip | 2,154,130,128.18 | 469,969,184.97 | 1,684,160,943.21 | 24.57 | 68,533,094.80 | 3.18% |
| 23 | 368.20 | Gas Turbine Engines | 101,820,228.09 | 24,718,024.05 | 77,102,204.04 | 5.51 | 13,985,347.65 | 13.74% |
| 24 | 369.00 | Measure & Reg Equip | 305,266,275.37 | 84,398,410.32 | 220,867,865.05 | 27.02 | 8,172,935.38 | 2.68% |
| 25 | 371.00 | Other Tran Plant Equ | 2,873,504.77 | 1,707,979.08 | 1,165,525.69 | 26.87 | 43,379.72 | 1.51% |
| 26 | | Subtotal | 5,122,183,308.48 | 1,988,062,214.53 | 3,134,121,093.95 | 23.66 | 132,480,253.43 | 2.59% |
| 27 | | | | | | | | |
| 28 | 370.2 | Communications Equipmer | 43,458,351.28 | 6,236,564.82 | 37,221,786.46 | 22.30 | 1,668,883.00 | 3.84% |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 10 - Depreciation Rate Calculations

| | | | Plant in Service<br>(A)<br>9/30/2021 | Reserve for Depreciation<br>(B)<br>9/30/2021 | Net Plant<br>(C ) | Avg Rem Lives<br>(D) | Depreciation Expence<br>(E ) | Depr. Rate<br>(F) |
|---|---|---|---|---|---|---|---|---|
| 1 | **General Plant** | | | | | | | |
| 2 | 389.00 | Land | - | - | - | **Avg Serv Life** | | **Depr Rate** |
| 3 | 390.00 | Structures & Improve | 3,170,398.98 | 793,925.36 | 2,376,473.62 | 16.33 | 194,106.06 | 6.12% |
| 4 | 390.10 | Other Structures | 799,112.93 | 172,929.05 | 626,183.88 | 15.00 | 53,274.20 | 6.67% |
| 5 | 390.11 | L/H Improve BOA 11th Floo | 1,357,137.95 | 540,935.53 | 816,202.42 | 15.00 | 90,475.86 | 6.67% |
| 6 | 390.12 | L/H 12th Floor - Exl GC | 3,205,023.73 | 1,245,420.12 | 1,959,603.61 | 15.00 | 213,668.25 | 6.67% |
| 7 | 390.13 | L/H Improve 13 Yr (BOA 9t | 2,149,021.61 | 557,783.37 | 1,591,238.24 | 13.00 | 165,309.35 | 7.69% |
| 8 | 390.14 | L/H Improve 13.2 Yr (BOA | 1,744,071.00 | 244,725.99 | 1,499,345.01 | 13.20 | 132,126.59 | 7.58% |
| 9 | 390.20 | L/H Improve 10 Yr * | 13,802.95 | 13,802.95 | - | 10.00 | | 10.00% |
| 10 | 390.30 | L/H Improve 5 Yr * | 126,824.19 | 126,824.19 | - | 5.00 | | 20.00% |
| 11 | 390.40 | Leaseholds | - | - | - | 0.00 | - | 0.00% |
| 12 | 390.50 | L/H Improve 10 Yr (1301 F | 516,000.00 | 516,000.00 | - | 10.00 | | 10.00% |
| 13 | 390.60 | L/H 717 Texas 14th F | - | - | - | 0.00 | - | 0.00% |
| 14 | 390.70 | L/H Improve 17.2 Yr (BOA | 3,193,142.67 | 1,430,562.00 | 1,762,580.67 | 17.20 | 185,647.83 | 5.81% |
| 15 | 390.80 | L/H Improve 15.9 Yr (BOA | 9,948,188.50 | 3,944,769.68 | 6,003,418.82 | 15.90 | 625,672.23 | 6.29% |
| 16 | 390.90 | L/H Improve BOA 12th Floo | 542,589.43 | 220,194.51 | 322,394.92 | 15.00 | 36,172.63 | 6.67% |
| 17 | 391.00 | Office Furn & Equip | 13,263,989.08 | 6,875,776.91 | 6,388,212.17 | 14.95 | 888,687.27 | 6.70% |
| 18 | 391.10 | Computer Equipment | 37,326,997.39 | 21,827,995.91 | 15,499,001.48 | 5.00 | 7,465,399.48 | 20.00% |
| 19 | 392.00 | Cars & Trucks | 23,094,050.04 | 16,986,768.95 | 6,107,281.09 | 10.54 | 2,193,934.75 | 9.50% |
| 20 | 392.10 | Patrol Plane | 4,699,959.98 | 2,623,055.16 | 2,076,904.82 | 30.75 | 155,098.68 | 3.30% |
| 21 | 394.00 | Tools, Shop & Gar Eq | 23,449,082.62 | 12,416,285.04 | 11,032,797.58 | 14.75 | 1,594,537.62 | 6.80% |
| 22 | 396.00 | Power Operated Equip | 5,535,198.21 | 3,255,238.31 | 2,279,959.90 | 18.72 | 293,365.51 | 5.30% |
| 23 | | | 134,134,591.26 | 73,792,993.03 | 60,341,598.23 | | 14,287,476.31 | 10.65% |
| 24 | | | | | | | | |
| 25 | * | Fully depreciated | | | | | | |
| 26 | | | | | | | | |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 11 - Negative Salvage on Interim Retirements

| line # | | Retirements | Costs of Removal | Salvage | Net Cost of Removal % |
|---|---|---|---|---|---|
| | | Form 2 | BWMQ Depr 1-10 | | |
| | | (A) | (B) | (C ) | (D) |
| 1 | **350.1** | | | | |
| 2 | 2015 | - | | | |
| 3 | 2016 | 367.00 | 14,930.00 | - | |
| 4 | 2017 | - | | | |
| 5 | 2018 | - | | | |
| 6 | 2019 | - | | | |
| 7 | 2020 | - | | | |
| 8 | Total | 367.00 | 14,930.00 | - | 4068.1% |
| 9 | | | | - | |
| 10 | **351** | | | - | |
| 11 | 2015 | 651,380.00 | (21,468.14) | - | |
| 12 | 2016 | 4,131.00 | (1,110.71) | - | |
| 13 | 2017 | - | | | |
| 14 | 2018 | - | (206.19) | - | |
| 15 | 2019 | - | (3,090.87) | - | |
| 16 | 2020 | - | (290.22) | | |
| 17 | Total | 655,511.00 | (4,697.99) | - | -0.7% |
| 18 | | | | | |
| 19 | **352** | | | - | |
| 20 | 2015 | 42,623.00 | | - | |
| 21 | 2016 | 27,509.00 | (53,868.43) | - | |
| 22 | 2017 | - | (63,684.45) | - | |
| 23 | 2018 | - | (95,666.85) | - | |
| 24 | 2019 | - | (69,359.76) | - | |
| 25 | 2020 | - | (1,097,173.62) | | |
| 26 | Total | 70,132.00 | (1,379,753.11) | - | -1967.4% |
| 27 | | | | | |
| 28 | **353** | | | - | |
| 29 | 2015 | 712,259.00 | (16,899.48) | - | |
| 30 | 2016 | 1,298,637.00 | (553,312.46) | - | |
| 31 | 2017 | 195,207.00 | (6,000.00) | - | |
| 32 | 2018 | - | (5,501.25) | - | |
| 33 | 2019 | - | (315,424.71) | - | |
| 34 | 2020 | - | (985.28) | - | |
| 35 | Total | 2,206,103.00 | (881,223.70) | - | -39.9% |
| 36 | | | | | |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 11 - Negative Salvage on Interim Retirements

| **line #** | | **Retirements**<br>Form 2 | **Costs of Removal**<br>BWMQ Depr 1-10 | **Salvage** | **Net Cost of Removal %** |
|---|---|---|---|---|---|
| 1 | **354** | | | - | |
| 2 | 2015 | 3,086,251.00 | (549,377.36) | - | |
| 3 | 2016 | 3,834,144.00 | (55,523.24) | - | |
| 4 | 2017 | 94,149.00 | | - | |
| 5 | 2018 | - | (27,167.16) | - | |
| 6 | 2019 | - | (851,417.70) | - | |
| 7 | 2020 | - | (808,919.08) | | |
| 8 | Total | 7,014,544.00 | (1,743,027.18) | - | -24.8% |
| 9 | | | | | |
| 10 | **355** | | | - | |
| 11 | 2015 | - | | - | |
| 12 | 2016 | - | | - | |
| 13 | 2017 | - | | | |
| 14 | 2018 | - | (2,960.55) | | |
| 15 | 2019 | - | (715.95) | | |
| 16 | 2020 | - | | | |
| 17 | Total | - | (3,676.50) | - | 0.0% |
| 18 | | | | | |
| 19 | **356** | | | - | |
| 20 | 2015 | 495,574.00 | (11,392.93) | - | |
| 21 | 2016 | 5,107.00 | | - | |
| 22 | 2017 | - | | - | |
| 23 | 2018 | - | (569.54) | - | |
| 24 | 2019 | - | (5,544.61) | | |
| 25 | 2020 | - | (2,804.65) | | |
| 26 | Total | 500,681.00 | (8,918.80) | - | -1.8% |
| 27 | | | | | |
| 28 | **Storage** | | | - | |
| 29 | 2015 | 4,988,087.00 | (599,137.91) | - | |
| 30 | 2016 | 5,169,895.00 | (648,884.84) | - | |
| 31 | 2017 | 289,356.00 | (69,684.45) | - | |
| 32 | 2018 | - | (132,071.54) | - | |
| 33 | 2019 | - | (1,245,553.60) | - | |
| 34 | 2020 | - | (1,910,172.85) | - | |
| 35 | Total | 10,447,338.00 | (4,006,367.28) | - | -38.3% |
| 36 | | | | | |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 11 - Negative Salvage on Interim Retirements

| **line #** | | **Retirements**<br>Form 2 | **Costs of Removal**<br>BWMQ Depr 1-10 | **Salvage** | **Net Cost of Removal %** |
|---|---|---|---|---|---|
| 1 | **366** | | | | |
| 2 | 2015 | 1,370,498.00 | (23,015.74) | - | |
| 3 | 2016 | 4,703,325.00 | (1,230,342.69) | - | |
| 4 | 2017 | 288,956.00 | (1,790,932.70) | 380,050.09 | |
| 5 | 2018 | - | (55,261.19) | - | |
| 6 | 2019 | - | (2,193,595.82) | - | |
| 7 | 2020 | - | (139,434.54) | - | |
| 8 | Total | 6,362,779.00 | (5,409,566.94) | 380,050.09 | -91.0% |
| 9 | | | | | |
| 10 | **367** | | | - | |
| 11 | 2015 | 3,558,619.00 | (2,466,678.65) | - | |
| 12 | 2016 | 1,771,524.00 | (1,622,052.54) | - | |
| 13 | 2017 | 1,583,091.00 | (510,955.01) | - | |
| 14 | 2018 | 2,821,636.00 | (217,705.48) | - | |
| 15 | 2019 | 5,809.00 | (2,143,562.77) | - | |
| 16 | 2020 | 76,450.00 | (71,287.35) | - | |
| 17 | Total | 9,817,129.00 | (4,565,563.15) | - | -46.5% |
| 18 | | | | | |
| 19 | **368** | | | | |
| 20 | 2015 | 5,332,597.00 | (1,218,146.02) | - | |
| 21 | 2016 | 45,268,810.00 | (3,903,169.24) | - | |
| 22 | 2017 | 451,788.00 | (7,075,122.57) | 18,000.00 | |
| 23 | 2018 | 18,152,608.00 | (4,535,473.88) | - | |
| 24 | 2019 | - | (8,727,223.11) | - | |
| 25 | 2020 | - | (2,403,089.24) | 62,190.00 | |
| 26 | Total | 69,205,803.00 | (26,644,078.04) | 80,190.00 | -38.6% |
| 27 | | | | | |
| 28 | **369** | | | - | |
| 29 | 2015 | 584,544.00 | (58,119.86) | - | |
| 30 | 2016 | 531,661.00 | (103,442.38) | - | |
| 31 | 2017 | 74,292.00 | | - | |
| 32 | 2018 | - | (2,303.89) | - | |
| 33 | 2019 | 27,781.00 | (122,745.82) | - | |
| 34 | 2020 | 424,969.00 | (82,728.73) | | |
| 35 | Total | 1,643,247.00 | (311,220.82) | - | -18.9% |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 11 - Negative Salvage on Interim Retirements

| line # | | Retirements<br>Form 2 | Costs of Removal<br>BWMQ Depr 1-10 | Salvage | Net Cost of Removal % |
|---|---|---|---|---|---|
| 1 | **370** | | | - | |
| 2 | 2015 | 104,881.00 | (3,525.56) | - | |
| 3 | 2016 | 28,108.00 | 5,886.60 | - | |
| 4 | 2017 | 29,064.00 | (3,700.74) | - | |
| 5 | 2018 | - | (11,170.35) | - | |
| 6 | 2019 | 207,578.00 | (667.00) | - | |
| 7 | 2020 | - | (75,979.09) | - | |
| 8 | Total | 369,631.00 | (85,630.58) | - | -23.2% |
| 9 | | | | | |
| 10 | **Transmission** | | | | |
| 11 | 2015 | 10,951,139.00 | (3,769,485.83) | - | |
| 12 | 2016 | 52,303,428.00 | (6,853,120.25) | - | |
| 13 | 2017 | 2,427,191.00 | (9,380,711.02) | 398,050.09 | |
| 14 | 2018 | 20,974,244.00 | (4,821,914.79) | - | |
| 15 | 2019 | 241,168.00 | (13,187,794.52) | - | |
| 16 | 2020 | 501,419.00 | (2,772,518.95) | 62,190.00 | |
| 17 | Total | 87,398,589.00 | (37,016,059.53) | 460,240.09 | -42.9% |
| 18 | | | | | |
| 19 | | | | | |
| 20 | **Storage** | | | | |
| 21 | Forecast Retirements (Sch. 7) | | 82,418,705.19 | | |
| 22 | Net Cost of removal | | 31,606,099.44 | -38.3% | |
| 23 | Reserve for Neg. Sal.* | | - | | |
| 24 | Net to Recover | | 31,606,099.44 | | |
| 25 | Avg. Rem. Life (Sch. 11) | | 26.37 | | |
| 26 | Annual Accrual | | 1,198,336.71 | | |
| 27 | Gross Plant (SCh 2) | | 529,106,192.74 | | |
| 28 | Neg. Salv. Rate | | **0.23%** | | |
| 29 | | | | | |
| 30 | **Transmission** | | | | |
| 31 | Forecast Retirements (Sch 8) | | $863,776,662 | | |
| 32 | Net Cost of removal | | 370,385,304.53 | -42.9% | |
| 33 | Reserve for Neg. Sal.* | | - | | |
| 34 | Net to Recover | | 370,385,304.53 | | |
| 35 | Avg. Rem. Life (Sch. 11) | | 23.66 | | |
| 36 | Annual Accrual | | 15,656,299.66 | | |
| 37 | Gross Plant (Sch 2) | | 4,432,949,648.59 | | |
| 38 | Neg. Salv. Rate | | **0.35%** | | |
| 39 | | | | | |
| 40 | * Reserve for negative salvage is deemed attributed to the terminal decommissioning | | | | |
| 41 | process. | | | | |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 12 - Terminal Decommissioning Recovery Rates

| | **Cost Assignments by FERC Accounts** | Direct Costs<br>(A) | CM Costs<br>(B) | Contingency<br>(C ) | Salvage<br>(D) | Total<br>(E ) |
|---|---|---|---|---|---|---|
| 1 | **325 - 337** | | | | | |
| 2 | Composite Plant | 1,650,470.96 | $ 41,261.77 | 169,173.27 | (5,456.00) | 1,855,450.01 |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | **Underground Storage Plant** | 5,410,926.00 | 2.50% | 10.00% | | |
| 6 | 350.11 Land | | | | | |
| 7 | 350.12 Land (Leased) | | | | | |
| 8 | 350.2 Rights of Way | 32,864.93 | 821.62 | 3,368.66 | | 37,055.21 |
| 9 | | | | | | |
| 10 | | | | | | |
| 11 | 351 Structures & Improvemen | 24,003,403.43 | 600,085.09 | 2,460,348.85 | | 27,063,837.37 |
| 12 | | | | | | |
| 13 | 352 Wells | 69,719,107.29 | 1,742,977.68 | 7,146,208.50 | (3,602,776.00) | 75,005,517.47 |
| 14 | 352.1 Storage Leaseholds | | - | - | | - |
| 15 | 352.2 Reservoirs | | - | - | | - |
| 16 | 353 Lines | 7,211,329.12 | 180,283.23 | 739,161.23 | | 8,130,773.58 |
| 17 | 354 Compressor Equipment | 1,941,272.00 | 48,531.80 | 198,980.38 | | 2,188,784.18 |
| 18 | 355 Meas & Reg Stn Equip | 709,019.94 | 17,725.50 | 72,674.54 | | 799,419.98 |
| 19 | 356 Purification Equip | | - | - | | - |
| 20 | 357 Other Equipment | | - | - | | - |
| 21 | Total | 103,616,996.71 | 2,590,424.92 | 10,620,742.16 | (3,602,776.00) | 113,225,387.79 |
| 22 | Reserve for Negative Salvage | | | | | 4,747,474.65 |
| 23 | Net to Recovetr | | | | | 108,477,913.14 |
| 24 | | | | | | |
| 25 | **Transmission Plant** | 410,968,796.00 | | | | |
| 26 | 365.1 Land Rights | | | | | |
| 27 | 365.11 Land Transmission | | | - | | - |
| 28 | 365.2 Land ROW | 2,769,376.49 | 69,234.41 | 283,861.09 | | 3,122,471.99 |
| 29 | 366 Structures & Improvemen | 450,171,468.54 | 11,254,286.71 | 46,142,575.53 | | 507,568,330.78 |
| 30 | 367 Mains | 656,375,906.84 | 16,409,397.67 | 67,278,530.45 | (15,803,068.00) | 724,260,766.96 |
| 31 | 368 Compressor Stn Equip | 31,791,882.81 | 794,797.07 | 3,258,667.99 | | 35,845,347.87 |
| 32 | 368.2 Gas Turbine Engines | | - | - | | - |
| 33 | 369 Measure & Reg Equip | 18,227,169.25 | 455,679.23 | 1,868,284.85 | | 20,551,133.33 |
| 34 | 370 Communication Equip | 6,030,988.69 | 150,774.72 | 618,176.34 | | 6,799,939.75 |
| 35 | 371 Other Tran Plant Equ | | - | - | | - |
| 36 | Total | 1,165,366,792.62 | 29,134,169.82 | 119,450,096.24 | (15,803,068.00) | 1,298,147,990.68 |
| 37 | Reserve for Negative Salvage | | | | | 17,361,780.57 |
| 38 | Net to Recover | | | | | 1,280,786,210.11 |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 12 - Terminal Decommissioning Recovery Rates

| | | Plant in Service | Interim Retirements | Plant Subject to Terminal Decomm. | Net TDS Cost to Recover | Allowed TDC | Avg Rem Lives | TDC Recovery & Rate |
|---|---|---|---|---|---|---|---|---|
| | | (A) | (B) | (C ) | (D) | (E ) | (F) | (G) |
| | **PARTIAL RECOVERY MODEL** | | 2022 - 2050 | 2050 | | | | |
| 1 | **Gathering Plant** | | | | | | | |
| 2 | 325 - 337 Composite P&G Plant | $ 7,588,858.55 | $ 4,627,544.21 | 2,961,314.34 | $ 1,855,449.00 | $ 724,030.85 | 20.49 | 35,336.34 |
| 3 | | | | 39.0% | | | | **0.50%** |
| 4 | | | | | | | | |
| 5 | **Underground Storage Plant** | | | | | | | |
| 6 | 350.11 Land | 3,097,645.83 | | 3,097,645.83 | - | | | |
| 7 | 350.12 Land (Leased) | 2,806,038.42 | 214,998.79 | 2,591,039.63 | - | | 27.27 | - |
| 8 | 350.2 Rights of Way | 1,654,377.40 | 956,759.98 | 697,617.42 | 35,501.51 | 30,826.38 | 19.79 | 1,557.30 |
| 9 | 351.1 Well Structures | 1,338,754.18 | | 1,338,754.18 | - | | 27.04 | - |
| 10 | 351.2 Comp Stn Structures | 25,671,585.26 | | 25,671,585.26 | - | | 27.04 | - |
| 11 | 351.3 Meas & Reg Structure | 1,147,974.58 | 4,828,662.64 | (3,680,688.06) | 25,929,066.41 | 22,514,520.00 | 27.04 | 832,695.20 |
| 12 | 351.4 Other Structures | 3,383,385.75 | | 3,383,385.75 | - | | 27.04 | |
| 13 | 352 Wells | 104,014,643.92 | 2,982,667.95 | 101,031,975.97 | 71,860,579.75 | 62,397,405.08 | 27.69 | 2,253,408.98 |
| 14 | 352.1 Storage Leaseholds | 16,843,965.59 | 10,782,932.15 | 6,061,033.44 | - | | 18.61 | |
| 15 | 352.2 Reservoirs | 6,967,139.58 | | 6,967,139.58 | - | | | |
| 16 | 353 Lines | 131,079,146.56 | 18,726,320.52 | 112,352,826.04 | 8,130,773.58 | 7,060,048.43 | 26.21 | 269,388.61 |
| 17 | 354 Compressor Equipment | 283,999,153.78 | 35,287,705.02 | 248,711,448.76 | 2,188,784.18 | 1,900,547.61 | 26.44 | 71,876.51 |
| 18 | 355 Meas & Reg Stn Equip | 17,867,058.12 | 6,559,515.64 | 11,307,542.48 | 799,419.98 | 694,145.98 | 22.58 | 30,735.28 |
| 19 | 356 Purification Equip | 24,464,108.88 | 1,354,935.02 | 23,109,173.86 | - | | 27.45 | - |
| 20 | 357 Other Equipment | 1,528,555.88 | 724,207.49 | 804,348.39 | - | | 13.06 | - |
| 21 | | 625,863,533.73 | 82,418,705.19 | 543,444,828.54 | 108,477,913.14 | 94,597,493.48 | | 3,459,661.87 |
| 22 | Reserve for Negative Salvage | | | 86.8% | | | | **0.56%** |
| 23 | | | | | | | | |
| 24 | | | | | | | | |
| 25 | **Transmission Plant** | | | | | | | |
| 26 | 365.1 Land Easements | 520,036.44 | | 520,036.44 | - | | | |
| 27 | 365.11 Land in Fee | 15,164,646.93 | 7,233.68 | 15,157,413.25 | - | | | |
| 28 | 365.2 Land ROW | 51,337,596.12 | 6,630,349.04 | 44,707,247.08 | 3,080,711.21 | 2,421,556.65 | 26.78 | 90,431.53 |
| 29 | 366 Structures & Improvements | 238,472,172.78 | 47,011,560.19 | 191,460,612.59 | 500,779,975.33 | 393,632,183.41 | 26.09 | 15,087,107.06 |
| 30 | 367 Mains | 2,077,195,052.02 | 115,839,514.27 | 1,961,355,537.75 | 714,574,308.56 | 561,682,693.29 | 27.49 | 20,434,154.05 |
| 31 | 368 Compressor Stn Equip | 1,655,572,538.96 | 586,433,386.42 | 1,069,139,152.54 | 35,365,942.54 | 27,798,981.32 | 24.57 | 1,131,216.25 |
| 32 | 368.2 Gas Turbine Engines | 101,820,228.09 | 101,820,228.09 | - | - | - | 5.51 | - |
| 33 | 369 Measure & Reg Equip | 290,513,908.92 | 33,172,683.67 | 257,341,225.25 | 20,276,276.94 | 15,937,927.95 | 27.02 | 589,762.82 |
| 34 | 370 Communication Equip | 79,470,603.34 | 74,359,914.44 | 5,110,688.90 | 6,708,995.52 | 5,273,526.67 | 22.30 | 236,444.83 |
| 35 | 371 Other Tran Plant Equ | 2,873,504.77 | 322,020.60 | 2,551,484.17 | - | - | 26.87 | - |
| 36 | Subtotal | 4,512,940,288.37 | 965,596,890.42 | 3,547,343,397.95 | 1,280,786,210.11 | 1,006,746,869.29 | | 37,569,116.54 |
| 37 | Reserve for Negative Salvage | - | | 78.6% | | | | **0.84%** |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 12 - Terminal Decommissioning Recovery Rates

| | | TDS Cost Estimate | Net TDS Cost to Recover | Avg Rem Lives | TDC Recovery & Rate |
|---|---|---|---|---|---|
| | | (A) | (D) | (F) | (G) |
| | **FULL RECOVERY MODEL** | | | | |
| 1 | **Gathering Plant** | | | | |
| 2 | 325 - 337 Composite P&G Plant | | 1,855,450.01 | 20.49 | $ 90,555.28 |
| 3 | | | | | **1.19%** |
| 4 | | | | | |
| 5 | **Underground Storage Plant** | | | | |
| 6 | 350.11 Land | | | | |
| 7 | 350.12 Land (Leased) | | | 27.27 | |
| 8 | 350.2 Rights of Way | 37,055.21 | 35,501.51 | 19.79 | 1,793.48 |
| 9 | 351.1 Well Structures | | | 27.04 | |
| 10 | 351.2 Comp Stn Structures | | | 27.04 | |
| 11 | 351.3 Meas & Reg Structure | 27,063,837.37 | 25,929,066.41 | 27.04 | 958,981.55 |
| 12 | 351.4 Other Structures | - | | 27.04 | |
| 13 | 352 Wells | 75,005,517.47 | 71,860,579.75 | 18.61 | 3,862,423.52 |
| 14 | 352.1 Storage Leaseholds | - | | | |
| 15 | 352.2 Reservoirs | - | | | |
| 16 | 353 Lines | 8,130,773.58 | 7,789,854.98 | 26.21 | 297,235.67 |
| 17 | 354 Compressor Equipment | 2,188,784.18 | 2,097,009.73 | 26.44 | 79,306.48 |
| 18 | 355 Meas & Reg Stn Equip | 799,419.98 | 765,900.77 | 22.58 | 33,912.43 |
| 19 | 356 Purification Equip | | | 27.45 | |
| 20 | 357 Other Equipment | | - | 13.06 | |
| 21 | | 113,225,387.79 | 108,477,913.14 | | 5,233,653.11 |
| 22 | Reserve for Negative Salvage | | | | **0.85%** |
| 23 | Net to Recover | | | | |
| 24 | | | | | |
| 25 | **Transmission Plant** | | | | |
| 26 | 365.1 Land Easements | | - | | |
| 27 | 365.11 Land in Fee | | - | | |
| 28 | 365.2 Land ROW | 3,122,471.99 | 3,088,139.20 | 26.78 | 115,324.64 |
| 29 | 366 Structures & Improvements | 507,568,330.78 | 501,987,419.84 | 26.09 | 19,240,139.06 |
| 30 | 367 Mains | 724,260,766.96 | 716,297,238.52 | 27.49 | 26,059,069.10 |
| 31 | 368 Compressor Stn Equip | 35,845,347.87 | 35,451,214.35 | 24.57 | 1,442,606.45 |
| 32 | 368.2 Gas Turbine Engines | - | - | 5.51 | - |
| 33 | 369 Measure & Reg Equip | 20,551,133.33 | 20,325,165.64 | 27.02 | 752,106.99 |
| 34 | 370 Communication Equip | 6,799,939.75 | 6,725,171.77 | 26.87 | 250,304.29 |
| 35 | 371 Other Tran Plant Equ | - | - | | |
| 36 | Subtotal | 1,295,025,518.69 | 1,280,786,210.11 | | 47,859,550.52 |
| 37 | Reserve for Negative Salvage | | | | **1.06%** |

# ANR Pipeline Company
## Depreciation Workpapers
## Schedule No. 13 - Iowa Curves Table Sampling

| Age | L0 | L1 | L2 | L3 | L4 | L5 | R1 | R2 | R3 | R4 | R5 | S0 | S1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0% | 99.99247% | 99.99453% | 100.00000% | 99.99628% | 100.00000% | 100.00000% | 99.97817% | 99.99068% | 99.99852% | 99.99992% | 100.00000% | 100.00000% | 100.00000% |
| 0.1% | 99.98350% | 99.98899% | 100.00000% | 99.99279% | 100.00000% | 100.00000% | 99.95627% | 99.98132% | 99.99702% | 99.99985% | 100.00000% | 99.99934% | 100.00000% |
| 0.2% | 99.97334% | 99.98339% | 100.00000% | 99.98953% | 100.00000% | 100.00000% | 99.93429% | 99.97194% | 99.99551% | 99.99977% | 100.00000% | 99.99822% | 100.00000% |
| 0.3% | 99.96216% | 99.97773% | 99.99999% | 99.98649% | 100.00000% | 100.00000% | 99.91223% | 99.96252% | 99.99399% | 99.99969% | 100.00000% | 99.99672% | 99.99999% |
| 0.4% | 99.95005% | 99.97200% | 99.99999% | 99.98365% | 100.00000% | 100.00000% | 99.89010% | 99.95307% | 99.99245% | 99.99960% | 100.00000% | 99.99485% | 99.99997% |
| 0.5% | 99.93711% | 99.96620% | 99.99998% | 99.98099% | 100.00000% | 100.00000% | 99.86790% | 99.94358% | 99.99091% | 99.99952% | 100.00000% | 99.99264% | 99.99995% |
| 0.6% | 99.92339% | 99.96034% | 99.99997% | 99.97851% | 100.00000% | 100.00000% | 99.84561% | 99.93407% | 99.98935% | 99.99944% | 100.00000% | 99.99011% | 99.99993% |
| 0.7% | 99.90895% | 99.95442% | 99.99995% | 99.97620% | 100.00000% | 100.00000% | 99.82326% | 99.92452% | 99.98777% | 99.99935% | 100.00000% | 99.98727% | 99.99989% |
| 0.8% | 99.89384% | 99.94842% | 99.99993% | 99.97404% | 100.00000% | 100.00000% | 99.80083% | 99.91494% | 99.98618% | 99.99927% | 100.00000% | 99.98413% | 99.99984% |
| 0.9% | 99.87809% | 99.94236% | 99.99990% | 99.97202% | 100.00000% | 100.00000% | 99.77832% | 99.90533% | 99.98458% | 99.99918% | 100.00000% | 99.98070% | 99.99978% |
| 1.0% | 99.86174% | 99.93623% | 99.99986% | 99.97014% | 100.00000% | 100.00000% | 99.75575% | 99.89568% | 99.98297% | 99.99909% | 100.00000% | 99.97700% | 99.99971% |
| 1.1% | 99.84480% | 99.93003% | 99.99982% | 99.96839% | 100.00000% | 100.00000% | 99.73309% | 99.88600% | 99.98134% | 99.99900% | 100.00000% | 99.97302% | 99.99963% |
| 1.2% | 99.82732% | 99.92376% | 99.99977% | 99.96676% | 100.00000% | 100.00000% | 99.71037% | 99.87629% | 99.97970% | 99.99891% | 100.00000% | 99.96878% | 99.99953% |
| 1.3% | 99.80930% | 99.91743% | 99.99971% | 99.96524% | 100.00000% | 100.00000% | 99.68757% | 99.86655% | 99.97804% | 99.99881% | 100.00000% | 99.96428% | 99.99942% |
| 1.4% | 99.79077% | 99.91102% | 99.99964% | 99.96383% | 100.00000% | 100.00000% | 99.66470% | 99.85677% | 99.97637% | 99.99872% | 100.00000% | 99.95952% | 99.99929% |
| 1.5% | 99.77176% | 99.90454% | 99.99956% | 99.96251% | 100.00000% | 100.00000% | 99.64176% | 99.84696% | 99.97469% | 99.99862% | 100.00000% | 99.95451% | 99.99914% |
| 1.6% | 99.75226% | 99.89800% | 99.99947% | 99.96129% | 100.00000% | 100.00000% | 99.61874% | 99.83712% | 99.97299% | 99.99852% | 100.00000% | 99.94926% | 99.99898% |
| 1.7% | 99.73231% | 99.89138% | 99.99936% | 99.96015% | 100.00000% | 100.00000% | 99.59565% | 99.82724% | 99.97128% | 99.99842% | 100.00000% | 99.94376% | 99.99879% |
| 1.8% | 99.71191% | 99.88469% | 99.99925% | 99.95909% | 100.00000% | 100.00000% | 99.57249% | 99.81733% | 99.96955% | 99.99832% | 100.00000% | 99.93803% | 99.99859% |
| 1.9% | 99.69108% | 99.87792% | 99.99912% | 99.95811% | 100.00000% | 100.00000% | 99.54926% | 99.80739% | 99.96781% | 99.99822% | 100.00000% | 99.93206% | 99.99836% |
| 2.0% | 99.66983% | 99.87109% | 99.99898% | 99.95720% | 100.00000% | 100.00000% | 99.52596% | 99.79741% | 99.96605% | 99.99812% | 100.00000% | 99.92586% | 99.99811% |
| 2.1% | 99.64816% | 99.86418% | 99.99882% | 99.95635% | 100.00000% | 100.00000% | 99.50259% | 99.78740% | 99.96428% | 99.99801% | 100.00000% | 99.91943% | 99.99784% |
| 2.2% | 99.62610% | 99.85720% | 99.99865% | 99.95556% | 100.00000% | 100.00000% | 99.47915% | 99.77735% | 99.96250% | 99.99791% | 100.00000% | 99.91278% | 99.99755% |
| 2.3% | 99.60365% | 99.85014% | 99.99846% | 99.95483% | 100.00000% | 100.00000% | 99.45563% | 99.76728% | 99.96070% | 99.99780% | 100.00000% | 99.90590% | 99.99723% |
| 2.4% | 99.58082% | 99.84301% | 99.99826% | 99.95415% | 100.00000% | 100.00000% | 99.43205% | 99.75716% | 99.95888% | 99.99769% | 100.00000% | 99.89880% | 99.99688% |
| 2.5% | 99.55761% | 99.83580% | 99.99804% | 99.95353% | 100.00000% | 100.00000% | 99.40840% | 99.74702% | 99.95705% | 99.99758% | 100.00000% | 99.89149% | 99.99651% |
| 2.6% | 99.53404% | 99.82852% | 99.99780% | 99.95294% | 100.00000% | 100.00000% | 99.38467% | 99.73684% | 99.95521% | 99.99746% | 100.00000% | 99.88396% | 99.99612% |
| 2.7% | 99.51012% | 99.82116% | 99.99755% | 99.95241% | 100.00000% | 100.00000% | 99.36088% | 99.72662% | 99.95335% | 99.99735% | 100.00000% | 99.87622% | 99.99569% |
| 2.8% | 99.48585% | 99.81372% | 99.99727% | 99.95191% | 100.00000% | 100.00000% | 99.33702% | 99.71637% | 99.95148% | 99.99723% | 100.00000% | 99.86827% | 99.99523% |
| 2.9% | 99.46123% | 99.80621% | 99.99698% | 99.95145% | 100.00000% | 100.00000% | 99.31309% | 99.70609% | 99.94958% | 99.99711% | 100.00000% | 99.86011% | 99.99475% |
| 3.0% | 99.43628% | 99.79862% | 99.99666% | 99.95102% | 100.00000% | 100.00000% | 99.28909% | 99.69577% | 99.94768% | 99.99699% | 100.00000% | 99.85174% | 99.99423% |
| 3.1% | 99.41100% | 99.79095% | 99.99633% | 99.95063% | 100.00000% | 100.00000% | 99.26503% | 99.68542% | 99.94576% | 99.99687% | 100.00000% | 99.84317% | 99.99369% |
| 3.2% | 99.38540% | 99.78320% | 99.99597% | 99.95026% | 100.00000% | 100.00000% | 99.24089% | 99.67504% | 99.94382% | 99.99675% | 100.00000% | 99.83440% | 99.99311% |
| 3.3% | 99.35949% | 99.77537% | 99.99559% | 99.94992% | 100.00000% | 100.00000% | 99.21669% | 99.66461% | 99.94187% | 99.99662% | 100.00000% | 99.82542% | 99.99250% |
| 3.4% | 99.33326% | 99.76747% | 99.99519% | 99.94961% | 100.00000% | 100.00000% | 99.19242% | 99.65416% | 99.93990% | 99.99650% | 100.00000% | 99.81625% | 99.99185% |
| 3.5% | 99.30672% | 99.75948% | 99.99476% | 99.94933% | 100.00000% | 100.00000% | 99.16808% | 99.64367% | 99.93791% | 99.99637% | 100.00000% | 99.80687% | 99.99117% |
| 3.6% | 99.27988% | 99.75141% | 99.99431% | 99.94906% | 100.00000% | 100.00000% | 99.14368% | 99.63314% | 99.93591% | 99.99624% | 100.00000% | 99.79731% | 99.99046% |
| 3.7% | 99.25275% | 99.74326% | 99.99384% | 99.94882% | 100.00000% | 100.00000% | 99.11921% | 99.62258% | 99.93389% | 99.99610% | 100.00000% | 99.78754% | 99.98971% |
| 3.8% | 99.22533% | 99.73503% | 99.99333% | 99.94860% | 100.00000% | 100.00000% | 99.09467% | 99.61198% | 99.93186% | 99.99597% | 100.00000% | 99.77759% | 99.98892% |
| 3.9% | 99.19761% | 99.72672% | 99.99281% | 99.94839% | 100.00000% | 100.00000% | 99.07007% | 99.60135% | 99.92981% | 99.99583% | 100.00000% | 99.76744% | 99.98809% |
| 4.0% | 99.16962% | 99.71832% | 99.99226% | 99.94820% | 100.00000% | 100.00000% | 99.04540% | 99.59068% | 99.92774% | 99.99570% | 100.00000% | 99.75710% | 99.98723% |
| 4.1% | 99.14135% | 99.70984% | 99.99167% | 99.94802% | 100.00000% | 100.00000% | 99.02067% | 99.57998% | 99.92566% | 99.99556% | 100.00000% | 99.74657% | 99.98632% |
| 4.2% | 99.11280% | 99.70128% | 99.99107% | 99.94786% | 100.00000% | 100.00000% | 98.99587% | 99.56924% | 99.92356% | 99.99541% | 100.00000% | 99.73586% | 99.98538% |
| 4.3% | 99.08398% | 99.69263% | 99.99043% | 99.94771% | 100.00000% | 100.00000% | 98.97100% | 99.55847% | 99.92144% | 99.99527% | 100.00000% | 99.72496% | 99.98440% |
| 4.4% | 99.05489% | 99.68390% | 99.98976% | 99.94758% | 100.00000% | 100.00000% | 98.94607% | 99.54766% | 99.91931% | 99.99512% | 100.00000% | 99.71387% | 99.98337% |
| 4.5% | 99.02555% | 99.67508% | 99.98907% | 99.94745% | 100.00000% | 100.00000% | 98.92108% | 99.53682% | 99.91716% | 99.99497% | 100.00000% | 99.70260% | 99.98231% |
| 4.6% | 98.99594% | 99.66618% | 99.98834% | 99.94734% | 100.00000% | 100.00000% | 98.89602% | 99.52594% | 99.91499% | 99.99482% | 100.00000% | 99.69115% | 99.98120% |
| 4.7% | 98.96607% | 99.65719% | 99.98759% | 99.94724% | 100.00000% | 100.00000% | 98.87089% | 99.51502% | 99.91280% | 99.99467% | 100.00000% | 99.67952% | 99.98005% |
| 4.8% | 98.93596% | 99.64811% | 99.98680% | 99.94714% | 100.00000% | 100.00000% | 98.84570% | 99.50407% | 99.91060% | 99.99451% | 100.00000% | 99.66770% | 99.97885% |
| 4.9% | 98.90559% | 99.63895% | 99.98598% | 99.94705% | 100.00000% | 100.00000% | 98.82045% | 99.49308% | 99.90838% | 99.99436% | 100.00000% | 99.65571% | 99.97761% |
| 5.0% | 98.87498% | 99.62970% | 99.98513% | 99.94697% | 100.00000% | 100.00000% | 98.79514% | 99.48205% | 99.90614% | 99.99420% | 100.00000% | 99.64354% | 99.97632% |
| 5.1% | 98.84412% | 99.62036% | 99.98424% | 99.94690% | 100.00000% | 100.00000% | 98.76976% | 99.47099% | 99.90389% | 99.99404% | 100.00000% | 99.63119% | 99.97499% |
| 5.2% | 98.81302% | 99.61093% | 99.98332% | 99.94683% | 100.00000% | 100.00000% | 98.74432% | 99.45989% | 99.90161% | 99.99387% | 100.00000% | 99.61867% | 99.97361% |
| 5.3% | 98.78168% | 99.60142% | 99.98237% | 99.94677% | 100.00000% | 100.00000% | 98.71881% | 99.44876% | 99.89932% | 99.99371% | 100.00000% | 99.60597% | 99.97218% |

**United States of America**
**before the**
**Federal Energy Regulatory Commission**

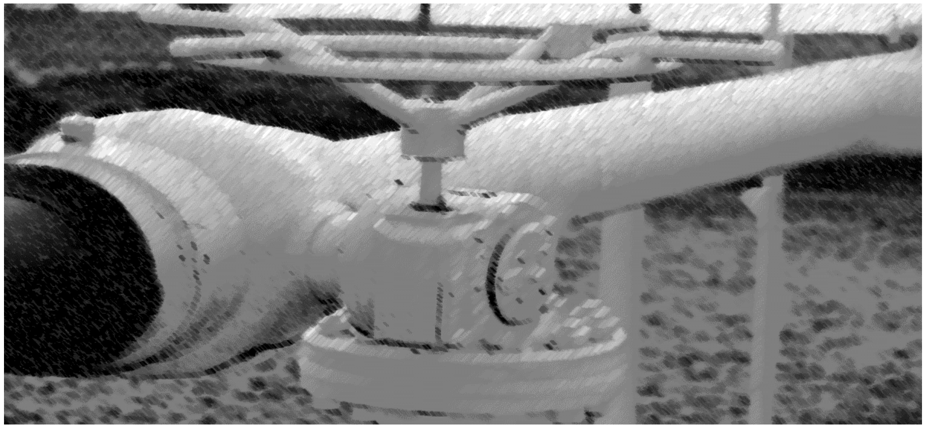
| | | |
|---|---|---|
| | § | |
| ANR Pipeline Company | § | Docket No. RP 22-____-000 |
| | § | |

# Production & Gathering Facilities Survivor Curve Study

## Supporting the Prepared Direct Testimony of

## Patrick R. Crowley

## on behalf of ANR Pipeline Company



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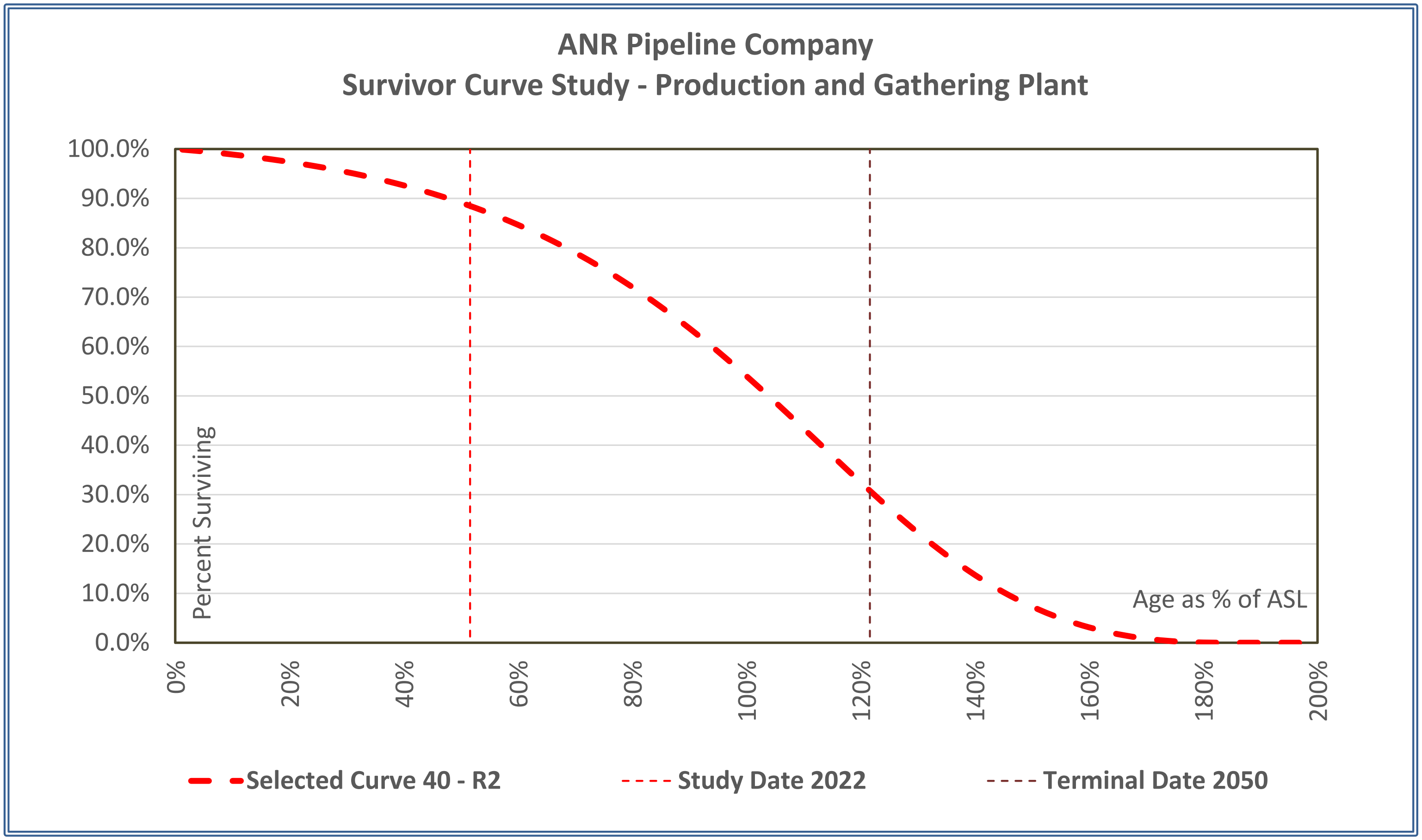
# ANR Pipeline Company

## Survivor Curve Study - Production and Gathering Plant

### Salient Statistical Results

| Economic Life | Ave Age at Study Date: | Average Service Life | Age as % of ASL | Iowa Curve | Conformance Index | Retirement Index | Average Remaining Life |
|---|---|---|---|---|---|---|---|
| **2050** | 20.65 | 40 | 51.6% | R2 | 869 | #DIV/0! | **20.49** |



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## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1998 | 23,848,179 | 347,941 | 231,550 | - | - | 23,964,570 |
| 1999 | 23,964,570 | 132,421 | - | - | (52,555) | 24,044,436 |
| 2000 | 24,044,436 | 221,263 | 92,519 | - | - | 24,173,180 |
| 2001 | 24,173,180 | 927,520 | - | - | - | 25,100,700 |
| 2002 | 25,100,700 | 35,288 | 113,005 | - | - | 25,022,983 |
| 2003 | 25,022,983 | 983,849 | 75,707 | - | - | 25,931,125 |
| 2004 | 25,931,125 | 819,171 | 1,119,174 | - | - | 25,631,122 |
| 2005 | 25,631,122 | 322,917 | 531,647 | - | - | 25,422,392 |
| 2006 | 25,422,392 | 195,817 | 630,890 | - | - | 24,987,319 |
| 2007 | 24,987,319 | 103,158 | 601,939 | - | - | 24,488,538 |
| 2008 | 24,488,538 | 6,520 | 218,924 | - | (38,941) | 24,237,193 |
| 2009 | 24,237,193 | 31,913 | 267,596 | - | - | 24,001,510 |
| 2010 | 24,001,510 | 86,622 | 230,611 | - | - | 23,857,521 |
| 2011 | 23,857,521 | 31,774 | 303,675 | - | 886 | 23,586,506 |
| 2012 | 23,586,506 | 30,840 | 8,159,868 | - | 62,439 | 15,519,917 |
| 2013 | 15,519,917 | 44,808 | 922,143 | - | (8,568,402) | 6,074,180 |
| 2014 | 6,074,180 | - | 493,404 | - | - | 5,580,776 |
| 2015 | 5,580,776 | - | 81,131 | - | - | 5,499,645 |
| 2016 | 5,499,645 | - |  | - | - | 3,818,224 |
| 2017 | 3,818,224 | - |  | - | - | 3,818,224 |
| 2018 | 3,818,224 | - | - | - | - | 3,818,224 |
| 2019 | 3,818,224 | 382,059 | - | - | - | 4,200,283 |
| 2020 | 4,200,283 | - | - | - | - | 4,200,283 |
| 2021 | 4,200,283 | 181,340 | - | - | - | 4,381,623 |
|  |  | 563,399 | - | Σ of last 5 years: | ` |  |
|  |  | 112,680 | - | Ave last 5 yrs |  |  |

# Goodness of Fit Test Statistics

**Best 5-Year Retirement Predictors**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| 1 | 5 - L0 | 28.00 | - | #DIV/0! | 1.90 |
| 2 | 5 - L0 | 28.00 | - | #DIV/0! | 1.90 |
| 3 | 5 - L0 | 28.00 | - | #DIV/0! | 1.90 |
| 4 | 5 - L0 | 28.00 | - | #DIV/0! | 1.90 |
| 5 | 5 - L0 | 28.00 | - | #DIV/0! | 1.90 |
| 6 | 5 - L0 | 28.00 | - | #DIV/0! | 1.90 |
| 7 | 5 - L0 | 28.00 | - | #DIV/0! | 1.90 |
| 8 | 5 - L0 | 28.00 | - | #DIV/0! | 1.90 |
| 9 | 5 - L0 | 28.00 | - | #DIV/0! | 1.90 |
| 10 | 5 - L0 | 28.00 | - | #DIV/0! | 1.90 |

**Best Conformance Indices**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| L Curves 1 | 50 - L1 | 3.74 | 425,092 | #DIV/0! | 584.93 |
| L Curves 2 | 80 - L0 | 15.22 | 227,026 | #DIV/0! | 250.47 |
| L Curves 3 | 25 - L5 | -57.33 | 3,037,634 | #DIV/0! | 129.33 |
| S Curves 1 | 40 - S1 | -4.82 | 505,436 | #DIV/0! | 352.04 |
| S Curves 2 | 25 - S4 | -52.44 | 2,515,745 | #DIV/0! | 297.21 |
| S Curves 3 | 55 - S0 | 10.13 | 296,737 | #DIV/0! | 230.50 |
| R Curves 1 | 40 - R2 | -1.84 | 382,468 | #DIV/0! | 869.15 |
| R Curves 2 | 60 - R1 | 15.16 | 208,663 | #DIV/0! | 400.78 |
| R Curves 3 | 30 - R3 | -32.67 | 851,411 | #DIV/0! | 232.67 |
| | | | | | |

## Selected Curve Forecasted Survivorship & Interim Retirements

Selected Curve

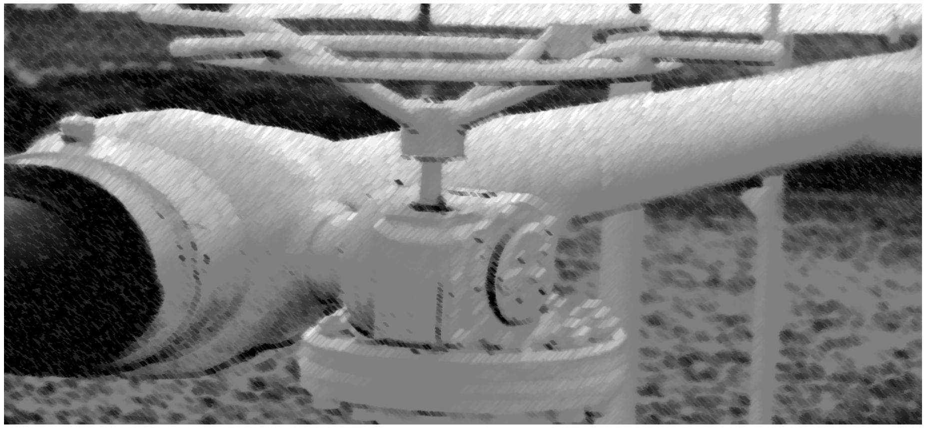
| 40 - R2 | Year | Age | Age as % of ASL | Percent Surviving | Surviving Plant | Interim Retirements | |
|---|---|---|---|---|---|---|---|
| Original Installations | | | | | 8,019,477 | | |
| Surviving Balance | 2022 | 20.6 | 51.62% | 88.4546% | 7,588,858 | | |
| 1st Forecast Year | 2023 | 21.6 | 54.12% | 87.3914% | 7,503,595 | 85,263 | |
| 2 | 2024 | 22.6 | 56.62% | 86.2626% | 7,413,070 | 90,526 | |
| 3 | 2025 | 23.6 | 59.12% | 85.0653% | 7,317,051 | 96,019 | |
| 4 | 2026 | 24.6 | 61.62% | 83.7966% | 7,215,309 | 101,742 | |
| 5 | 2027 | 25.6 | 64.12% | 82.4537% | 7,107,618 | 107,691 | |
| 6 | 2028 | 26.6 | 66.62% | 81.0339% | 6,993,758 | 113,860 | |
| 7 | 2029 | 27.6 | 69.12% | 79.5346% | 6,873,520 | 120,239 | |
| 8 | 2030 | 28.6 | 71.62% | 77.9533% | 6,746,707 | 126,812 | |
| 9 | 2031 | 29.6 | 74.12% | 76.2878% | 6,613,147 | 133,561 | |
| 10 | 2032 | 30.6 | 76.62% | 74.5364% | 6,472,690 | 140,457 | |
| 11 | 2033 | 31.6 | 79.12% | 72.6975% | 6,325,222 | 147,468 | |
| 12 | 2034 | 32.6 | 81.62% | 70.7703% | 6,170,669 | 154,553 | |
| 13 | 2035 | 33.6 | 84.12% | 68.7544% | 6,009,007 | 161,662 | |
| 14 | 2036 | 34.6 | 86.62% | 66.6504% | 5,840,271 | 168,737 | |
| 15 | 2037 | 35.6 | 89.12% | 64.4593% | 5,664,561 | 175,710 | |
| 16 | 2038 | 36.6 | 91.62% | 62.1836% | 5,482,057 | 182,504 | |
| 17 | 2039 | 37.6 | 94.12% | 59.8264% | 5,293,024 | 189,033 | |
| 18 | 2040 | 38.6 | 96.62% | 57.3923% | 5,097,820 | 195,203 | |
| 19 | 2041 | 39.6 | 99.12% | 54.8870% | 4,896,908 | 200,912 | |
| 20 | 2042 | 40.6 | 101.62% | 52.3176% | 4,690,857 | 206,051 | |
| 21 | 2043 | 41.6 | 104.12% | 49.6926% | 4,480,347 | 210,510 | |
| 22 | 2044 | 42.6 | 106.62% | 47.0219% | 4,266,172 | 214,175 | |
| 23 | 2045 | 43.6 | 109.12% | 44.3168% | 4,049,235 | 216,937 | |
| 24 | 2046 | 44.6 | 111.62% | 41.5898% | 3,830,544 | 218,691 | |
| 25 | 2047 | 45.6 | 114.12% | 38.8546% | 3,611,200 | 219,345 | |
| 26 | 2048 | 46.6 | 116.62% | 36.1261% | 3,392,381 | 218,818 | |
| 27 | 2049 | 47.6 | 119.12% | 33.4195% | 3,175,328 | 217,053 | |
| 28 | 2050 | 48.6 | 121.62% | 30.7508% | 2,961,314 | 214,014 | |
| | | | | | 155,493,383 | **4,627,544** | Total Interm Retires |
| | | | | **Average Remaining Life** | **20.5** | **96,248** | 5 Yr Ave Ann Retires |

**United States of America**
**before the**
**Federal Energy Regulatory Commission**

§
ANR Pipeline Company § Docket No. RP 22-____-000
§

# Storage Survivor Curve Study

## Supporting the Prepared Direct Testimony of
## Patrick R. Crowley
## on behalf of ANR Pipeline Company



BROWN, WILLIAMS, MOORHEAD & QUINN, INC.
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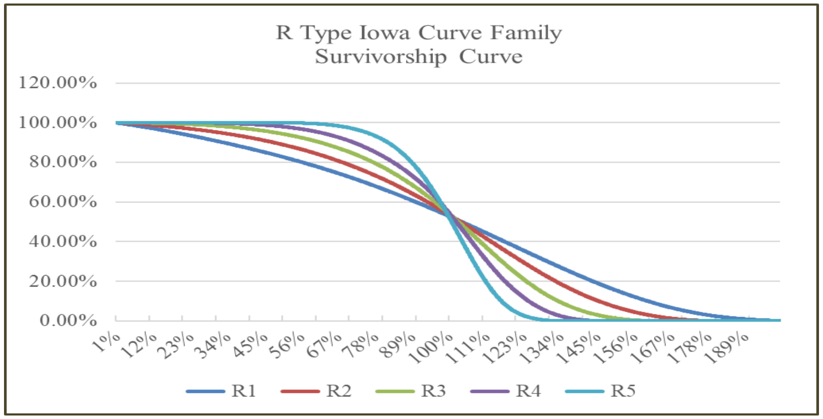
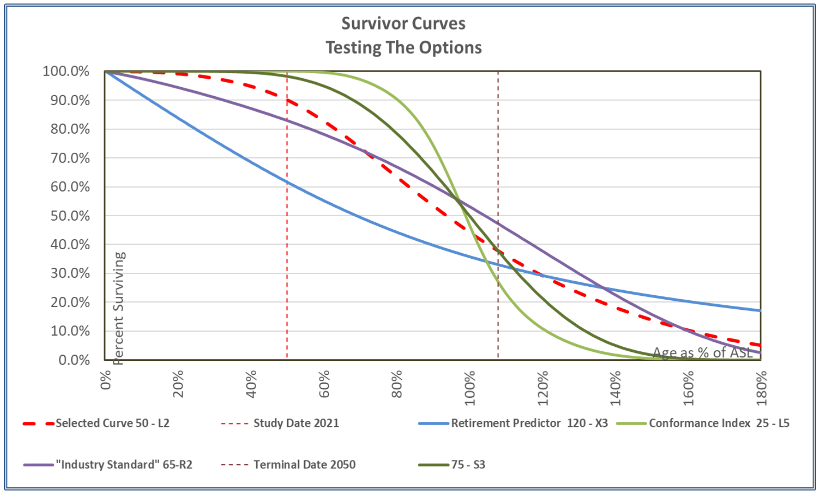
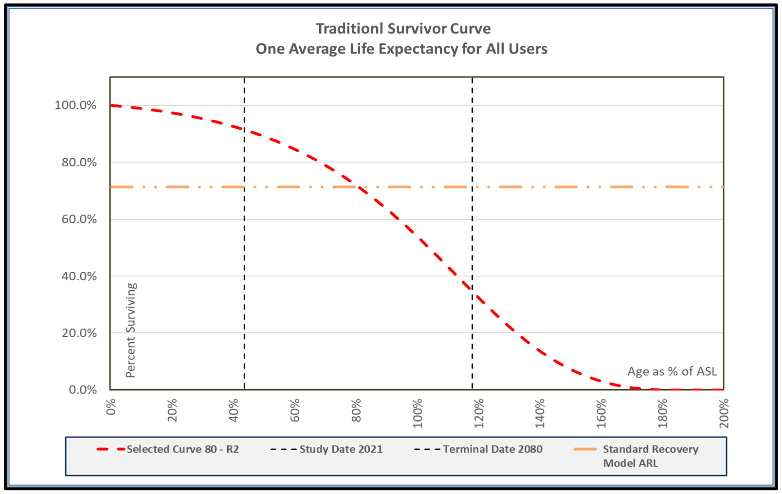
## Brief Primer on Survivor Curve Theory

Survivor Curve Theory is based on an assumption that industrial property expires from service in patterns rather than in random happinstance and that these patterns are discoverable, measurable, and predictable. The frequency distributions of these retirement patterns tend to follow recognized patterns known as Iowa Survivor Curves.



Under the Simulated Plant Record (SPR) model, each of over 660 curve and service life options are tested against the actual data to find which of the curves provides the best predictor of retirement behavior.





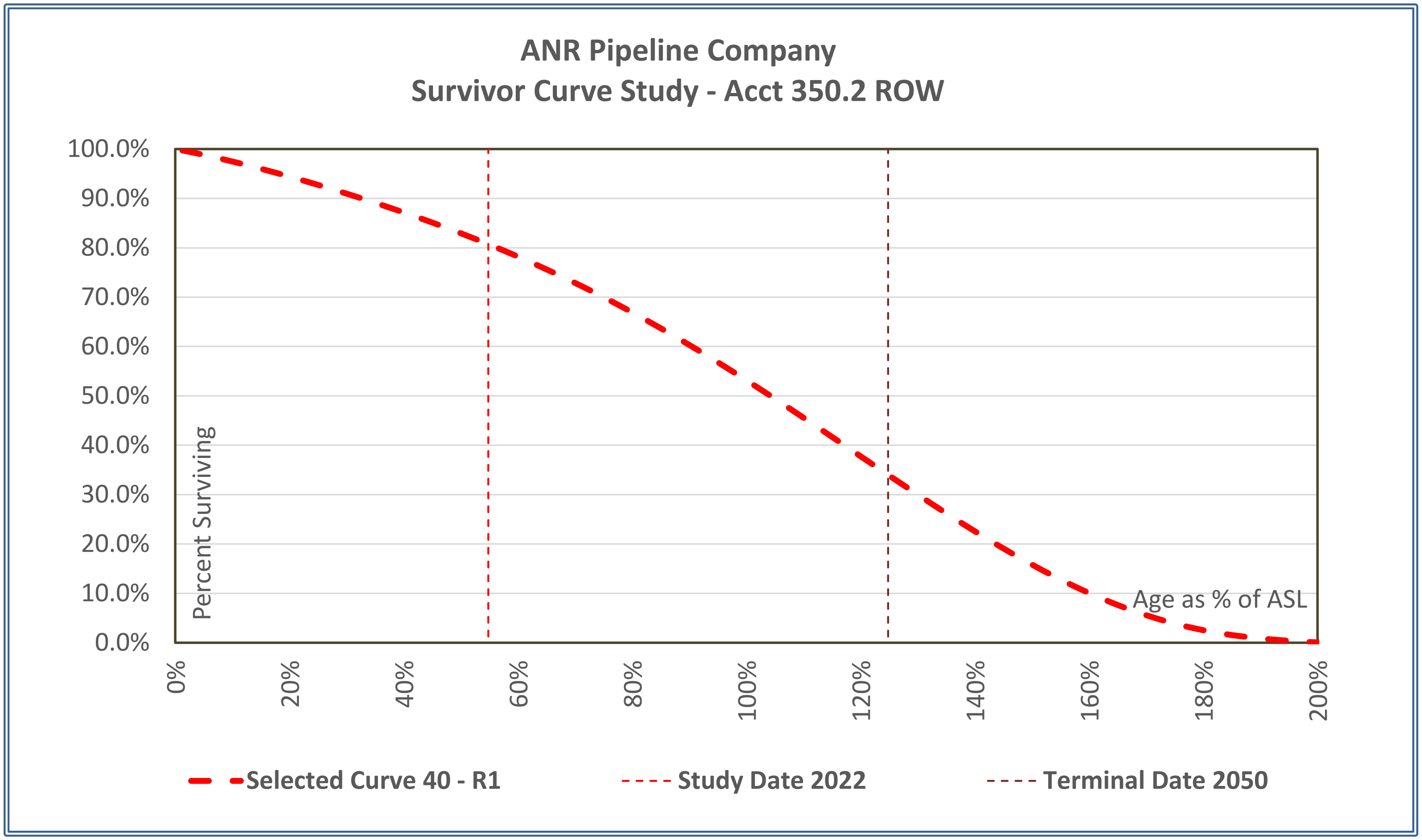
The survivor curves here illustrate the proportion of plant in service over the probable life of the assets. As plant retires, the depreciable base declines, as do the depreciation accruals (rate * plant). A simple rate calculation, (net plant / remaining life) will fall short of full recovery of the investors capital because not all plant survives the entire rate period. The solution is to determine the *average* remaining life and apply that rate across the remaining life.

-

# ANR Pipeline Company
## Survivor Curve Study - Acct 350.2 ROW

### Salient Statistical Results

| Economic Life | Ave Age at Study Date: | Average Service Life | Age as % of ASL | Iowa Curve | Conformance Index | Retirement Index | Average Remaining Life |
|---|---|---|---|---|---|---|---|
| **2050** | 21.92 | 40 | 54.8% | R1 | 961 | #DIV/0! | **19.79** |



## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1971 | - | 27,467 | - | - | - | 27,467 |
| 1972 | 27,467 | 29,210 | - | - | - | 56,677 |
| 1973 | 56,677 | 22,393 | - | - | - | 79,070 |
| 1974 | 79,070 | 2,811 | - | - | - | 81,881 |
| 1975 | 81,881 | 5,215 | - | - | - | 87,096 |
| 1976 | 87,096 | 121,349 | - | - | - | 208,445 |
| 1977 | 208,445 | 29,688 | - | - | - | 238,133 |
| 1978 | 238,133 | (4,273) | - | - | - | 233,860 |
| 1979 | 233,860 | 153,014 | - | - | 49,472 | 436,346 |
| 1980 | 436,346 | 34,345 | - | - | - | 470,691 |
| 1981 | 470,691 | 1,024,940 | - | - | - | 1,495,631 |
| 1982 | 1,495,631 | (13,518) | - | - | - | 1,482,113 |
| 1983 | 1,482,113 | 29,243 | - | - | - | 1,511,356 |
| 1984 | 1,511,356 | (543,554) | - | - | - | 967,802 |
| 1985 | 967,802 | 123,716 | - | - | - | 1,091,518 |
| 1986 | 1,091,518 | - | 573 | - | - | 1,090,945 |
| 1987 | 1,090,945 | 633 | - | - | - | 1,091,578 |
| 1988 | 1,091,578 | - | - | - | - | 1,091,578 |
| 1989 | 1,091,578 | - | - | - | - | 1,091,578 |
| 1990 | 1,091,578 | - | - | - | - | 1,091,578 |

## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1991 | 1,091,578 | - | - | - | - | 1,091,578 |
| 1992 | 1,091,578 | 16,749 | - | - | - | 1,108,327 |
| 1993 | 1,108,327 | 3,372 | - | - | - | 1,111,699 |
| 1994 | 1,111,699 | 2,713 | - | - | - | 1,114,412 |
| 1995 | 1,114,412 | - | - | - | - | 1,114,412 |
| 1996 | 1,114,412 | (1,724) | - | - | - | 1,112,688 |
| 1997 | 1,112,688 | - | - | (12,309) | - | 1,100,379 |
| 1998 | 1,100,379 | 703 | - | - | - | 1,101,082 |
| 1999 | 1,101,082 | 42 | - | - | - | 1,101,124 |
| 2000 | 1,101,124 | - | - | - | (59,151) | 1,041,973 |
| 2001 | 1,041,973 | (320,270) | - | - | - | 721,703 |
| 2002 | 721,703 | - | - | - | - | 721,703 |
| 2003 | 721,703 | 1,672 | - | - | - | 723,375 |
| 2004 | 723,375 | 320,810 | - | - | - | 1,044,185 |
| 2005 | 1,044,185 | - | 566 | - | - | 1,043,619 |
| 2006 | 1,043,619 | - | 42 | - | - | 1,043,577 |
| 2007 | 1,043,577 | 15,258 | - | - | - | 1,058,835 |
| 2008 | 1,058,835 | - | - | - | - | 1,058,835 |
| 2009 | 1,058,835 | - | - | - | - | 1,058,835 |
| 2010 | 1,058,835 | - | 174,838 | - | - | 883,997 |
| 2011 | 883,997 | 143,870 | - | - | - | 1,027,867 |
| 2012 | 1,027,867 | - | - | - | - | 1,027,867 |
| 2013 | 1,027,867 | 4,816 | - | - | - | 1,032,683 |
| 2014 | 1,032,683 | - | - | - | 100,442 | 1,032,683 |
| 2015 | 1,032,683 | - | - | - | - | 1,032,683 |
| 2016 | 1,032,683 | - | - | - | (1,765) | 1,032,683 |
| 2017 | 1,032,683 | - | - | - | - | 1,032,683 |
| 2018 | 1,032,683 | - | - | - | - | 1,032,683 |
| 2019 | 1,032,683 | - | - | - | - | 1,032,683 |
| 2020 | 1,032,683 | - | - | - | - | 1,032,683 |
| 2021 | 1,032,683 | - | - | - | 103,289 | 1,032,683 |
| | | - | - | Σ of last 5 years: | ` | |
| | | - | - | Ave last 5 yrs | | |

# Goodness of Fit Test Statistics

**Best 5-Year Retirement Predictors**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| 1 | 5 - L0 | 28.00 | - | #DIV/0! | 1.69 |
| 2 | 5 - L0 | 28.00 | - | #DIV/0! | 1.69 |
| 3 | 5 - L0 | 28.00 | - | #DIV/0! | 1.69 |
| 4 | 5 - L0 | 28.00 | - | #DIV/0! | 1.69 |
| 5 | 5 - L0 | 28.00 | - | #DIV/0! | 1.69 |
| 6 | 5 - L0 | 28.00 | - | #DIV/0! | 1.69 |
| 7 | 5 - L0 | 28.00 | - | #DIV/0! | 1.69 |
| 8 | 5 - L0 | 28.00 | - | #DIV/0! | 1.69 |
| 9 | 5 - L0 | 28.00 | - | #DIV/0! | 1.69 |
| 10 | 5 - L0 | 28.00 | - | #DIV/0! | 1.69 |

**Best Conformance Indices**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| L Curves 1 | 45 - L0 | 20.80 | 28,325 | #DIV/0! | 83.86 |
| L Curves 2 | 40 - L4 | 14.01 | 20,035 | #DIV/0! | 68.97 |
| L Curves 3 | 40 - L3 | 14.15 | 34,436 | #DIV/0! | 57.91 |
| S Curves 1 | 40 - S1 | 17.39 | 34,363 | #DIV/0! | 260.25 |
| S Curves 2 | 40 - S3 | 14.58 | 26,047 | #DIV/0! | 182.90 |
| S Curves 3 | 40 - S4 | 14.10 | 10,596 | #DIV/0! | 137.73 |
| R Curves 1 | 40 - R1 | 19.79 | 26,019 | #DIV/0! | 960.85 |
| R Curves 2 | 40 - R5 | 14.27 | 6,279 | #DIV/0! | 91.16 |
| R Curves 3 | 40 - R4 | 15.24 | 18,560 | #DIV/0! | 71.95 |
| | | | | | |

## Selected Curve Forecasted Survivorship & Interim Retirements

| Selected Curve<br>40 - R1 | Year | Age | Age as % of ASL | Percent Surviving | Surviving Plant | Interim Retirements | |
|---|---|---|---|---|---|---|---|
| Original Installations | | | | | 2,047,373 | | |
| Surviving Balance | 2022 | 21.92 | 54.81% | 80.7028% | 1,551,089 | | |
| 1st Forecast Year | 2023 | 22.9 | 57.31% | 79.5062% | 1,526,590 | 24,498 | |
| 2 | 2024 | 23.9 | 59.81% | 78.2736% | 1,501,354 | 25,236 | |
| 3 | 2025 | 24.9 | 62.31% | 77.0038% | 1,475,356 | 25,998 | |
| 4 | 2026 | 25.9 | 64.81% | 75.6957% | 1,448,575 | 26,782 | |
| 5 | 2027 | 26.9 | 67.31% | 74.3484% | 1,420,992 | 27,583 | |
| 6 | 2028 | 27.9 | 69.81% | 72.9614% | 1,392,593 | 28,398 | |
| 7 | 2029 | 28.9 | 72.31% | 71.5340% | 1,363,370 | 29,224 | |
| 8 | 2030 | 29.9 | 74.81% | 70.0660% | 1,333,315 | 30,055 | |
| 9 | 2031 | 30.9 | 77.31% | 68.5574% | 1,302,428 | 30,887 | |
| 10 | 2032 | 31.9 | 79.81% | 67.0084% | 1,270,713 | 31,715 | |
| 11 | 2033 | 32.9 | 82.31% | 65.4193% | 1,238,180 | 32,533 | |
| 12 | 2034 | 33.9 | 84.81% | 63.7910% | 1,204,842 | 33,338 | |
| 13 | 2035 | 34.9 | 87.31% | 62.1243% | 1,170,719 | 34,123 | |
| 14 | 2036 | 35.9 | 89.81% | 60.4205% | 1,135,835 | 34,883 | |
| 15 | 2037 | 36.9 | 92.31% | 58.6810% | 1,100,222 | 35,613 | |
| 16 | 2038 | 37.9 | 94.81% | 56.9077% | 1,063,914 | 36,308 | |
| 17 | 2039 | 38.9 | 97.31% | 55.1024% | 1,026,954 | 36,961 | |
| 18 | 2040 | 39.9 | 99.81% | 53.2675% | 989,387 | 37,567 | |
| 19 | 2041 | 40.9 | 102.31% | 51.4055% | 951,265 | 38,121 | |
| 20 | 2042 | 41.9 | 104.81% | 49.5193% | 912,647 | 38,618 | |
| 21 | 2043 | 42.9 | 107.31% | 47.6119% | 873,594 | 39,053 | |
| 22 | 2044 | 43.9 | 109.81% | 45.6865% | 834,175 | 39,420 | |
| 23 | 2045 | 44.9 | 112.31% | 43.7467% | 794,461 | 39,714 | |
| 24 | 2046 | 45.9 | 114.81% | 41.7964% | 754,530 | 39,931 | |
| 25 | 2047 | 46.9 | 117.31% | 39.8394% | 714,463 | 40,067 | |
| 26 | 2048 | 47.9 | 119.81% | 37.8800% | 674,347 | 40,116 | |
| 27 | 2049 | 48.9 | 122.31% | 35.9226% | 634,271 | 40,076 | |
| 28 | 2050 | 49.9 | 124.81% | 33.9717% | 594,329 | 39,942 | |
| | | | | | 30,703,423 | **956,760** | Total Interm Retires |
| | | | | **Average Remaining Life** | **19.79** | **26,019** | 5 Yr Ave Ann Retires |

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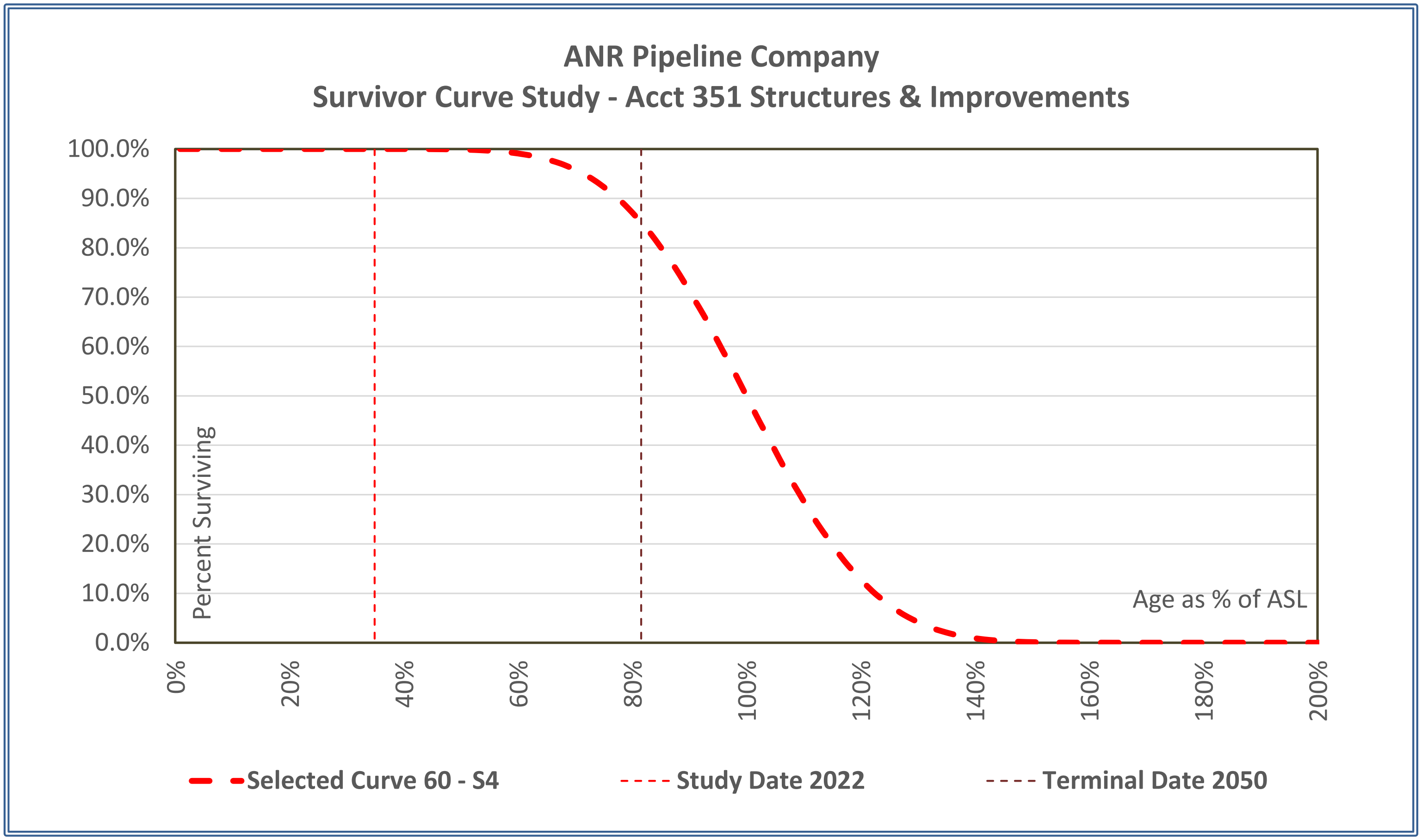
# ANR Pipeline Company

## Survivor Curve Study - Acct 351 Structures & Improvements

### Salient Statistical Results

| Economic Life | Ave Age at Study Date: | Average Service Life | Age as % of ASL | Iowa Curve | Conformance Index | Retirement Index | Average Remaining Life |
|---|---|---|---|---|---|---|---|
| **2050** | 20.94 | 60 | 34.9% | S4 | 8 | 74% | **27.04** |



## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1971 | - | 324 | - | - | - | 324 |
| 1972 | 324 | 770,698 | - | - | - | 771,022 |
| 1973 | 771,022 | 276,635 | - | - | - | 1,047,657 |
| 1974 | 1,047,657 | 412,053 | - | - | - | 1,459,710 |
| 1975 | 1,459,710 | 15,887 | 760 | - | - | 1,474,837 |
| 1976 | 1,474,837 | 1,751,910 | 30,079 | - | 29,634 | 3,226,302 |
| 1977 | 3,226,302 | 532,237 | - | - | - | 3,758,539 |
| 1978 | 3,758,539 | (597,213) | - | - | - | 3,161,326 |
| 1979 | 3,161,326 | 440,435 | - | - | - | 3,601,761 |
| 1980 | 3,601,761 | 263,926 | - | - | - | 3,865,687 |
| 1981 | 3,865,687 | 5,838,833 | - | - | - | 9,704,520 |
| 1982 | 9,704,520 | 17,877 | - | - | - | 9,722,397 |
| 1983 | 9,722,397 | 567,267 | - | - | - | 10,289,664 |
| 1984 | 10,289,664 | (612,714) | - | - | 3,312 | 9,680,262 |
| 1985 | 9,680,262 | 3,082,805 | - | - | - | 12,763,067 |
| 1986 | 12,763,067 | 413,953 | - | - | - | 13,177,020 |
| 1987 | 13,177,020 | 200,157 | - | - | - | 13,377,177 |
| 1988 | 13,377,177 | 23,404 | - | - | - | 13,400,581 |
| 1989 | 13,400,581 | 45,720 | - | - | - | 13,446,301 |
| 1990 | 13,446,301 | 172,580 | 5,723 | - | - | 13,613,158 |

## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1991 | 13,613,158 | 27,376 | - | - | - | 13,640,534 |
| 1992 | 13,640,534 | 128,179 | - | - | - | 13,768,713 |
| 1993 | 13,768,713 | 31,387 | - | - | - | 13,800,100 |
| 1994 | 13,800,100 | 69,220 | - | - | - | 13,869,320 |
| 1995 | 13,869,320 | 25,307 | - | - | - | 13,894,627 |
| 1996 | 13,894,627 | 216,822 | - | - | - | 14,111,449 |
| 1997 | 14,111,449 | 138,099 | - | - | - | 14,249,548 |
| 1998 | 14,249,548 | 647,098 | - | - | - | 14,896,646 |
| 1999 | 14,896,646 | 371,529 | - | - | - | 15,268,175 |
| 2000 | 15,268,175 | 234,840 | - | - | (530,913) | 14,972,102 |
| 2001 | 14,972,102 | 47,939 | 53,791 | - | - | 14,966,250 |
| 2002 | 14,966,250 | - | 37,614 | - | - | 14,928,636 |
| 2003 | 14,928,636 | 46,774 | 844,874 | - | - | 14,130,536 |
| 2004 | 14,130,536 | 369,672 | 52,493 | - | - | 14,447,715 |
| 2005 | 14,447,715 | 297,745 | 1,938,045 | - | - | 12,807,415 |
| 2006 | 12,807,415 | 181,030 | 89,620 | - | - | 12,898,825 |
| 2007 | 12,898,825 | 890,583 | 175,104 | - | - | 13,614,304 |
| 2008 | 13,614,304 | 24,588 | 1,698 | - | 6,898 | 13,644,092 |
| 2009 | 13,644,092 | 92,018 | - | - | - | 13,736,110 |
| 2010 | 13,736,110 | 84,103 | - | - | - | 13,820,213 |
| 2011 | 13,820,213 | 105,732 | - | - | 1,080,877 | 15,006,822 |
| 2012 | 15,006,822 | 351,138 | 4,816 | - | - | 15,353,144 |
| 2013 | 15,353,144 | 77,356 | 31,533 | - | - | 15,398,967 |
| 2014 | 15,398,967 | 378,715 | - | - | 785,406 | 16,563,088 |
| 2015 | 16,563,088 | 99,475 | 51,905 | - | - | 16,610,658 |
| 2016 | 16,610,658 | 1,636,260 | 651,380 | - | (86,529) | 17,509,009 |
| 2017 | 17,509,009 | 435,719 | 4,131 | - | - | 17,940,597 |
| 2018 | 17,940,597 | 374,793 | - | - | - | 18,315,390 |
| 2019 | 18,315,390 | 1,108,449 | - | - | - | 19,423,839 |
| 2020 | 19,423,839 | 38,130 | - | - | - | 19,461,969 |
| 2021 | 19,461,969 | 290,656 | - | - | 2,950,739 | 22,703,364 |
| | | 2,247,747 | 4,131 | Σ of last 5 years: | ` | |
| | | 449,549 | 826 | Ave last 5 yrs | | |

# Goodness of Fit Test Statistics

| Best 5-Year Retirement Predictors | | | | | |
|---|---|---|---|---|---|
| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
| 1 | 105 - S3 | 27.91 | 879 | 93.7% | 7.30 |
| 2 | 140 - L3 | 27.90 | 767 | 92.8% | 7.34 |
| 3 | 110 - S3 | 27.93 | 615 | 74.4% | 7.27 |
| 4 | 60 - S4 | 27.04 | 1,038 | 74.3% | 8.43 |
| 5 | 80 - L4 | 27.68 | 1,085 | 68.6% | 7.58 |
| 6 | 115 - S3 | 27.95 | 452 | 54.7% | 7.25 |
| 7 | 85 - L4 | 27.78 | 449 | 54.4% | 7.45 |
| 8 | 100 - S3 | 27.87 | 1,219 | 52.4% | 7.34 |
| 9 | 45 - S5 | 22.26 | 432 | 52.3% | 61.86 |
| 10 | 55 - R5 | 26.75 | 1,279 | 45.2% | 8.91 |

| Best Conformance Indices | | | | | |
|---|---|---|---|---|---|
| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
| L Curves 1 | 80 - L0 | 24.52 | 236,453 | -28419.3% | 963.34 |
| L Curves 2 | 65 - L1 | 23.44 | 268,177 | -32259.1% | 326.10 |
| L Curves 3 | 45 - L5 | 21.47 | 13,611 | -1447.4% | 258.88 |
| S Curves 1 | 50 - S2 | 22.13 | 228,225 | -27423.4% | 288.24 |
| S Curves 2 | 65 - S0 | 24.20 | 235,189 | -28266.3% | 128.81 |
| S Curves 3 | 45 - S4 | 21.36 | 35,247 | -4066.2% | 94.88 |
| R Curves 1 | 60 - R1 | 24.50 | 214,310 | -25739.2% | 258.63 |
| R Curves 2 | 45 - R4 | 21.60 | 145,407 | -17399.5% | 119.95 |
| R Curves 3 | 45 - R5 | 22.17 | 19,782 | -2194.3% | 79.11 |
| | | | | | |

## Selected Curve Forecasted Survivorship & Interim Retirements

| Selected Curve<br>60 - S4 | Year | Age | Age as % of ASL | Percent Surviving | Surviving Plant | Interim Retirements | |
|---|---|---|---|---|---|---|---|
| Original Installations | | | | | 32,564,886 | | |
| Surviving Balance | 2022 | 20.9 | 34.91% | 99.9993% | 28,590,960 | | |
| 1st Forecast Year | 2023 | 21.9 | 36.57% | 99.9985% | 28,590,722 | 239 | |
| 2 | 2024 | 22.9 | 38.24% | 99.9971% | 28,590,254 | 468 | |
| 3 | 2025 | 23.9 | 39.91% | 99.9945% | 28,589,415 | 838 | |
| 4 | 2026 | 24.9 | 41.57% | 99.9904% | 28,588,083 | 1,333 | |
| 5 | 2027 | 25.9 | 43.24% | 99.9833% | 28,585,769 | 2,314 | |
| 6 | 2028 | 26.9 | 44.91% | 99.9719% | 28,582,064 | 3,705 | |
| 7 | 2029 | 27.9 | 46.57% | 99.9555% | 28,576,721 | 5,343 | |
| 8 | 2030 | 28.9 | 48.24% | 99.9295% | 28,568,243 | 8,478 | |
| 9 | 2031 | 29.9 | 49.91% | 99.8912% | 28,555,763 | 12,480 | |
| 10 | 2032 | 30.9 | 51.57% | 99.8399% | 28,539,068 | 16,696 | |
| 11 | 2033 | 31.9 | 53.24% | 99.7640% | 28,514,358 | 24,710 | |
| 12 | 2034 | 32.9 | 54.91% | 99.6595% | 28,480,318 | 34,040 | |
| 13 | 2035 | 33.9 | 56.57% | 99.5278% | 28,437,421 | 42,897 | |
| 14 | 2036 | 34.9 | 58.24% | 99.3435% | 28,377,402 | 60,019 | |
| 15 | 2037 | 35.9 | 59.91% | 99.1029% | 28,299,076 | 78,326 | |
| 16 | 2038 | 36.9 | 61.57% | 98.8144% | 28,205,117 | 93,959 | |
| 17 | 2039 | 37.9 | 63.24% | 98.4292% | 28,079,660 | 125,457 | |
| 18 | 2040 | 38.9 | 64.91% | 97.9488% | 27,923,213 | 156,447 | |
| 19 | 2041 | 39.9 | 66.57% | 97.3960% | 27,743,226 | 179,987 | |
| 20 | 2042 | 40.9 | 68.24% | 96.6870% | 27,512,319 | 230,907 | |
| 21 | 2043 | 41.9 | 69.91% | 95.8368% | 27,235,450 | 276,869 | |
| 22 | 2044 | 42.9 | 71.57% | 94.8936% | 26,928,297 | 307,153 | |
| 23 | 2045 | 43.9 | 73.24% | 93.7252% | 26,547,806 | 380,491 | |
| 24 | 2046 | 44.9 | 74.91% | 92.3719% | 26,107,107 | 440,698 | |
| 25 | 2047 | 45.9 | 76.57% | 90.9184% | 25,633,772 | 473,335 | |
| 26 | 2048 | 46.9 | 78.24% | 89.1734% | 25,065,523 | 568,250 | |
| 27 | 2049 | 47.9 | 79.91% | 87.2145% | 24,427,604 | 637,919 | |
| 28 | 2050 | 48.9 | 81.57% | 85.1714% | 23,762,298 | 665,306 | |
| | | | | | 773,046,066 | **4,828,663** | Total Interm Retires |
| | | | | **Average Remaining Life** | **27.04** | **1,038** | 5 Yr Ave Ann Retires |

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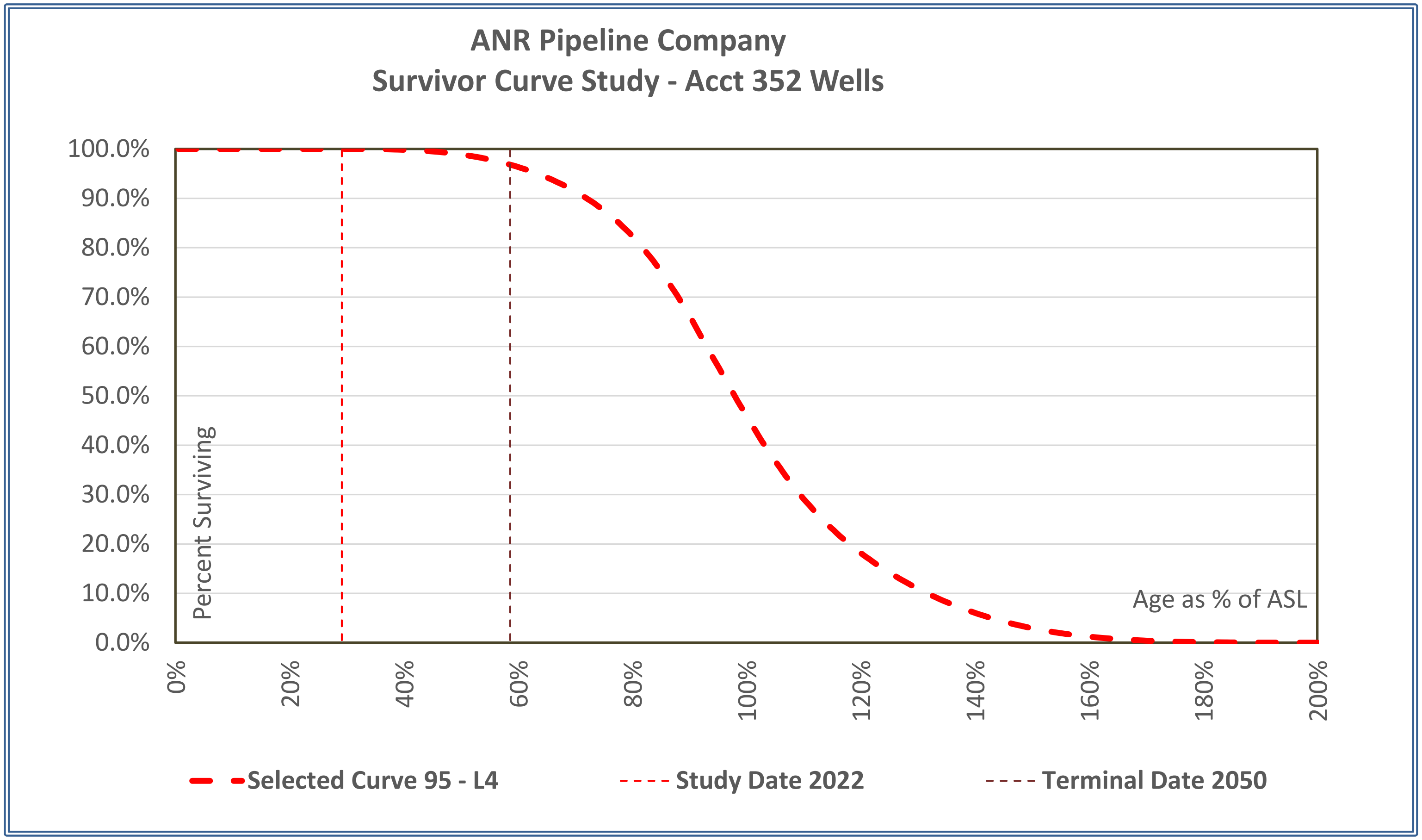
# ANR Pipeline Company
## Survivor Curve Study - Acct 352 Wells

### Salient Statistical Results

| Economic Life | Ave Age at Study Date: | Average Service Life | Age as % of ASL | Iowa Curve | Conformance Index | Retirement Index | Average Remaining Life |
|---|---|---|---|---|---|---|---|
| **2050** | 27.69 | 95 | 29.1% | L4 | 3 | 86% | **27.69** |



## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1971 | - | 1,171,173 | - | - | - | 1,171,173 |
| 1972 | 1,171,173 | 1,239,962 | - | - | - | 2,411,135 |
| 1973 | 2,411,135 | 1,832,318 | - | - | - | 4,243,453 |
| 1974 | 4,243,453 | 1,345,232 | - | - | - | 5,588,685 |
| 1975 | 5,588,685 | 358,991 | - | - | - | 5,947,676 |
| 1976 | 5,947,676 | 72,758 | - | - | 184,874 | 6,205,308 |
| 1977 | 6,205,308 | 1,999,463 | - | - | - | 8,204,771 |
| 1978 | 8,204,771 | 1,199,745 | 89,853 | - | - | 9,314,663 |
| 1979 | 9,314,663 | 8,972,312 | - | - | - | 18,286,975 |
| 1980 | 18,286,975 | 6,609,343 | - | - | - | 24,896,318 |
| 1981 | 24,896,318 | 6,223,608 | - | - | - | 31,119,926 |
| 1982 | 31,119,926 | 821,160 | - | - | - | 31,941,086 |
| 1983 | 31,941,086 | 7,030,491 | - | - | - | 38,971,577 |
| 1984 | 38,971,577 | 3,954,228 | - | - | (567,875) | 42,357,930 |
| 1985 | 42,357,930 | 2,856,696 | - | - | (11,573) | 45,203,053 |
| 1986 | 45,203,053 | 867,097 | 258,175 | - | - | 45,811,975 |
| 1987 | 45,811,975 | 119,316 | - | - | - | 45,931,291 |
| 1988 | 45,931,291 | 375,865 | - | - | - | 46,307,156 |
| 1989 | 46,307,156 | 322,960 | - | - | - | 46,630,116 |
| 1990 | 46,630,116 | 496,959 | - | - | - | 47,127,075 |

## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1991 | 47,127,075 | 417,833 | 855 | - | - | 47,544,053 |
| 1992 | 47,544,053 | 6,327,568 | - | - | - | 53,871,621 |
| 1993 | 53,871,621 | 4,796,513 | - | - | - | 58,668,134 |
| 1994 | 58,668,134 | 2,373,127 | - | - | - | 61,041,261 |
| 1995 | 61,041,261 | 480,740 | 21,155 | - | - | 61,500,846 |
| 1996 | 61,500,846 | 277,496 | - | - | - | 61,778,342 |
| 1997 | 61,778,342 | 802,513 | - | (316) | - | 62,580,539 |
| 1998 | 62,580,539 | 292,300 | - | - | - | 62,872,839 |
| 1999 | 62,872,839 | 504,968 | - | - | - | 63,377,807 |
| 2000 | 63,377,807 | 2,331,920 | - | - | (5,530,741) | 60,178,986 |
| 2001 | 60,178,986 | 968,564 | 219,467 | - | - | 60,928,083 |
| 2002 | 60,928,083 | - | 402,390 | - | - | 60,525,693 |
| 2003 | 60,525,693 | 922,587 | 177,804 | - | - | 61,270,476 |
| 2004 | 61,270,476 | 616,841 | 66,766 | - | - | 61,820,551 |
| 2005 | 61,820,551 | 331,886 | 18,531,179 | - | - | 43,621,258 |
| 2006 | 43,621,258 | 4,638,954 | 189,963 | - | - | 48,070,249 |
| 2007 | 48,070,249 | 777,653 | 312,882 | - | - | 48,535,020 |
| 2008 | 48,535,020 | 4,551,007 | 348,457 | - | 6,726 | 52,744,296 |
| 2009 | 52,744,296 | 167,416 | 157,175 | - | - | 52,754,537 |
| 2010 | 52,754,537 | (328,997) | 159 | - | - | 52,425,381 |
| 2011 | 52,425,381 | 932,630 | - | - | (28,582) | 53,329,429 |
| 2012 | 53,329,429 | 78,095 | 65,019 | - | - | 53,342,505 |
| 2013 | 53,342,505 | 112,098 | - | - | - | 53,454,603 |
| 2014 | 53,454,603 | 1,479 | - | - | - | 53,456,082 |
| 2015 | 53,456,082 | 39,248 | - | - | - | 53,495,330 |
| 2016 | 53,495,330 | 188,122 | 42,623 | - | (1,050,550) | 52,590,279 |
| 2017 | 52,590,279 | 1,239,582 | 27,509 | - | - | 53,802,352 |
| 2018 | 53,802,352 | 14,834 | - | - | - | 53,817,186 |
| 2019 | 53,817,186 | (19,913) | - | - | - | 53,797,273 |
| 2020 | 53,797,273 | 227,764 | - | - | - | 54,025,037 |
| 2021 | 54,025,037 | 2,739,308 | - | - | 32,337,945 | 89,102,290 |
| | | 4,201,575 | 27,509 | Σ of last 5 years: ` | | |
| | | 840,315 | 5,502 | Ave last 5 yrs | | |

# Goodness of Fit Test Statistics

**Best 5-Year Retirement Predictors**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| 1 | 10 - L1 | 27.99 | 5,607 | 98.1% | 1.47 |
| 2 | 115 - S3 | 27.85 | 5,871 | 93.3% | 3.30 |
| 3 | 20 - S5 | 27.99 | 5,957 | 91.7% | 1.84 |
| 4 | 95 - L4 | 27.69 | 6,260 | 86.2% | 3.31 |
| 5 | 120 - S3 | 27.89 | 4,358 | 79.2% | 3.30 |
| 6 | 150 - R4 | 27.93 | 6,657 | 79.0% | 3.30 |
| 7 | 15 - S2 | 27.99 | 7,438 | 64.8% | 1.61 |
| 8 | 145 - R4 | 27.92 | 7,643 | 61.1% | 3.30 |
| 9 | 70 - S4 | 27.01 | 7,653 | 60.9% | 3.36 |
| 10 | 125 - S3 | 27.91 | 3,263 | 59.3% | 3.29 |

**Best Conformance Indices**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| L Curves 1 | 60 - L0 | 22.63 | 967,136 | -17378.5% | 544.36 |
| L Curves 2 | 45 - L3 | 14.76 | 1,885,968 | -34079.1% | 92.21 |
| L Curves 3 | 50 - L2 | 18.26 | 1,579,807 | -28514.4% | 52.77 |
| S Curves 1 | 50 - S0 | 21.19 | 1,141,378 | -20545.5% | 257.02 |
| S Curves 2 | 45 - S2 | 16.53 | 1,613,657 | -29129.6% | 64.98 |
| S Curves 3 | 45 - S1 | 18.42 | 1,524,011 | -27500.2% | 62.87 |
| R Curves 1 | 45 - R2 | 18.83 | 1,223,488 | -22038.0% | 76.48 |
| R Curves 2 | 50 - R1 | 21.82 | 940,649 | -16897.1% | 43.42 |
| R Curves 3 | 40 - R4 | 10.80 | 1,786,254 | -32266.7% | 19.42 |
| | | | | | |

## Selected Curve Forecasted Survivorship & Interim Retirements *

Selected Curve

| 95 - L4 | Year | Age | Age as % of ASL | Percent Surviving | Surviving Plant | Interim Retirements | |
|---|---|---|---|---|---|---|---|
| Original Installations | | | | | 93,375,814 | | |
| Surviving Balance | 2022 | 27.69 | 29.15% | 99.9969% | 72,464,483 | | |
| 1st Forecast Year | 2023 | 28.7 | 30.20% | 99.9944% | 72,462,162 | 2,321 | |
| 2 | 2024 | 29.7 | 31.25% | 99.9902% | 72,458,190 | 3,972 | |
| 3 | 2025 | 30.7 | 32.30% | 99.9838% | 72,452,237 | 5,954 | |
| 4 | 2026 | 31.7 | 33.36% | 99.9756% | 72,444,612 | 7,624 | |
| 5 | 2027 | 32.7 | 34.41% | 99.9634% | 72,433,184 | 11,428 | |
| 6 | 2028 | 33.7 | 35.46% | 99.9487% | 72,419,438 | 13,746 | |
| 7 | 2029 | 34.7 | 36.51% | 99.9277% | 72,399,897 | 19,542 | |
| 8 | 2030 | 35.7 | 37.57% | 99.9037% | 72,377,423 | 22,474 | |
| 9 | 2031 | 36.7 | 38.62% | 99.8707% | 72,346,689 | 30,733 | |
| 10 | 2032 | 37.7 | 39.67% | 99.8341% | 72,312,513 | 34,176 | |
| 11 | 2033 | 38.7 | 40.72% | 99.7856% | 72,267,145 | 45,368 | |
| 12 | 2034 | 39.7 | 41.78% | 99.7329% | 72,218,000 | 49,145 | |
| 13 | 2035 | 40.7 | 42.83% | 99.6647% | 72,154,278 | 63,722 | |
| 14 | 2036 | 41.7 | 43.88% | 99.5923% | 72,086,690 | 67,588 | |
| 15 | 2037 | 42.7 | 44.93% | 99.5002% | 72,000,713 | 85,978 | |
| 16 | 2038 | 43.7 | 45.99% | 99.4042% | 71,911,084 | 89,629 | |
| 17 | 2039 | 44.7 | 47.04% | 99.2841% | 71,798,862 | 112,222 | |
| 18 | 2040 | 45.7 | 48.09% | 99.1606% | 71,683,559 | 115,303 | |
| 19 | 2041 | 46.7 | 49.15% | 99.0080% | 71,541,111 | 142,448 | |
| 20 | 2042 | 47.7 | 50.20% | 98.8532% | 71,396,547 | 144,564 | |
| 21 | 2043 | 48.7 | 51.25% | 98.6641% | 71,219,987 | 176,560 | |
| 22 | 2044 | 49.7 | 52.30% | 98.4543% | 71,024,064 | 195,923 | |
| 23 | 2045 | 50.7 | 53.36% | 98.2447% | 70,828,318 | 195,747 | |
| 24 | 2046 | 51.7 | 54.41% | 97.9923% | 70,592,713 | 235,605 | |
| 25 | 2047 | 52.7 | 55.46% | 97.7424% | 70,359,334 | 233,379 | |
| 26 | 2048 | 53.7 | 56.51% | 97.4440% | 70,080,678 | 278,656 | |
| 27 | 2049 | 54.7 | 57.57% | 97.1506% | 69,806,700 | 273,978 | |
| 28 | 2050 | 55.7 | 58.62% | 96.8026% | 69,481,815 | 324,886 | |
| | | | | | 2,006,557,943 | **2,982,668** | Total Interm Retires |
| | | | | **Average Remaining Life** | **27.69** | **6,260** | 5 Yr Ave Ann Retires |

* Mainline & Incremental plant

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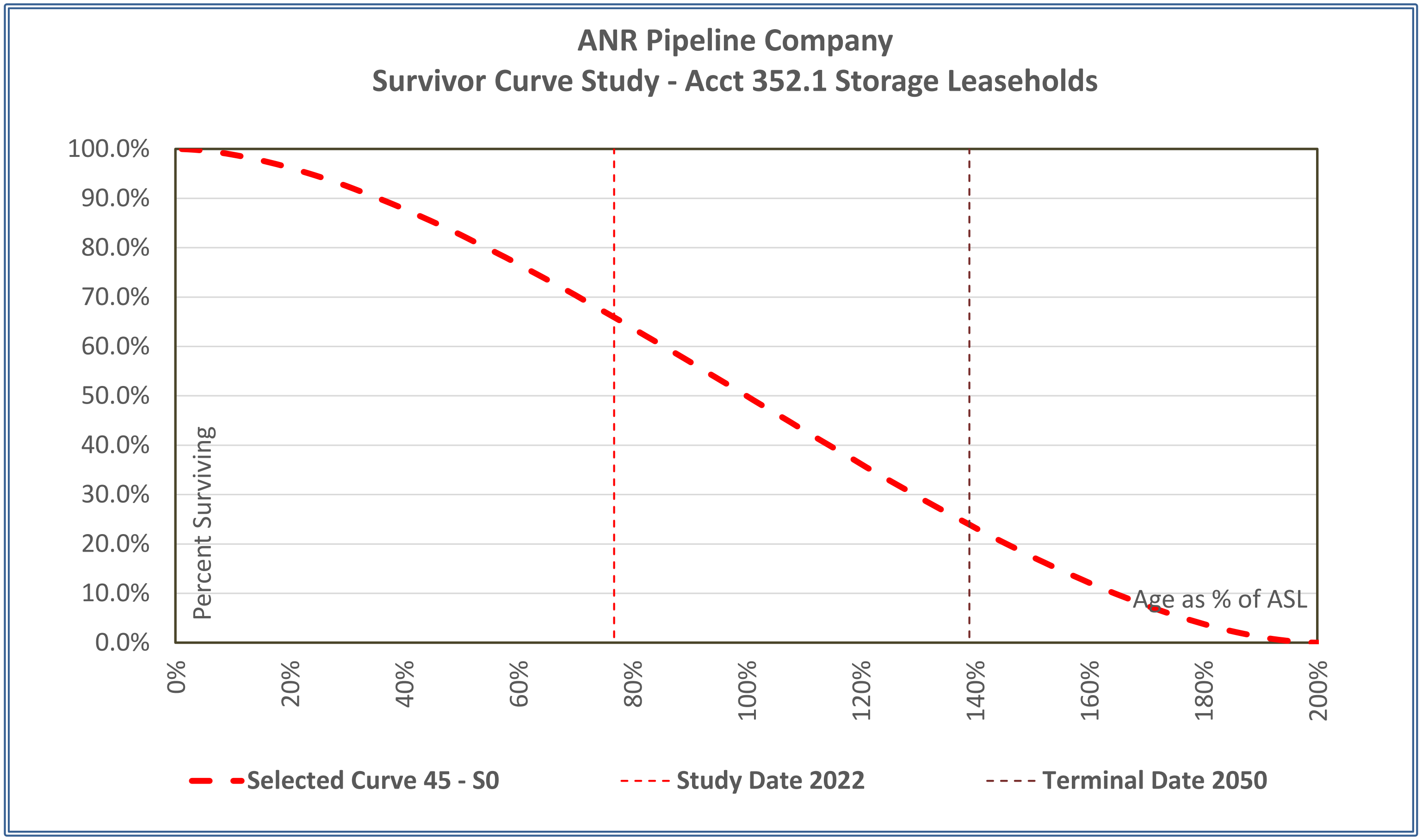
# ANR Pipeline Company

## Survivor Curve Study - Acct 352.1 Storage Leaseholds

**Salient Statistical Results**

| Economic Life | Ave Age at Study Date: | Average Service Life | Age as % of ASL | Iowa Curve | Conformance Index | Retirement Index | Average Remaining Life |
|---|---|---|---|---|---|---|---|
| **2050** | 34.57 | 45 | 76.8% | S0 | 101 | #DIV/0! | **18.61** |



## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1971 | - | 3,036 | - | - | - | 3,036 |
| 1972 | 3,036 | 36,964 | - | - | 141,689 | 181,689 |
| 1973 | 181,689 | (171,916) | - | - | - | 9,773 |
| 1974 | 9,773 | 2,333 | - | - | - | 12,106 |
| 1975 | 12,106 | 1,262 | - | - | - | 13,368 |
| 1976 | 13,368 | 107,916 | - | - | 54,286 | 175,570 |
| 1977 | 175,570 | 16,385 | - | - | - | 191,955 |
| 1978 | 191,955 | 9,194 | - | - | - | 201,149 |
| 1979 | 201,149 | 4,596,736 | - | - | - | 4,797,885 |
| 1980 | 4,797,885 | 626,856 | - | - | - | 5,424,741 |
| 1981 | 5,424,741 | 4,301,929 | - | - | - | 9,726,670 |
| 1982 | 9,726,670 | (507,533) | - | - | - | 9,219,137 |
| 1983 | 9,219,137 | 13,382,552 | - | - | - | 22,601,689 |
| 1984 | 22,601,689 | (3,204,588) | 1,418,874 | - | 681,915 | 18,660,142 |
| 1985 | 18,660,142 | (47,951) | 3,205,622 | - | - | 15,406,569 |
| 1986 | 15,406,569 | 1,451,808 | - | - | - | 16,858,377 |
| 1987 | 16,858,377 | (66,258) | 6,437,472 | - | - | 10,354,647 |
| 1988 | 10,354,647 | 2,725 | 2,515,854 | - | - | 7,841,518 |
| 1989 | 7,841,518 | 2,743 | 2,515,853 | - | - | 5,328,408 |
| 1990 | 5,328,408 | 22,497 | - | - | - | 5,350,905 |

## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1991 | 5,350,905 | - | 750 | - | - | 5,350,155 |
| 1992 | 5,350,155 | - | 725 | - | - | 5,349,430 |
| 1993 | 5,349,430 | - | - | - | - | 5,349,430 |
| 1994 | 5,349,430 | 15,600 | - | - | - | 5,365,030 |
| 1995 | 5,365,030 | - | - | - | - | 5,365,030 |
| 1996 | 5,365,030 | - | - | - | - | 5,365,030 |
| 1997 | 5,365,030 | - | - | - | - | 5,365,030 |
| 1998 | 5,365,030 | - | - | - | - | 5,365,030 |
| 1999 | 5,365,030 | 74 | - | - | - | 5,365,104 |
| 2000 | 5,365,104 | - | - | - | (58,592) | 5,306,512 |
| 2001 | 5,306,512 | 1,800,000 | - | - | - | 7,106,512 |
| 2002 | 7,106,512 | - | - | - | - | 7,106,512 |
| 2003 | 7,106,512 | (1,800,000) | - | - | - | 5,306,512 |
| 2004 | 5,306,512 | - | - | - | - | 5,306,512 |
| 2005 | 5,306,512 | 295,852 | 2,122,355 | - | - | 3,480,009 |
| 2006 | 8,997,983 | (452,675) | - | - | - | 8,545,308 |
| 2007 | 8,545,308 | 1,098,743 | - | - | - | 9,644,051 |
| 2008 | 9,644,051 | 1,755,568 | 323,073 | - | - | 11,076,546 |
| 2009 | 11,076,546 | 17,852 | - | - | - | 11,094,398 |
| 2010 | 11,094,398 | - | - | - | - | 11,094,398 |
| 2011 | 11,094,398 | 3,799,600 | - | - | - | 14,893,998 |
| 2012 | 14,893,998 | - | - | - | - | 14,893,998 |
| 2013 | 14,893,998 | - | - | - | - | 14,893,998 |
| 2014 | 14,893,998 | - | - | - | - | 14,893,998 |
| 2015 | 14,893,998 | - | - | - | - | 14,893,998 |
| 2016 | 14,893,998 | - | - | - | 613,369 | 15,507,367 |
| 2017 | 15,507,367 | - | - | - | - | 15,507,367 |
| 2018 | 15,507,367 | - | - | - | - | 15,507,367 |
| 2019 | 15,507,367 | - | - | - | - | 15,507,367 |
| 2020 | 15,507,367 | - | - | - | - | 15,507,367 |
| 2021 | 15,507,367 | - | - | - | 1,336,599 | 16,843,966 |
|  |  | - | - | Σ of last 5 years: | ` |  |
|  |  | - | - | Ave last 5 yrs |  |  |

# Goodness of Fit Test Statistics

**Best 5-Year Retirement Predictors**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| 1 | 5 - L0 | 28.00 | - | #DIV/0! | 1.10 |
| 2 | 5 - L0 | 28.00 | - | #DIV/0! | 1.10 |
| 3 | 5 - L0 | 28.00 | - | #DIV/0! | 1.10 |
| 4 | 5 - L0 | 28.00 | - | #DIV/0! | 1.10 |
| 5 | 5 - L0 | 28.00 | - | #DIV/0! | 1.10 |
| 6 | 5 - L0 | 28.00 | - | #DIV/0! | 1.10 |
| 7 | 5 - L0 | 28.00 | - | #DIV/0! | 1.10 |
| 8 | 5 - L0 | 28.00 | - | #DIV/0! | 1.10 |
| 9 | 5 - L0 | 28.00 | - | #DIV/0! | 1.10 |
| 10 | 5 - L0 | 28.00 | - | #DIV/0! | 1.10 |

**Best Conformance Indices**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| L Curves 1 | 50 - L1 | 19.36 | 377,370 | #DIV/0! | 54.04 |
| L Curves 2 | 45 - L3 | 11.94 | 779,379 | #DIV/0! | 52.49 |
| L Curves 3 | 55 - L0 | 21.34 | 287,083 | #DIV/0! | 46.25 |
| S Curves 1 | 45 - S0 | 18.61 | 386,882 | #DIV/0! | 100.95 |
| S Curves 2 | 45 - S1 | 16.02 | 487,923 | #DIV/0! | 35.53 |
| S Curves 3 | 40 - S6 | -5.56 | 2,101,506 | #DIV/0! | 17.31 |
| R Curves 1 | 40 - R4 | 5.07 | 998,137 | #DIV/0! | 45.64 |
| R Curves 2 | 45 - R1 | 18.22 | 366,971 | #DIV/0! | 35.28 |
| R Curves 3 | 40 - R3 | 8.80 | 799,196 | #DIV/0! | 29.89 |
| | | | | | |

## Selected Curve Forecasted Survivorship & Interim Retirements *

Selected Curve

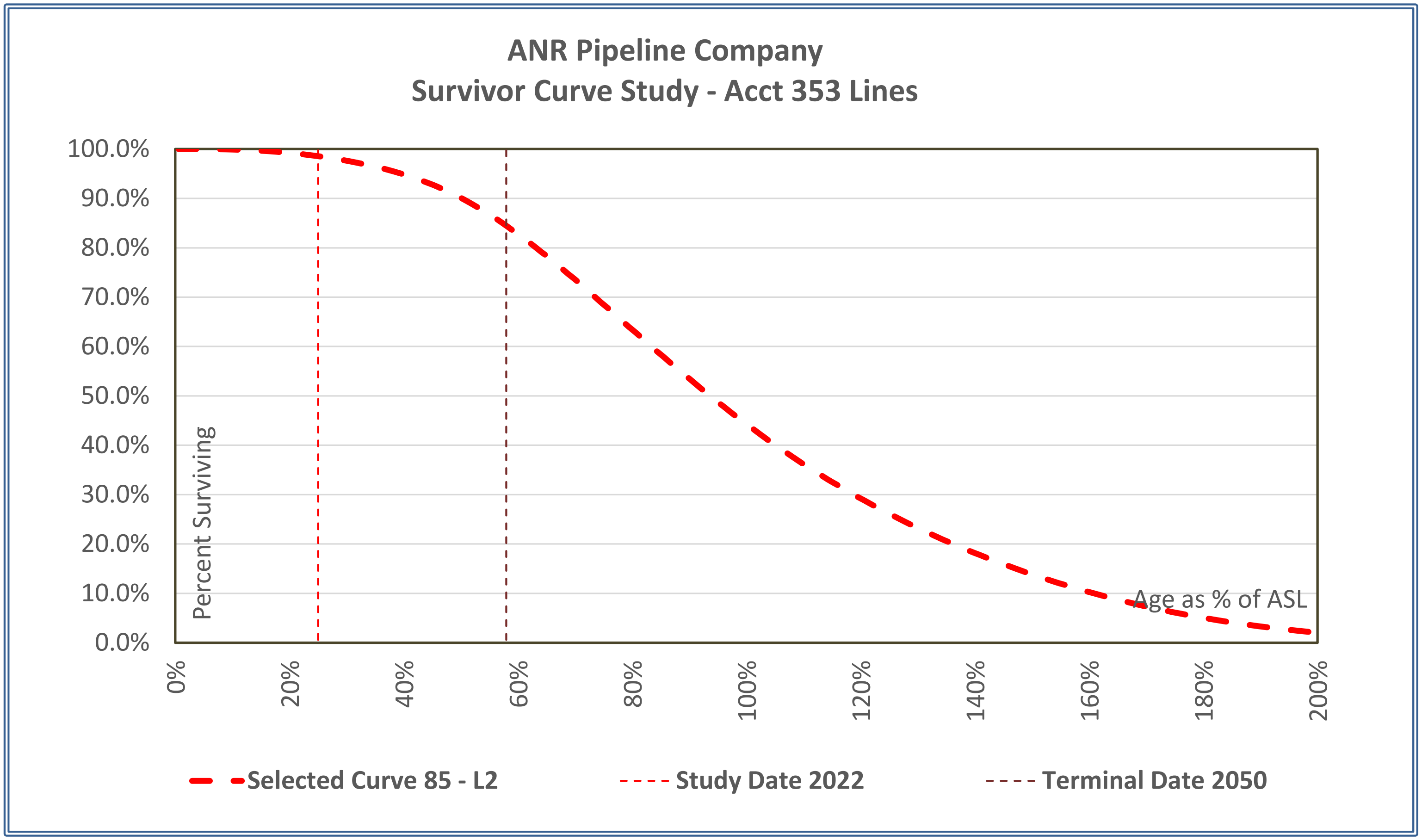
| 45 - S0 | Year | Age | Age as % of ASL | Percent Surviving | Surviving Plant | Interim Retirements | |
|---|---|---|---|---|---|---|---|
| Original Installations | | | | | 25,685,194 | | |
| Surviving Balance | 2022 | 34.57 | 76.82% | 65.8768% | 16,843,966 | | |
| 1st Forecast Year | 2023 | 35.6 | 79.05% | 64.4034% | 16,465,514 | 378,451 | |
| 2 | 2024 | 36.6 | 81.27% | 62.9193% | 16,084,321 | 381,193 | |
| 3 | 2025 | 37.6 | 83.49% | 61.4257% | 15,700,680 | 383,641 | |
| 4 | 2026 | 38.6 | 85.71% | 59.8552% | 15,297,299 | 403,381 | ` |
| 5 | 2027 | 39.6 | 87.94% | 58.3456% | 14,909,557 | 387,742 | |
| 6 | 2028 | 40.6 | 90.16% | 56.8299% | 14,520,249 | 389,308 | |
| 7 | 2029 | 41.6 | 92.38% | 55.3093% | 14,129,664 | 390,585 | |
| 8 | 2030 | 42.6 | 94.60% | 53.7154% | 13,720,270 | 409,395 | |
| 9 | 2031 | 43.6 | 96.82% | 52.1880% | 13,327,962 | 392,308 | |
| 10 | 2032 | 44.6 | 99.05% | 50.6591% | 12,935,246 | 392,715 | |
| 11 | 2033 | 45.6 | 101.27% | 49.1296% | 12,542,408 | 392,838 | |
| 12 | 2034 | 46.6 | 103.49% | 47.6008% | 12,149,731 | 392,677 | |
| 13 | 2035 | 47.6 | 105.71% | 46.0044% | 11,739,688 | 410,043 | |
| 14 | 2036 | 48.6 | 107.94% | 44.4803% | 11,348,230 | 391,458 | |
| 15 | 2037 | 49.6 | 110.16% | 42.9603% | 10,957,802 | 390,428 | |
| 16 | 2038 | 50.6 | 112.38% | 41.4454% | 10,568,691 | 389,111 | |
| 17 | 2039 | 51.6 | 114.60% | 39.8683% | 10,163,613 | 405,078 | |
| 18 | 2040 | 52.6 | 116.82% | 38.3673% | 9,778,092 | 385,521 | |
| 19 | 2041 | 53.6 | 119.05% | 36.8749% | 9,394,767 | 383,325 | |
| 20 | 2042 | 54.6 | 121.27% | 35.3922% | 9,013,931 | 380,836 | |
| 21 | 2043 | 55.6 | 123.49% | 33.9203% | 8,635,876 | 378,055 | |
| 22 | 2044 | 56.6 | 125.71% | 32.3944% | 8,243,933 | 391,943 | |
| 23 | 2045 | 57.6 | 127.94% | 30.9483% | 7,872,494 | 371,440 | |
| 24 | 2046 | 58.6 | 130.16% | 29.5165% | 7,504,746 | 367,748 | |
| 25 | 2047 | 59.6 | 132.38% | 28.1003% | 7,140,994 | 363,752 | |
| 26 | 2048 | 60.6 | 134.60% | 26.6377% | 6,765,315 | 375,679 | |
| 27 | 2049 | 61.6 | 136.82% | 25.2571% | 6,410,701 | 354,614 | |
| 28 | 2050 | 62.6 | 139.05% | 23.8957% | 6,061,033 | 349,667 | |
| | | | | | 313,382,809 | **10,782,932** | Total Interm Retires |
| | | | | **Average Remaining Life** | **18.61** | **386,882** | 5 Yr Ave Ann Retires |

* Mainline & Incremental plant

# ANR Pipeline Company
## Survivor Curve Study - Acct 353 Lines

### Salient Statistical Results

| Economic Life | Ave Age at Study Date: | Average Service Life | Age as % of ASL | Iowa Curve | Conformance Index | Retirement Index | Average Remaining Life |
|---|---|---|---|---|---|---|---|
| **2050** | 21.26 | 85 | 25.0% | L2 | 8 | 98% | **26.21** |



## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1971 | - | 1,239,316 | - | - | - | 1,239,316 |
| 1972 | 1,239,316 | 1,302,648 | - | - | - | 2,541,964 |
| 1973 | 2,541,964 | 1,189,100 | - | - | - | 3,731,064 |
| 1974 | 3,731,064 | 138,954 | - | - | - | 3,870,018 |
| 1975 | 3,870,018 | 101,753 | - | - | - | 3,971,771 |
| 1976 | 3,971,771 | 2,296,173 | - | - | 24,326 | 6,292,270 |
| 1977 | 6,292,270 | 991,341 | - | - | - | 7,283,611 |
| 1978 | 7,283,611 | 244,375 | - | - | - | 7,527,986 |
| 1979 | 7,527,986 | 8,312,710 | - | - | 4,160,265 | 20,000,961 |
| 1980 | 20,000,961 | 4,346,895 | - | - | - | 24,347,856 |
| 1981 | 24,347,856 | 23,754,556 | - | - | - | 48,102,412 |
| 1982 | 48,102,412 | 112,357 | - | - | - | 48,214,769 |
| 1983 | 48,214,769 | 7,334,496 | - | - | - | 55,549,265 |
| 1984 | 55,549,265 | (1,301,190) | - | - | (12,233) | 54,235,842 |
| 1985 | 54,235,842 | 160,345 | - | - | 90,928 | 54,487,115 |
| 1986 | 54,487,115 | 517,874 | 47,822 | - | - | 54,957,167 |
| 1987 | 54,957,167 | 497,707 | - | - | - | 55,454,874 |
| 1988 | 55,454,874 | 19,668 | - | - | - | 55,474,542 |
| 1989 | 55,474,542 | 304,563 | - | - | - | 55,779,105 |
| 1990 | 55,779,105 | 2,225,673 | - | - | 1,163 | 58,005,941 |

## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1991 | 58,005,941 | 450,292 | - | - | - | 58,456,233 |
| 1992 | 58,456,233 | 112,769 | - | - | - | 58,569,002 |
| 1993 | 58,569,002 | 2,744,348 | - | - | - | 61,313,350 |
| 1994 | 61,313,350 | 818,772 | 37,749 | - | - | 62,094,373 |
| 1995 | 62,094,373 | 8,009 | - | - | - | 62,102,382 |
| 1996 | 62,102,382 | 32,106 | - | - | - | 62,134,488 |
| 1997 | 62,134,488 | 28,666 | - | 2,955 | - | 62,166,109 |
| 1998 | 62,166,109 | 224,961 | - | - | - | 62,391,070 |
| 1999 | 62,391,070 | 341,106 | - | - | - | 62,732,176 |
| 2000 | 62,732,176 | 125,475 | - | - | (3,188,780) | 59,668,871 |
| 2001 | 59,668,871 | 437,142 | 2,226 | - | - | 60,103,787 |
| 2002 | 60,103,787 | - | 449,673 | - | - | 59,654,114 |
| 2003 | 59,654,114 | 64,416 | 154,036 | - | - | 59,564,494 |
| 2004 | 59,564,494 | 650,911 | 89,025 | - | - | 60,126,380 |
| 2005 | 60,126,380 | 281,733 | 7,914,771 | - | - | 52,493,342 |
| 2006 | 52,493,342 | 1,543,876 | 135,186 | - | - | 53,902,032 |
| 2007 | 53,902,032 | 1,084,613 | 82,922 | - | - | 54,903,723 |
| 2008 | 54,903,723 | 1,285,636 | 1,599,238 | - | - | 54,590,121 |
| 2009 | 54,590,121 | 1,371,853 | 579,120 | - | - | 55,382,854 |
| 2010 | 55,382,854 | (653,502) | 3,206,895 | - | - | 51,522,457 |
| 2011 | 51,522,457 | 539,245 | - | - | 3,536,025 | 55,597,727 |
| 2012 | 55,597,727 | 455,040 | 196,892 | - | 155,403 | 56,011,278 |
| 2013 | 56,011,278 | 47,626 | 10,045 | - | - | 56,048,859 |
| 2014 | 56,048,859 | 1,496,779 | - | - | 2,225,802 | 59,771,440 |
| 2015 | 59,771,440 | 2,947,774 | 260,414 | - | - | 62,458,800 |
| 2016 | 62,458,800 | 2,430,170 | 712,259 | - | (870,916) | 63,305,795 |
| 2017 | 63,305,795 | 13,236,019 | 1,298,637 | - | - | 75,243,177 |
| 2018 | 75,243,177 | 5,467,731 | 195,207 | - | - | 80,515,701 |
| 2019 | 80,515,701 | 2,651,591 | - | - | - | 83,167,292 |
| 2020 | 83,167,292 | 6,384,179 | - | - | - | 89,551,471 |
| 2021 | 89,551,471 | 8,904,394 | - | - | 17,903,913 | 116,359,778 |
| | | 36,643,914 | 1,493,844 | Σ of last 5 years: ` | | |
| | | 7,328,783 | 298,769 | Ave last 5 yrs | | |

# Goodness of Fit Test Statistics

**Best 5-Year Retirement Predictors**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| 1 | 120 - L1 | 26.54 | 299,209 | 99.9% | 7.69 |
| 2 | 140 - R1 | 26.86 | 301,874 | 99.0% | 7.97 |
| 3 | 85 - L2 | 26.21 | 292,841 | 98.0% | 7.72 |
| 4 | 135 - S0 | 26.76 | 292,453 | 97.9% | 7.42 |
| 5 | 145 - R1 | 26.91 | 291,307 | 97.5% | 7.85 |
| 6 | 130 - S0 | 26.68 | 307,800 | 97.0% | 7.58 |
| 7 | 95 - R2 | 26.72 | 287,985 | 96.4% | 7.73 |
| 8 | 90 - R2 | 26.58 | 311,062 | 95.9% | 8.01 |
| 9 | 135 - R1 | 26.81 | 312,938 | 95.3% | 8.12 |
| 10 | 95 - S1 | 26.50 | 282,997 | 94.7% | 7.35 |

**Best Conformance Indices**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| L Curves 1 | 70 - L0 | 23.82 | 1,143,114 | -182.6% | 248.05 |
| L Curves 2 | 60 - L1 | 22.64 | 1,294,851 | -233.4% | 156.36 |
| L Curves 3 | 45 - L4 | 19.94 | 628,531 | -10.4% | 134.01 |
| S Curves 1 | 50 - S1 | 21.71 | 1,341,699 | -249.1% | 839.73 |
| S Curves 2 | 55 - S0 | 22.94 | 1,257,416 | -220.9% | 775.49 |
| S Curves 3 | 45 - S3 | 19.99 | 827,814 | -77.1% | 121.34 |
| R Curves 1 | 55 - R1 | 23.81 | 1,002,715 | -135.6% | 148.69 |
| R Curves 2 | 50 - R2 | 22.89 | 994,867 | -133.0% | 63.73 |
| R Curves 3 | 45 - R4 | 21.18 | 624,278 | -9.0% | 46.33 |
| | | | | | |

## Selected Curve Forecasted Survivorship & Interim Retirements

Selected Curve

| 85 - L2 | Year | Age | Age as % of ASL | Percent Surviving | Surviving Plant | Interim Retirements | |
|---|---|---|---|---|---|---|---|
| Original Installations | | | | | 133,147,351 | | |
| Surviving Balance | 2022 | 21.26 | 25.01% | 98.5331% | 113,175,234 | | |
| 1st Forecast Year | 2023 | 22.3 | 26.19% | 98.3517% | 112,933,657 | 241,577 | |
| 2 | 2024 | 23.3 | 27.36% | 98.1394% | 112,651,052 | 282,605 | |
| 3 | 2025 | 24.3 | 28.54% | 97.9120% | 112,348,308 | 302,745 | |
| 4 | 2026 | 25.3 | 29.72% | 97.6694% | 112,025,215 | 323,093 | |
| 5 | 2027 | 26.3 | 30.89% | 97.4334% | 111,711,029 | 314,186 | |
| 6 | 2028 | 27.3 | 32.07% | 97.1611% | 111,348,463 | 362,566 | |
| 7 | 2029 | 28.3 | 33.25% | 96.8726% | 110,964,358 | 384,105 | |
| 8 | 2030 | 29.3 | 34.42% | 96.5665% | 110,556,717 | 407,640 | |
| 9 | 2031 | 30.3 | 35.60% | 96.2686% | 110,160,113 | 396,604 | |
| 10 | 2032 | 31.3 | 36.78% | 95.9228% | 109,699,659 | 460,454 | |
| 11 | 2033 | 32.3 | 37.95% | 95.5529% | 109,207,183 | 492,476 | |
| 12 | 2034 | 33.3 | 39.13% | 95.1567% | 108,679,604 | 527,578 | |
| 13 | 2035 | 34.3 | 40.31% | 94.7319% | 108,113,981 | 565,623 | |
| 14 | 2036 | 35.3 | 41.48% | 94.3156% | 107,559,744 | 554,237 | |
| 15 | 2037 | 36.3 | 42.66% | 93.8305% | 106,913,842 | 645,902 | |
| 16 | 2038 | 37.3 | 43.84% | 93.3115% | 106,222,795 | 691,047 | |
| 17 | 2039 | 38.3 | 45.01% | 92.7572% | 105,484,822 | 737,973 | |
| 18 | 2040 | 39.3 | 46.19% | 92.2173% | 104,765,914 | 718,908 | |
| 19 | 2041 | 40.3 | 47.36% | 91.5928% | 103,934,386 | 831,528 | |
| 20 | 2042 | 41.3 | 48.54% | 90.9307% | 103,052,881 | 881,505 | |
| 21 | 2043 | 42.3 | 49.72% | 90.2309% | 102,121,089 | 931,792 | |
| 22 | 2044 | 43.3 | 50.89% | 89.5563% | 101,222,806 | 898,283 | |
| 23 | 2045 | 44.3 | 52.07% | 88.7844% | 100,195,060 | 1,027,746 | |
| 24 | 2046 | 45.3 | 53.25% | 87.9755% | 99,118,112 | 1,076,948 | |
| 25 | 2047 | 46.3 | 54.42% | 87.1305% | 97,992,954 | 1,125,158 | |
| 26 | 2048 | 47.3 | 55.60% | 86.3249% | 96,920,291 | 1,072,663 | |
| 27 | 2049 | 48.3 | 56.78% | 85.4132% | 95,706,507 | 1,213,784 | |
| 28 | 2050 | 49.3 | 57.95% | 84.4687% | 94,448,913 | 1,257,593 | |
| | | | | | 2,966,059,455 | **18,726,321** | Total Interm Retires |
| | | | | **Average Remaining Life** | **26.2** | **292,841** | 5 Yr Ave Ann Retires |

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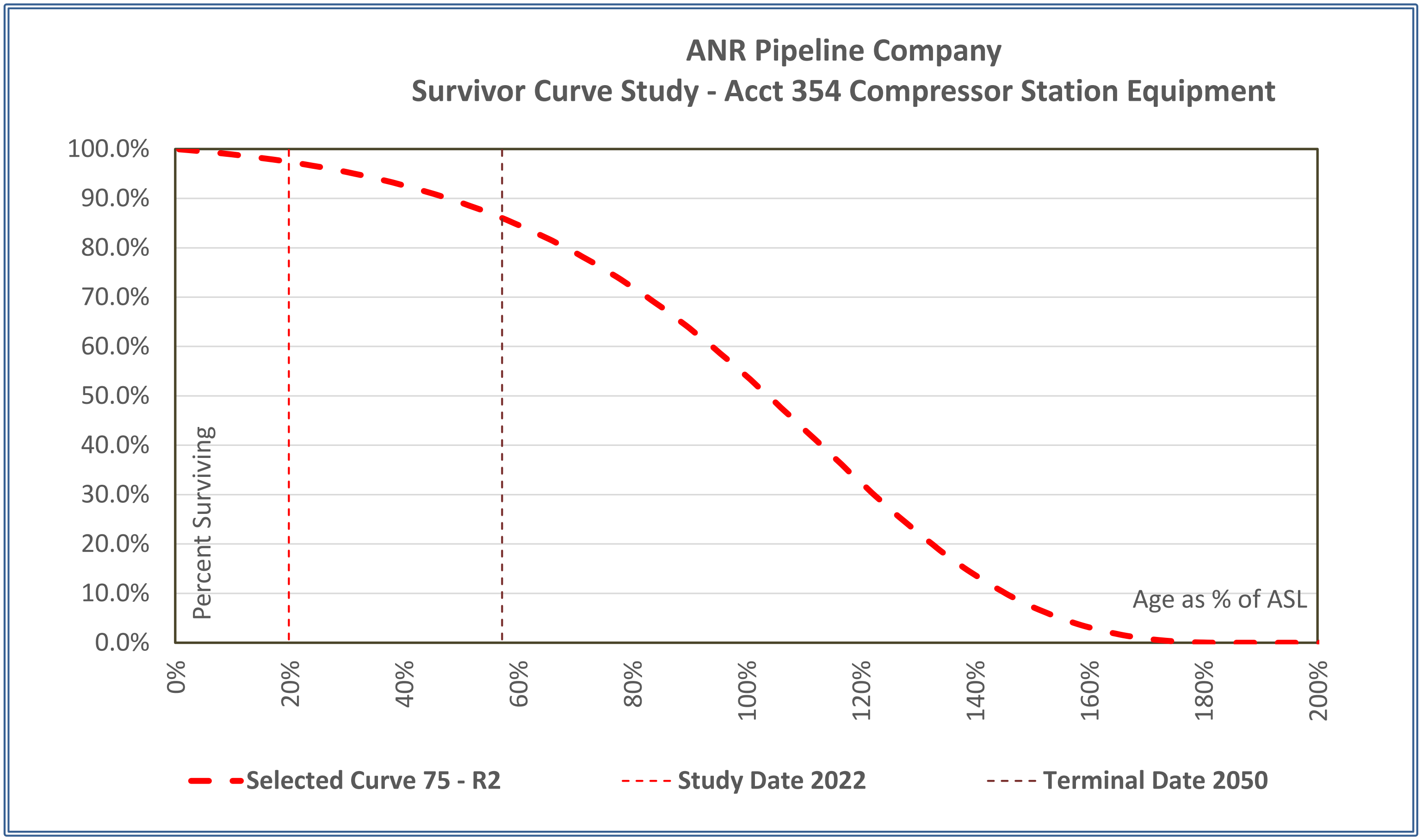
# ANR Pipeline Company

## Survivor Curve Study - Acct 354 Compressor Station Equipment

### Salient Statistical Results

| Economic Life | Ave Age at Study Date: | Average Service Life | Age as % of ASL | Iowa Curve | Conformance Index | Retirement Index | Average Remaining Life |
|---|---|---|---|---|---|---|---|
| **2050** | 14.92 | 75 | 19.9% | R2 | 11 | 98% | **26.44** |



## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1971 | - | - | - | - | - | - |
| 1972 | - | 4,479,125 | - | - | - | 4,479,125 |
| 1973 | 4,479,125 | 958,664 | - | - | - | 5,437,789 |
| 1974 | 5,437,789 | (48,001) | - | - | - | 5,389,788 |
| 1975 | 5,389,788 | 2,981,572 | 32,822 | - | - | 8,338,538 |
| 1976 | 8,338,538 | 4,561,665 | 65,667 | - | (22,586) | 12,811,950 |
| 1977 | 12,811,950 | 100,380 | - | - | - | 12,912,330 |
| 1978 | 12,912,330 | 1,057,768 | - | - | - | 13,970,098 |
| 1979 | 13,970,098 | 10,975,636 | - | - | - | 24,945,734 |
| 1980 | 24,945,734 | 726,504 | - | - | - | 25,672,238 |
| 1981 | 25,672,238 | 12,515,524 | - | - | - | 38,187,762 |
| 1982 | 38,187,762 | 440,318 | - | - | - | 38,628,080 |
| 1983 | 38,628,080 | 26,060,258 | - | - | - | 64,688,338 |
| 1984 | 64,688,338 | 5,344,945 | - | - | (3,098) | 70,030,185 |
| 1985 | 70,030,185 | (2,061,119) | - | - | 221,054 | 68,190,120 |
| 1986 | 68,190,120 | 1,297,002 | - | - | - | 69,487,122 |
| 1987 | 69,487,122 | 1,851,868 | - | - | - | 71,338,990 |
| 1988 | 71,338,990 | 113,422 | - | - | - | 71,452,412 |
| 1989 | 71,452,412 | 102,781 | - | - | - | 71,555,193 |
| 1990 | 71,555,193 | 1,615,263 | - | - | - | 73,170,456 |

## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1991 | 73,170,456 | 413,187 | - | - | - | 73,583,643 |
| 1992 | 73,583,643 | 322,515 | 12,801 | - | - | 73,893,357 |
| 1993 | 73,893,357 | 1,701,366 | - | - | - | 75,594,723 |
| 1994 | 75,594,723 | 272,224 | 204,351 | - | - | 75,662,596 |
| 1995 | 75,662,596 | 1,229,907 | 5,287 | - | - | 76,887,216 |
| 1996 | 76,887,216 | 701,760 | - | - | - | 77,588,976 |
| 1997 | 77,588,976 | 2,109,089 | - | - | - | 79,698,065 |
| 1998 | 79,698,065 | 2,044,582 | - | - | - | 81,742,647 |
| 1999 | 81,742,647 | 1,670,378 | - | - | - | 83,413,025 |
| 2000 | 83,413,025 | 1,867,160 | - | - | (225,955) | 85,054,230 |
| 2001 | 85,054,230 | 2,056,610 | - | - | - | 87,110,840 |
| 2002 | 87,110,840 | 581,287 | 574,777 | - | - | 87,117,350 |
| 2003 | 87,117,350 | 4,359,848 | 459,338 | - | - | 91,017,860 |
| 2004 | 91,017,860 | 2,709,145 | 477,975 | - | - | 93,249,030 |
| 2005 | 93,249,030 | 86,314 | 12,992,668 | - | - | 80,342,676 |
| 2006 | 80,342,676 | 5,031,319 | 639,962 | - | - | 84,734,033 |
| 2007 | 84,734,033 | 8,180,771 | 2,997,270 | - | - | 89,917,534 |
| 2008 | 89,917,534 | 25,180,161 | 3,484,879 | - | (13,624) | 111,599,192 |
| 2009 | 111,599,192 | 23,241,485 | 828,890 | - | - | 134,011,787 |
| 2010 | 134,011,787 | 8,393,015 | 471,262 | - | 23,158 | 141,956,698 |
| 2011 | 141,956,698 | (23,532,410) | (2,091) | - | (4,822,990) | 113,603,389 |
| 2012 | 113,603,389 | 327,443 | 778,376 | - | 628,868 | 113,781,324 |
| 2013 | 113,781,324 | (611,334) | 576,122 | - | - | 112,593,868 |
| 2014 | 112,593,868 | 12,015,128 | 5,212 | - | 4,056,206 | 128,659,990 |
| 2015 | 128,659,990 | 2,974,477 | 37,563 | - | - | 131,596,904 |
| 2016 | 131,596,904 | 10,899,827 | 3,086,251 | - | (1,732,664) | 137,677,816 |
| 2017 | 137,677,816 | 15,754,831 | 3,834,144 | - | - | 149,598,503 |
| 2018 | 149,598,503 | 10,496,806 | 94,149 | - | - | 160,001,160 |
| 2019 | 160,001,160 | 16,691,898 | - | - | - | 176,693,058 |
| 2020 | 176,693,058 | 25,346,357 | - | - | - | 202,039,415 |
| 2021 | 202,039,415 | 12,700,846 | - | - | 25,175,326 | 239,915,587 |
|  |  | 80,990,738 | 3,928,293 | Σ of last 5 years: | ` |  |
|  |  | 16,198,148 | 785,659 | Ave last 5 yrs |  |  |

# Goodness of Fit Test Statistics

**Best 5-Year Retirement Predictors**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| 1 | 110 - S0 | 26.59 | 785,839 | 100.0% | 10.26 |
| 2 | 120 - R1 | 26.77 | 770,994 | 98.1% | 10.78 |
| 3 | 75 - R2 | 26.44 | 802,909 | 97.8% | 11.23 |
| 4 | 95 - L1 | 26.25 | 811,985 | 96.6% | 11.20 |
| 5 | 40 - R4 | 22.57 | 820,716 | 95.5% | 976.73 |
| 6 | 125 - R1 | 26.83 | 745,947 | 94.9% | 10.55 |
| 7 | 50 - L3 | 24.35 | 743,706 | 94.7% | 21.54 |
| 8 | 105 - S0 | 26.48 | 828,687 | 94.5% | 10.57 |
| 9 | 100 - L1 | 26.42 | 740,186 | 94.2% | 10.69 |
| 10 | 75 - S1 | 26.18 | 739,187 | 94.1% | 10.81 |

**Best Conformance Indices**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| L Curves 1 | 60 - L0 | 23.46 | 2,947,855 | -175.2% | 585.47 |
| L Curves 2 | 45 - L2 | 21.44 | 2,329,034 | -96.4% | 278.28 |
| L Curves 3 | 45 - L3 | 22.65 | 1,090,912 | 61.1% | 76.64 |
| S Curves 1 | 45 - S1 | 22.25 | 2,633,027 | -135.1% | 122.10 |
| S Curves 2 | 40 - S6 | 24.00 | 0 | 0.0% | 114.56 |
| S Curves 3 | 50 - S0 | 23.09 | 2,838,604 | -161.3% | 113.39 |
| R Curves 1 | 40 - R4 | 22.57 | 820,716 | 95.5% | 976.73 |
| R Curves 2 | 40 - R5 | 23.38 | 28,064 | 3.6% | 242.55 |
| R Curves 3 | 40 - R3 | 22.10 | 1,763,060 | -24.4% | 159.05 |
| | | | | | |

## Selected Curve Forecasted Survivorship & Interim Retirements

| Selected Curve<br>75 - R2 | Year | Age | Age as % of ASL | Percent Surviving | Surviving Plant | Interim Retirements | |
|---|---|---|---|---|---|---|---|
| Original Installations | | | | | 309,168,740 | | |
| Surviving Balance | 2022 | 14.92 | 19.89% | 97.3953% | 277,511,065 | | |
| 1st Forecast Year | 2023 | 15.92 | 21.22% | 97.1446% | 276,735,778 | 775,287 | |
| 2 | 2024 | 16.92 | 22.56% | 96.9023% | 275,986,699 | 749,079 | |
| 3 | 2025 | 17.92 | 23.89% | 96.6506% | 275,208,670 | 778,029 | |
| 4 | 2026 | 18.92 | 25.22% | 96.3688% | 274,337,434 | 871,237 | |
| 5 | 2027 | 19.92 | 26.56% | 96.0968% | 273,496,519 | 840,914 | |
| 6 | 2028 | 20.92 | 27.89% | 95.8146% | 272,623,961 | 872,558 | |
| 7 | 2029 | 21.92 | 29.22% | 95.4989% | 271,647,848 | 976,113 | |
| 8 | 2030 | 22.92 | 30.56% | 95.1944% | 270,706,633 | 941,215 | |
| 9 | 2031 | 23.92 | 31.89% | 94.8788% | 269,730,909 | 975,724 | |
| 10 | 2032 | 24.92 | 33.22% | 94.5261% | 268,640,425 | 1,090,484 | |
| 11 | 2033 | 25.92 | 34.56% | 94.1863% | 267,589,912 | 1,050,514 | |
| 12 | 2034 | 26.92 | 35.89% | 93.8344% | 266,501,848 | 1,088,064 | |
| 13 | 2035 | 27.92 | 37.22% | 93.4414% | 265,286,913 | 1,214,934 | |
| 14 | 2036 | 28.92 | 38.56% | 93.0632% | 264,117,556 | 1,169,358 | |
| 15 | 2037 | 29.92 | 39.89% | 92.6718% | 262,907,426 | 1,210,130 | |
| 16 | 2038 | 30.92 | 41.22% | 92.2351% | 261,557,367 | 1,350,059 | |
| 17 | 2039 | 31.92 | 42.56% | 91.8152% | 260,259,068 | 1,298,299 | |
| 18 | 2040 | 32.92 | 43.89% | 91.3810% | 258,916,599 | 1,342,469 | |
| 19 | 2041 | 33.92 | 45.22% | 90.8970% | 257,420,157 | 1,496,443 | |
| 20 | 2042 | 34.92 | 46.56% | 90.4319% | 255,982,284 | 1,437,873 | |
| 21 | 2043 | 35.92 | 47.89% | 89.9514% | 254,496,676 | 1,485,608 | |
| 22 | 2044 | 36.92 | 49.22% | 89.4162% | 252,842,041 | 1,654,635 | |
| 23 | 2045 | 37.92 | 50.56% | 88.9024% | 251,253,472 | 1,588,569 | |
| 24 | 2046 | 38.92 | 51.89% | 88.3719% | 249,613,461 | 1,640,011 | |
| 25 | 2047 | 39.92 | 53.22% | 87.7816% | 247,788,357 | 1,825,104 | |
| 26 | 2048 | 40.92 | 54.56% | 87.2153% | 246,037,571 | 1,750,786 | |
| 27 | 2049 | 41.92 | 55.89% | 86.6311% | 244,231,537 | 1,806,034 | |
| 28 | 2050 | 42.92 | 57.22% | 85.9816% | 242,223,360 | 2,008,177 | |
| | | | | | 7,338,140,482 | **35,287,705** | Total Interm Retires |
| | | | | **Average Remaining Life** | **26.44** | **802,909** | 5 Yr Ave Ann Retires |

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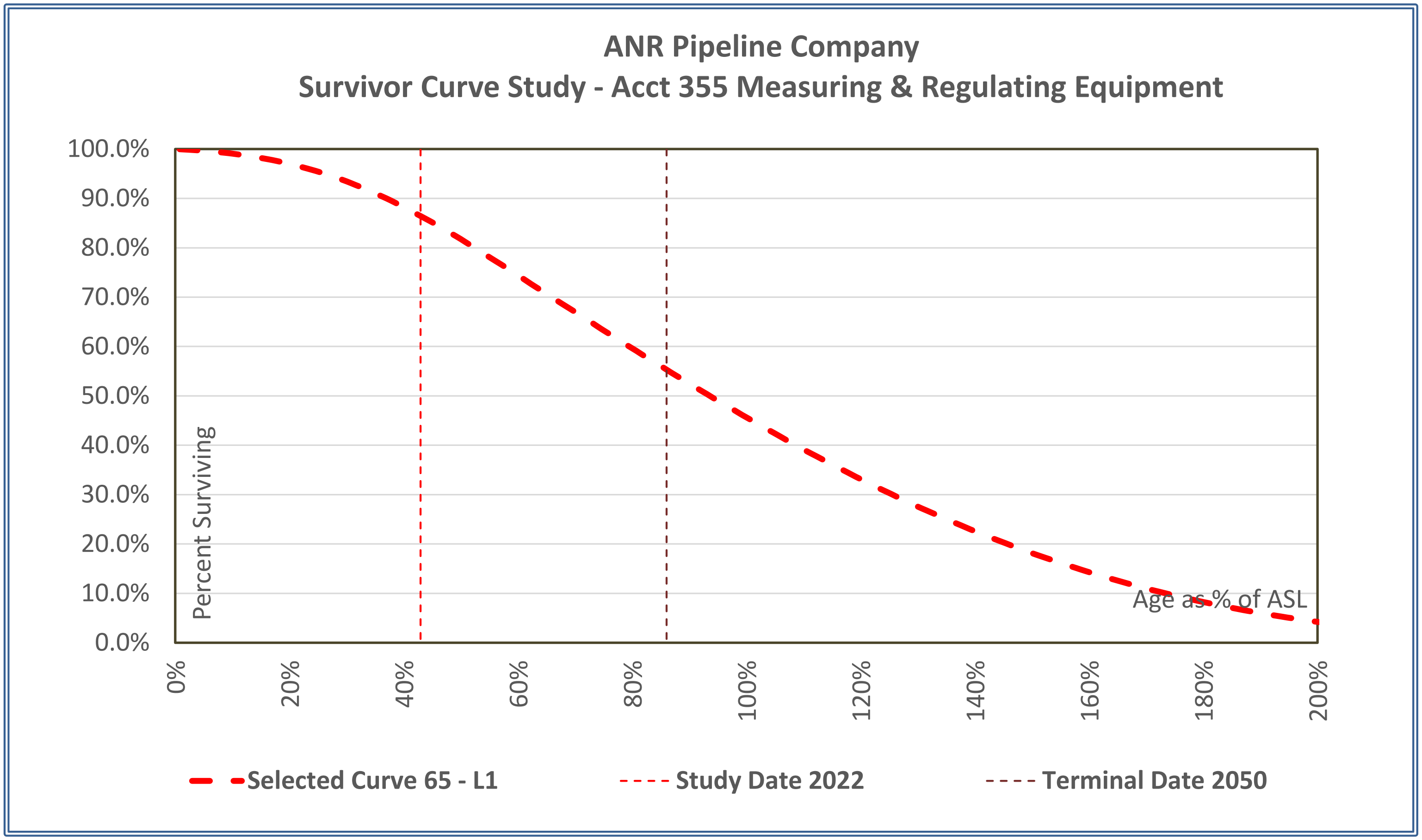
# ANR Pipeline Company

## Survivor Curve Study - Acct 355 Measuring & Regulating Equipment

**Salient Statistical Results**

| Economic Life | Ave Age at Study Date: | Average Service Life | Age as % of ASL | Iowa Curve | Conformance Index | Retirement Index | Average Remaining Life |
|---|---|---|---|---|---|---|---|
| **2050** | 27.91 | 65 | 42.9% | L1 | 257 | #DIV/0! | **22.58** |



## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1971 | - | 217,102 | - | - | - | 217,102 |
| 1972 | 217,102 | 244,192 | - | - | - | 461,294 |
| 1973 | 461,294 | (58,818) | - | - | - | 402,476 |
| 1974 | 402,476 | (87,041) | - | - | - | 315,435 |
| 1975 | 315,435 | 52,067 | - | - | - | 367,502 |
| 1976 | 367,502 | 1,411,066 | - | - | - | 1,778,568 |
| 1977 | 1,778,568 | 188,429 | - | - | - | 1,966,997 |
| 1978 | 1,966,997 | (339,985) | - | - | - | 1,627,012 |
| 1979 | 1,627,012 | 2,764,999 | - | - | - | 4,392,011 |
| 1980 | 4,392,011 | 426,596 | - | - | - | 4,818,607 |
| 1981 | 4,818,607 | 827,330 | - | - | - | 5,645,937 |
| 1982 | 5,645,937 | 4,936,922 | 2,057 | - | - | 10,580,802 |
| 1983 | 10,580,802 | 141,584 | - | - | 449,142 | 11,171,528 |
| 1984 | 11,171,528 | (201,757) | - | - | 12,019 | 10,981,790 |
| 1985 | 10,981,790 | (136,840) | - | - | 68,481 | 10,913,431 |
| 1986 | 10,913,431 | 124,759 | - | - | - | 11,038,190 |
| 1987 | 11,038,190 | 251,474 | - | - | - | 11,289,664 |
| 1988 | 11,289,664 | 51,643 | - | - | - | 11,341,307 |
| 1989 | 11,341,307 | 818 | - | - | - | 11,342,125 |
| 1990 | 11,342,125 | 281,308 | - | - | - | 11,623,433 |

## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1991 | 11,623,433 | 13,464 | - | - | - | 11,636,897 |
| 1992 | 11,636,897 | 389,974 | - | - | - | 12,026,871 |
| 1993 | 12,026,871 | 27,517 | - | - | - | 12,054,388 |
| 1994 | 12,054,388 | 173,303 | 57,970 | - | - | 12,169,721 |
| 1995 | 12,169,721 | 304,355 | 93,318 | - | - | 12,380,758 |
| 1996 | 12,380,758 | 295,757 | - | - | - | 12,676,515 |
| 1997 | 12,676,515 | 136,765 | - | - | - | 12,813,280 |
| 1998 | 12,813,280 | 579,821 | - | - | - | 13,393,101 |
| 1999 | 13,393,101 | 650,528 | - | - | - | 14,043,629 |
| 2000 | 14,043,629 | 145,824 | - | - | (17,391) | 14,172,062 |
| 2001 | 14,172,062 | 56,428 | - | - | - | 14,228,490 |
| 2002 | 14,228,490 | - | - | - | - | 14,228,490 |
| 2003 | 14,228,490 | 286,999 | 19,588 | - | - | 14,495,901 |
| 2004 | 14,495,901 | 459,983 | 13,482 | - | - | 14,942,402 |
| 2005 | 14,942,402 | 118,723 | 3,228,978 | - | - | 11,832,147 |
| 2006 | 11,832,147 | 122,286 | 167,094 | - | - | 11,787,339 |
| 2007 | 11,787,339 | 256,386 | - | - | - | 12,043,725 |
| 2008 | 12,043,725 | 555,794 | 91,873 | - | - | 12,507,646 |
| 2009 | 12,507,646 | (10,617) | 6,673 | - | - | 12,490,356 |
| 2010 | 12,490,356 | - | - | - | (23,158) | 12,467,198 |
| 2011 | 12,467,198 | - | - | - | - | 12,467,198 |
| 2012 | 12,467,198 | - | - | - | - | 12,467,198 |
| 2013 | 12,467,198 | - | - | - | - | 12,467,198 |
| 2014 | 12,467,198 | - | - | - | 445,158 | 12,912,356 |
| 2015 | 12,912,356 | - | - | - | - | 12,912,356 |
| 2016 | 12,912,357 | 11,229 | - | - | (138,235) | 12,785,351 |
| 2017 | 12,785,351 | 320 | - | - | - | 12,785,671 |
| 2018 | 12,785,671 | 87,594 | - | - | - | 12,873,265 |
| 2019 | 12,873,266 | (1,849) | - | - | - | 12,871,417 |
| 2020 | 12,871,417 | 79,543 | - | - | - | 12,950,960 |
| 2021 | 12,950,960 | 1,176,089 | - | - | 1,715,610 | 15,842,659 |
| | | 1,341,697 | - | Σ of last 5 years: | ` | |
| | | 268,339 | - | Ave last 5 yrs | | |

# Goodness of Fit Test Statistics

**Best 5-Year Retirement Predictors**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| 1 | 5 - L0 | 28.00 | - | #DIV/0! | 1.35 |
| 2 | 5 - L0 | 28.00 | - | #DIV/0! | 1.35 |
| 3 | 5 - L0 | 28.00 | - | #DIV/0! | 1.35 |
| 4 | 5 - L0 | 28.00 | - | #DIV/0! | 1.35 |
| 5 | 5 - L0 | 28.00 | - | #DIV/0! | 1.35 |
| 6 | 5 - L0 | 28.00 | - | #DIV/0! | 1.35 |
| 7 | 5 - L0 | 28.00 | - | #DIV/0! | 1.35 |
| 8 | 5 - L0 | 28.00 | - | #DIV/0! | 1.35 |
| 9 | 5 - L0 | 28.00 | - | #DIV/0! | 1.35 |
| 10 | 5 - L0 | 28.00 | - | #DIV/0! | 1.35 |

**Best Conformance Indices**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| L Curves 1 | 65 - L1 | 22.58 | 218,425 | #DIV/0! | 256.84 |
| L Curves 2 | 80 - L0 | 24.20 | 161,573 | #DIV/0! | 124.49 |
| L Curves 3 | 50 - L3 | 17.79 | 278,275 | #DIV/0! | 118.76 |
| S Curves 1 | 50 - S2 | 19.25 | 270,963 | #DIV/0! | 197.74 |
| S Curves 2 | 60 - S0 | 22.98 | 197,124 | #DIV/0! | 168.75 |
| S Curves 3 | 55 - S1 | 21.50 | 231,254 | #DIV/0! | 111.41 |
| R Curves 1 | 45 - R4 | 15.97 | 243,790 | #DIV/0! | 249.41 |
| R Curves 2 | 60 - R1 | 23.75 | 157,139 | #DIV/0! | 164.00 |
| R Curves 3 | 50 - R2 | 21.15 | 216,190 | #DIV/0! | 107.66 |
| | | | | | |

## Selected Curve Forecasted Survivorship & Interim Retirements

| Selected Curve<br>65 - L1 | Year | Age | Age as % of ASL | Percent Surviving | Surviving Plant | Interim Retirements | |
|---|---|---|---|---|---|---|---|
| Original Installations | | | | | 21,053,351 | | |
| Surviving Balance | 2022 | 27.91 | 42.94% | 86.4415% | 17,372,320 | | |
| 1st Forecast Year | 2023 | 28.91 | 44.48% | 85.4804% | 17,169,977 | 202,343 | |
| 2 | 2024 | 29.91 | 46.02% | 84.4265% | 16,948,092 | 221,885 | |
| 3 | 2025 | 30.91 | 47.56% | 83.4136% | 16,734,854 | 213,238 | |
| 4 | 2026 | 31.91 | 49.10% | 82.3790% | 16,517,036 | 217,818 | |
| 5 | 2027 | 32.91 | 50.64% | 81.2541% | 16,280,197 | 236,838 | |
| 6 | 2028 | 33.91 | 52.18% | 80.1820% | 16,054,485 | 225,712 | |
| 7 | 2029 | 34.91 | 53.71% | 79.0227% | 15,810,419 | 244,066 | |
| 8 | 2030 | 35.91 | 55.25% | 77.9240% | 15,579,092 | 231,327 | |
| 9 | 2031 | 36.91 | 56.79% | 76.8164% | 15,345,911 | 233,181 | |
| 10 | 2032 | 37.91 | 58.33% | 75.6284% | 15,095,793 | 250,118 | |
| 11 | 2033 | 38.91 | 59.87% | 74.5113% | 14,860,623 | 235,170 | |
| 12 | 2034 | 39.91 | 61.41% | 73.3192% | 14,609,640 | 250,983 | |
| 13 | 2035 | 40.91 | 62.94% | 72.2020% | 14,374,419 | 235,221 | |
| 14 | 2036 | 41.91 | 64.48% | 71.0854% | 14,139,339 | 235,080 | |
| 15 | 2037 | 42.91 | 66.02% | 69.8955% | 13,888,824 | 250,515 | |
| 16 | 2038 | 43.91 | 67.56% | 68.7813% | 13,654,264 | 234,560 | |
| 17 | 2039 | 44.91 | 69.10% | 67.6689% | 13,420,065 | 234,199 | |
| 18 | 2040 | 45.91 | 70.64% | 66.4846% | 13,170,730 | 249,334 | |
| 19 | 2041 | 46.91 | 72.18% | 65.3768% | 12,937,502 | 233,228 | |
| 20 | 2042 | 47.91 | 73.71% | 64.1982% | 12,689,364 | 248,138 | |
| 21 | 2043 | 48.91 | 75.25% | 63.0965% | 12,457,408 | 231,956 | |
| 22 | 2044 | 49.91 | 76.79% | 61.9981% | 12,226,174 | 231,234 | |
| 23 | 2045 | 50.91 | 78.33% | 60.8307% | 11,980,398 | 245,776 | |
| 24 | 2046 | 51.91 | 79.87% | 59.7405% | 11,750,875 | 229,523 | |
| 25 | 2047 | 52.91 | 81.41% | 58.5826% | 11,507,079 | 243,796 | |
| 26 | 2048 | 53.91 | 82.94% | 57.5019% | 11,279,555 | 227,523 | |
| 27 | 2049 | 54.91 | 84.48% | 56.4262% | 11,053,102 | 226,454 | |
| 28 | 2050 | 55.91 | 86.02% | 55.2849% | 10,812,804 | 240,297 | |
| | | | | | 392,348,022 | **6,559,516** | Total Interm Retires |
| | | | | **Average Remaining Life** | **22.58** | **218,425** | 5 Yr Ave Ann Retires |

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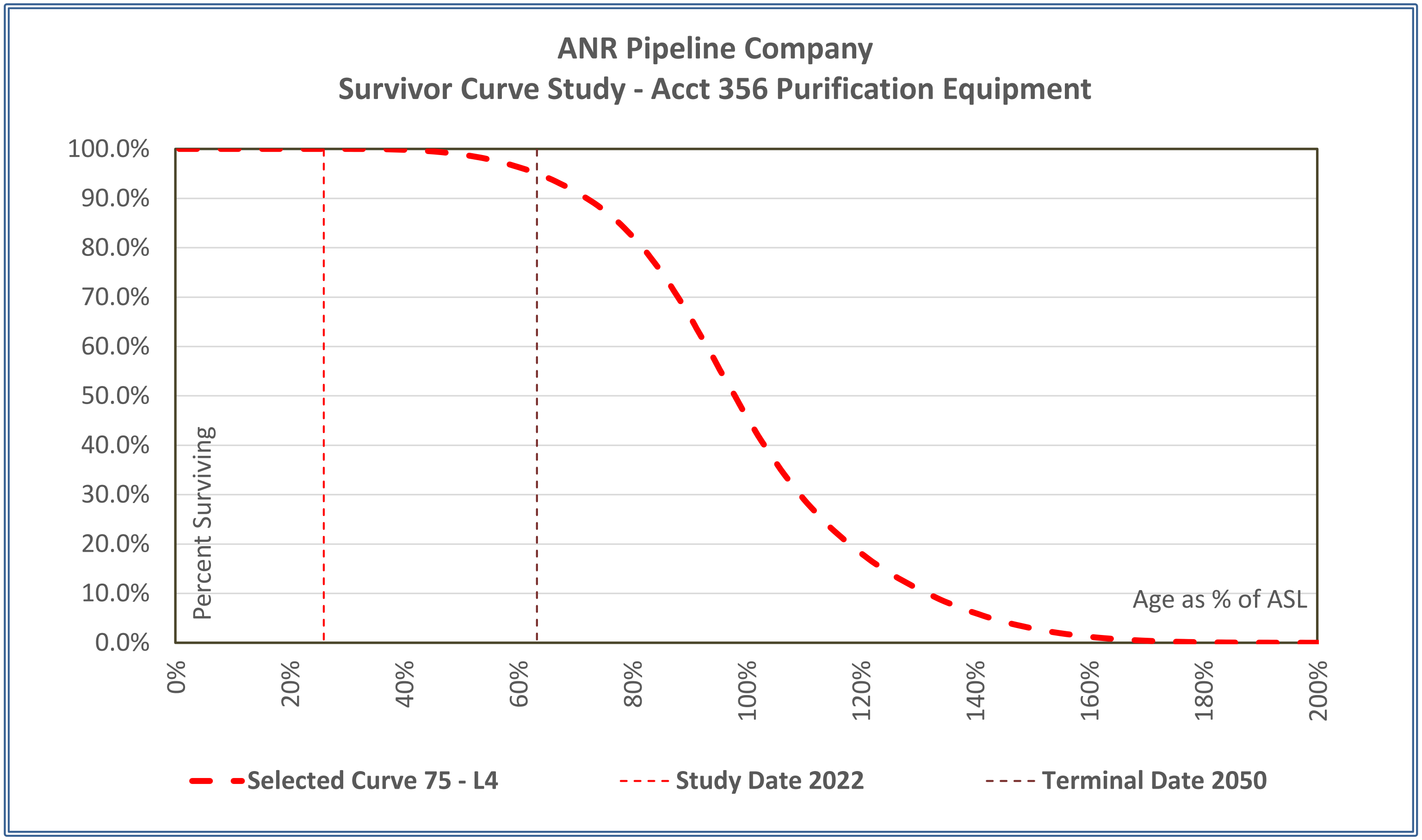
# ANR Pipeline Company

## Survivor Curve Study - Acct 356 Purification Equipment

### Salient Statistical Results

| Economic Life | Ave Age at Study Date: | Average Service Life | Age as % of ASL | Iowa Curve | Conformance Index | Retirement Index | Average Remaining Life |
|---|---|---|---|---|---|---|---|
| **2050** | 19.49 | 75 | 26.0% | L4 | 2 | 97% | **27.45** |



## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1971 | - | 69,117 | - | - | - | 69,117 |
| 1972 | 69,117 | 1,486,203 | - | - | - | 1,555,320 |
| 1973 | 1,555,320 | 96,713 | - | - | - | 1,652,033 |
| 1974 | 1,652,033 | 111,836 | - | - | - | 1,763,869 |
| 1975 | 1,763,869 | 32,460 | - | - | - | 1,796,329 |
| 1976 | 1,796,329 | - | - | - | - | 1,796,329 |
| 1977 | 1,796,329 | 371,302 | - | - | - | 2,167,631 |
| 1978 | 2,167,631 | 115,835 | - | - | - | 2,283,466 |
| 1979 | 2,283,466 | 1,176,077 | - | - | - | 3,459,543 |
| 1980 | 3,459,543 | 121,644 | - | - | - | 3,581,187 |
| 1981 | 3,581,187 | 4,791,825 | - | - | - | 8,373,012 |
| 1982 | 8,373,012 | 2,889,879 | - | - | - | 11,262,891 |
| 1983 | 11,262,891 | (449,477) | - | - | - | 10,813,414 |
| 1984 | 10,813,414 | (2,832,160) | - | - | - | 7,981,254 |
| 1985 | 7,981,254 | 277,285 | - | - | - | 8,258,539 |
| 1986 | 8,258,539 | 60,877 | - | - | - | 8,319,416 |
| 1987 | 8,319,416 | 39,879 | - | - | - | 8,359,295 |
| 1988 | 8,359,295 | 64,339 | - | - | - | 8,423,634 |
| 1989 | 8,423,634 | - | - | - | - | 8,423,634 |
| 1990 | 8,423,634 | - | - | - | (1,163) | 8,422,471 |

## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1991 | 8,422,471 | 9,026 | - | - | - | 8,431,497 |
| 1992 | 8,431,497 | 52,047 | - | - | - | 8,483,544 |
| 1993 | 8,483,544 | - | - | - | - | 8,483,544 |
| 1994 | 8,483,544 | 5,882 | - | - | - | 8,489,426 |
| 1995 | 8,489,426 | - | - | - | - | 8,489,426 |
| 1996 | 8,489,426 | - | - | - | - | 8,489,426 |
| 1997 | 8,489,426 | 73,688 | - | - | - | 8,563,114 |
| 1998 | 8,563,114 | 3,449 | - | - | - | 8,566,563 |
| 1999 | 8,566,563 | 367,727 | - | - | - | 8,934,290 |
| 2000 | 8,934,290 | 178,609 | - | - | (250,083) | 8,862,816 |
| 2001 | 8,862,816 | 3,028,807 | - | - | - | 11,891,623 |
| 2002 | 11,891,623 | - | - | - | - | 11,891,623 |
| 2003 | 11,891,623 | 1,932,575 | - | - | - | 13,824,198 |
| 2004 | 13,824,198 | (89,233) | - | - | - | 13,734,965 |
| 2005 | 13,734,965 | 797,363 | 1,202,184 | - | - | 13,330,144 |
| 2006 | 13,330,144 | 92,619 | 634,225 | - | - | 12,788,538 |
| 2007 | 12,788,538 | 216,078 | 2,248 | - | - | 13,002,368 |
| 2008 | 13,002,368 | (12,000) | 72,271 | - | - | 12,918,097 |
| 2009 | 12,918,097 | 9,648 | 205,514 | - | - | 12,722,231 |
| 2010 | 12,722,231 | - | - | - | - | 12,722,231 |
| 2011 | 12,722,231 | - | - | - | - | 12,722,231 |
| 2012 | 12,722,231 | - | - | - | - | 12,722,231 |
| 2013 | 12,722,231 | 952,787 | - | - | - | 13,675,018 |
| 2014 | 13,675,018 | 505,276 | - | - | - | 14,180,294 |
| 2015 | 14,180,294 | 1,477,839 | - | - | - | 15,658,133 |
| 2016 | 15,658,133 | 3,269,768 | 495,574 | - | (1,008,529) | 17,423,798 |
| 2017 | 17,423,798 | (888,782) | 5,107 | - | - | 16,529,909 |
| 2018 | 16,529,909 | 48,616 | - | - | - | 16,578,525 |
| 2019 | 16,578,524 | 28,646 | - | - | - | 16,607,170 |
| 2020 | 16,607,170 | 107,770 | - | - | - | 16,714,940 |
| 2021 | 16,714,940 | 175,379 | - | - | 7,575,502 | 24,465,821 |
|  |  | (528,371) | 5,107 | Σ of last 5 years: ` |  |  |
|  |  | (105,674) | 1,021 | Ave last 5 yrs |  |  |

# Goodness of Fit Test Statistics

**Best 5-Year Retirement Predictors**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| 1 | 150 - R4 | 27.95 | 1,049 | 97.3% | 1.66 |
| 2 | 75 - L4 | 27.45 | 986 | 96.5% | 1.70 |
| 3 | 95 - S3 | 27.80 | 982 | 96.2% | 1.67 |
| 4 | 145 - R4 | 27.95 | 1,114 | 90.9% | 1.66 |
| 5 | 130 - L3 | 27.83 | 907 | 88.8% | 1.67 |
| 6 | 140 - R4 | 27.94 | 1,227 | 79.9% | 1.66 |
| 7 | 55 - S4 | 25.92 | 1,299 | 72.8% | 1.83 |
| 8 | 100 - S3 | 27.86 | 687 | 67.3% | 1.67 |
| 9 | 10 - S1 | 27.99 | 1,358 | 67.1% | 3.04 |
| 10 | 135 - R4 | 27.93 | 1,394 | 63.5% | 1.66 |

**Best Conformance Indices**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| L Curves 1 | 25 - L1 | 12.83 | 763,622 | -74562.2% | 291.65 |
| L Curves 2 | 25 - L0 | 15.23 | 627,227 | -61208.6% | 122.73 |
| L Curves 3 | 25 - L2 | 9.59 | 1,053,032 | -102896.9% | 81.79 |
| S Curves 1 | 25 - S0 | 11.28 | 743,041 | -72547.3% | 537.97 |
| S Curves 2 | 25 - S1 | 8.00 | 951,959 | -93001.4% | 140.69 |
| S Curves 3 | 25 - S2 | 4.47 | 1,208,398 | -118108.0% | 59.97 |
| R Curves 1 | 25 - R2 | 6.05 | 947,534 | -92568.2% | 196.40 |
| R Curves 2 | 25 - R3 | 2.03 | 1,198,100 | -117099.7% | 41.12 |
| R Curves 3 | 25 - R4 | -1.36 | 1,408,424 | -137691.6% | 21.76 |
| | | | | | |

## Selected Curve Forecasted Survivorship & Interim Retirements

| Selected Curve<br>75 - L4 | Year | Age | Age as % of ASL | Percent Surviving | Surviving Plant | Interim Retirements | |
|---|---|---|---|---|---|---|---|
| Original Installations | | | | | 27,082,945 | | |
| Surviving Balance | 2022 | 19.49 | 25.98% | 99.9998% | 16,888,607 | | |
| 1st Forecast Year | 2023 | 20.49 | 27.32% | 99.9992% | 16,888,437 | 170 | |
| 2 | 2024 | 21.49 | 28.65% | 99.9978% | 16,888,057 | 380 | |
| 3 | 2025 | 22.49 | 29.98% | 99.9950% | 16,887,309 | 748 | |
| 4 | 2026 | 23.49 | 31.32% | 99.9897% | 16,885,867 | 1,442 | |
| 5 | 2027 | 24.49 | 32.65% | 99.9816% | 16,883,678 | 2,188 | |
| 6 | 2028 | 25.49 | 33.98% | 99.9694% | 16,880,378 | 3,300 | |
| 7 | 2029 | 26.49 | 35.32% | 99.9503% | 16,875,203 | 5,175 | |
| 8 | 2030 | 27.49 | 36.65% | 99.9255% | 16,868,500 | 6,703 | |
| 9 | 2031 | 28.49 | 37.98% | 99.8925% | 16,859,555 | 8,945 | |
| 10 | 2032 | 29.49 | 39.32% | 99.8458% | 16,846,913 | 12,642 | |
| 11 | 2033 | 30.49 | 40.65% | 99.7904% | 16,831,887 | 15,026 | |
| 12 | 2034 | 31.49 | 41.98% | 99.7214% | 16,813,199 | 18,689 | |
| 13 | 2035 | 32.49 | 43.32% | 99.6298% | 16,788,398 | 24,801 | |
| 14 | 2036 | 33.49 | 44.65% | 99.5267% | 16,760,478 | 27,919 | |
| 15 | 2037 | 34.49 | 45.98% | 99.4042% | 16,727,314 | 33,165 | |
| 16 | 2038 | 35.49 | 47.32% | 99.2485% | 16,685,129 | 42,185 | |
| 17 | 2039 | 36.49 | 48.65% | 99.0796% | 16,639,392 | 45,736 | |
| 18 | 2040 | 37.49 | 49.98% | 98.8854% | 16,586,806 | 52,586 | |
| 19 | 2041 | 38.49 | 51.32% | 98.6459% | 16,521,937 | 64,870 | |
| 20 | 2042 | 39.49 | 52.65% | 98.3933% | 16,453,530 | 68,407 | |
| 21 | 2043 | 40.49 | 53.98% | 98.1099% | 16,376,772 | 76,758 | |
| 22 | 2044 | 41.49 | 55.32% | 97.7683% | 16,284,254 | 92,518 | |
| 23 | 2045 | 42.49 | 56.65% | 97.4156% | 16,188,732 | 95,522 | |
| 24 | 2046 | 43.49 | 57.98% | 97.0271% | 16,083,526 | 105,206 | |
| 25 | 2047 | 44.49 | 59.32% | 96.5671% | 15,958,929 | 124,597 | |
| 26 | 2048 | 45.49 | 60.65% | 96.0995% | 15,832,299 | 126,630 | |
| 27 | 2049 | 46.49 | 61.98% | 95.5914% | 15,694,693 | 137,605 | |
| 28 | 2050 | 47.49 | 63.32% | 94.9969% | 15,533,672 | 161,021 | |
| | | | | | 463,524,844 | **1,354,935** | Total Interm Retires |
| | | | | **Average Remaining Life** | **27.45** | **986** | 5 Yr Ave Ann Retires |

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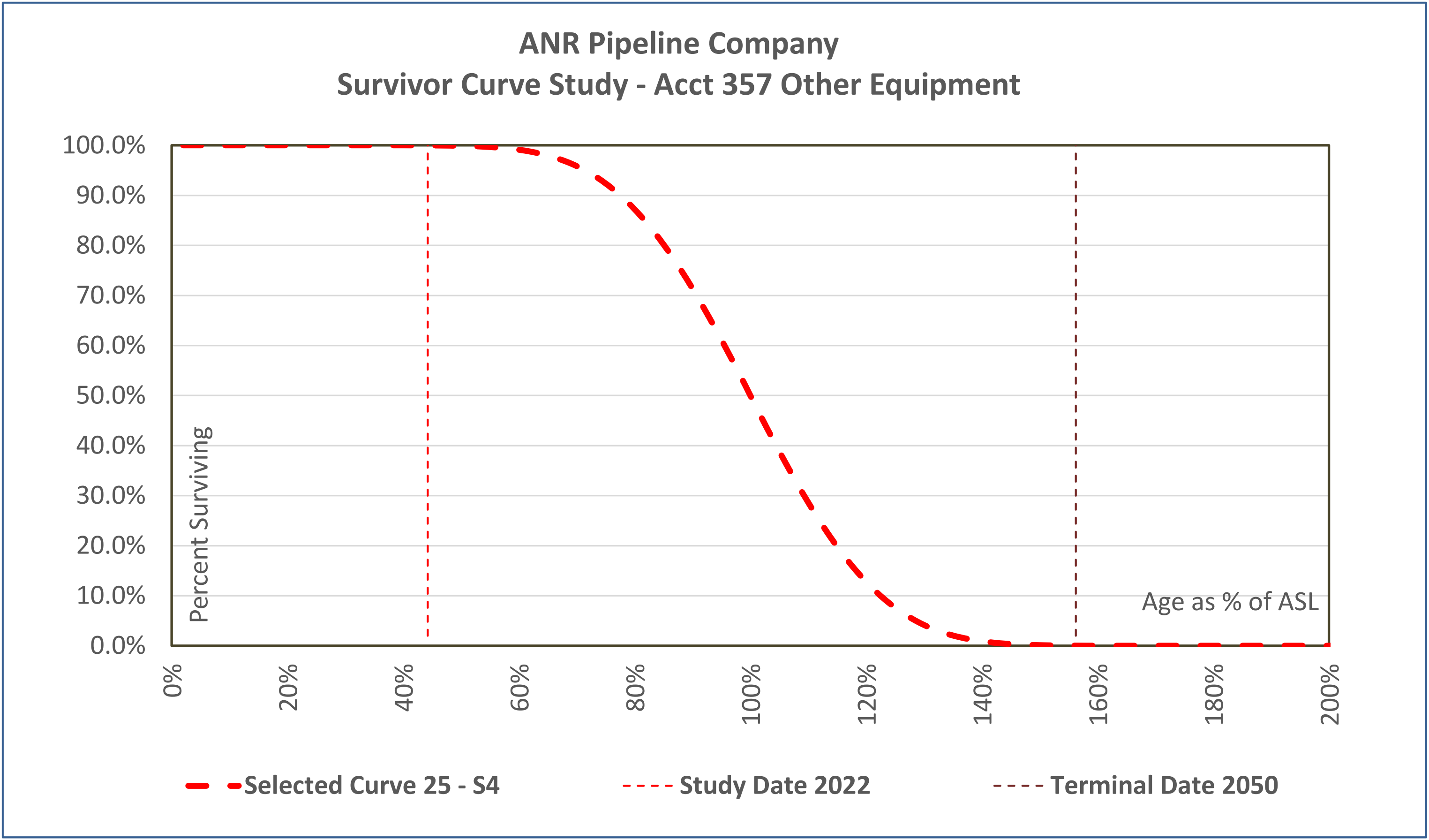
# ANR Pipeline Company

## Survivor Curve Study - Acct 357 Other Equipment

### Salient Statistical Results

| Economic Life | Ave Age at Study Date: | Average Service Life | Age as % of ASL | Iowa Curve | Conformance Index | Retirement Index | Average Remaining Life |
|---|---|---|---|---|---|---|---|
| **2050** | 11.06 | 25 | 44.2% | S4 | 847 | #DIV/0! | **13.06** |



## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 2000 | - | - | - | - | - | - |
| 2001 | - | 176,287 | - | - | - | 176,287 |
| 2002 | 176,287 | - | - | - | - | 176,287 |
| 2003 | 176,287 | 30,531 | - | - | - | 206,818 |
| 2004 | 206,818 | - | - | - | - | 206,818 |
| 2005 | 206,818 | - | - | - | - | 206,818 |
| 2006 | 206,818 | 19,687 | 30,531 | - | - | 195,974 |
| 2007 | 195,974 | 2,326 | - | - | - | 198,300 |
| 2008 | 198,300 | 85,688 | - | - | - | 283,988 |
| 2009 | 283,988 | - | - | - | - | 283,988 |
| 2010 | 283,988 | - | - | - | - | 283,988 |
| 2011 | 283,988 | - | - | - | - | 283,988 |
| 2012 | 283,988 | 98,683 | - | - | - | 382,671 |
| 2013 | 382,671 | (64,770) | - | - | - | 317,901 |
| 2014 | 317,901 | 184,001 | - | - | 63,193 | 565,095 |
| 2015 | 565,095 | - | - | - | - | 565,095 |
| 2016 | 565,095 | 187,672 | - | - | - | 752,767 |
| 2017 | 752,767 | (179,537) | - | - | - | 573,230 |
| 2018 | 573,231 | - | - | - | - | 573,231 |
| 2019 | 573,231 | - | - | - | - | 573,231 |
| 2020 | 573,231 | - | - | - | - | 573,231 |
| 2021 | 573,231 | - | - | - | 804,348 | 1,377,579 |
| | | (179,537) | - | Σ of last 5 years: | ` | |
| | | (35,907) | - | Ave last 5 yrs | | |

# Goodness of Fit Test Statistics

| Best 5-Year Retirement Predictors | | | | | |
|---|---|---|---|---|---|
| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
| 1 | 5 - L4 | 28.00 | - | #DIV/0! | 1.28 |
| 2 | 5 - L4 | 28.00 | - | #DIV/0! | 1.28 |
| 3 | 5 - L4 | 28.00 | - | #DIV/0! | 1.28 |
| 4 | 5 - L4 | 28.00 | - | #DIV/0! | 1.28 |
| 5 | 5 - L4 | 28.00 | - | #DIV/0! | 1.28 |
| 6 | 5 - L4 | 28.00 | - | #DIV/0! | 1.28 |
| 7 | 5 - L4 | 28.00 | - | #DIV/0! | 1.28 |
| 8 | 5 - L4 | 28.00 | - | #DIV/0! | 1.28 |
| 9 | 5 - L4 | 28.00 | - | #DIV/0! | 1.28 |
| 10 | 5 - L4 | 28.00 | - | #DIV/0! | 1.28 |

| Best Conformance Indices | | | | | |
|---|---|---|---|---|---|
| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
| L Curves 1 | 95 - L0 | 25.69 | 3,670 | #DIV/0! | 366.28 |
| L Curves 2 | 40 - L2 | 21.70 | 4,950 | #DIV/0! | 213.47 |
| L Curves 3 | 30 - L3 | 17.19 | 6,331 | #DIV/0! | 182.16 |
| S Curves 1 | 25 - S4 | 12.83 | 2,745 | #DIV/0! | 846.51 |
| S Curves 2 | 60 - S0 | 24.86 | 4,386 | #DIV/0! | 608.67 |
| S Curves 3 | 45 - S1 | 23.59 | 4,474 | #DIV/0! | 99.00 |
| R Curves 1 | 75 - R1 | 26.00 | 3,231 | #DIV/0! | 845.50 |
| R Curves 2 | 30 - R3 | 18.56 | 6,240 | #DIV/0! | 159.28 |
| R Curves 3 | 50 - R2 | 25.19 | 3,281 | #DIV/0! | 144.56 |
| | | | | | |

## Selected Curve Forecasted Survivorship & Interim Retirements

| Selected Curve<br>25 - S4 | Year | Age | Age as % of ASL | Percent Surviving | Surviving Plant | Interim Retirements | |
|---|---|---|---|---|---|---|---|
| Original Installations | | | | | 754,737 | | |
| Surviving Balance | 2022 | 11.06 | 44.24% | 99.9773% | 724,207 | | |
| 1st Forecast Year | 2023 | 12.06 | 48.24% | 99.9295% | 723,847 | 360 | |
| 2 | 2024 | 13.06 | 52.24% | 99.8117% | 722,958 | 889 | |
| 3 | 2025 | 14.06 | 56.24% | 99.5553% | 721,023 | 1,935 | |
| 4 | 2026 | 15.06 | 60.24% | 99.0538% | 717,238 | 3,785 | |
| 5 | 2027 | 16.06 | 64.24% | 98.1591% | 710,485 | 6,753 | |
| 6 | 2028 | 17.06 | 68.24% | 96.6870% | 699,375 | 11,110 | |
| 7 | 2029 | 18.06 | 72.24% | 94.4340% | 682,370 | 17,004 | |
| 8 | 2030 | 19.06 | 76.24% | 91.2046% | 657,997 | 24,373 | |
| 9 | 2031 | 20.06 | 80.24% | 86.8462% | 625,102 | 32,895 | |
| 10 | 2032 | 21.06 | 84.24% | 81.2847% | 583,128 | 41,974 | |
| 11 | 2033 | 22.06 | 88.24% | 74.5535% | 532,324 | 50,803 | |
| 12 | 2034 | 23.06 | 92.24% | 66.8070% | 473,859 | 58,466 | |
| 13 | 2035 | 24.06 | 96.24% | 58.3160% | 409,775 | 64,084 | |
| 14 | 2036 | 25.06 | 100.24% | 49.4418% | 342,797 | 66,977 | |
| 15 | 2037 | 26.06 | 104.24% | 40.5936% | 276,017 | 66,781 | |
| 16 | 2038 | 27.06 | 108.24% | 32.1775% | 212,497 | 63,520 | |
| 17 | 2039 | 28.06 | 112.24% | 24.5453% | 154,894 | 57,603 | |
| 18 | 2040 | 29.06 | 116.24% | 17.9543% | 105,150 | 49,745 | |
| 19 | 2041 | 30.06 | 120.24% | 12.5438% | 64,315 | 40,835 | |
| 20 | 2042 | 31.06 | 124.24% | 8.3325% | 32,530 | 31,784 | |
| 21 | 2043 | 32.06 | 128.24% | 5.2348% | 9,150 | 23,380 | |
| 22 | 2044 | 33.06 | 132.24% | 3.0906% | | 9,150 | |
| 23 | 2045 | 34.06 | 136.24% | 1.7016% | | - | |
| 24 | 2046 | 35.06 | 140.24% | 0.8655% | | - | |
| 25 | 2047 | 36.06 | 144.24% | 0.4019% | | - | |
| 26 | 2048 | 37.06 | 148.24% | 0.1678% | | - | |
| 27 | 2049 | 38.06 | 152.24% | 0.0618% | | - | |
| 28 | 2050 | 39.06 | 156.24% | 0.0195% | | - | |
| | | | | | 9,456,830 | **724,207** | Total Interm Retires |
| | | | | **Average Remaining Life** | **13.06** | **2,745** | 5 Yr Ave Ann Retires |

**United States of America**
**before the**
**Federal Energy Regulatory Commission**

| | | |
|---|---|---|
| | § | |
| ANR Pipeline Company | § | Docket No. RP 22-____-000 |
| | § | |

# Transmission Survivor Curve Study

## Supporting the Prepared Direct Testimony of
## Patrick R. Crowley
## on behalf of ANR Pipeline Company

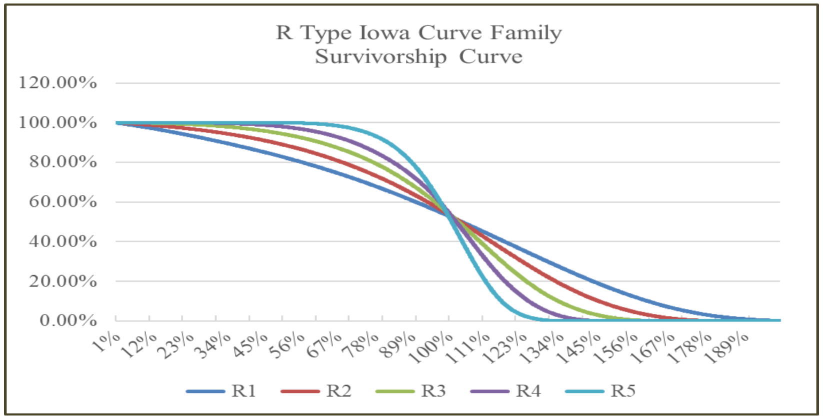
BROWN, WILLIAMS, MOORHEAD & QUINN, INC.
ENERGY CONSULTANTS

# Contents

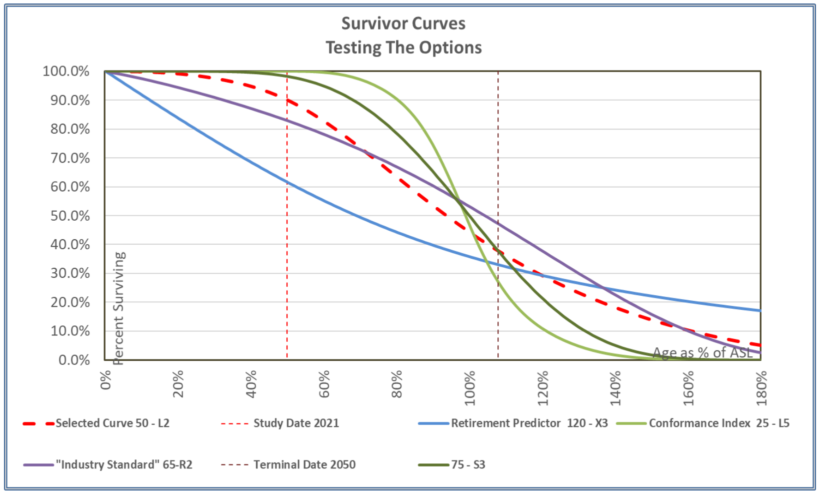
## Transmission Plant

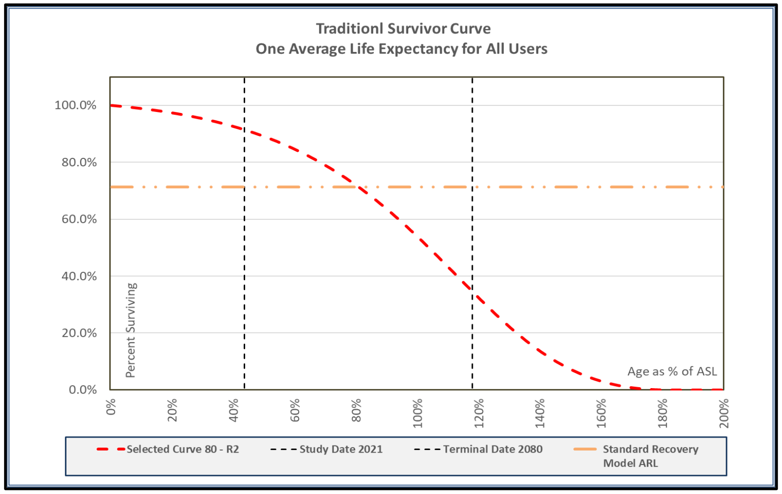
## Brief Primer on Survivor Curve Theory

Survivor Curve Theory is based on an assumption that industrial property expires from service in patterns rather than in random happinstance and that these patterns are discoverable, measurable, and predictable. The frequency distributions of these retirement patterns tend to follow recognized patterns known as Iowa Survivor Curves.



Under the Simulated Plant Record (SPR) model, each of over 660 curve and service life options are tested against the actual data to find which of the curves provides the best predictor of retirement behavior.





The survivor curves here illustrate the proportion of plant in service over the probable life of the assets. As plant retires, the depreciable base declines, as do the depreciation accruals (rate * plant). A simple rate calculation, (net plant / remaining life) will fall short of full recovery of the investors capital because not all plant survives the entire rate period. The solution is to determine the *average* remaining life and apply that rate across the remaining life.

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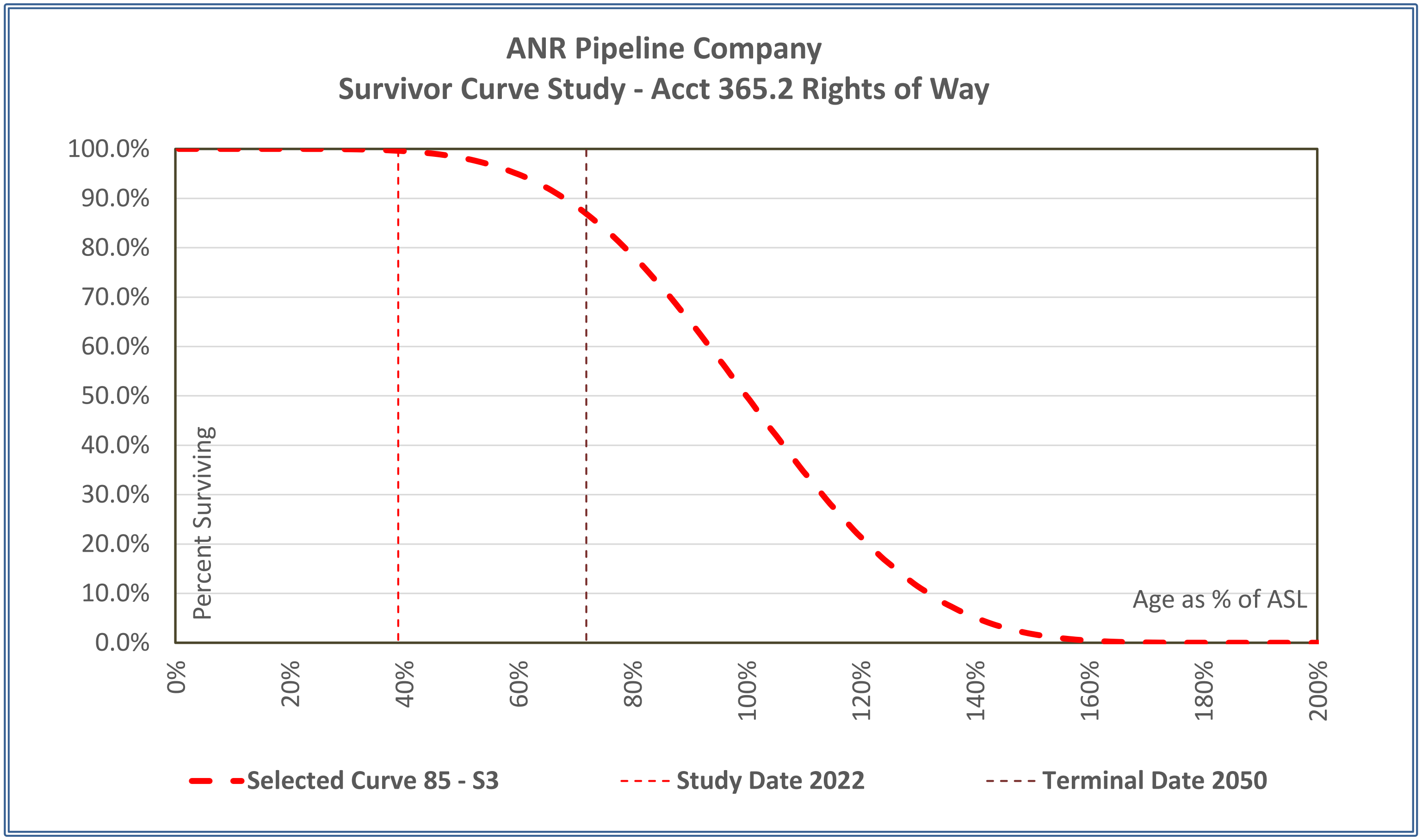
# ANR Pipeline Company

## Survivor Curve Study - Acct 365.2 Rights of Way

### Salient Statistical Results

| Economic Life | Ave Age at Study Date: | Average Service Life | Age as % of ASL | Iowa Curve | Conformance Index | Retirement Index | Average Remaining Life |
|---|---|---|---|---|---|---|---|
| **2050** | 33.17 | 85 | 39.0% | S3 | 837 | #DIV/0! | **26.78** |



## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1971 | 9,744,045 | 305,075 | 50 | - | - | 10,049,070 |
| 1972 | 10,049,070 | 302,086 | 1,511 | - | (691,706) | 9,657,939 |
| 1973 | 9,657,939 | 810,736 | 2,704 | - | - | 10,465,971 |
| 1974 | 10,465,971 | 966,133 | - | - | - | 11,432,104 |
| 1975 | 11,432,104 | 290,184 | 21,325 | - | - | 11,700,963 |
| 1976 | 11,700,963 | 1,254,812 | 1,078 | - | - | 12,954,697 |
| 1977 | 12,954,697 | (186,221) | - | - | - | 12,768,476 |
| 1978 | 12,768,476 | 633,848 | - | - | - | 13,402,324 |
| 1979 | 13,402,324 | 129,702 | 487 | - | (49,472) | 13,482,067 |
| 1980 | 13,482,067 | 884,924 | - | - | - | 14,366,991 |
| 1981 | 14,366,991 | (3,043) | - | - | - | 14,363,948 |
| 1982 | 14,363,948 | 1,001,537 | - | - | - | 15,365,485 |
| 1983 | 15,365,485 | 389,199 | - | - | 21,623 | 15,776,307 |
| 1984 | 15,776,307 | 6,935 | 3,077 | - | 11,222 | 15,791,387 |
| 1985 | 15,791,387 | 367,535 | - | - | 6,864 | 16,165,786 |
| 1986 | 16,165,786 | 33,951 | - | - | - | 16,199,737 |
| 1987 | 16,199,737 | 67,266 | - | - | 1,468,864 | 17,735,867 |
| 1988 | 17,735,867 | 522,000 | - | - | (39,613) | 18,218,254 |
| 1989 | 18,218,254 | 1,511,953 | - | - | - | 19,730,207 |
| 1990 | 19,730,207 | 576,908 | - | - | (906,852) | 19,400,263 |

## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1991 | 19,400,263 | 9,215,546 | - | - | - | 28,615,809 |
| 1992 | 28,615,809 | 4,409,080 | - | - | - | 33,024,889 |
| 1993 | 33,024,889 | 2,662,250 | - | - | - | 35,687,139 |
| 1994 | 35,687,139 | 1,875,570 | - | - | (23,707) | 37,539,002 |
| 1995 | 37,539,002 | 631,273 | - | - | (609,839) | 37,560,436 |
| 1996 | 37,560,436 | (1,363,764) | - | - | (38) | 36,196,634 |
| 1997 | 36,196,634 | 1,801,701 | - | (199,697) | 477,324 | 38,275,962 |
| 1998 | 38,275,962 | 784,033 | - | - | (1,500) | 39,058,495 |
| 1999 | 39,058,495 | 2,674,870 | - | - | 6,351 | 41,739,716 |
| 2000 | 41,739,716 | 2,432,859 | - | - | - | 44,172,575 |
| 2001 | 44,172,575 | 360,702 | - | - | - | 44,533,277 |
| 2002 | 44,533,277 | 1,372,235 | 200 | - | - | 45,905,312 |
| 2003 | 45,905,312 | (1,350,746) | 289,163 | - | - | 44,265,403 |
| 2004 | 44,265,403 | 5,382 | 7,049 | - | - | 44,263,736 |
| 2005 | 44,263,736 | 96,252 | 21,275 | - | - | 44,338,713 |
| 2006 | 44,338,713 | 1,806,136 | 81,414 | - | - | 46,063,435 |
| 2007 | 46,063,435 | 59,632 | 67,673 | - | - | 46,055,394 |
| 2008 | 46,055,394 | (2) | 20,751 | - | - | 46,034,641 |
| 2009 | 46,034,641 | - | 67,810 | - | - | 45,966,831 |
| 2010 | 45,966,831 | 332,222 | 8,008 | - | - | 46,291,045 |
| 2011 | 46,291,045 | 104,791 | - | - | - | 46,395,836 |
| 2012 | 46,395,836 | - | 26 | - | - | 46,395,810 |
| 2013 | 46,395,810 | 5,840,817 | - | - | (1,135,802) | 51,100,825 |
| 2014 | 51,100,825 | - | 19,122 | - | (20,250) | 51,061,453 |
| 2015 | 51,061,453 | - | 3,337 | - | (17,019) | 51,041,097 |
| 2016 | 51,041,099 | - | 46,541 | - | - | 50,994,558 |
| 2017 | 50,994,558 | - | - | - | - | 50,994,558 |
| 2018 | 50,994,558 | - | - | - | - | 50,994,558 |
| 2019 | 50,994,558 | - | - | - | - | 50,994,558 |
| 2020 | 50,994,558 | - | - | - | - | 50,994,558 |
| 2021 | 50,994,558 | 174,642 | - | - | - | 51,169,200 |
| | | 174,642 | - | Σ of last 5 years: | ` | |
| | | 34,928 | - | Ave last 5 yrs | | |

# Goodness of Fit Test Statistics

**Best 5-Year Retirement Predictors**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| 1 | 5 - L0 | 28.00 | - | #DIV/0! | 1.08 |
| 2 | 5 - L0 | 28.00 | - | #DIV/0! | 1.08 |
| 3 | 5 - L0 | 28.00 | - | #DIV/0! | 1.08 |
| 4 | 5 - L0 | L3 | - | 55.0% | 1.08 |
| 5 | 5 - L0 | 28.00 | - | #DIV/0! | 1.08 |
| 6 | 5 - L0 | 28.00 | - | #DIV/0! | 1.08 |
| 7 | 5 - L0 | 28.00 | - | #DIV/0! | 1.08 |
| 8 | 5 - L0 | 28.00 | - | #DIV/0! | 1.08 |
| 9 | 5 - L0 | 28.00 | - | #DIV/0! | 1.08 |
| 10 | 5 - L0 | 28.00 | - | #DIV/0! | 1.08 |

**Best Conformance Indices**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| L Curves 1 | 100 - L3 | 27.08 | 65,789 | #DIV/0! | 829.72 |
| L Curves 2 | 140 - L2 | 27.35 | 61,210 | #DIV/0! | 592.13 |
| L Curves 3 | 85 - L4 | 27.09 | 37,102 | #DIV/0! | 308.52 |
| S Curves 1 | 85 - S3 | 26.78 | 57,374 | #DIV/0! | 837.25 |
| S Curves 2 | 65 - S5 | 26.29 | 1,077 | #DIV/0! | 723.30 |
| S Curves 3 | 105 - S2 | 27.02 | 71,614 | #DIV/0! | 498.28 |
| R Curves 1 | 135 - R3 | 27.60 | 36,567 | #DIV/0! | 583.86 |
| R Curves 2 | 70 - R5 | 26.84 | 14,592 | #DIV/0! | 461.02 |
| R Curves 3 | 90 - R4 | 27.28 | 43,688 | #DIV/0! | 428.91 |
| | | | | | |

## Selected Curve Forecasted Survivorship & Interim Retirements

| Selected Curve<br>85 - S3 | Year | Age | Age as % of ASL | Percent Surviving | Surviving Plant | Interim Retirements | |
|---|---|---|---|---|---|---|---|
| Original Installations | | | | | 52,008,448 | | |
| Surviving Balance | 2022 | 33.17 | 39.02% | 99.6188% | 51,337,596 | | |
| 1st Forecast Year | 2023 | 34.17 | 40.20% | 99.5438% | 51,298,615 | 38,981 | |
| 2 | 2024 | 35.17 | 41.38% | 99.4490% | 51,249,310 | 49,306 | |
| 3 | 2025 | 36.17 | 42.55% | 99.3391% | 51,192,137 | 57,173 | |
| 4 | 2026 | 37.17 | 43.73% | 99.2124% | 51,126,241 | 65,896 | |
| 5 | 2027 | 38.17 | 44.91% | 99.0672% | 51,050,726 | 75,515 | |
| 6 | 2028 | 39.17 | 46.08% | 98.9163% | 50,972,258 | 78,468 | |
| 7 | 2029 | 40.17 | 47.26% | 98.7306% | 50,875,671 | 96,587 | |
| 8 | 2030 | 41.17 | 48.44% | 98.5210% | 50,766,657 | 109,014 | |
| 9 | 2031 | 42.17 | 49.61% | 98.2855% | 50,644,203 | 122,454 | |
| 10 | 2032 | 43.17 | 50.79% | 98.0453% | 50,519,267 | 124,936 | |
| 11 | 2033 | 44.17 | 51.96% | 97.7548% | 50,368,163 | 151,104 | |
| 12 | 2034 | 45.17 | 53.14% | 97.4326% | 50,200,588 | 167,575 | |
| 13 | 2035 | 46.17 | 54.32% | 97.0767% | 50,015,500 | 185,088 | |
| 14 | 2036 | 47.17 | 55.49% | 96.7192% | 49,829,567 | 185,933 | |
| 15 | 2037 | 48.17 | 56.67% | 96.2932% | 49,608,035 | 221,532 | |
| 16 | 2038 | 49.17 | 57.85% | 95.8279% | 49,366,027 | 242,008 | |
| 17 | 2039 | 50.17 | 59.02% | 95.3214% | 49,102,579 | 263,448 | |
| 18 | 2040 | 51.17 | 60.20% | 94.8193% | 48,841,460 | 261,119 | |
| 19 | 2041 | 52.17 | 61.38% | 94.2288% | 48,534,374 | 307,087 | |
| 20 | 2042 | 53.17 | 62.55% | 93.5922% | 48,203,287 | 331,086 | |
| 21 | 2043 | 54.17 | 63.73% | 92.9080% | 47,847,434 | 355,854 | |
| 22 | 2044 | 55.17 | 64.91% | 92.1748% | 47,466,114 | 381,319 | |
| 23 | 2045 | 56.17 | 66.08% | 91.4587% | 47,093,667 | 372,447 | |
| 24 | 2046 | 57.17 | 67.26% | 90.6284% | 46,661,868 | 431,800 | |
| 25 | 2047 | 58.17 | 68.44% | 89.7462% | 46,203,021 | 458,847 | |
| 26 | 2048 | 59.17 | 69.61% | 88.8112% | 45,716,760 | 486,261 | |
| 27 | 2049 | 60.17 | 70.79% | 87.9074% | 45,246,709 | 470,051 | |
| 28 | 2050 | 61.17 | 71.96% | 86.8702% | 44,707,247 | 539,462 | |
| | | | | | 1,374,707,487 | **6,630,349** | Total Interm Retires |
| | | | | **Average Remaining Life** | **26.78** | **57,374** | 5 Yr Ave Ann Retires |

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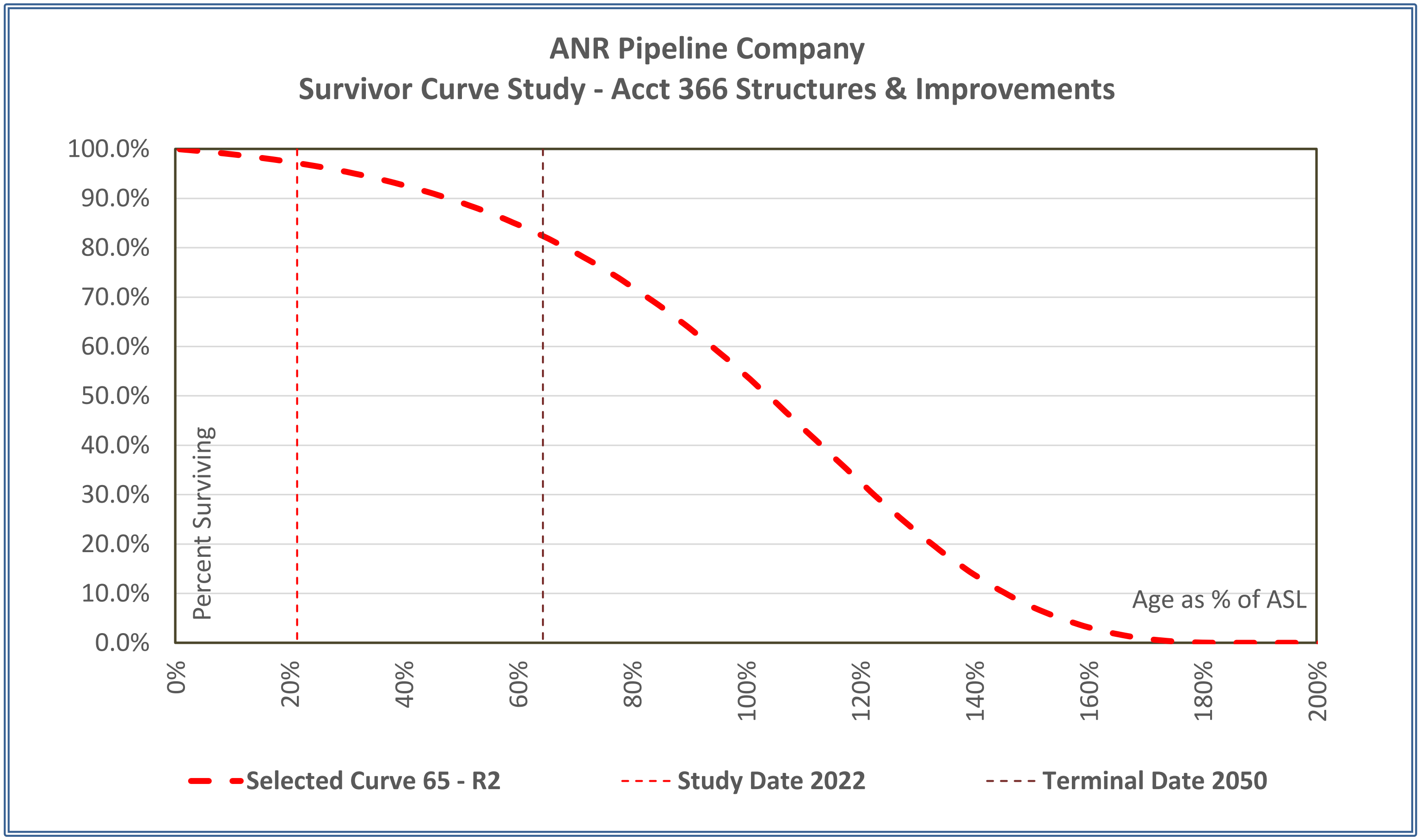
# ANR Pipeline Company

## Survivor Curve Study - Acct 366 Structures & Improvements

### Salient Statistical Results

| Economic Life | Ave Age at Study Date: | Average Service Life | Age as % of ASL | Iowa Curve | Conformance Index | Retirement Index | Average Remaining Life |
|---|---|---|---|---|---|---|---|
| **2050** | 13.88 | 65 | 21.4% | R2 | 37 | 100% | **26.09** |



## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1971 | 21,949,894 | 636,161 | 282,654 | - | - | 22,303,401 |
| 1972 | 22,303,401 | 1,666,934 | 293,021 | - | (142,714) | 23,534,600 |
| 1973 | 23,534,600 | 6,998,121 | 253,035 | - | - | 30,279,686 |
| 1974 | 30,279,686 | 2,589,472 | 94,377 | - | - | 32,774,781 |
| 1975 | 32,774,781 | 1,524,006 | 63,042 | - | 34,770 | 34,270,515 |
| 1976 | 34,270,515 | 1,918,486 | 35,657 | - | - | 36,153,344 |
| 1977 | 36,153,344 | 905,312 | 180,815 | - | - | 36,877,841 |
| 1978 | 36,877,841 | 1,823,951 | 915 | - | - | 38,700,877 |
| 1979 | 38,700,877 | 211,757 | 20,857 | - | - | 38,891,777 |
| 1980 | 38,891,777 | 831,970 | 3,500 | - | - | 39,720,247 |
| 1981 | 39,720,247 | 2,175,870 | 53,784 | - | - | 41,842,333 |
| 1982 | 41,842,333 | 678,128 | 29,090 | - | - | 42,491,371 |
| 1983 | 42,491,371 | 1,013,398 | 3,558 | - | (748,022) | 42,753,189 |
| 1984 | 42,753,189 | 3,438,625 | 626,760 | - | 27,124 | 45,592,178 |
| 1985 | 45,592,178 | 4,231,132 | - | - | - | 49,823,310 |
| 1986 | 49,823,310 | 2,616,709 | 230,020 | - | - | 52,209,999 |
| 1987 | 52,209,999 | 362,721 | 358,499 | - | 31,463,515 | 83,677,736 |
| 1988 | 83,677,736 | 493,135 | 159,492 | - | (3,101) | 84,008,278 |
| 1989 | 84,008,278 | 314,924 | 19,769 | - | - | 84,303,433 |
| 1990 | 84,303,433 | 1,440,402 | - | - | (814,958) | 84,928,877 |

# Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1991 | 84,928,877 | 522,197 | 97,805 | - | - | 85,353,269 |
| 1992 | 85,353,269 | 2,756,509 | 455,405 | - | - | 87,654,373 |
| 1993 | 87,654,373 | 710,674 | 645 | - | - | 88,364,402 |
| 1994 | 88,364,402 | 2,724,949 | 259,316 | - | - | 90,830,035 |
| 1995 | 90,830,035 | 551,575 | 198,008 | - | - | 91,183,602 |
| 1996 | 91,183,602 | 2,620,873 | - | - | - | 93,804,475 |
| 1997 | 93,804,475 | 668,656 | 10,520 | 2,099,478 | (21,992) | 96,540,097 |
| 1998 | 96,540,097 | 1,593,464 | - | - | - | 98,133,561 |
| 1999 | 98,133,561 | 1,666,888 | - | - | - | 99,800,449 |
| 2000 | 99,800,449 | 841,421 | - | - | - | 100,641,870 |
| 2001 | 100,641,870 | 1,107,358 | 89,640 | - | - | 101,659,588 |
| 2002 | 101,659,588 | 3,016,630 | 564,836 | - | - | 104,111,382 |
| 2003 | 104,111,382 | 6,656,121 | 1,504,565 | - | (360,870) | 108,902,068 |
| 2004 | 108,902,068 | 101,869 | 479,697 | - | - | 108,524,240 |
| 2005 | 108,524,240 | 8,993,608 | 2,582,887 | - | - | 114,934,961 |
| 2006 | 114,934,961 | 6,289,058 | 862,245 | - | - | 120,361,774 |
| 2007 | 120,361,774 | 2,481,002 | 3,281,988 | - | - | 119,560,788 |
| 2008 | 119,560,788 | 1,814,496 | 1,506,972 | (4,449) | 1,980 | 119,865,843 |
| 2009 | 119,865,843 | 232,511 | 27,866 | - | - | 120,070,488 |
| 2010 | 120,070,488 | 362,173 | 147,732 | - | 6,703,522 | 126,988,451 |
| 2011 | 126,988,451 | 1,173,628 | (980) | - | - | 128,163,059 |
| 2012 | 128,163,059 | 931,531 | 322,439 | - | 5,701 | 128,777,852 |
| 2013 | 128,777,852 | 1,349,126 | 57,916 | - | (30,369,691) | 99,699,371 |
| 2014 | 99,699,371 | 5,449,262 | 11,923 | - | (785,405) | 104,351,305 |
| 2015 | 104,351,305 | 1,748,683 | 101,892 | - | - | 105,998,096 |
| 2016 | 105,998,096 | 4,479,680 | 1,370,498 | - | 58,205 | 109,165,483 |
| 2017 | 109,165,483 | 24,739,517 | 4,703,325 | - | (33,552) | 129,168,123 |
| 2018 | 129,168,123 | 10,870,533 | 288,956 | - | - | 139,749,700 |
| 2019 | 139,749,701 | 35,955,547 | - | - | - | 175,705,248 |
| 2020 | 175,705,248 | 18,024,056 | - | - | 33,552 | 193,762,856 |
| 2021 | 193,762,856 | 11,689,880 | - | - | - | 205,452,736 |
| | | 101,279,533 | 4,992,281 | Σ of last 5 years: | ` | |
| | | 20,255,907 | 998,456 | Ave last 5 yrs | | |

# Goodness of Fit Test Statistics

**Best 5-Year Retirement Predictors**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| 1 | 65 - R2 | 26.09 | 999,222 | 99.9% | 36.52 |
| 2 | 5 - X2 | 27.52 | 1,004,850 | 99.4% | 2.35 |
| 3 | 85 - L1 | 25.98 | 991,572 | 99.3% | 32.23 |
| 4 | 100 - R1 | L3 | 987,943 | 55.0% | 27.73 |
| 5 | 135 - L0 | 26.43 | 1,008,982 | 98.9% | 25.98 |
| 6 | 5 - X4 | 27.52 | 1,010,682 | 98.8% | 2.14 |
| 7 | 65 - S1 | 25.68 | 985,609 | 98.7% | 36.81 |
| 8 | 5 - X3 | 27.51 | 1,032,814 | 96.6% | 2.23 |
| 9 | 95 - S0 | 26.33 | 960,414 | 96.2% | 25.74 |
| 10 | 95 - R1 | 26.43 | 1,040,071 | 95.8% | 29.87 |

**Best Conformance Indices**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| L Curves 1 | 50 - L3 | 24.86 | 640,772 | 64.2% | 685.40 |
| L Curves 2 | 75 - L0 | 24.67 | 2,212,264 | -21.6% | 647.71 |
| L Curves 3 | 55 - L2 | 24.45 | 1,202,832 | 79.5% | 472.33 |
| S Curves 1 | 60 - S0 | 24.51 | 2,074,749 | -7.8% | 811.43 |
| S Curves 2 | 50 - S2 | 24.74 | 822,177 | 82.3% | 298.69 |
| S Curves 3 | 55 - S1 | 24.59 | 1,507,956 | 49.0% | 141.74 |
| R Curves 1 | 50 - R2 | 24.69 | 1,604,508 | 39.3% | 191.98 |
| R Curves 2 | 65 - R1 | 25.40 | 1,687,785 | 31.0% | 134.32 |
| R Curves 3 | 50 - R3 | 25.45 | 853,596 | 85.5% | 117.54 |
| X Curves | 50 - X1 | 23.64 | 3,168,154 | -117.3% | 685.40 |

## Selected Curve Forecasted Survivorship & Interim Retirements

| Selected Curve<br>65 - R2 | Year | Age | Age as % of ASL | Percent Surviving | Surviving Plant | Interim Retirements | |
|---|---|---|---|---|---|---|---|
| Original Installations | | | | | 316,815,382 | | |
| Surviving Balance | 2022 | 13.88 | 21.35% | 97.1446% | 295,032,286 | | |
| 1st Forecast Year | 2023 | 14.88 | 22.89% | 96.8642% | 294,143,976 | 888,310 | |
| 2 | 2024 | 15.88 | 24.43% | 96.5513% | 293,152,681 | 991,295 | |
| 3 | 2025 | 16.88 | 25.97% | 96.2445% | 292,180,881 | 971,800 | |
| 4 | 2026 | 17.88 | 27.51% | 95.9025% | 291,097,402 | 1,083,480 | |
| 5 | 2027 | 18.88 | 29.05% | 95.5676% | 290,036,174 | 1,061,228 | |
| 6 | 2028 | 19.88 | 30.59% | 95.2183% | 288,929,458 | 1,106,716 | |
| 7 | 2029 | 20.88 | 32.12% | 94.8293% | 287,697,141 | 1,232,317 | |
| 8 | 2030 | 21.88 | 33.66% | 94.4488% | 286,491,651 | 1,205,490 | |
| 9 | 2031 | 22.88 | 35.20% | 94.0254% | 285,150,457 | 1,341,194 | |
| 10 | 2032 | 23.88 | 36.74% | 93.6117% | 283,839,522 | 1,310,936 | |
| 11 | 2033 | 24.88 | 38.28% | 93.1810% | 282,475,079 | 1,364,443 | |
| 12 | 2034 | 25.88 | 39.82% | 92.7024% | 280,958,817 | 1,516,262 | |
| 13 | 2035 | 26.88 | 41.35% | 92.2351% | 279,478,470 | 1,480,347 | |
| 14 | 2036 | 27.88 | 42.89% | 91.7493% | 277,939,393 | 1,539,076 | |
| 15 | 2037 | 28.88 | 44.43% | 91.2101% | 276,230,984 | 1,708,409 | |
| 16 | 2038 | 29.88 | 45.97% | 90.6842% | 274,564,887 | 1,666,096 | |
| 17 | 2039 | 30.88 | 47.51% | 90.1009% | 272,716,845 | 1,848,042 | |
| 18 | 2040 | 31.88 | 49.05% | 89.5324% | 270,915,894 | 1,800,952 | |
| 19 | 2041 | 32.88 | 50.59% | 88.9425% | 269,046,804 | 1,869,090 | |
| 20 | 2042 | 33.88 | 52.12% | 88.2888% | 266,975,847 | 2,070,957 | |
| 21 | 2043 | 34.88 | 53.66% | 87.6525% | 264,959,849 | 2,015,998 | |
| 22 | 2044 | 35.88 | 55.20% | 86.9479% | 262,727,765 | 2,232,084 | |
| 23 | 2045 | 36.88 | 56.74% | 86.2626% | 260,556,534 | 2,171,231 | |
| 24 | 2046 | 37.88 | 58.28% | 85.5526% | 258,307,178 | 2,249,356 | |
| 25 | 2047 | 38.88 | 59.82% | 84.7674% | 255,819,542 | 2,487,636 | |
| 26 | 2048 | 39.88 | 61.35% | 84.0045% | 253,402,519 | 2,417,023 | |
| 27 | 2049 | 40.88 | 62.89% | 83.2150% | 250,901,394 | 2,501,126 | |
| 28 | 2050 | 41.88 | 64.43% | 82.3430% | 248,138,684 | 2,762,710 | |
| | | | | | 7,698,835,829 | **46,893,603** | Total Interm Retires |
| | | | | **Average Remaining Life** | **26.09** | **999,222** | 5 Yr Ave Ann Retires |

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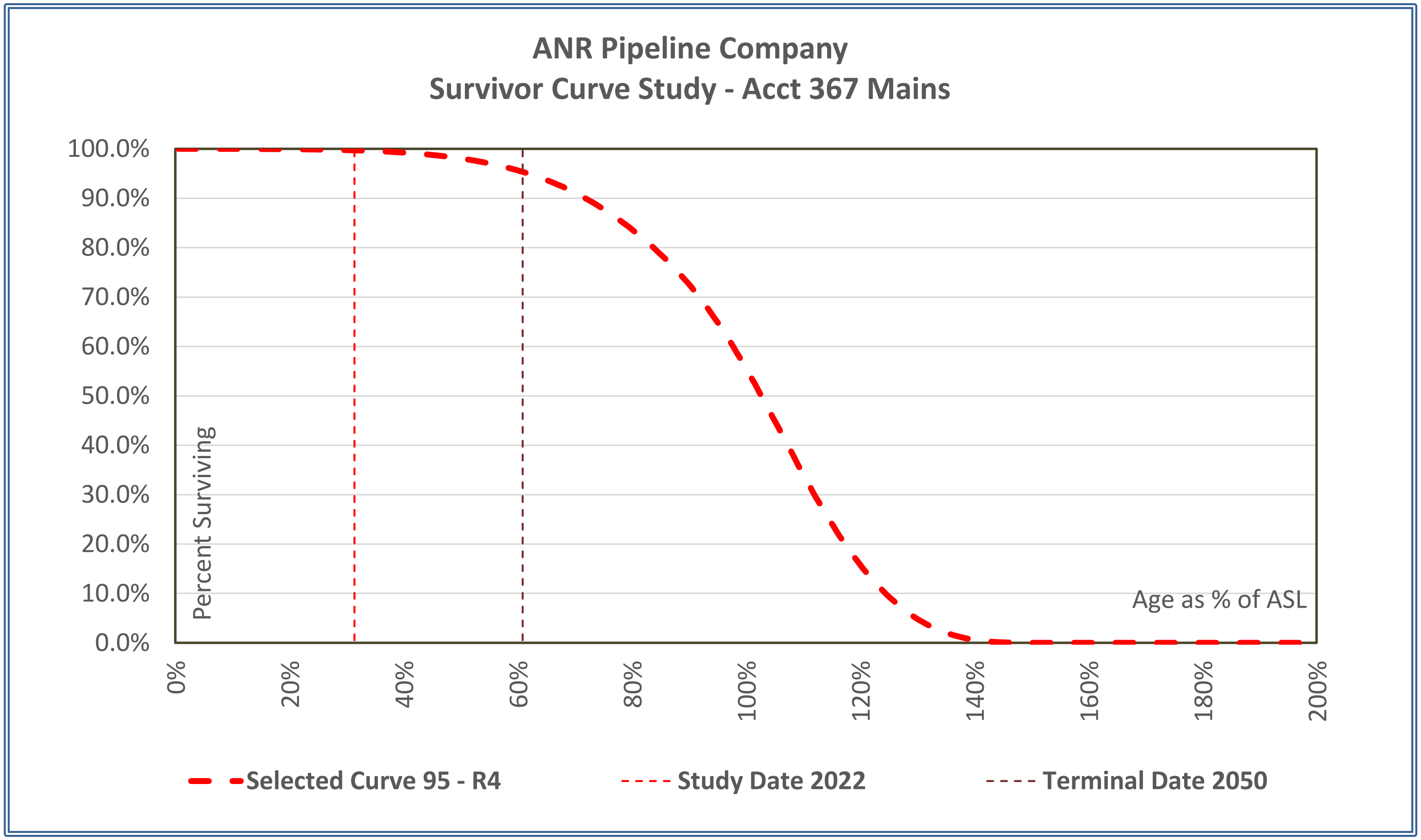
# ANR Pipeline Company
## Survivor Curve Study - Acct 367 Mains

### Salient Statistical Results

| Economic Life | Ave Age at Study Date: | Average Service Life | Age as % of ASL | Iowa Curve | Conformance Index | Retirement Index | Average Remaining Life |
|---|---|---|---|---|---|---|---|
| **2050** | 29.82 | 95 | 31.4% | R4 | 5 | 100% | **27.49** |



## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1971 | 600,677,284 | 30,216,107 | 278,522 | - | - | 630,614,869 |
| 1972 | 630,614,869 | 19,370,556 | 1,632,733 | - | (86,047,222) | 562,305,470 |
| 1973 | 562,305,470 | 55,628,127 | 905,276 | - | - | 617,028,321 |
| 1974 | 617,028,321 | 55,441,487 | 1,033,870 | - | - | 671,435,938 |
| 1975 | 671,435,938 | 31,706,197 | 1,147,993 | - | - | 701,994,142 |
| 1976 | 701,994,142 | 41,134,800 | 923,385 | - | (409,751) | 741,795,806 |
| 1977 | 741,795,806 | (789,130) | 1,026,670 | - | - | 739,980,006 |
| 1978 | 739,980,006 | 30,460,602 | 678,295 | - | - | 769,762,313 |
| 1979 | 769,762,313 | 8,653,732 | 1,204,071 | - | (4,160,265) | 773,051,709 |
| 1980 | 773,051,709 | 19,467,423 | 112,914 | - | - | 792,406,218 |
| 1981 | 792,406,218 | 13,088,434 | 632,640 | - | - | 804,862,012 |
| 1982 | 804,862,012 | 44,468,291 | 317,271 | - | - | 849,013,032 |
| 1983 | 849,013,032 | 23,949,018 | 4,152 | - | 7,977 | 872,965,875 |
| 1984 | 872,965,875 | 6,680,835 | 495,935 | - | 47,552 | 879,198,327 |
| 1985 | 879,198,327 | 2,952,323 | 155,315 | - | 1,903,598 | 883,898,933 |
| 1986 | 883,898,933 | 6,387,279 | 77,271 | - | - | 890,208,941 |
| 1987 | 890,208,941 | 14,941,893 | 48,405 | - | 278,137,888 | 1,183,240,317 |
| 1988 | 1,183,240,317 | 17,626,568 | 396,862 | - | (11,642,279) | 1,188,827,744 |
| 1989 | 1,188,827,744 | 24,177,129 | 191,641 | - | - | 1,212,813,232 |
| 1990 | 1,212,813,232 | 20,998,005 | 5,514,780 | - | 169,599,951 | 1,397,896,408 |

## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1991 | 1,397,896,408 | 88,779,295 | 4,923,452 | - | - | 1,481,752,251 |
| 1992 | 1,481,752,251 | 105,501,166 | 2,782,046 | - | - | 1,584,471,371 |
| 1993 | 1,584,471,371 | 32,773,312 | 2,331,784 | - | - | 1,614,912,899 |
| 1994 | 1,614,912,899 | 24,765,405 | 2,723,721 | - | (539,048) | 1,636,415,535 |
| 1995 | 1,636,415,535 | 10,139,615 | 724,683 | - | (170,607,090) | 1,475,223,377 |
| 1996 | 1,475,223,377 | 17,080,039 | 384,482 | - | (6,024) | 1,491,912,910 |
| 1997 | 1,491,912,910 | 20,501,916 | - | 187,799 | 17,161,548 | 1,529,764,173 |
| 1998 | 1,529,764,173 | 15,165,414 | 499,096 | - | - | 1,544,430,491 |
| 1999 | 1,544,430,491 | 23,463,949 | 363,305 | - | 286,472 | 1,567,817,607 |
| 2000 | 1,567,817,607 | 21,161,241 | 2,500,681 | - | - | 1,586,478,167 |
| 2001 | 1,586,478,167 | 8,869,120 | 746,945 | - | - | 1,594,600,342 |
| 2002 | 1,594,600,342 | 12,216,135 | 2,507,204 | - | - | 1,604,309,273 |
| 2003 | 1,604,309,273 | 25,655,037 | 2,474,768 | - | - | 1,627,489,542 |
| 2004 | 1,627,489,542 | 21,442,143 | 1,213,174 | - | 492,493 | 1,648,211,004 |
| 2005 | 1,648,211,004 | 59,916,019 | 6,388,447 | - | - | 1,701,738,576 |
| 2006 | 1,701,738,576 | 49,438,012 | 3,768,933 | - | 313,911 | 1,747,721,566 |
| 2007 | 1,747,721,566 | 67,298,587 | 17,382,673 | - | - | 1,797,637,480 |
| 2008 | 1,797,637,480 | 11,504,739 | 9,012,698 | - | (40,056) | 1,800,089,465 |
| 2009 | 1,800,089,465 | 13,710,820 | 753,739 | - | - | 1,813,046,546 |
| 2010 | 1,813,046,546 | 26,025,349 | 3,774,803 | - | (4,756,072) | 1,830,541,020 |
| 2011 | 1,830,541,020 | 42,829,204 | 465,558 | - | (258,528) | 1,872,646,138 |
| 2012 | 1,872,646,138 | 56,563,648 | 15,767,422 | - | (1,282,097) | 1,912,160,267 |
| 2013 | 1,912,160,267 | 22,164,071 | 3,669,034 | - | (258,336,853) | 1,672,318,451 |
| 2014 | 1,672,318,451 | 20,005,756 | 9,898,125 | - | 119,706 | 1,682,545,788 |
| 2015 | 1,682,545,788 | 62,690,863 | 3,227,747 | - | - | 1,742,008,904 |
| 2016 | 1,742,008,903 | 52,208,897 | 3,558,619 | - | (47,070) | 1,790,612,111 |
| 2017 | 1,790,612,111 | 32,948,953 | 1,771,524 | - | - | 1,821,789,540 |
| 2018 | 1,821,789,540 | 41,594,972 | 1,583,091 | - | - | 1,861,801,421 |
| 2019 | 1,861,801,420 | 27,930,458 | 2,821,636 | - | - | 1,886,910,242 |
| 2020 | 1,886,900,242 | 50,796,819 | 5,809 | - | - | 1,937,691,252 |
| 2021 | 1,937,691,252 | 72,230,325 | 76,450 | - | - | 2,009,845,127 |
| | | 225,501,527 | 6,258,510 | Σ of last 5 years: | ` | |
| | | 45,100,305 | 1,251,702 | Ave last 5 yrs | | |

# Goodness of Fit Test Statistics

**Best 5-Year Retirement Predictors**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| 1 | 95 - R4 | 27.49 | 1,257,330 | 99.6% | 5.17 |
| 2 | 120 - L3 | 27.57 | 1,272,296 | 98.4% | 5.12 |
| 3 | 150 - R3 | 27.69 | 1,272,821 | 98.3% | 5.16 |
| 4 | 125 - S2 | L3 | 1,306,742 | 55.0% | 5.14 |
| 5 | 90 - S3 | 27.24 | 1,185,352 | 94.7% | 5.26 |
| 6 | 60 - L5 | 24.51 | 1,180,777 | 94.3% | 7.21 |
| 7 | 145 - R3 | 27.66 | 1,371,972 | 90.4% | 5.18 |
| 8 | 65 - S4 | 25.69 | 1,116,877 | 89.2% | 6.22 |
| 9 | 130 - S2 | 27.59 | 1,095,131 | 87.5% | 5.11 |
| 10 | 125 - L3 | 27.63 | 1,066,115 | 85.2% | 5.09 |

**Best Conformance Indices**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| L Curves 1 | 50 - L4 | 17.18 | 25,415,875 | -1830.5% | 329.05 |
| L Curves 2 | 65 - L1 | 22.54 | 28,477,997 | -2075.1% | 225.97 |
| L Curves 3 | 75 - L0 | 23.96 | 21,940,080 | -1552.8% | 167.62 |
| S Curves 1 | 50 - S3 | 17.76 | 32,822,226 | -2422.2% | 162.96 |
| S Curves 2 | 60 - S0 | 22.90 | 25,774,994 | -1859.2% | 148.34 |
| S Curves 3 | 50 - S2 | 18.75 | 38,292,924 | -2859.3% | 69.24 |
| R Curves 1 | 50 - R3 | 19.59 | 27,620,200 | -2006.6% | 684.65 |
| R Curves 2 | 55 - R2 | 22.21 | 23,509,487 | -1678.2% | 68.08 |
| R Curves 3 | 50 - R4 | 18.69 | 23,309,988 | -1662.3% | 53.07 |
| X Curves | 50 - X1 | 23.11 | 26,441,654 | -1912.5% | 329.05 |

## Selected Curve Forecasted Survivorship & Interim Retirements

Selected Curve

| 95 - R4 | Year | Age | Age as % of ASL | Percent Surviving | Surviving Plant | Interim Retirements | |
|---|---|---|---|---|---|---|---|
| Original Installations | | | | | 2,644,165,375 | | |
| Surviving Balance | 2022 | 29.82 | 31.39% | 99.6887% | 2,195,731,639 | | |
| 1st Forecast Year | 2023 | 30.82 | 32.44% | 99.6486% | 2,194,670,762 | 1,060,877 | |
| 2 | 2024 | 31.82 | 33.49% | 99.6082% | 2,193,604,865 | 1,065,897 | |
| 3 | 2025 | 32.82 | 34.55% | 99.5593% | 2,192,310,770 | 1,294,095 | |
| 4 | 2026 | 33.82 | 35.60% | 99.5103% | 2,191,014,365 | 1,296,405 | |
| 5 | 2027 | 34.82 | 36.65% | 99.4509% | 2,189,444,991 | 1,569,374 | |
| 6 | 2028 | 35.82 | 37.70% | 99.3854% | 2,187,712,759 | 1,732,232 | |
| 7 | 2029 | 36.82 | 38.76% | 99.3201% | 2,185,984,970 | 1,727,789 | |
| 8 | 2030 | 37.82 | 39.81% | 99.2413% | 2,183,902,391 | 2,082,579 | |
| 9 | 2031 | 38.82 | 40.86% | 99.1630% | 2,181,830,924 | 2,071,467 | |
| 10 | 2032 | 39.82 | 41.91% | 99.0688% | 2,179,340,982 | 2,489,942 | |
| 11 | 2033 | 40.82 | 42.97% | 98.9754% | 2,176,871,076 | 2,469,906 | |
| 12 | 2034 | 41.82 | 44.02% | 98.8634% | 2,173,910,245 | 2,960,832 | |
| 13 | 2035 | 42.82 | 45.07% | 98.7526% | 2,170,981,105 | 2,929,140 | |
| 14 | 2036 | 43.82 | 46.13% | 98.6202% | 2,167,479,112 | 3,501,992 | |
| 15 | 2037 | 44.82 | 47.18% | 98.4895% | 2,164,023,737 | 3,455,375 | |
| 16 | 2038 | 45.82 | 48.23% | 98.3337% | 2,159,903,431 | 4,120,306 | |
| 17 | 2039 | 46.82 | 49.28% | 98.1803% | 2,155,848,538 | 4,054,893 | |
| 18 | 2040 | 47.82 | 50.34% | 97.9979% | 2,151,025,859 | 4,822,678 | |
| 19 | 2041 | 48.82 | 51.39% | 97.8189% | 2,146,291,924 | 4,733,936 | |
| 20 | 2042 | 49.82 | 52.44% | 97.6065% | 2,140,676,027 | 5,615,897 | |
| 21 | 2043 | 50.82 | 53.49% | 97.3986% | 2,135,177,460 | 5,498,567 | |
| 22 | 2044 | 51.82 | 54.55% | 97.1525% | 2,128,670,990 | 6,506,470 | |
| 23 | 2045 | 52.82 | 55.60% | 96.9122% | 2,122,316,475 | 6,354,515 | |
| 24 | 2046 | 53.82 | 56.65% | 96.6285% | 2,114,816,034 | 7,500,441 | |
| 25 | 2047 | 54.82 | 57.70% | 96.3235% | 2,106,751,843 | 8,064,191 | |
| 26 | 2048 | 55.82 | 58.76% | 96.0268% | 2,098,905,876 | 7,845,967 | |
| 27 | 2049 | 56.82 | 59.81% | 95.6779% | 2,089,680,145 | 9,225,730 | |
| 28 | 2050 | 57.82 | 60.86% | 95.3393% | 2,080,726,298 | 8,953,847 | |
| | | | | | 60,363,873,953 | **115,005,341** | Total Interm Retires |
| | | | | **Average Remaining Life** | **27.49** | **1,257,330** | 5 Yr Ave Ann Retires |

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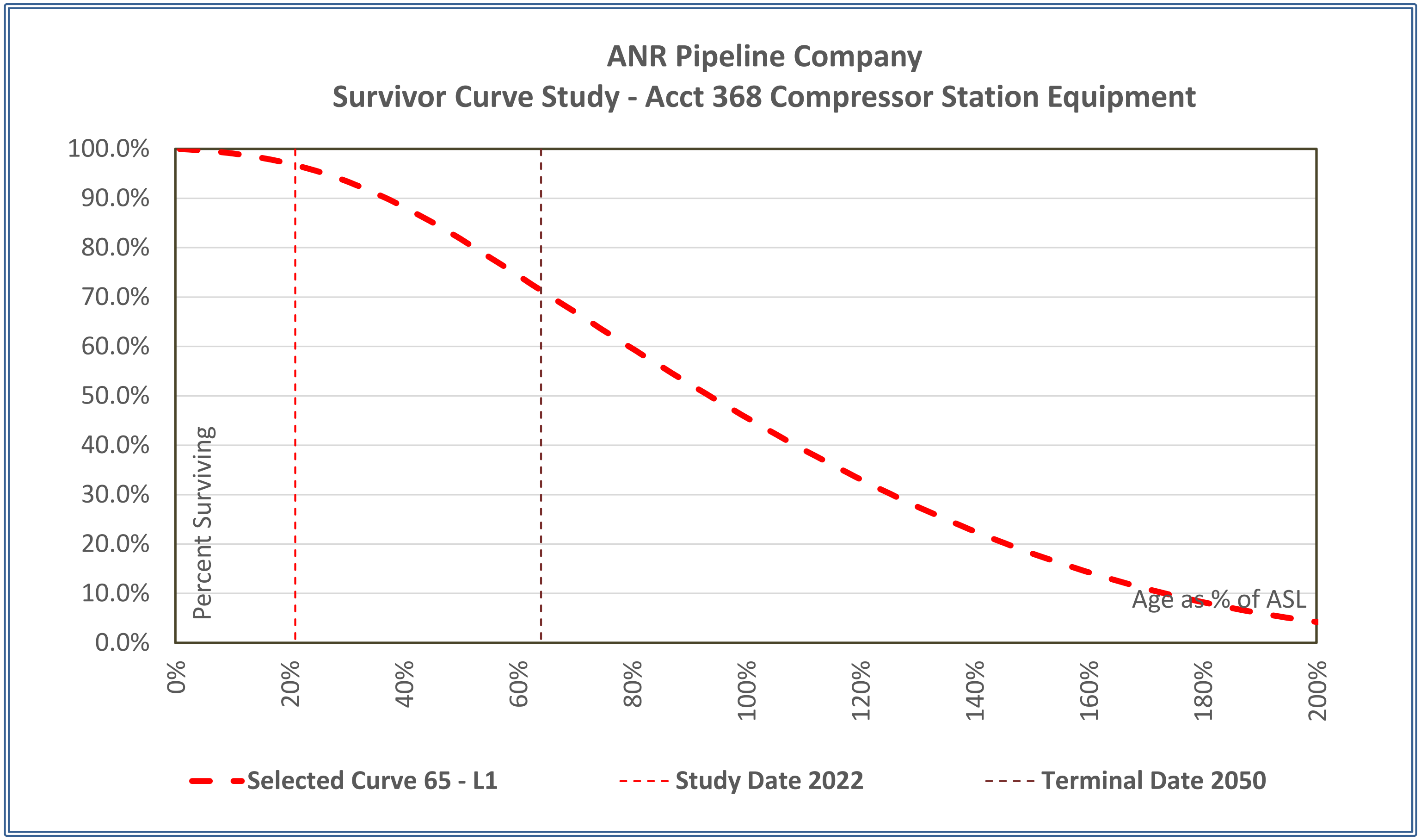
# ANR Pipeline Company
## Survivor Curve Study - Acct 368 Compressor Station Equipment

**Salient Statistical Results**

| Economic Life | Ave Age at Study Date: | Average Service Life | Age as % of ASL | Iowa Curve | Conformance Index | Retirement Index | Average Remaining Life |
|---|---|---|---|---|---|---|---|
| **2050** | 13.66 | 65 | 21.0% | L1 | 145 | 99% | **24.57** |



## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1971 | 123,814,885 | 10,071,309 | 33,759 | - | - | 133,852,435 |
| 1972 | 133,852,435 | 33,116,086 | 525,784 | - | (174,280) | 166,268,457 |
| 1973 | 166,268,457 | 1,056,884 | 335,181 | - | - | 166,990,160 |
| 1974 | 166,990,160 | 25,053,254 | 47,248 | - | - | 191,996,166 |
| 1975 | 191,996,166 | (431,389) | 248,009 | - | - | 191,316,768 |
| 1976 | 191,316,768 | 10,218,446 | 155,027 | - | (110,603) | 201,269,584 |
| 1977 | 201,269,584 | 1,937,296 | 1,794,409 | - | - | 201,412,471 |
| 1978 | 201,412,471 | 965,708 | 277,671 | - | - | 202,100,508 |
| 1979 | 202,100,508 | 1,262,589 | 464,345 | - | - | 202,898,752 |
| 1980 | 202,898,752 | 3,679,225 | 10,933 | - | - | 206,567,044 |
| 1981 | 206,567,044 | 11,995,660 | 346,199 | - | - | 218,216,505 |
| 1982 | 218,216,505 | 16,344,803 | 356,279 | - | - | 234,205,029 |
| 1983 | 234,205,029 | 13,939,720 | 82,805 | - | (5,012,123) | 243,049,821 |
| 1984 | 243,049,821 | (869,170) | 3,527,330 | - | (577,670) | 238,075,651 |
| 1985 | 238,075,651 | 2,009,908 | 185,464 | - | 217,194 | 240,117,289 |
| 1986 | 240,117,289 | 21,137,851 | 1,172,667 | - | - | 260,082,473 |
| 1987 | 260,082,473 | 21,174,593 | 283,367 | - | 72,335,844 | 353,309,543 |
| 1988 | 353,309,543 | 3,707,979 | 1,688,640 | - | (634,446) | 354,694,436 |
| 1989 | 354,694,436 | 1,479,669 | 408,724 | - | - | 355,765,381 |
| 1990 | 355,765,381 | 10,752,271 | - | - | (2,841,783) | 363,675,869 |

## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1991 | 363,675,869 | 6,756,707 | 584,108 | - | - | 369,848,468 |
| 1992 | 369,848,468 | 19,307,407 | 1,588,898 | - | - | 387,566,977 |
| 1993 | 387,566,977 | 49,810,774 | 920,960 | - | - | 436,456,791 |
| 1994 | 436,456,791 | 14,881,995 | 1,383,107 | - | 13,237 | 449,968,916 |
| 1995 | 449,968,916 | 9,706,115 | 420,817 | - | - | 459,254,214 |
| 1996 | 459,254,214 | 4,311,627 | 452,234 | - | - | 463,113,607 |
| 1997 | 463,113,607 | 21,558,397 | - | (2,027,879) | - | 482,644,125 |
| 1998 | 482,644,125 | 14,130,208 | - | - | - | 496,774,333 |
| 1999 | 496,774,333 | 21,678,480 | - | - | - | 518,452,813 |
| 2000 | 518,452,813 | 20,211,208 | - | - | - | 538,664,021 |
| 2001 | 538,664,021 | 13,650,495 | 291,330 | - | - | 552,023,186 |
| 2002 | 552,023,186 | 35,804,003 | 8,736,877 | - | - | 579,090,312 |
| 2003 | 579,090,312 | 41,080,140 | 6,384,167 | - | - | 613,786,285 |
| 2004 | 613,786,285 | 36,018,618 | 5,987,531 | - | - | 643,817,372 |
| 2005 | 643,817,372 | 33,378,319 | 10,564,707 | - | - | 666,630,984 |
| 2006 | 666,630,984 | 30,549,310 | 12,115,230 | - | - | 685,065,064 |
| 2007 | 685,065,064 | 71,167,438 | 5,727,964 | - | - | 750,504,538 |
| 2008 | 750,504,538 | 31,307,167 | 8,146,424 | - | 328,948 | 773,994,229 |
| 2009 | 773,994,229 | 6,633,652 | 63,059 | - | - | 780,564,822 |
| 2010 | 780,564,822 | 26,369,985 | 748,857 | - | (9,269,769) | 796,916,181 |
| 2011 | 796,916,181 | 9,837,451 | 2,483,085 | - | - | 804,270,547 |
| 2012 | 804,270,547 | 11,760,398 | 1,450,695 | - | (6,119,522) | 808,460,728 |
| 2013 | 808,460,728 | 15,871,145 | 525,904 | - | (53,741,746) | 770,064,223 |
| 2014 | 770,064,223 | 68,261,696 | 722,285 | - | (3,953,365) | 833,650,269 |
| 2015 | 833,650,269 | 40,119,198 | 8,776,194 | - | (332,246) | 864,661,027 |
| 2016 | 864,661,024 | 122,469,654 | 5,332,597 | - | (63,054) | 981,735,027 |
| 2017 | 981,735,027 | 272,960,285 | 45,268,810 | - | (7,692,636) | 1,201,733,866 |
| 2018 | 1,201,733,866 | 150,945,835 | 451,788 | - | - | 1,352,227,913 |
| 2019 | 1,352,227,913 | 129,974,147 | 18,152,608 | - | - | 1,464,049,452 |
| 2020 | 1,464,049,452 | 87,076,999 | - | - | 7,692,636 | 1,558,819,087 |
| 2021 | 1,558,819,087 | 73,762,899 | - | - | - | 1,632,581,986 |
| | | 714,720,165 | 63,873,206 | Σ of last 5 years: | ` | |
| | | 142,944,033 | 12,774,641 | Ave last 5 yrs | | |

# Goodness of Fit Test Statistics

| Best 5-Year Retirement Predictors | | | | | |
|---|---|---|---|---|---|
| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
| 1 | 65 - L1 | 24.57 | 12,655,656 | 99.1% | 144.59 |
| 2 | 90 - L0 | 25.34 | 12,897,589 | 99.0% | 79.57 |
| 3 | 65 - R1 | 25.41 | 12,321,060 | 96.4% | 169.34 |
| 4 | 65 - S0 | 25.34 | 13,310,291 | 55.0% | 101.41 |
| 5 | 60 - R1 | 25.09 | 13,549,568 | 93.9% | 473.09 |
| 6 | 10 - L5 | 27.23 | 11,992,500 | 93.9% | 3.30 |
| 7 | 95 - L0 | 25.52 | 11,982,444 | 93.8% | 59.61 |
| 8 | 50 - S1 | 23.81 | 13,765,594 | 92.2% | 240.92 |
| 9 | 40 - S2 | 21.72 | 13,805,622 | 91.9% | 27.35 |
| 10 | 85 - L0 | 25.14 | 13,849,607 | 91.6% | 128.30 |

| Best Conformance Indices | | | | | |
|---|---|---|---|---|---|
| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
| L Curves 1 | 80 - L0 | 24.91 | 15,087,588 | 81.9% | 428.85 |
| L Curves 2 | 60 - L1 | 24.03 | 14,893,159 | 83.4% | 368.11 |
| L Curves 3 | 45 - L4 | 25.09 | 1,131,666 | 8.9% | 280.79 |
| S Curves 1 | 45 - S6 | 27.59 | - | 0.0% | 992.54 |
| S Curves 2 | 45 - S5 | 26.92 | 1 | 0.0% | 961.24 |
| S Curves 3 | 60 - S0 | 24.52 | 15,070,682 | 82.0% | 873.72 |
| R Curves 1 | 60 - R1 | 25.09 | 13,549,568 | 93.9% | 473.09 |
| R Curves 2 | 45 - R4 | 25.36 | 2,847,902 | 22.3% | 464.14 |
| R Curves 3 | 50 - R2 | 24.70 | 11,641,254 | 91.1% | 281.42 |
| | | | | | |

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## Selected Curve Forecasted Survivorship & Interim Retirements

| Selected Curve<br>65 - L1 | Year | Age | Age as % of ASL | Percent Surviving | Surviving Plant | Interim Retirements | |
|---|---|---|---|---|---|---|---|
| Original Installations | | | | | 2,317,529,018 | | |
| Surviving Balance | 2022 | 13.66 | 21.01% | 96.6873% | 2,154,130,128 | | |
| 1st Forecast Year | 2023 | 14.66 | 22.55% | 96.2302% | 2,143,536,219 | 10,593,909 | |
| 2 | 2024 | 15.66 | 24.09% | 95.7374% | 2,132,116,192 | 11,420,028 | |
| 3 | 2025 | 16.66 | 25.62% | 95.1718% | 2,119,008,513 | 13,107,679 | |
| 4 | 2026 | 17.66 | 27.16% | 94.6036% | 2,105,841,129 | 13,167,384 | |
| 5 | 2027 | 18.66 | 28.70% | 93.9569% | 2,090,851,849 | 14,989,279 | |
| 6 | 2028 | 19.66 | 30.24% | 93.3123% | 2,075,913,007 | 14,938,843 | |
| 7 | 2029 | 20.66 | 31.78% | 92.6308% | 2,060,119,643 | 15,793,364 | |
| 8 | 2030 | 21.66 | 33.32% | 91.8636% | 2,042,340,328 | 17,779,315 | |
| 9 | 2031 | 22.66 | 34.86% | 91.1072% | 2,024,810,578 | 17,529,750 | |
| 10 | 2032 | 23.66 | 36.39% | 90.3156% | 2,006,464,344 | 18,346,234 | |
| 11 | 2033 | 24.66 | 37.93% | 89.4334% | 1,986,019,433 | 20,444,911 | |
| 12 | 2034 | 25.66 | 39.47% | 88.5721% | 1,966,059,025 | 19,960,408 | |
| 13 | 2035 | 26.66 | 41.01% | 87.6184% | 1,943,956,899 | 22,102,126 | |
| 14 | 2036 | 27.66 | 42.55% | 86.6931% | 1,922,512,641 | 21,444,257 | |
| 15 | 2037 | 28.66 | 44.09% | 85.7393% | 1,900,408,001 | 22,104,640 | |
| 16 | 2038 | 29.66 | 45.62% | 84.6926% | 1,876,150,118 | 24,257,884 | |
| 17 | 2039 | 30.66 | 47.16% | 83.6860% | 1,852,820,331 | 23,329,787 | |
| 18 | 2040 | 31.66 | 48.70% | 82.5876% | 1,827,365,461 | 25,454,869 | |
| 19 | 2041 | 32.66 | 50.24% | 81.5372% | 1,803,023,397 | 24,342,064 | |
| 20 | 2042 | 33.66 | 51.78% | 80.4694% | 1,778,275,683 | 24,747,714 | |
| 21 | 2043 | 34.66 | 53.32% | 79.3139% | 1,751,496,674 | 26,779,008 | |
| 22 | 2044 | 35.66 | 54.86% | 78.2179% | 1,726,097,512 | 25,399,163 | |
| 23 | 2045 | 36.66 | 56.39% | 77.1124% | 1,700,477,448 | 25,620,064 | |
| 24 | 2046 | 37.66 | 57.93% | 75.9258% | 1,672,977,375 | 27,500,073 | |
| 25 | 2047 | 38.66 | 59.47% | 74.8094% | 1,647,102,809 | 25,874,566 | |
| 26 | 2048 | 39.66 | 61.01% | 73.6172% | 1,619,474,653 | 27,628,156 | |
| 27 | 2049 | 40.66 | 62.55% | 72.4998% | 1,593,578,969 | 25,895,684 | |
| 28 | 2050 | 41.66 | 64.09% | 71.3830% | 1,567,696,742 | 25,882,227 | |
| | | | | | 52,936,494,972 | **586,433,386** | Total Interm Retires |
| | | | | **Average Remaining Life** | **24.57** | **12,655,656** | 5 Yr Ave Ann Retires |

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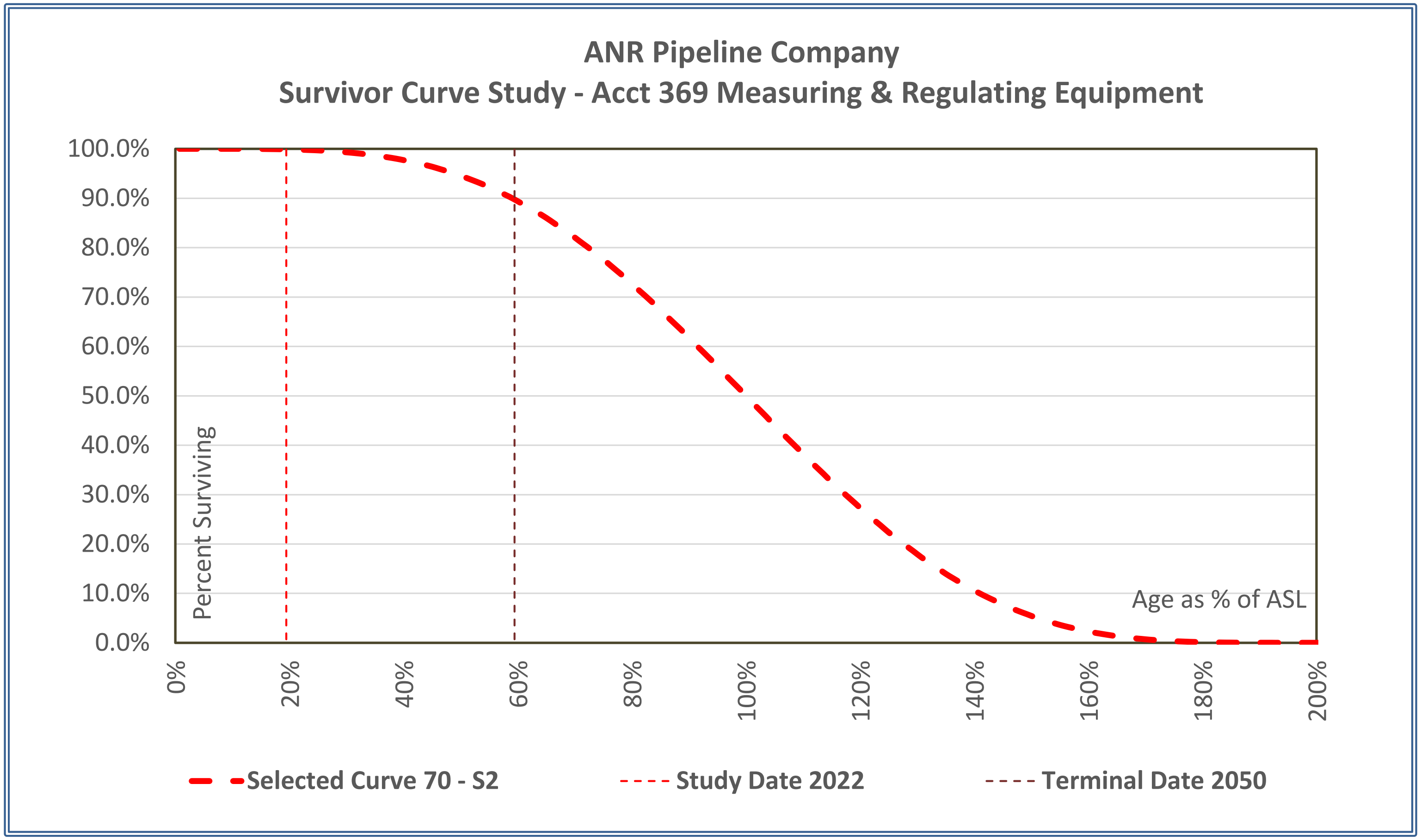
# ANR Pipeline Company
## Survivor Curve Study - Acct 369 Measuring & Regulating Equipment

### Salient Statistical Results

| Economic Life | Ave Age at Study Date: | Average Service Life | Age as % of ASL | Iowa Curve | Conformance Index | Retirement Index | Average Remaining Life |
|---|---|---|---|---|---|---|---|
| **2050** | 13.61 | 70 | 19.4% | S2 | 29 | 96% | **27.02** |



## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1971 | 6,062,637 | 1,169,197 | 87,082 | - | - | 7,144,752 |
| 1972 | 7,144,752 | 2,935,686 | 534,991 | - | (2,328,036) | 7,217,411 |
| 1973 | 7,217,411 | 1,235,821 | 270,142 | - | - | 8,183,090 |
| 1974 | 8,183,090 | 695,728 | 373,150 | - | - | 8,505,668 |
| 1975 | 8,505,668 | 184,263 | 127,514 | - | 80,777 | 8,643,194 |
| 1976 | 8,643,194 | 253,158 | 66,018 | - | (14,113) | 8,816,221 |
| 1977 | 8,816,221 | 132,563 | 11,644 | - | - | 8,937,140 |
| 1978 | 8,937,140 | 154,410 | - | - | - | 9,091,550 |
| 1979 | 9,091,550 | 1,190,882 | - | - | - | 10,282,432 |
| 1980 | 10,282,432 | 2,334,643 | - | - | - | 12,617,075 |
| 1981 | 12,617,075 | (680,735) | 139,068 | - | - | 11,797,272 |
| 1982 | 11,797,272 | 2,980,279 | 33,152 | - | - | 14,744,399 |
| 1983 | 14,744,399 | 2,084,435 | 11,177 | - | (449,142) | 16,368,515 |
| 1984 | 16,368,515 | 809,701 | 227,022 | - | 658,758 | 17,609,952 |
| 1985 | 17,609,952 | (610,044) | 2,348 | - | (130,563) | 16,866,997 |
| 1986 | 16,866,997 | 2,088,600 | 46,376 | - | 8,448 | 18,917,669 |
| 1987 | 18,917,669 | 2,158,894 | - | - | 4,860,230 | 25,936,793 |
| 1988 | 25,936,793 | 1,980,570 | 9,918 | - | (374,935) | 27,532,510 |
| 1989 | 27,532,510 | 2,873,826 | 14,360 | - | - | 30,391,976 |
| 1990 | 30,391,976 | 1,964,562 | - | - | (1,339,737) | 31,016,801 |

## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1991 | 31,016,801 | 14,122,532 | 39,177 | - | - | 45,100,156 |
| 1992 | 45,100,156 | 6,283,959 | 501,432 | - | (847,901) | 50,034,782 |
| 1993 | 50,034,782 | 9,783,442 | - | - | (587,787) | 59,230,437 |
| 1994 | 59,230,437 | 20,445,115 | 1,303,051 | - | (11,501,735) | 66,870,766 |
| 1995 | 66,870,766 | 6,366,754 | 16,951 | - | (498,655) | 72,721,914 |
| 1996 | 72,721,914 | 1,306,400 | 11,551 | - | - | 74,016,763 |
| 1997 | 74,016,763 | 5,060,046 | 2,058,410 | (29,431) | 817,507 | 77,806,475 |
| 1998 | 77,806,475 | 1,117,509 | - | - | (61,890) | 78,862,094 |
| 1999 | 78,862,094 | 1,678,859 | - | - | - | 80,540,953 |
| 2000 | 80,540,953 | 1,523,009 | - | - | - | 82,063,962 |
| 2001 | 82,063,962 | 3,994,438 | - | - | - | 86,058,400 |
| 2002 | 86,058,400 | - | 440,590 | - | - | 85,617,810 |
| 2003 | 85,617,810 | 3,014,464 | 80,131 | - | 360,870 | 88,913,013 |
| 2004 | 88,913,013 | 7,580,749 | 391,919 | - | - | 96,101,843 |
| 2005 | 96,101,843 | 5,791,397 | 574,259 | - | - | 101,318,981 |
| 2006 | 101,318,981 | 10,303,505 | 610,874 | - | - | 111,011,612 |
| 2007 | 111,011,612 | 5,452,983 | 1,221,251 | - | - | 115,243,344 |
| 2008 | 115,243,344 | 4,607,992 | 2,391,110 | 4,449 | (51,318) | 117,413,357 |
| 2009 | 117,413,357 | 4,551,409 | 3,422 | - | - | 121,961,344 |
| 2010 | 121,961,344 | 11,230,239 | 194,115 | - | (20,636) | 132,976,832 |
| 2011 | 132,976,832 | 1,691,932 | 7,632 | - | (1,103,728) | 133,557,404 |
| 2012 | 133,557,404 | 8,096,753 | 2,031,717 | - | 1,378,077 | 141,000,517 |
| 2013 | 141,000,517 | 4,703,160 | 28,360 | - | (4,934,660) | 140,740,657 |
| 2014 | 140,740,657 | 9,681,081 | - | - | (445,159) | 149,976,579 |
| 2015 | 149,976,579 | 16,572,051 | 419,786 | - | (2,335,606) | 163,793,238 |
| 2016 | 163,793,238 | 16,632,137 | 584,544 | - | 54,875 | 179,895,706 |
| 2017 | 179,895,706 | 13,939,508 | 531,661 | - | - | 193,303,553 |
| 2018 | 193,303,553 | 14,434,545 | 74,292 | - | (58,238) | 207,605,568 |
| 2019 | 207,605,568 | 23,621,697 | - | - | - | 231,227,265 |
| 2020 | 231,227,265 | 16,970,047 | 27,781 | - | - | 248,169,531 |
| 2021 | 248,169,531 | 22,286,758 | 424,969 | - | - | 270,031,320 |
| | | 91,252,555 | 1,058,703 | Σ of last 5 years: | ` | |
| | | 18,250,511 | 211,741 | Ave last 5 yrs | | |

# Goodness of Fit Test Statistics

| Best 5-Year Retirement Predictors | | | | | |
|---|---|---|---|---|---|
| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
| 1 | 105 - L2 | 27.45 | 218,200 | 96.9% | 24.66 |
| 2 | 115 - S1 | 27.45 | 218,535 | 96.8% | 24.54 |
| 3 | 70 - S2 | 27.02 | 203,674 | 96.2% | 29.44 |
| 4 | 90 - R3 | L3 | 203,506 | 55.0% | 24.68 |
| 5 | 120 - S1 | 27.51 | 199,487 | 94.2% | 23.98 |
| 6 | 65 - L3 | 26.96 | 228,406 | 92.1% | 32.19 |
| 7 | 85 - R3 | 27.46 | 229,707 | 91.5% | 25.55 |
| 8 | 110 - L2 | 27.51 | 192,498 | 90.9% | 23.99 |
| 9 | 95 - R3 | 27.59 | 180,752 | 85.4% | 24.02 |
| 10 | 125 - S1 | 27.56 | 175,819 | 83.0% | 23.50 |

| Best Conformance Indices | | | | | |
|---|---|---|---|---|---|
| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
| L Curves 1 | 75 - L1 | 25.42 | 1,313,823 | -420.5% | 934.31 |
| L Curves 2 | 105 - L0 | 25.83 | 1,474,458 | -496.4% | 454.14 |
| L Curves 3 | 50 - L3 | 24.95 | 638,432 | -101.5% | 345.06 |
| S Curves 1 | 50 - S2 | 24.82 | 816,839 | -185.8% | 627.44 |
| S Curves 2 | 40 - S6 | 25.28 | - | 0.0% | 256.71 |
| S Curves 3 | 60 - S1 | 25.25 | 1,229,590 | -380.7% | 230.22 |
| R Curves 1 | 45 - R4 | 25.39 | 397,409 | 12.3% | 301.72 |
| R Curves 2 | 90 - R1 | 26.33 | 1,144,192 | -340.4% | 285.78 |
| R Curves 3 | 50 - R3 | 25.50 | 861,007 | -206.6% | 224.44 |
| | | | | | |

## Selected Curve Forecasted Survivorship & Interim Retirements

| Selected Curve | | | | | | | |
|---|---|---|---|---|---|---|---|
| 70 - S2 | Year | Age | Age as % of ASL | Percent Surviving | Surviving Plant | Interim Retirements | |
| Original Installations | | | | | 326,307,927 | | |
| Surviving Balance | 2022 | 13.61 | 19.44% | 99.8899% | 305,266,275 | | |
| 1st Forecast Year | 2023 | 14.61 | 20.87% | 99.8509% | 305,138,848 | 127,427 | |
| 2 | 2024 | 15.61 | 22.30% | 99.8022% | 304,980,158 | 158,691 | |
| 3 | 2025 | 16.61 | 23.72% | 99.7379% | 304,770,248 | 209,909 | |
| 4 | 2026 | 17.61 | 25.15% | 99.6649% | 304,532,037 | 238,211 | |
| 5 | 2027 | 18.61 | 26.58% | 99.5778% | 304,247,907 | 284,131 | |
| 6 | 2028 | 19.61 | 28.01% | 99.4671% | 303,886,711 | 361,196 | |
| 7 | 2029 | 20.61 | 29.44% | 99.3459% | 303,491,060 | 395,651 | |
| 8 | 2030 | 21.61 | 30.87% | 99.2056% | 303,033,451 | 457,609 | |
| 9 | 2031 | 22.61 | 32.30% | 99.0448% | 302,508,517 | 524,934 | |
| 10 | 2032 | 23.61 | 33.72% | 98.8476% | 301,865,264 | 643,253 | |
| 11 | 2033 | 24.61 | 35.15% | 98.6388% | 301,183,772 | 681,492 | |
| 12 | 2034 | 25.61 | 36.58% | 98.4043% | 300,418,513 | 765,258 | |
| 13 | 2035 | 26.61 | 38.01% | 98.1227% | 299,499,698 | 918,815 | |
| 14 | 2036 | 27.61 | 39.44% | 97.8299% | 298,544,410 | 955,288 | |
| 15 | 2037 | 28.61 | 40.87% | 97.5067% | 297,489,677 | 1,054,733 | |
| 16 | 2038 | 29.61 | 42.30% | 97.1515% | 296,330,703 | 1,158,974 | |
| 17 | 2039 | 30.61 | 43.72% | 96.7339% | 294,968,049 | 1,362,654 | |
| 18 | 2040 | 31.61 | 45.15% | 96.3082% | 293,578,774 | 1,389,275 | |
| 19 | 2041 | 32.61 | 46.58% | 95.8464% | 292,071,877 | 1,506,897 | |
| 20 | 2042 | 33.61 | 48.01% | 95.3102% | 290,322,471 | 1,749,406 | |
| 21 | 2043 | 34.61 | 49.44% | 94.7701% | 288,560,071 | 1,762,401 | |
| 22 | 2044 | 35.61 | 50.87% | 94.1907% | 286,669,237 | 1,890,834 | |
| 23 | 2045 | 36.61 | 52.30% | 93.5710% | 284,647,104 | 2,022,133 | |
| 24 | 2046 | 37.61 | 53.72% | 92.8615% | 282,331,983 | 2,315,121 | |
| 25 | 2047 | 38.61 | 55.15% | 92.1561% | 280,030,293 | 2,301,690 | |
| 26 | 2048 | 39.61 | 56.58% | 91.4085% | 277,590,762 | 2,439,531 | |
| 27 | 2049 | 40.61 | 58.01% | 90.5601% | 274,822,491 | 2,768,271 | |
| 28 | 2050 | 41.61 | 59.44% | 89.7238% | 272,093,592 | 2,728,899 | |
| | | | | | 8,249,607,679 | **33,172,684** | Total Interm Retires |
| | | | | **Average Remaining Life** | **27.02** | **203,674** | 5 Yr Ave Ann Retires |

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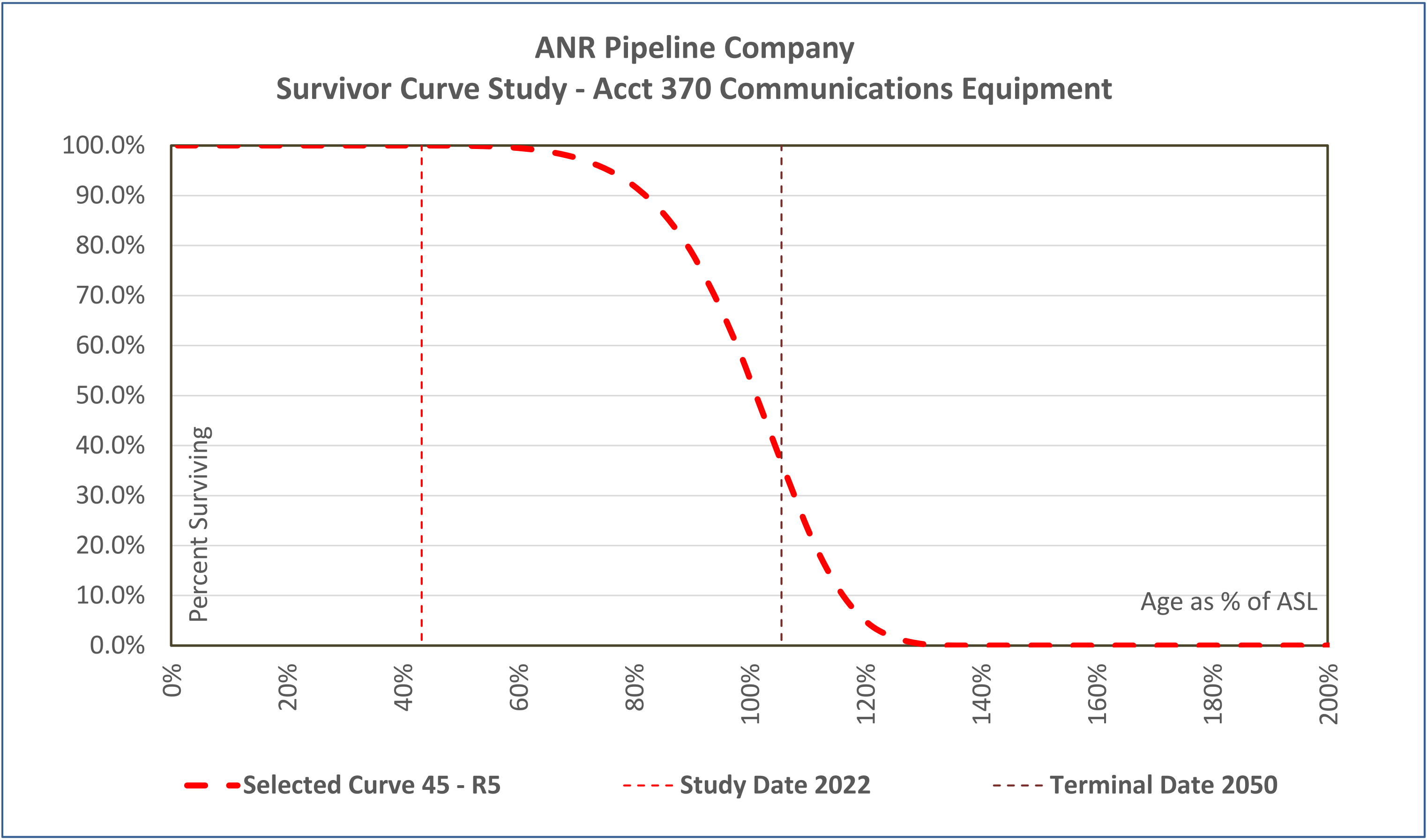
# ANR Pipeline Company

## Survivor Curve Study - Acct 370 Communications Equipment

### Salient Statistical Results

| Economic Life | Ave Age at Study Date: | Average Service Life | Age as % of ASL | Iowa Curve | Conformance Index | Retirement Index | Average Remaining Life |
|---|---|---|---|---|---|---|---|
| **2050** | 19.49 | 45 | 43.3% | R5 | 3 | 68% | **22.30** |



## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1971 | 3,371,853 | 118,386 | 48,032 | - | - | 3,442,207 |
| 1972 | 3,442,207 | 1,162,089 | 15,175 | - | - | 4,589,121 |
| 1973 | 4,589,121 | 644,068 | 504,295 | - | - | 4,728,894 |
| 1974 | 4,728,894 | 214,883 | 8,189 | - | - | 4,935,588 |
| 1975 | 4,935,588 | 90,318 | 35,213 | - | 96,446 | 5,087,139 |
| 1976 | 5,087,139 | 2,216,641 | 736,960 | - | - | 6,566,820 |
| 1977 | 6,566,820 | 1,432,902 | 40,331 | - | - | 7,959,391 |
| 1978 | 7,959,391 | 431,217 | 101,296 | - | - | 8,289,312 |
| 1979 | 8,289,312 | 659,667 | 18,885 | - | - | 8,930,094 |
| 1980 | 8,930,094 | 433,611 | 2,879 | - | - | 9,360,826 |
| 1981 | 9,360,826 | 1,418,658 | 34,869 | - | - | 10,744,615 |
| 1982 | 10,744,615 | 1,231,930 | 254,032 | - | - | 11,722,513 |
| 1983 | 11,722,513 | 1,016,332 | 36,955 | - | - | 12,701,890 |
| 1984 | 12,701,890 | 4,683,672 | 33,123 | - | - | 17,352,439 |
| 1985 | 17,352,439 | 3,946,247 | 896 | - | 178,591 | 21,476,381 |
| 1986 | 21,476,381 | 6,015,982 | 1,494,193 | - | (8,448) | 25,989,722 |
| 1987 | 25,989,722 | 2,533,806 | 53,076 | - | - | 28,470,452 |
| 1988 | 28,470,452 | 873,862 | 22,630 | - | - | 29,321,684 |
| 1989 | 29,321,684 | (261,860) | 912 | - | - | 29,058,912 |
| 1990 | 29,058,912 | 2,057,579 | - | - | (571) | 31,115,920 |

## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 1991 | 31,115,920 | 563,405 | 468,058 | - | - | 31,211,267 |
| 1992 | 31,211,267 | (1,045,345) | 245,725 | - | - | 29,920,197 |
| 1993 | 29,920,197 | (211,687) | 154,075 | - | - | 29,554,435 |
| 1994 | 29,554,435 | 2,897,086 | 760,384 | - | - | 31,691,137 |
| 1995 | 31,691,137 | 420,569 | 2,079 | - | - | 32,109,627 |
| 1996 | 32,109,627 | (1,251,529) | 25,147 | - | - | 30,832,951 |
| 1997 | 30,832,951 | 6,559,998 | 535,515 | - | - | 36,857,434 |
| 1998 | 36,857,434 | 915,769 | 13,229,241 | - | - | 24,543,962 |
| 1999 | 24,543,962 | 2,663,245 | - | - | - | 27,207,207 |
| 2000 | 27,207,207 | 9,717,879 | 8,626,665 | - | - | 28,298,421 |
| 2001 | 28,298,421 | 1,729,691 | 305,885 | - | - | 29,722,227 |
| 2002 | 29,722,227 | 337,958 | 24,970 | - | - | 30,035,215 |
| 2003 | 30,035,215 | 2,196,727 | 87,847 | - | - | 32,144,095 |
| 2004 | 32,144,095 | 485,510 | - | - | - | 32,629,605 |
| 2005 | 32,629,605 | 2,829,722 | 658,851 | - | - | 34,800,476 |
| 2006 | 34,800,476 | 5,313,127 | 807,758 | - | - | 39,305,845 |
| 2007 | 39,305,845 | 2,148,068 | 917,700 | - | - | 40,536,213 |
| 2008 | 40,536,213 | 792,260 | 1,304,295 | - | - | 40,024,178 |
| 2009 | 40,024,178 | 343,211 | 194,821 | - | - | 40,172,568 |
| 2010 | 40,172,568 | 692,415 | 116,772 | - | - | 40,748,211 |
| 2011 | 40,748,211 | 37,219 | 48,651 | - | 51,110 | 40,787,889 |
| 2012 | 40,787,889 | 1,031,008 | 319,453 | - | - | 41,499,444 |
| 2013 | 41,499,444 | (787,014) | 291,269 | - | (336,688) | 40,084,473 |
| 2014 | 40,084,473 | 171,251 | - | - | (63,193) | 40,192,531 |
| 2015 | 40,192,531 | 306,961 | 39,483 | - | - | 40,460,009 |
| 2016 | 40,460,009 | 330,030 | 104,881 | - | (20,288) | 40,664,870 |
| 2017 | 40,664,870 | 1,262,026 | 28,108 | - | - | 41,898,788 |
| 2018 | 41,898,788 | 740,033 | 29,064 | - | - | 42,609,757 |
| 2019 | 42,609,759 | 11,201,638 | - | - | - | 53,811,397 |
| 2020 | 53,811,397 | 9,622,422 | 207,578 | - | - | 63,226,241 |
| 2021 | 63,226,241 | 7,433,653 | - | - | - | 70,659,894 |
|  |  | 30,259,772 | 264,750 | Σ of last 5 years: | ` |  |
|  |  | 6,051,954 | 52,950 | Ave last 5 yrs |  |  |

# Goodness of Fit Test Statistics

**Best 5-Year Retirement Predictors**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| 1 | 125 - R3 | 27.63 | 51,895 | 98.0% | 2.59 |
| 2 | 95 - S2 | 27.29 | 54,086 | 97.9% | 2.60 |
| 3 | 145 - L2 | 27.56 | 54,153 | 97.7% | 2.58 |
| 4 | 150 - L2 | L3 | 51,025 | 55.0% | 2.58 |
| 5 | 65 - S3 | 26.44 | 55,303 | 95.6% | 2.70 |
| 6 | 90 - L3 | 27.33 | 56,563 | 93.2% | 2.60 |
| 7 | 120 - R3 | 27.59 | 57,404 | 91.6% | 2.59 |
| 8 | 130 - R3 | 27.66 | 48,481 | 91.6% | 2.58 |
| 9 | 60 - L4 | 26.22 | 47,473 | 89.7% | 2.73 |
| 10 | 140 - L2 | 27.52 | 59,373 | 87.9% | 2.59 |

**Best Conformance Indices**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| L Curves 1 | 30 - L2 | 11.95 | 3,903,773 | -7172.6% | 266.16 |
| L Curves 2 | 30 - L3 | 8.06 | 4,445,495 | -8195.6% | 76.16 |
| L Curves 3 | 30 - L1 | 15.50 | 2,879,131 | -5237.5% | 53.02 |
| S Curves 1 | 30 - S1 | 12.37 | 3,094,473 | -5644.1% | 108.77 |
| S Curves 2 | 30 - S2 | 9.19 | 3,529,437 | -6465.6% | 60.74 |
| S Curves 3 | 30 - S3 | 6.31 | 3,663,958 | -6719.7% | 45.38 |
| R Curves 1 | 30 - R1 | 15.11 | 2,292,541 | -4129.6% | 132.31 |
| R Curves 2 | 30 - R2 | 11.72 | 2,635,760 | -4777.8% | 65.09 |
| R Curves 3 | 30 - R4 | 5.72 | 2,728,783 | -4953.5% | 55.19 |
| | | | | | |

Survivor Curve Workpapers
Acct 370
Page 5 of 5

## Selected Curve Forecasted Survivorship & Interim Retirements

| Selected Curve<br>45 - R5 | Year | Age | Age as % of ASL | Percent Surviving | Surviving Plant | Interim Retirements |
|---|---|---|---|---|---|---|
| Original Installations | | | | | 117,274,323 | |
| Surviving Balance | 2022 | 19.49 | 43.32% | 99.9954% | 84,019,506 | |
| 1st Forecast Year | 2023 | 20.49 | 45.54% | 99.9888% | 84,011,749 | 7,758 |
| 2 | 2024 | 21.49 | 47.76% | 99.9757% | 83,996,322 | 15,427 |
| 3 | 2025 | 22.49 | 49.98% | 99.9517% | 83,968,227 | 28,095 |
| 4 | 2026 | 23.49 | 52.21% | 99.9087% | 83,917,767 | 50,460 |
| 5 | 2027 | 24.49 | 54.43% | 99.8422% | 83,839,797 | 77,970 |
| 6 | 2028 | 25.49 | 56.65% | 99.7409% | 83,720,990 | 118,807 |
| 7 | 2029 | 26.49 | 58.87% | 99.5927% | 83,547,193 | 173,797 |
| 8 | 2030 | 27.49 | 61.10% | 99.3834% | 83,301,761 | 245,432 |
| 9 | 2031 | 28.49 | 63.32% | 99.0817% | 82,947,943 | 353,818 |
| 10 | 2032 | 29.49 | 65.54% | 98.6951% | 82,494,499 | 453,444 |
| 11 | 2033 | 30.49 | 67.76% | 98.1921% | 81,904,697 | 589,801 |
| 12 | 2034 | 31.49 | 69.98% | 97.5501% | 81,151,766 | 752,931 |
| 13 | 2035 | 32.49 | 72.21% | 96.7009% | 80,155,894 | 995,872 |
| 14 | 2036 | 33.49 | 74.43% | 95.6845% | 78,963,876 | 1,192,018 |
| 15 | 2037 | 34.49 | 76.65% | 94.4279% | 77,490,259 | 1,473,618 |
| 16 | 2038 | 35.49 | 78.87% | 92.8835% | 75,679,005 | 1,811,254 |
| 17 | 2039 | 36.49 | 81.10% | 90.9960% | 73,465,494 | 2,213,510 |
| 18 | 2040 | 37.49 | 83.32% | 88.5904% | 70,644,378 | 2,821,116 |
| 19 | 2041 | 38.49 | 85.54% | 85.8117% | 67,385,659 | 3,258,719 |
| 20 | 2042 | 39.49 | 87.76% | 82.5073% | 63,510,411 | 3,875,248 |
| 21 | 2043 | 40.49 | 89.98% | 78.6306% | 58,964,001 | 4,546,410 |
| 22 | 2044 | 41.49 | 92.21% | 73.9359% | 53,458,335 | 5,505,666 |
| 23 | 2045 | 42.49 | 94.43% | 68.8311% | 47,471,726 | 5,986,609 |
| 24 | 2046 | 43.49 | 96.65% | 63.1602% | 40,821,221 | 6,650,506 |
| 25 | 2047 | 44.49 | 98.87% | 56.9968% | 33,593,095 | 7,228,126 |
| 26 | 2048 | 45.49 | 101.10% | 50.4558% | 25,922,280 | 7,670,814 |
| 27 | 2049 | 46.49 | 103.32% | 43.3826% | 17,627,216 | 8,295,065 |
| 28 | 2050 | 47.49 | 105.54% | 36.5886% | 9,659,592 | 7,967,624 |
| | | | | | 1,873,615,154 | **74,359,914** Total Interm Retires |
| | | | | **Average Remaining Life** | **22.30** | **35,942** 5 Yr Ave Ann Retires |

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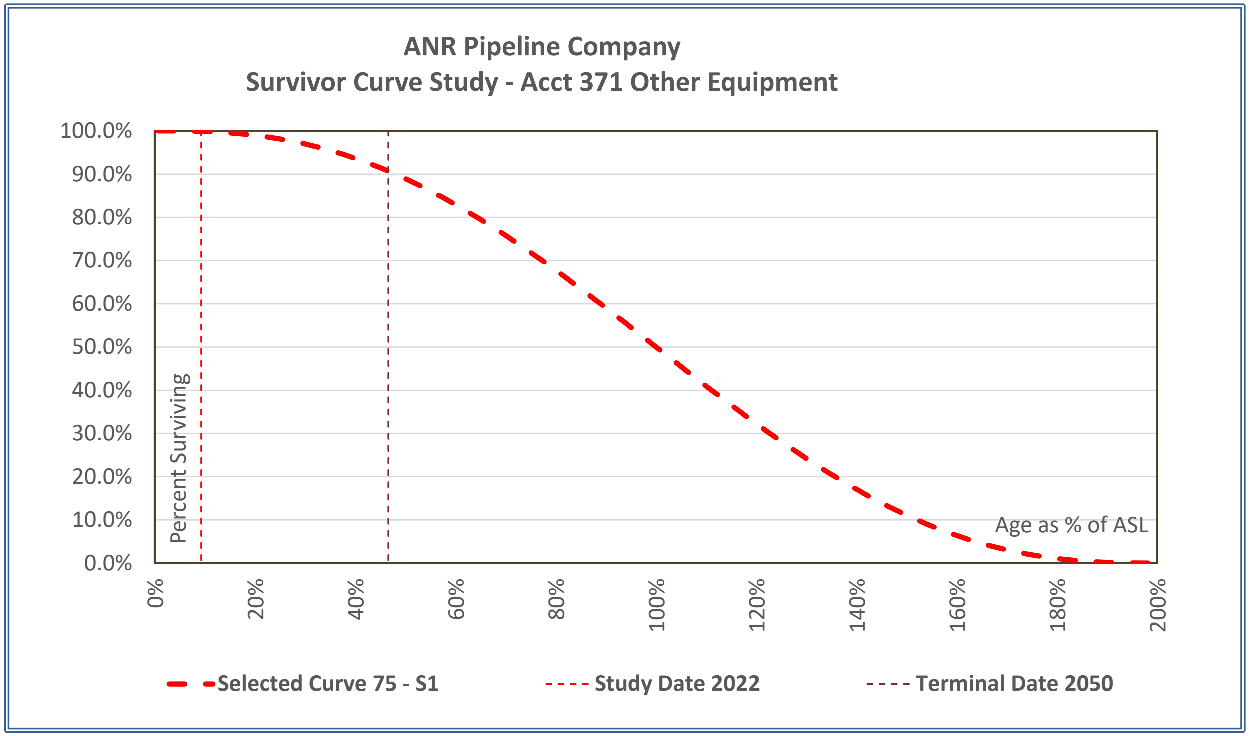
# ANR Pipeline Company
## Survivor Curve Study - Acct 371 Other Equipment

**Salient Statistical Results**

| Economic Life | Ave Age at Study Date: | Average Service Life | Age as % of ASL | Iowa Curve | Conformance Index | Retirement Index | Average Remaining Life |
|---|---|---|---|---|---|---|---|
| **2050** | 6.94 | 75 | 9.3% | S1 | 1 | 99% | **26.87** |



## Historical Plant Balances

| Year | BOY Balance | Additions | Retirements | Adjustments | Transfers | EOY Balance |
|---|---|---|---|---|---|---|
| 2013 | - | - | - | - | - | - |
| 2014 | 2,888,725 | - | - | - | - | 2,888,725 |
| 2015 | 2,888,725 | - | - | - | - | 2,888,725 |
| 2016 | 2,888,726 | - | - | - | - | 2,888,726 |
| 2017 | 2,888,726 | - | - | - | (618,463) | 2,270,263 |
| 2018 | 2,270,263 | - | 15,221 | - | - | 2,255,042 |
| 2019 | 2,255,042 | - | - | - | - | 2,255,042 |
| 2020 | 2,255,042 | - | - | - | 618,463 | 2,873,505 |
| 2021 | 2,873,505 | - | - | - | - | 2,873,505 |
| | | - | 15,221 | Σ of last 5 years: | ` | |
| | | - | 3,044 | Ave last 5 yrs | | |

## Goodness of Fit Test Statistics

**Best 5-Year Retirement Predictors**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| 1 | 130 - L1 | 27.31 | 3,035 | 99.7% | 0.82 |
| 2 | 135 - R2 | 27.49 | 3,056 | 99.6% | 0.82 |
| 3 | 75 - S1 | 26.87 | 3,087 | 98.6% | 0.82 |
| 4 | 30 - S3 | 20.16 | 2,974 | 55.0% | 0.82 |
| 5 | 140 - R2 | 27.51 | 2,950 | 96.9% | 0.82 |
| 6 | 130 - R2 | 27.46 | 3,165 | 96.0% | 0.82 |
| 7 | 60 - R3 | 27.04 | 2,916 | 95.8% | 0.82 |
| 8 | 135 - L1 | 27.36 | 2,891 | 95.0% | 0.82 |
| 9 | 145 - R2 | 27.53 | 2,844 | 93.4% | 0.82 |
| 10 | 125 - L1 | 27.26 | 3,280 | 92.2% | 0.82 |

**Best Conformance Indices**

| Ranking | ASL / Curve | Average Remaining Life | Annual Retirements | Retirement Index | Conformance Index |
|---|---|---|---|---|---|
| L Curves 1 | 5 - L5 | 27.31 | 14,207 | -266.7% | 4.43 |
| L Curves 2 | 5 - L4 | 25.79 | 45,659 | -1299.9% | 4.00 |
| L Curves 3 | 5 - L3 | 23.45 | 95,489 | -2936.7% | 3.23 |
| S Curves 1 | 5 - S6 | 28.00 | - | 0.0% | 4.53 |
| S Curves 2 | 5 - S5 | 27.99 | 192 | 6.3% | 4.53 |
| S Curves 3 | 5 - S4 | 27.62 | 7,766 | -55.1% | 4.51 |
| R Curves 1 | 5 - R4 | 27.72 | 5,810 | 9.1% | 4.55 |
| R Curves 2 | 5 - R5 | 28.00 | 0 | 0.0% | 4.53 |
| R Curves 3 | 5 - R3 | 25.95 | 42,061 | -1181.7% | 4.31 |
| | | | | | |

## Selected Curve Forecasted Survivorship & Interim Retirements

| Selected Curve 75 - S1 | Year | Age | Age as % of ASL | Percent Surviving | Surviving Plant | Interim Retirements | |
|---|---|---|---|---|---|---|---|
| Original Installations | | | | | 3,507,188 | | |
| Surviving Balance | 2022 | 6.94 | 9.26% | 99.8726% | 2,873,505 | | |
| 1st Forecast Year | 2023 | 7.94 | 10.59% | 99.8169% | 2,871,550 | 1,955 | |
| 2 | 2024 | 8.94 | 11.92% | 99.7420% | 2,868,926 | 2,625 | |
| 3 | 2025 | 9.94 | 13.26% | 99.6577% | 2,865,967 | 2,958 | |
| 4 | 2026 | 10.94 | 14.59% | 99.5580% | 2,862,472 | 3,495 | |
| 5 | 2027 | 11.94 | 15.92% | 99.4326% | 2,858,072 | 4,400 | |
| 6 | 2028 | 12.94 | 17.26% | 99.2983% | 2,853,365 | 4,707 | |
| 7 | 2029 | 13.94 | 18.59% | 99.1463% | 2,848,032 | 5,333 | |
| 8 | 2030 | 14.94 | 19.92% | 98.9618% | 2,841,562 | 6,471 | |
| 9 | 2031 | 15.94 | 21.26% | 98.7705% | 2,834,853 | 6,708 | |
| 10 | 2032 | 16.94 | 22.59% | 98.5594% | 2,827,450 | 7,403 | |
| 11 | 2033 | 17.94 | 23.92% | 98.3093% | 2,818,678 | 8,771 | |
| 12 | 2034 | 18.94 | 25.26% | 98.0554% | 2,809,774 | 8,904 | |
| 13 | 2035 | 19.94 | 26.59% | 97.7803% | 2,800,123 | 9,651 | |
| 14 | 2036 | 20.94 | 27.92% | 97.4597% | 2,788,879 | 11,244 | |
| 15 | 2037 | 21.94 | 29.26% | 97.1391% | 2,777,635 | 11,244 | |
| 16 | 2038 | 22.94 | 30.59% | 96.7962% | 2,765,608 | 12,027 | |
| 17 | 2039 | 23.94 | 31.92% | 96.4016% | 2,751,770 | 13,838 | |
| 18 | 2040 | 24.94 | 33.26% | 96.0115% | 2,738,090 | 13,680 | |
| 19 | 2041 | 25.94 | 34.59% | 95.5985% | 2,723,604 | 14,486 | |
| 20 | 2042 | 26.94 | 35.92% | 95.1278% | 2,707,098 | 16,507 | |
| 21 | 2043 | 27.94 | 37.26% | 94.6667% | 2,690,925 | 16,173 | |
| 22 | 2044 | 28.94 | 38.59% | 94.1823% | 2,673,937 | 16,988 | |
| 23 | 2045 | 29.94 | 39.92% | 93.6346% | 2,654,728 | 19,208 | |
| 24 | 2046 | 30.94 | 41.26% | 93.1019% | 2,636,045 | 18,683 | |
| 25 | 2047 | 31.94 | 42.59% | 92.5460% | 2,616,547 | 19,498 | |
| 26 | 2048 | 32.94 | 43.92% | 91.9214% | 2,594,643 | 21,905 | |
| 27 | 2049 | 33.94 | 45.26% | 91.3176% | 2,573,464 | 21,178 | |
| 28 | 2050 | 34.94 | 46.59% | 90.6909% | 2,551,484 | 21,980 | |
| | | | | | 77,205,283 | **322,021** | Total Interm Retires |
| | | | | **Average Remaining Life** | **26.87** | **3,087** | 5 Yr Ave Ann Retires |

Docket No. RP22-__-000
Exhibit No. ANR-0041

**UNITED STATES OF AMERICA**
**BEFORE THE**
**FEDERAL ENERGY REGULATORY COMMISSION**

ANR Pipeline Company ) Docket No. RP22 -___-000

## Summary of the Prepared Direct Testimony of Nada Siddik

Nada Siddik is the Manager Operations Planning West at TransCanada USA Services Inc. Her testimony supports the need for ANR Pipeline Company ("ANR") to hold transportation and storage contracts with third parties ("TBOs") required to support ANR's integrated system and storage operations and to meet its existing firm service obligations. Ms. Siddik explains the costs of the TBOs and the numerous benefits that the TBOs provide to customers across the system. She details the changes in the TBO portfolio since ANR's last rate case in 2016. Ms. Siddik also explains how ANR's ability to meet its customers' firm service requirements could be negatively impacted if ANR did not hold its TBOs. Ms. Siddik discusses the other options that ANR considered when entering into TBOs, and demonstrates that the TBOs were the most cost-effective and flexible alternative available to ANR.

Ms. Siddik's testimony also addresses the operational bases for outages of primary firm service that are expected to occur as a result of the construction of certain modernization projects that ANR is proposing in its Eligible Facilities Plan. She explains the expected outages' operational impacts on firm service and the operational mitigation measures that ANR intends to use to minimize the outages.

Docket No. RP22-___-000
Exhibit No. ANR-0041

# UNITED STATES OF AMERICA
# BEFORE THE
# FEDERAL ENERGY REGULATORY COMMISSION

ANR Pipeline Company ) Docket No. RP22-___-000

# PREPARED DIRECT TESTIMONY OF NADA SIDDIK ON BEHALF OF ANR PIPELINE COMPANY

January 28, 2022

Docket No. RP22-___-000
Exhibit No. ANR-0041

# **Glossary of Terms**

| | |
|---|---|
| ANR | ANR Pipeline Company |
| Bcf | Billion cubic feet |
| Bcf/d | Billion cubic feet per day |
| Commission | Federal Energy Regulatory Commission |
| Consumers | Consumers Energy |
| DDS | Deferred Delivery Service |
| Dth | Dekatherms |
| Dth/d | Dekatherms per day |
| DTE | DTE Energy |
| EFP | Eligible Facilities Plan |
| FERC | Federal Energy Regulatory Commission |
| GLGT | Great Lakes Gas Transmission Limited Partnership |
| Great Lakes | Great Lakes Gas Transmission Limited Partnership |
| MLN | Michigan Leg North |
| MLS | Michigan Leg South |
| NNS | No-Notice Service |
| Pine Prairie | Pine Prairie Energy Center, LLC |
| SBO | Storage by others |
| TBO | Transportation by others |
| TC Energy | TC Energy Corporation |

| | |
|---|---|
| Tie Line | A line from Defiance, Ohio to Bridgman, Michigan that connects ANR’s SE and SW Mainlines |

# UNITED STATES OF AMERICA
# BEFORE THE
# FEDERAL ENERGY REGULATORY COMMISSION

ANR Pipeline Company ) Docket No. RP22-___-000

## Prepared Direct Testimony of Nada Siddik

**Q: What is your name and business address?**

A: My name is Nada Siddik. My business address is TC Energy Corporation ("TC Energy"), 700 Louisiana Street, Houston, Texas 77002.

**Q: What is your occupation?**

A: I am employed by TransCanada USA Services Inc., an indirect subsidiary of TC Energy, as the Manager Operations Planning West. TransCanada USA Services Inc. employs all personnel in the United States who are involved in the operation and maintenance of TC Energy's U.S. energy systems and facilities, including ANR Pipeline Company ("ANR"). I am filing testimony on behalf of ANR.

**Q: Please describe your educational background and your occupational experiences as they are related to your testimony in this proceeding.**

A: I earned a Bachelor of Science in Mechanical Engineering from the University of Calgary in 2009. I have worked in the oil and gas industry for the past 11 years. I started as a project engineer with third-party engineering firms then joined TC Energy in 2013 as a measurement engineer. I then transitioned to a hydraulic modelling engineer and capacity analyst as part of the System Design and Operations team. In 2016, I moved into management as Manager of the Drafting Services team, followed by Manager of the SCADA West team, and in 2019 I became the Manager of Operations Planning West team.

In my current role, I am responsible for optimizing outages and supporting the safe, reliable, and efficient operations of TC Energy West pipelines, one of which is ANR pipeline. My team supports the Gas Control team by conducting analysis of flow and restrictions on the pipelines to meet daily demand. The team is also responsible for working with project management, marketing, and field operations teams to gather, track, and plan outages to minimize customer impacts.

**Q: Have you ever testified before the Federal Energy Regulatory Commission ("FERC" or "Commission") or any other energy regulatory commission?**

A: Yes. I testified on behalf of ANR in FERC Docket No. RP20-608-000.

**Q: What is the purpose of your testimony in this proceeding?**

A: In Section I of my testimony, I explain why ANR requires its existing transportation contracts on third parties (often referred to as "transportation by others" or "TBOs") to meet ANR's firm service obligations and to provide integrated transportation and storage services that benefit customers across the entire system. In my testimony, certain third-party storage contracts (referred to as "storage by others" or "SBOs") are included in the category of TBOs, but I refer generally to TBOs. The SBOs provide the same system benefits as the TBOs that are discussed throughout my testimony. I also discuss the costs of the TBOs and the numerous system benefits they provide to customers across the system. I also detail the changes in the TBO contract portfolio between ANR's last rate case in 2016 and today. I further explain how ANR's ability to meet its customers' firm service requirements could be negatively impacted if ANR did not hold its TBO contracts. Finally, I discuss the other options ANR considered when entering into TBOs and demonstrate how the TBOs were determined to be the most cost-effective and flexible alternative available to ANR to meet its firm service obligations.

In Section II of my testimony, I provide the operational bases for outages of primary firm services that are expected to occur as a result of the construction of modernization projects that are part of the Eligible Facilities Plan ("EFP") proposed by ANR in this proceeding. I also explain the operational mitigation measures that ANR intends to undertake in order to minimize these outages.

**Q: Are you sponsoring any statements or schedules?**

A: No.

**Q: Are you sponsoring any exhibits in addition to your testimony?**

A: Yes. I am sponsoring the following exhibits:

| | |
|---|---|
| Exhibit No. ANR-0042 | Current TBOs and SBOs |
| Exhibit No. ANR-0043 | Copy of all current TBOs |
| Exhibit No. ANR-0044 | System Map Comparisons |
| Exhibit No. ANR-0045 | Storage Map |
| Exhibit No. ANR-0046 | Description of TBO Differences |
| Exhibit No. ANR-0047 | TBO Replacement Build Cost Estimate |
| Exhibit No. ANR-0048 | TBO Replacement Build Map |

## **<u>Section I: TBOs</u>**

**Q: Please provide an overview of ANR's system.**

A: As ANR witness Lakhani explains, ANR consists of two mainlines that are joined in the ANR Northern Market Zone 7 ("ML-7") in the Midwest. These two mainline pipelines are known as the Southwest Mainline ("SW Mainline") and the Southeast Mainline ("SE

Mainline"). The SW Mainline connects the production entering its SW Area in Texas, Oklahoma, and Kansas to Midwest markets in Illinois, Wisconsin, and Michigan. The SE Mainline extends from Louisiana north through Arkansas, Mississippi, Tennessee, Kentucky, Indiana, Ohio, and into Michigan and primarily delivers gas to markets in both the Gulf Coast and Northern Areas. The segment between Woolfolk and Bridgman is referred to as Michigan Leg North ("MLN") and the segment between Bridgman and Sandwich is known as Michigan Leg South ("MLS"). The segment from Defiance to Bridgman is called the Tie Line.

Also, ANR has storage fields located in northern and southeastern Michigan. Some of these storage fields are directly connected to ANR's pipeline system, while others are physically discontiguous (*i.e.*, not physically connected) to ANR's system (and are often referred to as ANR's "discontiguous" storage fields). ANR's Northern Area is connected to the two mainlines just north and east of its Sandwich, Illinois compressor station and north and west of its Defiance, Ohio compressor station.

**Q: Please describe the TBOs and the costs associated with them.**

A: There are several TBOs held by ANR for transportation service on DTE Energy ("DTE"), Great Lakes Gas Transmission ("Great Lakes"), and Consumers Energy ("Consumers"). ANR also has SBOs with Blue Lake Gas Storage, ANR Storage Company, and Pine Prairie Energy Center, LLC ("Pine Prairie"). A summary description of each of these contracts is set forth in Exhibit No. ANR-0042. A copy of each of the TBOs is included in Exhibit No. ANR-0043. The costs incurred by ANR under these contracts during the test period in this case are identified on Schedule I-4 (Exhibit No. ANR-0125), and total approximately $70.3 million.

**Q: What general functions does ANR's TBO capacity perform?**

A: Exhibit No. ANR-0045 is a map of ANR's storage facilities, which illustrates the interconnections with DTE, Great Lakes, and Consumers. The capacity ANR holds on Consumers and DTE connect certain of ANR's discontiguous storage fields in northern and southeastern Michigan to ANR's Northern Area. The capacity ANR holds on DTE also functions as an operational loop of ANR's MLN and Tie Line facilities. The capacity ANR holds on Great Lakes connects all of ANR's discontiguous storage fields in the northern and southeastern areas of Michigan to its Northern Area. Additionally, Great Lakes provides a key operational loop of ANR's system along its MLN and MLS, as well as for pipeline segments north of Sandwich and south of Fortune Lake (*i.e.*, Northern Illinois and Wisconsin). Currently, Great Lakes is the only pipeline that exists that can serve as an operational loop of this critical section of ANR's system and can provide the capacity required by ANR to meet its firm customer obligations. Taken together, the TBO capacity integrates ANR's discontiguous storage fields, supports transportation into and through ANR's Northern Area, allows ANR to meet its firm service commitments, and thus provides broad benefits throughout the ANR system.

**Q: Why are the TBOs that ANR holds today important?**

A: The TBOs allow ANR to meet its customers' firm service requirements and they have served that purpose for decades. Without them, ANR would not be able to provide the kind of flexible services it has historically provided to its customers, and without them

ANR will fail to provide the firm and other services that customers have contracted for on the pipeline. ANR's system is designed to be operated as an integrated asset, and the TBO capacity ANR holds is a critical part of ANR's integrated operations and firm capacity design. As explained in more detail below, ANR has utilized TBOs for many years to enable ANR to meet its requirements for its customers. ANR's current TBOs are no less essential today and remain fundamental to ANR's ability to continue to meet its customers' firm service requirements, as I explain in greater detail below. Moreover, as I also explain below, they serve important operational and reliability functions that benefit all customers on ANR's system.

**Q: Can ANR meet its firm requirements across the system without the TBOs?**

A: No. ANR relies on the TBOs in order to meet its firm service obligations. These TBOs provide additional capacity beyond what the physical assets on ANR's MLN, MLS, Tie Line, Northern Illinois, and Wisconsin segments can provide during the winter and summer periods. The TBOs are integrated into the design of the ANR system and the capacity that is sold is dependent not just on the physical facilities, but also the TBOs. Because of that, the TBOs and their capability are intertwined with ANR's contracts. Without these TBOs, ANR would be at risk of being unable to make firm deliveries utilizing any one of these segments, as I will describe in greater detail below. Moreover, without these TBOs, ANR would not be able to operate its storage assets on an integrated basis, and it would not have access to nine storage fields, comprising approximately 67 percent of ANR's storage deliverability, that are physically discontiguous to its system. Thus, ANR would not be able to provide the overall system benefits to its customers associated with operating storage on an integrated basis.

**Q: Do these TBOs benefit ANR's shippers for the system?**

A: Yes, the TBOs yield many benefits for ANR's shippers including the following: (1) the Great Lakes TBOs connect all of ANR's discontiguous storage fields in northern and southeastern Michigan to ANR's Northern Area, and also provide an essential operational loop of ANR's system along its MLN and MLS, as well as for pipeline segments north of Sandwich and south of Fortune Lake (*i.e.*, Northern Illinois and Wisconsin); (2) the TBOs on DTE connect certain of ANR's discontiguous storage fields in northern and southeastern Michigan to ANR's Northern Area and function as an operational loop of ANR's MLN and Tie Line facilities; (3) the TBOs support numerous services offered by ANR; and (4) the TBOs provide operational and reliability benefits to the system. Thus, the system benefits from these TBOs advantage all customers on ANR's system.

One illustration of how the TBOs are integral to the operations of ANR's system and benefit all customers is shown on Exhibit No. ANR-0044, which depicts ANR's system capacity with and without the TBOs. This exhibit identifies the additional transportation capacity that is made available to ANR's customers during the winter and summer periods as a result of the TBOs. For example, as shown on page 2 of Exhibit No. ANR-0044, these TBOs increase ANR's winter capacity on its MLN by 1.56 Bcf/d and on its MLS by 0.94 Bcf/d. During the summer months, as shown on page 4 of Exhibit No. ANR-0044, the TBOs add approximately 0.25 Bcf/d of capacity on ANR's MLN and Tie Line.

**Q: Why are these TBOs essential to ANR's operation of its system and its ability to meet its firm service obligations?**

A: First, ANR's pipeline capacity in specific segments of ANR's pipeline system is insufficient to handle its full contractual obligations without relying upon the TBO capacity. For example, ANR's physical pipeline system enters Wisconsin at the southern end of the State and the physical capacity of ANR's pipeline system is insufficient to meet its firm winter contractual obligations in Wisconsin as well as markets across the MLN, MLS, and in Northern Illinois. Instead, ANR must also rely on third-party transportation, specifically certain of its Great Lakes TBOs, to create an operational loop of ANR to meet its contractual obligations in MLN, MLS, Northern Illinois, and Wisconsin.

Second, as I have noted, the TBOs provide the mechanism for connecting ANR's significant discontiguous storage fields to its system. The ability to take advantage of the unique performance characteristics of each field by aggregating all storage fields and maximizing the available total working storage capacity and associated Maximum Daily Withdrawal Quantity is a significant benefit to ANR's shippers and essential for ANR to be able to meet the collective firm requirements of its customers.

Third, the ability to operate ANR's storage as an integrated whole by means of the TBOs supports a number of other services, including Firm Storage Service ("FSS"), FTS-3 Firm Transportation Service ("FTS-3"), No-Notice Service ("NNS"), Deferred Delivery Service ("DDS"), ITS-3 Interruptible Transportation Service, and Small Transportation Service.

Fourth, the TBOs provide overall operational and reliability benefits to the system. These contracts assist ANR in protecting against system outages and enable ANR to balance its system. The enhanced operational flexibility provided by these arrangements increases ANR’s ability to respond rapidly to the shifting needs of its customers, such as local distribution companies, power generators, or other end users that may need to start up quickly or rapidly shift flow profile in order to meet demand. In addition, customers have more flexibility to utilize secondary firm capacity adding more segmentation and contract utilization, which augments the value those customers can achieve through capacity release. Also, ANR would not be able to manage imbalances on its system as efficiently. ANR currently allows customers to be out of balance by ten percent, which is significantly higher than most other pipelines. Thus, these TBOs advantage all customers on ANR’s system, and not merely those customers who contract for storage service, or have transportation routes on the MLN, MLS, Tie Line, or in Northern Illinois and Wisconsin.

**Q: What role does storage play on the ANR system and how are the TBOs used to integrate ANR’s storage assets?**

A: Storage plays a significant role on ANR’s system, comprising approximately 30 percent of winter deliverability. ANR owns and contracts for 203 billion cubic feet (“Bcf”) of storage with withdrawal capacity in the winter of approximately 3.5 Bcf. Six storage fields are directly connected to ANR’s system while a total of nine storage fields are discontiguous to ANR’s system. In sum, approximately 70 percent of ANR’s storage deliverability is discontiguous from its system. Therefore, ANR requires transportation from third-party pipelines to transport the gas to ANR’s integrated network of facilities. The TBOs on DTE, Consumers, and Great Lakes effectively provide an operational loop allowing ANR to meet its firm customer obligations and maintain the integrated storage operations of ANR’s system.

Second, ANR's storage assets have allowed it to supply weather-sensitive heating load and meet its winter peak day demand, as well as support the other benefits for all customers that I have described previously. ANR's system was primarily designed and constructed to serve base load markets and temperature-sensitive markets characterized by high winter demand and low summer demand.

Third, ANR operates its storage facilities on an integrated basis, rather than allocating capacity in individual storage facilities to individual customers, which provides significant benefits to the ANR system and to its customers. The TBO capacity is critical to ANR's ability to achieve the operation efficiencies built into the system design to operate storage as an integrated network.

**Q: How does ANR operate its system storage on a fully integrated basis?**

A: The capabilities of ANR's integrated storage operations are a significant component of the design of ANR's system. ANR operates and sells its storage on an integrated basis. ANR aggregates all its storage as if it was a single storage field. Storage customers do not buy storage from a specific field. Instead, customers buy storage from ANR's integrated complex of storage fields. Customers utilizing their storage gas as supply or market for their related transportation contracts must nominate that gas from/to what is called a "logical" point near the Woolfolk compressor station. What this means is that all storage-related supply is aggregated and nominated from this logical point, which is not a physical receipt or delivery point on the system. This logical point is then designated as the primary receipt or delivery point in the customer's transportation contract. ANR then determines which fields will be utilized on a daily basis to meet the customer's aggregated nominations and no-notice service requirements. ANR also determines which third-party pipeline transportation contracts to use depending on the storage fields selected for each day's injection/withdrawal requirements, as well as any operational issues on ANR's transportation network.

ANR's customers have no specific transportation or storage contracts associated with the third-party pipeline transportation. Instead, ANR operates and uses the TBO capacity to meet the requirements of all of its customers, and only considers the total capacity (sum of capacity provided by ANR's own facilities and its TBO contracts) when contracting for transportation and storage services. In addition, ANR operates its integrated storage fields and TBO capacity to meet its customers' firm requirements and does so in a manner that maintains the maximum efficiency of its operations while managing storage and transmission facility maintenance and unplanned outages throughout ANR's pipeline system. ANR's integrated operation of its system in this manner benefits all of its customers by maximizing flexibility and enhancing reliability by reducing the impacts of maintenance and unplanned outages.

**Q: Does ANR's integrated storage operations provide any system design economies or savings?**

A: Yes. Without integrated storage, ANR would need to expend significant capital on system expansion facilities to be able to deliver its full winter peak day requirements into the market area without the use of storage. Exhibit No. ANR-0044 depicts the ANR system with and without the TBOs, and shows the additional capacity that is made available for ANR's customers by virtue of those TBOs. It is important to note that even if ANR built these new facilities, ANR would not be able to provide the same level of service as its system storage currently provides. As I have explained previously, ANR's integrated storage provides multiple benefits such as operational flexibility, imbalance management, plus offering services such as FSS, FTS-3, NNS, and DDS to all of ANR's customers. Without storage, simply expanding the system would cost approximately $5.97 billion, as shown in Exhibit ANR-0047, and would not replicate these benefits in their entirety.

**Q: Can you provide an example of how ANR uses a particular TBO for the benefit of its integrated system operations and the benefit of its customers?**

A: Yes. In the normal course of a winter, ANR uses contract FT17593, which is a TBO between ANR and Great Lakes, to move gas to Wisconsin from Michigan to help meet its customers' strong winter demand. However, in the event of an unplanned outage on the MLS or MLN, ANR can and has used this contract to transport additional quantities to ensure that market demand is met.

**Q: Has the Commission previously recognized the central role that TBOs have played in integrating the ANR system, and preserving ANR's ability to meet its firm service obligations?**

A: Yes, the Commission has long recognized the critical role that ANR's upstream capacity arrangements on Great Lakes, DTE, Consumers, and others have played in enabling ANR to meet the firm requirements of its customers. ANR has held TBOs on various pipelines and used that capacity to meet its firm customer commitments for a period of approximately 50 years and through the restructuring of the industry and pipeline services that took place in the late 1980s and early 1990s. In its Order No. 636 restructuring proceeding, ANR explained to the Commission that it owned or leased multiple storage facilities located within the state of Michigan, and that it needed to retain capacity on Great Lakes and other systems, both intrastate and interstate, in order to provide firm and reliable service to its customers. Specifically, ANR required the use of capacity on Great Lakes and other third-party pipeline systems in conjunction with its own system to move gas from receipt and delivery points within the ANR system as part of the operations of its integrated storage network and to meet its firm service obligations. ANR explained that it was able to optimize utilization of its multiple storage fields by operating them on an integrated basis, using the Great Lakes capacity and other upstream arrangements to transport its storage volumes to a common point on its system. ANR requested that the Commission allow ANR to retain this capacity, rather than allocate it to individual customers. The Commission agreed with ANR that the configuration of ANR's storage complex and operational considerations supported ANR's proposal to retain its TBOs associated with the integration of storage.

**Q: Have ANR's TBO arrangements changed since ANR's last rate case?**

A: Yes, please see Exhibit No. ANR-0046 that describes the changes to ANR's TBO arrangements since ANR's last rate case. Specifically, contract FT-18388 replaced contract FT-18228 on Great Lakes. Contracts FT-18388 and FT-9141 on Great Lakes were combined, maintaining the same capability as before. Contracts FT-18138 and FT-18139 on Great Lakes were combined and the total transport is now 202,464 dekatherms ("Dth") per day ("Dth/d"), a reduction of 91,747 Dth/d. ANR expanded its storage capacity with ANR Storage Company under contract 10000129 from 30.53 MMDth to 32.39 MMDth. In addition, ANR executed a new SBO, contract ANR02511S with Pine Prairie, to provide 2 MMDth of storage capacity that assists the Southeast Area as described below.

**Q: Why did ANR replace Great Lakes contract FT-18228 with FT-18388?**

A: As described in Exhibit No. ANR-0046, contract FT-18228 was utilized by ANR to move gas from its on-system facilities at the Farwell Interconnection into discontiguous storage fields and to make deliveries in Southeastern Michigan for the summer season. It is essential to move gas from ANR's system at Farwell to the Muttonville lateral where the Muttonville storage field is located. Since the need for the capacity associated with contract FT-18228 remained in order to allow ANR to operate its system as an integrated whole and provide firm service, contract FT-18388 was agreed to for the following summer season.

**Q: Why did ANR combine Great Lakes contracts FT-18388 and FT-9141?**

A: As described in Exhibit No. ANR-0046, these two contracts served the same function of moving gas from ANR's system at Farwell to the Muttonville lateral. ANR continually evaluates its TBO portfolio, and when undertaking that review, ANR determined that for administrative ease, these two contracts could be combined and continue to provide the same required level of service. This service is essential to move gas from ANR's system at Farwell to the Muttonville lateral where the Muttonville storage field is located.

**Q: Why did ANR make a change to Great Lakes contracts FT-18138 and FT-18139?**

A: ANR continually evaluates its TBO portfolio on a yearly basis against contract demand. Both of these contracts are for transportation from the Deward to the Farwell Interconnection. As part of its annual review in 2017, ANR determined that there was some excess capacity under these agreements. Therefore, to ensure that ANR's TBOs are the most efficient and cost effective option, ANR reduced its contracted volumes under these contracts by entering into a new contract, FT-18659, for 202,464 Dth/d -- a 91,747 Dth/d reduction.

**Q: Why did ANR enter into SBO contract 10000129?**

A: ANR acquired storage capacity under this contract in order to further enhance its integrated storage capability and to better be able to balance its system to meet its shippers' demands. Since executing this contract, it has been utilized as part of the aggregated storage portfolio that ANR uses to meets it firm service obligations.

**Q: Were there operational challenges on the system that impacted ANR's decision to enter into the Pine Prairie SBO?**

A: Yes. ANR recognized that there were challenges to operating the southern part of the SEML. The SEML is sold-out and utilized at an average 95% year-round, which creates operational difficulty accommodating yearly maintenance and recovering from unplanned events such as inclement weather. Therefore, in addition to the general benefits arising from ANR's operation of its storage on an integrated basis, this SBO was necessary to managing linepack and outages on the SEML to ensure efficient and reliable operations.

**Q: Did ANR evaluate other alternatives to its SBO with Pine Prairie?**

A: ANR considered other storage locations with practical reach to the Southeast Headstation ("SEHS") where the majority of the SEML deliveries occur. The other potential storage options were in less ideal locations and did not offer the same benefits. The first alternative was Bobcat storage (LOC# 742882 and 742883), owned by Port Barre Investments. At Bobcat storage it is difficult to maintain adequate pressure for reliable injections because it is located between Eunice and Patterson compressor stations making it suspectable to pressure variations caused by daily market demand in that area. The second alternative was Egan Storage, (LOC# 186899 and 186900) owned Egan Hub Storage LLC. Egan storage is located on the ANR 502 lines south of Eunice compressor station, which are fully subscribed in the southbound direction making it difficult to inject when ANR's customers are flowing at full capacity.

**Q: Given the market and operational changes impacting ANR's system, does ANR still require TBOs on Great Lakes, DTE, and Consumers in order to meet its firm service obligations and integrate its storage?**

A: Yes. ANR's system design and integrated storage operations are reliant on the Great Lakes, DTE, and Consumers TBO arrangements to meet its firm contractual obligations. Without these TBO arrangements, ANR would be unable to meet its firm service obligations. In addition, the additional benefits outlined earlier in my testimony would not be available.

**Q: Did ANR evaluate other alternatives to its current TBO portfolio?**

A: Yes, ANR evaluated other alternatives to the portfolio of TBO contracts it holds on Great Lakes, DTE, and Consumers Energy, including the construction of new ANR facilities that would replace and replicate the TBO agreements. Ultimately, ANR determined that the TBOs were the least cost viable alternative to meet its standing firm obligations. Because Great Lakes, DTE, and Consumers Energy are the only existing pipelines that could accomplish the transportation routes required by ANR, any piecemeal approach would diminish ANR's ability to negotiate transportation agreements that would meet ANR's operational requirements as well as reduce overall costs.

**Q: Why did ANR reject constructing its own facilities as an alternative?**

A: For ANR to replace the transportation component of the Great Lakes TBOs from the Woolfolk area into Wisconsin, ANR would require: (1) facility modifications from its Farwell Interconnection to its Woolfolk compressor station; (2) an expansion of its MLN facilities between the Woolfolk compressor station and the Bridgman compressor station; (3) another expansion on its MLS facilities between the Bridgman compressor station and the Sandwich compressor station; and (4) an expansion of its Northern Illinois and Wisconsin system with gas coming from the south at ANR's Sandwich compressor station. These modifications and expansions are depicted on Exhibit No. ANR-0048. The costs of these facility expansions were estimated at approximately $3.271 billion (*see* Exhibit No. ANR-0047, Northern Storage to Wisconsin estimate). Also, for ANR to replace the functionality required to connect its discontiguous storage fields to its mainline system in Michigan currently provided by the DTE and some of the Great Lakes TBOs, ANR would need to spend an additional $2.7 billion (*see* Exhibit No. ANR-0047). This reflects the cost to construct new lines from the Northern fields and Muttonville to Woolfolk and a new line to connect to Willow Run. These modifications and expansions are depicted on Exhibit No. ANR-0048. Currently, the total TBO costs are expected to total around $70.3 million annually. As shown in Exhibit No. ANR-0047, the estimated cost-of-service for the replacement facilities in 2021 would be approximately $1.08 billion, which is far greater than the current costs ANR sees annually from the TBOs. Additionally, these facility modifications would take years to complete and would likely face stiff opposition in the associated regulatory processes. Thus, ANR ultimately rejected this alternative as more expensive and uncertain than the certain and cost-effective TBOs.

**Q: Why does ANR continue to evaluate all of its TBO requirements?**

A: ANR regularly evaluates its TBO requirements when contracts come up for expiration or renewal. ANR does so in order to ensure that it is meeting its TBO requirements in the most efficient and cost-effective manner, consistent with its obligations to manage its system in a prudent manner.

**Q: Have the costs associated with holding TBO contracts required to meet ANR's firm service obligations gone down over time?**

A: Yes. The costs associated with ANR's TBOs have gone down since it filed its last rate case in 2016.

**Q: How is ANR proposing to recover the costs associated with its TBOs?**

ANR's TBO costs are included in Account No. 858 and will be included in the system-wide access charge, as explained by ANR witnesses Linder and Barry. As I understand it, that is consistent with the Commission's historic treatment of such costs.

## Section II: Outages Expected Due to Modernization Projects

**Q: Are any of the modernization projects listed in the Eligible Facilities Plan ("EFP") sponsored by ANR witness Parks expected to cause interruptions to primary firm services?**

A: Yes. The pipe replacements and recoats on the 0-501, 1-501, and 2-501 lines between Mainline valves 14 and 18 are expected to cause interruptions to primary firm service. The horsepower replacements at the Jena, Delhi, and Saint John Compressor Stations are also expected to impact primary firm service.

**Q: How will the pipe replacements and recoats impact primary firm service?**

A: The pipeline upgrades on the 501 lines that are part of the EFP will result in a reduction of primary firm service. The pipeline valve sections must be taken out of service, cut-out and replaced with new piping that would need to be welded in place to the existing pipeline. In the past, similar types of replacement took an average of at least ten days per tie-in and it is currently anticipated that there will be two tie-in periods, with one occurring in 2024 and one in 2025. This will require ANR to have only the loop line available for segments impacted by pipe replacement. The availability of only the loop line will require ANR to reduce capacity, thereby impacting primary firm service.

**Q: How will the horsepower replacement projects impact primary firm service?**

A: The horsepower replacement projects at the Jena, Delhi, and Saint John Compressor Stations will require the stations to be out of service for an average of approximately five to ten days during the tie-in process due to safety concerns. This estimate is based on similar types of work performed by ANR. This work will result in pipeline outages and capacity reductions.

**Q: Please explain how ANR expects to operationally mitigate these outages.**

A: To the extent feasible, ANR will pursue efforts to minimize the impacts of outages by scheduling them during low demand periods. Consistent with ANR’s normal practice, to the extent feasible, ANR will work with interconnecting pipes to support demand needs to minimize the impacts of these outages.

**Q: Will any of these mitigation measures require ANR to incur costs?**

A: There is the possibility for costs to arise due to expenses incurred in working with interconnecting pipelines to minimize the impacts of these outages.

**Q: Does this conclude your direct testimony?**

A: Yes it does.

# UNITED STATES OF AMERICA
# BEFORE THE
# FEDERAL ENERGY REGULATORY COMMISSION

ANR Pipeline Company ) Docket No. RP22-____-000

State of Texas )
) ss.
County of Harris )

## AFFIDAVIT OF NADA SIDDIK

Nada Siddik, being first duly sworn, on oath states that he is the witness whose testimony appears on the preceding pages entitled “Prepared Direct Testimony of Nada Siddik”; that, if asked the questions which appear in the text of said testimony, he would give the answers that are therein set forth; and that affiant adopts the aforesaid testimony as Nada Siddik’s sworn testimony in this proceeding.

DocuSigned by:
Nada Siddik
E8FE52EE9CB941C...

Nada Siddik

SWORN TO AND SUBSCRIBED BEFORE ME THIS 24th DAY OF January, 2022. This notarial act was an online notarization.

**Notary Seal**

**SHELIA O. COPUS**
Notary ID
976876
My Commission Expires
2/22/2023

**Digital Certificate**

DocuSigned by:
Shelia Copus
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## Summary Description of Current TBOs/SBOs

**GLGT FT-17593**: a Firm Transportation Service Agreement between Great Lakes and ANR for service on Great Lakes beginning November 1, 2012. This Transportation Agreement is utilized by ANR to move gas in to and out of its integrated storage complex as well as to make critical deliveries into Northern Illinois and the State of Wisconsin. During the winter period this agreement essentially creates an operational loop of ANR's system between Michigan and Wisconsin. Under the Agreement, during the winter period (November-March) Great Lakes receives up to 506,500 Dth per day from ANR at the Farwell Interconnection in Clare County, Michigan and redelivers that gas to ANR at the Fortune Lake Interconnection in Iron County, Michigan. (ANR's name for this delivery point is Crystal Falls. Both Fortune Lake and Crystal Falls are the same location without any physical difference and different agreements may use one name versus the other.) In addition, during the winter period this Transportation Agreement includes additional primary receipt and delivery point capacity at the Deward Interconnection in Crawford County, Michigan, South Chester Interconnection in Otsego County, Michigan and the Muttonville Interconnection in St. Clair County, Michigan and the Otisville Interconnection in Genesee County, Michigan. During the summer period (April-October) Great Lakes receives up to 207,000 Dth per day from ANR at the Farwell Interconnection and redelivers that gas to ANR at either the Deward or South Chester Interconnections. In addition, ANR has the Mutttonville Interconnection as an alternate primary receipt point in the summer. The additional primary points included in contract FT-17593 provide ANR with more flexibility in operating its integrated storage complex. This operating flexibility is important when scheduling maintenance and dealing with unplanned outages. The annual costs associated with this contract during the Base Period were approximately $21.6 million.

**GLGT FT-18659**: a Firm Transportation Service Agreement between Great Lakes and ANR for service beginning April 1, 2017. This Transportation Agreement is utilized by ANR during the winter to move storage gas from disconnected storage fields in Northern Michigan to ANR's on-system facilities at the Farwell Interconnection. Pursuant to this Transportation Agreement, during the winter period, Great Lakes transports 202,464 Dth of gas from the Deward or South Chester Interconnections to the Farwell Interconnection. The annual costs associated with this contract during the Base Period were approximately $4.2 million.

**GLGT FT-18150**: a Firm Transportation Service Agreement between Great Lakes and ANR for service beginning November 1, 2014. This Transportation Agreement is utilized by ANR during the winter period to move storage gas from discontinguous storage fields in Northern Michigan to ANR's on-system facilities at the Farwell Interconnection. Pursuant to this Transportation Agreement, during the winter period, Great Lakes receives gas from ANR at the South Chester or Deward Interconnections up to a maximum quantity of 101,300 Dth per day and redelivers the gas to ANR at the Farwell Interconnection. The annual costs associated with this contract during the Base Period were approximately $2.1 million.

**GLGT FT-18147**: a Firm Transportation Service Agreement between Great Lakes and ANR for service beginning November 1, 2014. This Transportation Agreement is utilized by ANR during the winter period to move storage gas from discontiguous storage fields in Northern Michigan to ANR's on-system facilities at the Fortune Lake Interconnection. In effect this contract functions as an operational loop of ANR's Northern Area between Michigan and Wisconsin. Pursuant to this Transportation Agreement, during the winter period, Great Lakes receives gas from ANR at the South Chester Interconnection for up to a maximum quantity of 303,900 Dth per day and redelivers the gas to ANR at the Fortune Lake Interconnection. The annual costs associated with this contract during the Base Period were approximately $9.2 million.

**GLGT FT-9141:** a Firm Transportation Service Agreement between Great Lakes and ANR dated November 1, 2008. This Transportation Agreement is utilized by ANR to move gas from its on-system facilities at the Farwell Interconnection into discontinguous storage fields and to make deliveries in Southeastern Michigan. Pursuant to this Transportation Agreement, during the summer, Great Lakes receives gas from ANR at the Farwell Interconnection up to a maximum quantity of 100,000 Dth per day and redelivers the gas to ANR at the St. Clair Interconnection in St. Clair County, Michigan. During the winter, Great Lakes receives gas from ANR at the Farwell Interconnection up to a maximum quantity of 56,000 Dth per day and redelivers the gas to ANR at the St. Clair Interconnection in St. Clair County, Michigan. Although the contract provides for a firm delivery to the St. Clair Interconnection, ANR utilizes this contract to receive gas from Great Lakes at its Muttonville Interconnection which is just upstream of the St. Clair Interconnection. The annual costs associated with this contract during the Base Period were approximately $4.2 million.

**GLGT FT-5223:** a Firm Transportation Service Agreement between Great Lakes and ANR for service beginning November 10, 2006. This Transportation Agreement is utilized by ANR annually to move storage gas from Farwell to ANR’s on-system facilities at the Fortune Lake Interconnection. In effect this contract functions as an operational loop of ANR’s Northern Area between Michigan and Wisconsin. Pursuant to this Transportation Agreement, Great Lakes receives gas from ANR at Farwell for up to a maximum quantity of 125,000 Dth per day and redelivers the gas to ANR at the Fortune Lake Interconnection. The annual costs associated with this contract during the Base Period were approximately $9.1 million.

**GLGT FT-18759:** a Firm Transportation Service Agreement between Great Lakes and ANR for service originally beginning January 1, 2008 (under contract number FT-7225). This Transportation Agreement is utilized by ANR annually to move storage gas from Farwell to ANR’s on-system facilities at the Fortune Lake Interconnection. In effect this contract functions as an operational loop of ANR’s Northern Area between Michigan and Wisconsin. Pursuant to this Transportation Agreement, Great Lakes receives gas from ANR at Farwell for up to a maximum quantity of 10,100 Dth per day and redelivers the gas to ANR at the Fortune Lake Interconnection. The annual costs associated with this contract during the Base Period were approximately $0.7 million.

**GLGT FT-17196:** a Firm Transportation Agreement between Great Lakes and ANR for service beginning November 1, 2012. ANR entered into this contract on behalf of one of its shippers who reimburses ANR for any costs associated with this contract. Under the Agreement, Great Lakes receives up to 1,700 Dth per day from ANR at the Farwell Interconnection and redelivers that gas to ANR at the Deward Interconnection. The annual costs associated with this contract during the Base Period were approximately $0.06 million.

**DTE FT-90509:** a Firm Transportation Agreement between DTE and ANR originally dated August 1, 1991. This Transportation Agreement is utilized by ANR during the year to move gas into and out of its integrated storage fields in Northern Michigan to its on-system facilities near its

Woolfolk compressor station. Under this Transportation Agreement, during the winter period DTE receives up to 456,750 Dth per day from ANR at the Kalkaska Interconnection in Kalkaska County, Michigan and redelivers that gas to ANR at the Woolfolk (Detroit A/B) Interconnection in Mecosta, County, Michigan. In addition, this contract provides for a reduced quantity to be of redelivered to either the South Chester or Central Charlton Interconnections. During the summer period DTE receives up to 456,750 Dth per day from ANR at the Woolfolk (Detroit A/B) Interconnection and redelivers that gas to ANR at the Kalkaska Interconnection. The annual costs associated with this contract during the Base Period were approximately $6.8 million.

**DTE Gas FT-90511:** a Firm Transportation Agreement between DTE and ANR originally dated June 3, 1991. This Transportation Agreement is utilized by ANR annually to move gas in to and out of its integrated storage fields in Northern Michigan to its on-system facilities at the Willow Run Interconnection, thereby creating an operational loop of ANR's system between the Woolfolk area down to the Bridgman compressor station and then over to the Defiance compressor station. Under the Transportation Agreement, during the winter period DTE receives up to 609,000 Dth per day from ANR at the Woolfolk (Detroit A/B) Interconnection and redelivers that gas to ANR at the Willow Run Interconnection in Washtenaw County, Michigan. During the summer period DTE receives up to 253,750 Dth per day from ANR at the Willow Run Interconnection and redelivers that gas to ANR at the Woolfolk (Detroit A/B) Interconnection. The annual costs associated with this contract during the Base Period were approximately $10.6 million.

**Consumers Interconnection and Operating Agreement:** Consumers and ANR entered into an Interconnection and Operating Agreement on May 14, 1990. Under this Agreement, during the winter period Consumers receives up to 100 MMcf per day from ANR at the Otisville Interconnection. ANR may deliver volumes in excess of 100 MMcf per day, but less than 300 MMcf per day, subject to Consumers' agreement. The annual costs associated with this contract during the Base Period were $1.95 million.

**DTE Gas IT-90510:** a Interruptible Transportation Agreement between DTE Gas and ANR for service beginning July 1, 2005. Under the Agreement, DTE Gas receives up to 2,650 Dth per day from ANR at the Willow Run, Crystal Falls or Menominee and redelivers that gas to ANR at Pembine. The annual costs associated with this contract during the Base Period were approximately $0.05 million.

**Blue Lake Gas Storage Co. FS-8:** a Firm Storage Agreement between Blue Lake and ANR for service beginning April 1, 2013. ANR has contracted for 16 MMDth of storage capacity which ANR then utilizes for storage and balancing services it provides under its FERC Gas Tariff. The Blue Lake storage field is located in northern Michigan and is not directly connected to ANR's system. Therefore, ANR is required to utilize third party transportation contracts to transport the gas onto ANR's facilities. This storage capacity is included as part of ANR's integrated storage operations.

**Blue Lake Gas Storage Co. FS-9:** a Firm Storage Agreement between Blue Lake and ANR for service beginning April 1, 2013. ANR has contracted for 3 MMDth of storage capacity which ANR then utilizes for storage and balancing services it provides under its FERC Gas Tariff. The Blue Lake storage field is located in northern Michigan and is not directly connected to ANR's system. Therefore, ANR is required to utilize third party transportation contracts to transport the gas onto ANR’s facilities. This storage capacity is included as part of ANR’s integrated storage operations.

**Blue Lake Gas Storage Co. FS-10:** a Firm Storage Agreement between Blue Lake and ANR for service beginning April 1, 2013. ANR has contracted for 15 MMDth of storage capacity which ANR then utilizes for storage and balancing services it provides under its FERC Gas Tariff. The Blue Lake storage field is located in northern Michigan and is not directly connected to ANR’s system. Therefore, ANR is required to utilize third party transportation contracts to transport the gas onto ANR’s facilities. This storage capacity is included as part of ANR’s integrated storage operations.

**Blue Lake Gas Storage Co. FS-11:** a Firm Storage Agreement between Blue Lake and ANR for service beginning April 1, 2013. ANR has contracted for 2 MMDth of storage capacity which ANR then utilizes for storage and balancing services it provides under its FERC Gas Tariff. The Blue Lake storage field is located in northern Michigan and is not directly connected to ANR’s system. Therefore, ANR is required to utilize third party transportation contracts to transport the gas onto ANR’s facilities. This storage capacity is included as part of ANR’s integrated storage operations.

**ANR Storage Company Rate Schedule 10000129:** a Firm Storage Agreement between ANR Storage Company and ANR for service beginning July 1, 2016. ANR has contracted for 32.39 MMDth of storage capacity which ANR then utilizes for storage and balancing services it provides under its FERC Gas Tariff. The ANR Storage Company storage fields are located in northern Michigan and are not directly connected to ANR’s system. Therefore, ANR is required to utilize third party transportation contracts to transport the gas onto ANR’s facilities. This storage capacity is included as part of ANR’s integrated storage operations.

**Pine Prairie ANR02511S:** a Firm Storage Agreement between Pine Prairie and ANR for service beginning April 1, 2021. ANR initially has contracted for 2 MMDth of storage capacity which ANR then utilizes for operational balancing services it provides under its FERC Gas Tariff. Beginning April 1, 2022, the contracted capacity increases to 3 MMDth of storage capacity. The Pine Prairie storage field is located in Louisiana near ANR’s Eunice Compressor Station. It is directly connected to ANR’s pipeline system and is intended to be used to balance operational needs such as OBA’s, line pack management and to aid with planning maintenance.

# GLGT FT-17593

**Contract ID.:** FT17593
**Amendment No:** 3

# FORM OF TRANSPORTATION SERVICE AGREEMENT

This Transportation Service Agreement (Agreement) is entered into by Great Lakes Gas Transmission Limited Partnership (Transporter) and ANR Pipeline Company (Shipper).

WHEREAS, Shipper has requested Transporter to transport Gas on its behalf and Transporter represents that it is willing to transport Gas under the terms and conditions of this Agreement.

NOW, THEREFORE, Transporter and Shipper agree that the terms below constitute the transportation service to be provided and the rights and obligations of Shipper and Transporter.

1. EFFECTIVE DATE: November 01, 2020

2. CONTRACT IDENTIFICATION: FT17593

3. RATE SCHEDULE: FT

4. SHIPPER TYPE: Other

5. STATE/PROVINCE OF INCORPORATION: Delaware

6. TERM: November 01, 2012 to October 31, 2021

   Right of First Refusal:

   Regulatory (in accordance with Section 6.16 of the General Terms and Conditions of Transporter's FERC Gas Tariff)

7. EFFECT ON PREVIOUS CONTRACTS:
   This Agreement supersedes, cancels and terminates, as of the effective date stated above, the following contract(s): Service Agreement dated November 01, 2019 with Contract Identification FT17593.

8. MAXIMUM DAILY QUANTITY (Dth/Day):
   Please see Appendix A for further detail.

9. RATES:
   Unless Shipper and Transporter have agreed to a rate other than the maximum rate, rates shall be Transporter's maximum rates and charges plus all applicable surcharges in effect from time to time under the applicable Rate Schedule (as stated above) on file with the Commission unless otherwise agreed to by the parties in writing. Provisions governing a Rate other than the maximum shall be set forth in this Paragraph 9.

10. POINTS OF RECEIPT AND DELIVERY:
The primary receipt and delivery points are set forth on Appendix A.

11. RELEASED CAPACITY: N/A

12. INCORPORATION OF TARIFF INTO AGREEMENT:
This Agreement shall incorporate and in all respects be subject to the "General Terms and Conditions" and the applicable Rate Schedule (as stated above) set forth in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, as may be revised from time to time. Transporter may file and seek Commission approval under Section 4 of the Natural Gas Act (NGA) at any time and from time to time to change any rates, charges or provisions set forth in the applicable Rate Schedule (as stated above) and the "General Terms and Conditions" in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, and Transporter shall have the right to place such changes in effect in accordance with the NGA, and this Agreement shall be deemed to include such changes and any such changes which become effective by operation of law and Commission Order, without prejudice to Shipper's right to protest the same.

13. MISCELLANEOUS:
No waiver by either party to this Agreement of any one or more defaults by the other in the performance of this Agreement shall operate or be construed as a waiver of any continuing or future default(s), whether of a like or a different character.

Any controversy between the parties arising under this Agreement and not resolved by the parties shall be determined in accordance with the laws of the State of Michigan.

14. OTHER PROVISIONS (As necessary):
It is agreed that no personal liability whatsoever shall attach to, be imposed on or otherwise be incurred by any Partner, agent, management official or employee of the Transporter or any director, officer or employee of any of the foregoing, for any obligation of the Transporter arising under this Agreement or for any claim based on such obligation and that the sole recourse of Shipper under this Agreement is limited to assets of the Transporter.

Upon termination of this Agreement, Shipper's and Transporter's obligations to each other arising under this Agreement, prior to the date of termination, remain in effect and are not being terminated by any provision of this Agreement.

**Contract ID.:** FT17593
**Amendment No:** 3

15. NOTICES AND COMMUNICATIONS:

All notices and communications with respect to this Agreement shall be in writing by mail, e-mail, or other means as agreed to by the parties, and sent to the addresses stated below or to any other such address(es) as may be designated in writing by mail, e-mail, or other means similarly agreed to:

ADMINISTRATIVE MATTERS:

Great Lakes Gas Transmission Limited Partnership
Commercial Operations
700 Louisiana Street, Suite 700
Houston, TX 77002-2700

ANR Pipeline Company
700 Louisiana St., Suite 700
Houston, TX 77002-2700

Attn: Colin Lindley

AGREED TO BY:

GREAT LAKES GAS TRANSMISSION LIMITED PARTNERSHIP
By: Great Lakes Gas Transmission Company

By:

Title: Director, Transportation Accounting and Contracts

ANR Pipeline Company

By: Jon Howe

Title: Director, Short Term Marketing

DJ
12/6/19

CW 12-6-19

# APPENDIX A
## CONTRACT IDENTIFICATION: FT17593

Date: November 01, 2020
Supersedes Appendix Dated: November 01, 2019

Shipper: ANR Pipeline Company

Maximum Daily Quantity (Dth/Day) per Location:

| Begin Date | End Date | Point(s) of Primary Receipt | Point(s) of Primary Delivery | MDQ |
|---|---|---|---|---|
| 11/1/2012 | 3/31/2013 | MUTTONVILLE RECEIPT | FORTUNE LAKE | 506,500 |
| 4/1/2013 | 10/31/2013 | MUTTONVILLE RECEIPT | SOUTH CHESTER DELIVERY | 390,000 |
| 11/1/2013 | 3/31/2014 | MUTTONVILLE RECEIPT | FORTUNE LAKE | 506,500 |
| 4/1/2014 | 10/31/2014 | MUTTONVILLE RECEIPT | SOUTH CHESTER DELIVERY | 207,000 |
| 11/1/2014 | 3/31/2015 | MUTTONVILLE RECEIPT | FORTUNE LAKE | 506,500 |
| 4/1/2015 | 10/31/2015 | MUTTONVILLE RECEIPT | SOUTH CHESTER DELIVERY | 207,000 |
| 11/1/2015 | 3/31/2016 | MUTTONVILLE RECEIPT | FORTUNE LAKE | 506,500 |
| 4/1/2016 | 10/31/2016 | MUTTONVILLE RECEIPT | SOUTH CHESTER DELIVERY | 207,000 |
| 11/1/2016 | 3/31/2017 | MUTTONVILLE RECEIPT | FORTUNE LAKE | 506,500 |

| | | | | |
|---|---|---|---|---|
| 4/1/2017 | 10/31/2017 | MUTTONVILLE RECEIPT | SOUTH CHESTER DELIVERY | 207,000 |
| 11/1/2017 | 3/31/2018 | MUTTONVILLE RECEIPT | FORTUNE LAKE | 506,500 |
| 4/1/2018 | 10/31/2018 | MUTTONVILLE RECEIPT | SOUTH CHESTER DELIVERY | 207,000 |
| 11/1/2018 | 3/31/2019 | MUTTONVILLE RECEIPT | FORTUNE LAKE | 506,500 |
| 4/1/2019 | 10/31/2019 | MUTTONVILLE RECEIPT | SOUTH CHESTER DELIVERY | 207,000 |
| 11/1/2019 | 3/31/2020 | MUTTONVILLE RECEIPT | FORTUNE LAKE | 506,500 |
| 4/1/2020 | 10/31/2020 | MUTTONVILLE RECEIPT | SOUTH CHESTER DELIVERY | 207,000 |
| 11/1/2020 | 3/31/2021 | MUTTONVILLE RECEIPT | FORTUNE LAKE | 506,500 |
| 4/1/2021 | 10/31/2021 | MUTTONVILLE RECEIPT | SOUTH CHESTER DELIVERY | 207,000 |
| 11/1/2012 | 3/31/2013 | FARWELL RECEIPT | | 506,500 |
| 11/1/2012 | 3/31/2013 | DEWARD RECEIPT | | 506,500 |
| 11/1/2012 | 3/31/2013 | SOUTH CHESTER RECEIPT | | 100,000 |
| 4/1/2013 | 10/31/2013 | FARWELL RECEIPT | | 390,000 |
| 4/1/2013 | 10/31/2013 | DEWARD RECEIPT | | 207,000 |
| 11/1/2013 | 3/31/2014 | FARWELL RECEIPT | | 506,500 |

| | | | |
|---|---|---|---|
| 11/1/2013 | 3/31/2014 | DEWARD RECEIPT | 506,500 |
| 11/1/2013 | 3/31/2014 | SOUTH CHESTER RECEIPT | 100,000 |
| 4/1/2014 | 10/31/2014 | FARWELL RECEIPT | 207,000 |
| 4/1/2014 | 10/31/2014 | SOUTH CHESTER RECEIPT | 100,000 |
| 4/1/2014 | 10/31/2014 | DEWARD RECEIPT | 207,000 |
| 11/1/2014 | 3/31/2015 | FARWELL RECEIPT | 506,500 |
| 11/1/2014 | 3/31/2015 | DEWARD RECEIPT | 506,500 |
| 11/1/2014 | 3/31/2015 | SOUTH CHESTER RECEIPT | 100,000 |
| 4/1/2015 | 10/31/2015 | FARWELL RECEIPT | 207,000 |
| 4/1/2015 | 10/31/2015 | DEWARD RECEIPT | 207,000 |
| 11/1/2015 | 3/31/2016 | SOUTH CHESTER RECEIPT | 100,000 |
| 11/1/2015 | 3/31/2016 | DEWARD RECEIPT | 506,500 |
| 11/1/2015 | 3/31/2016 | FARWELL RECEIPT | 506,500 |
| 4/1/2016 | 10/31/2016 | FARWELL RECEIPT | 207,000 |
| 4/1/2016 | 10/31/2016 | DEWARD RECEIPT | 207,000 |

| | | | |
|---|---|---|---|
| 11/1/2016 | 3/31/2017 | SOUTH CHESTER RECEIPT | 100,000 |
| 11/1/2016 | 3/31/2017 | DEWARD RECEIPT | 506,500 |
| 11/1/2016 | 3/31/2017 | FARWELL RECEIPT | 506,500 |
| 4/1/2017 | 10/31/2017 | FARWELL RECEIPT | 207,000 |
| 11/1/2017 | 3/31/2018 | FARWELL RECEIPT | 506,500 |
| 11/1/2017 | 3/31/2018 | DEWARD RECEIPT | 506,500 |
| 11/1/2017 | 3/31/2018 | SOUTH CHESTER RECEIPT | 100,000 |
| 4/1/2018 | 10/31/2018 | FARWELL RECEIPT | 207,000 |
| 11/1/2018 | 3/31/2019 | DEWARD RECEIPT | 506,500 |
| 11/1/2018 | 3/31/2019 | FARWELL RECEIPT | 506,500 |
| 11/1/2018 | 3/31/2019 | SOUTH CHESTER RECEIPT | 100,000 |
| 4/1/2019 | 10/31/2019 | FARWELL RECEIPT | 207,000 |
| 11/1/2019 | 3/31/2020 | DEWARD RECEIPT | 506,500 |
| 11/1/2019 | 3/31/2020 | FARWELL RECEIPT | 506,500 |
| 11/1/2019 | 3/31/2020 | SOUTH CHESTER RECEIPT | 100,000 |

| | | | | |
|---|---|---|---|---|
| 4/1/2020 | 10/31/2020 | FARWELL RECEIPT | | 207,000 |
| 11/1/2020 | 3/31/2021 | DEWARD RECEIPT | | 506,500 |
| 11/1/2020 | 3/31/2021 | FARWELL RECEIPT | | 506,500 |
| 11/1/2020 | 3/31/2021 | SOUTH CHESTER RECEIPT | | 100,000 |
| 4/1/2021 | 10/31/2021 | FARWELL RECEIPT | | 207,000 |
| 11/1/2012 | 3/31/2013 | | FARWELL DELIVERY | 506,500 |
| 11/1/2012 | 3/31/2013 | | DEWARD DELIVERY | 506,500 |
| 11/1/2012 | 3/31/2013 | | MUTTONVILLE DELIVERY | 100,000 |
| 11/1/2012 | 3/31/2013 | | OTISVILLE | 100,000 |
| 4/1/2013 | 10/31/2013 | | DEWARD DELIVERY | 390,000 |
| 11/1/2013 | 3/31/2014 | | FARWELL DELIVERY | 506,500 |
| 11/1/2013 | 3/31/2014 | | DEWARD DELIVERY | 506,500 |
| 11/1/2013 | 3/31/2014 | | MUTTONVILLE DELIVERY | 100,000 |
| 11/1/2013 | 3/31/2014 | | OTISVILLE | 100,000 |
| 4/1/2014 | 10/31/2014 | | DEWARD DELIVERY | 207,000 |
| 4/1/2014 | 10/31/2014 | | FARWELL DELIVERY | 207,000 |
| 11/1/2014 | 3/31/2015 | | FARWELL DELIVERY | 506,500 |

| | | | |
|---|---|---|---|
| 11/1/2014 | 3/31/2015 | MUTTONVILLE DELIVERY | 100,000 |
| 11/1/2014 | 3/31/2015 | OTISVILLE | 100,000 |
| 11/1/2014 | 3/31/2015 | DEWARD DELIVERY | 506,500 |
| 4/1/2015 | 10/31/2015 | DEWARD DELIVERY | 207,000 |
| 11/1/2015 | 3/31/2016 | DEWARD DELIVERY | 506,500 |
| 11/1/2015 | 3/31/2016 | FARWELL DELIVERY | 506,500 |
| 11/1/2015 | 3/31/2016 | OTISVILLE | 100,000 |
| 11/1/2015 | 3/31/2016 | MUTTONVILLE DELIVERY | 100,000 |
| 4/1/2016 | 10/31/2016 | DEWARD DELIVERY | 207,000 |
| 11/1/2016 | 3/31/2017 | DEWARD DELIVERY | 506,500 |
| 11/1/2016 | 3/31/2017 | OTISVILLE | 100,000 |
| 11/1/2016 | 3/31/2017 | MUTTONVILLE DELIVERY | 100,000 |
| 11/1/2016 | 3/31/2017 | FARWELL DELIVERY | 506,500 |
| 4/1/2017 | 10/31/2017 | DEWARD DELIVERY | 207,000 |
| 11/1/2017 | 3/31/2018 | FARWELL DELIVERY | 506,500 |
| 11/1/2017 | 3/31/2018 | DEWARD DELIVERY | 506,500 |
| 11/1/2017 | 3/31/2018 | MUTTONVILLE DELIVERY | 100,000 |

| | | | |
|---|---|---|---|
| 11/1/2017 | 3/31/2018 | OTISVILLE | 100,000 |
| 11/1/2017 | 3/31/2018 | SOUTH CHESTER DELIVERY | 100,000 |
| 4/1/2018 | 10/31/2018 | DEWARD DELIVERY | 207,000 |
| 11/1/2018 | 3/31/2019 | DEWARD DELIVERY | 506,500 |
| 11/1/2018 | 3/31/2019 | FARWELL DELIVERY | 506,500 |
| 11/1/2018 | 3/31/2019 | OTISVILLE | 100,000 |
| 11/1/2018 | 3/31/2019 | MUTTONVILLE DELIVERY | 100,000 |
| 11/1/2018 | 3/31/2019 | SOUTH CHESTER DELIVERY | 100,000 |
| 4/1/2019 | 10/31/2019 | DEWARD DELIVERY | 207,000 |
| 11/1/2019 | 3/31/2020 | DEWARD DELIVERY | 506,500 |
| 11/1/2019 | 3/31/2020 | FARWELL DELIVERY | 506,500 |
| 11/1/2019 | 3/31/2020 | OTISVILLE | 100,000 |
| 11/1/2019 | 3/31/2020 | MUTTONVILLE DELIVERY | 100,000 |
| 11/1/2019 | 3/31/2020 | SOUTH CHESTER DELIVERY | 100,000 |
| 4/1/2020 | 10/31/2020 | DEWARD DELIVERY | 207,000 |
| 11/1/2020 | 3/31/2021 | DEWARD DELIVERY | 506,500 |

| | | | |
|---|---|---|---|
| 11/1/2020 | 3/31/2021 | FARWELL DELIVERY | 506,500 |
| 11/1/2020 | 3/31/2021 | OTISVILLE | 100,000 |
| 11/1/2020 | 3/31/2021 | MUTTONVILLE DELIVERY | 100,000 |
| 11/1/2020 | 3/31/2021 | SOUTH CHESTER DELIVERY | 100,000 |
| 4/1/2021 | 10/31/2021 | DEWARD DELIVERY | 207,000 |

**Contract ID.:** FT17593
**Amendment No:** 4

# FORM OF TRANSPORTATION SERVICE AGREEMENT

This Transportation Service Agreement (Agreement) is entered into by Great Lakes Gas Transmission Limited Partnership (Transporter) and ANR Pipeline Company (Shipper).

WHEREAS, Shipper has requested Transporter to transport Gas on its behalf and Transporter represents that it is willing to transport Gas under the terms and conditions of this Agreement.

NOW, THEREFORE, Transporter and Shipper agree that the terms below constitute the transportation service to be provided and the rights and obligations of Shipper and Transporter.

1. EFFECTIVE DATE: November 01, 2021

2. CONTRACT IDENTIFICATION: FT17593

3. RATE SCHEDULE: FT

4. SHIPPER TYPE: Other

5. STATE/PROVINCE OF INCORPORATION: Delaware

6. TERM: November 01, 2012 to October 31, 2022

   Right of First Refusal:

   Regulatory (in accordance with Section 6.16 of the General Terms and Conditions of Transporter's FERC Gas Tariff)

7. EFFECT ON PREVIOUS CONTRACTS:
   This Agreement supersedes, cancels and terminates, as of the effective date stated above, the following contract(s): Service Agreement dated November 01, 2020 with Contract Identification FT17593.

8. MAXIMUM DAILY QUANTITY (Dth/Day):
   Please see Appendix A for further detail.

9. RATES:
   Unless Shipper and Transporter have agreed to a rate other than the maximum rate, rates shall be Transporter's maximum rates and charges plus all applicable surcharges in effect from time to time under the applicable Rate Schedule (as stated above) on file with the Commission unless otherwise agreed to by the parties in writing. Provisions governing a Rate other than the maximum shall be set forth in this Paragraph 9.

10. POINTS OF RECEIPT AND DELIVERY:
    The primary receipt and delivery points are set forth on Appendix A.

11. RELEASED CAPACITY: N/A

12. INCORPORATION OF TARIFF INTO AGREEMENT:
    This Agreement shall incorporate and in all respects be subject to the "General Terms and Conditions" and the applicable Rate Schedule (as stated above) set forth in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, as may be revised from time to time. Transporter may file and seek Commission approval under Section 4 of the Natural Gas Act (NGA) at any time and from time to time to change any rates, charges or provisions set forth in the applicable Rate Schedule (as stated above) and the "General Terms and Conditions" in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, and Transporter shall have the right to place such changes in effect in accordance with the NGA, and this Agreement shall be deemed to include such changes and any such changes which become effective by operation of law and Commission Order, without prejudice to Shipper's right to protest the same.

13. MISCELLANEOUS:
    No waiver by either party to this Agreement of any one or more defaults by the other in the performance of this Agreement shall operate or be construed as a waiver of any continuing or future default(s), whether of a like or a different character.

    Any controversy between the parties arising under this Agreement and not resolved by the parties shall be determined in accordance with the laws of the State of Michigan.

14. OTHER PROVISIONS (As necessary):
    It is agreed that no personal liability whatsoever shall attach to, be imposed on or otherwise be incurred by any Partner, agent, management official or employee of the Transporter or any director, officer or employee of any of the foregoing, for any obligation of the Transporter arising under this Agreement or for any claim based on such obligation and that the sole recourse of Shipper under this Agreement is limited to assets of the Transporter.

    Upon termination of this Agreement, Shipper's and Transporter's obligations to each other arising under this Agreement, prior to the date of termination, remain in effect and are not being terminated by any provision of this Agreement.

15. NOTICES AND COMMUNICATIONS:

All notices and communications with respect to this Agreement shall be in writing by mail, e-mail, or other means as agreed to by the parties, and sent to the addresses stated below or to any other such address(es) as may be designated in writing by mail, e-mail, or other means similarly agreed to:

ADMINISTRATIVE MATTERS:

Great Lakes Gas Transmission Limited Partnership
Commercial Operations
700 Louisiana Street, Suite 700
Houston, TX 77002-2700

ANR Pipeline Company
700 Louisiana St., Suite 700
Houston, TX 77002-2700

Attn: Eric Miller

AGREED TO BY:

GREAT LAKES GAS TRANSMISSION LIMITED PARTNERSHIP
By: Great Lakes Gas Transmission Company

By: DocuSigned by: Kay Dennison A0EF51A630C148B...

Title: Director, Trans. Acct.& Contracts

ANR Pipeline Company

By: DocuSigned by: Tina Faraca 23D9B12BC97442C...

Title: Senior Vice President, Commercial

DS

DS DJ

DS CW

# APPENDIX A
# CONTRACT IDENTIFICATION: FT17593

Date: November 01, 2021
Supersedes Appendix Dated: November 01, 2020

Shipper: ANR Pipeline Company

Maximum Daily Quantity (Dth/Day) per Location:

| Begin Date | End Date | Point(s) of Primary Receipt | Point(s) of Primary Delivery | MDQ |
|---|---|---|---|---|
| 11/1/2012 | 3/31/2013 | MUTTONVILLE RECEIPT | FORTUNE LAKE | 506,500 |
| 4/1/2013 | 10/31/2013 | MUTTONVILLE RECEIPT | SOUTH CHESTER DELIVERY | 390,000 |
| 11/1/2013 | 3/31/2014 | MUTTONVILLE RECEIPT | FORTUNE LAKE | 506,500 |
| 4/1/2014 | 10/31/2014 | MUTTONVILLE RECEIPT | SOUTH CHESTER DELIVERY | 207,000 |
| 11/1/2014 | 3/31/2015 | MUTTONVILLE RECEIPT | FORTUNE LAKE | 506,500 |
| 4/1/2015 | 10/31/2015 | MUTTONVILLE RECEIPT | SOUTH CHESTER DELIVERY | 207,000 |
| 11/1/2015 | 3/31/2016 | MUTTONVILLE RECEIPT | FORTUNE LAKE | 506,500 |
| 4/1/2016 | 10/31/2016 | MUTTONVILLE RECEIPT | SOUTH CHESTER DELIVERY | 207,000 |
| 11/1/2016 | 3/31/2017 | MUTTONVILLE RECEIPT | FORTUNE LAKE | 506,500 |

| | | | | |
|---|---|---|---|---|
| 4/1/2017 | 10/31/2017 | MUTTONVILLE RECEIPT | SOUTH CHESTER DELIVERY | 207,000 |
| 11/1/2017 | 3/31/2018 | MUTTONVILLE RECEIPT | FORTUNE LAKE | 506,500 |
| 4/1/2018 | 10/31/2018 | MUTTONVILLE RECEIPT | SOUTH CHESTER DELIVERY | 207,000 |
| 11/1/2018 | 3/31/2019 | MUTTONVILLE RECEIPT | FORTUNE LAKE | 506,500 |
| 4/1/2019 | 10/31/2019 | MUTTONVILLE RECEIPT | SOUTH CHESTER DELIVERY | 207,000 |
| 11/1/2019 | 3/31/2020 | MUTTONVILLE RECEIPT | FORTUNE LAKE | 506,500 |
| 4/1/2020 | 10/31/2020 | MUTTONVILLE RECEIPT | SOUTH CHESTER DELIVERY | 207,000 |
| 11/1/2020 | 3/31/2021 | MUTTONVILLE RECEIPT | FORTUNE LAKE | 506,500 |
| 4/1/2021 | 10/31/2021 | MUTTONVILLE RECEIPT | SOUTH CHESTER DELIVERY | 207,000 |
| 11/1/2021 | 3/31/2022 | MUTTONVILLE RECEIPT | FORTUNE LAKE | 506,500 |
| 4/1/2022 | 10/31/2022 | MUTTONVILLE RECEIPT | SOUTH CHESTER DELIVERY | 207,000 |
| 11/1/2012 | 3/31/2013 | FARWELL RECEIPT | | 506,500 |
| 11/1/2012 | 3/31/2013 | DEWARD RECEIPT | | 506,500 |
| 11/1/2012 | 3/31/2013 | SOUTH CHESTER RECEIPT | | 100,000 |

| | | | |
|---|---|---|---|
| 4/1/2013 | 10/31/2013 | FARWELL RECEIPT | 390,000 |
| 4/1/2013 | 10/31/2013 | DEWARD RECEIPT | 207,000 |
| 11/1/2013 | 3/31/2014 | FARWELL RECEIPT | 506,500 |
| 11/1/2013 | 3/31/2014 | DEWARD RECEIPT | 506,500 |
| 11/1/2013 | 3/31/2014 | SOUTH CHESTER RECEIPT | 100,000 |
| 4/1/2014 | 10/31/2014 | FARWELL RECEIPT | 207,000 |
| 4/1/2014 | 10/31/2014 | SOUTH CHESTER RECEIPT | 100,000 |
| 4/1/2014 | 10/31/2014 | DEWARD RECEIPT | 207,000 |
| 11/1/2014 | 3/31/2015 | FARWELL RECEIPT | 506,500 |
| 11/1/2014 | 3/31/2015 | DEWARD RECEIPT | 506,500 |
| 11/1/2014 | 3/31/2015 | SOUTH CHESTER RECEIPT | 100,000 |
| 4/1/2015 | 10/31/2015 | FARWELL RECEIPT | 207,000 |
| 4/1/2015 | 10/31/2015 | DEWARD RECEIPT | 207,000 |
| 11/1/2015 | 3/31/2016 | SOUTH CHESTER RECEIPT | 100,000 |
| 11/1/2015 | 3/31/2016 | DEWARD RECEIPT | 506,500 |

| | | | |
|---|---|---|---|
| 11/1/2015 | 3/31/2016 | FARWELL RECEIPT | 506,500 |
| 4/1/2016 | 10/31/2016 | FARWELL RECEIPT | 207,000 |
| 4/1/2016 | 10/31/2016 | DEWARD RECEIPT | 207,000 |
| 11/1/2016 | 3/31/2017 | SOUTH CHESTER RECEIPT | 100,000 |
| 11/1/2016 | 3/31/2017 | DEWARD RECEIPT | 506,500 |
| 11/1/2016 | 3/31/2017 | FARWELL RECEIPT | 506,500 |
| 4/1/2017 | 10/31/2017 | FARWELL RECEIPT | 207,000 |
| 11/1/2017 | 3/31/2018 | FARWELL RECEIPT | 506,500 |
| 11/1/2017 | 3/31/2018 | DEWARD RECEIPT | 506,500 |
| 11/1/2017 | 3/31/2018 | SOUTH CHESTER RECEIPT | 100,000 |
| 4/1/2018 | 10/31/2018 | FARWELL RECEIPT | 207,000 |
| 11/1/2018 | 3/31/2019 | DEWARD RECEIPT | 506,500 |
| 11/1/2018 | 3/31/2019 | FARWELL RECEIPT | 506,500 |
| 11/1/2018 | 3/31/2019 | SOUTH CHESTER RECEIPT | 100,000 |
| 4/1/2019 | 10/31/2019 | FARWELL RECEIPT | 207,000 |
| 11/1/2019 | 3/31/2020 | DEWARD RECEIPT | 506,500 |

| | | | | |
|---|---|---|---|---|
| 11/1/2019 | 3/31/2020 | FARWELL RECEIPT | | 506,500 |
| 11/1/2019 | 3/31/2020 | SOUTH CHESTER RECEIPT | | 100,000 |
| 4/1/2020 | 10/31/2020 | FARWELL RECEIPT | | 207,000 |
| 11/1/2020 | 3/31/2021 | DEWARD RECEIPT | | 506,500 |
| 11/1/2020 | 3/31/2021 | FARWELL RECEIPT | | 506,500 |
| 11/1/2020 | 3/31/2021 | SOUTH CHESTER RECEIPT | | 100,000 |
| 4/1/2021 | 10/31/2021 | FARWELL RECEIPT | | 207,000 |
| 11/1/2021 | 3/31/2022 | DEWARD RECEIPT | | 506,500 |
| 11/1/2021 | 3/31/2022 | FARWELL RECEIPT | | 506,500 |
| 11/1/2021 | 3/31/2022 | SOUTH CHESTER RECEIPT | | 100,000 |
| 4/1/2022 | 10/31/2022 | FARWELL RECEIPT | | 207,000 |
| 11/1/2012 | 3/31/2013 | | FARWELL DELIVERY | 506,500 |
| 11/1/2012 | 3/31/2013 | | DEWARD DELIVERY | 506,500 |
| 11/1/2012 | 3/31/2013 | | MUTTONVILLE DELIVERY | 100,000 |
| 11/1/2012 | 3/31/2013 | | OTISVILLE | 100,000 |

| | | | |
|---|---|---|---|
| 4/1/2013 | 10/31/2013 | DEWARD DELIVERY | 390,000 |
| 11/1/2013 | 3/31/2014 | FARWELL DELIVERY | 506,500 |
| 11/1/2013 | 3/31/2014 | DEWARD DELIVERY | 506,500 |
| 11/1/2013 | 3/31/2014 | MUTTONVILLE DELIVERY | 100,000 |
| 11/1/2013 | 3/31/2014 | OTISVILLE | 100,000 |
| 4/1/2014 | 10/31/2014 | DEWARD DELIVERY | 207,000 |
| 4/1/2014 | 10/31/2014 | FARWELL DELIVERY | 207,000 |
| 11/1/2014 | 3/31/2015 | FARWELL DELIVERY | 506,500 |
| 11/1/2014 | 3/31/2015 | MUTTONVILLE DELIVERY | 100,000 |
| 11/1/2014 | 3/31/2015 | OTISVILLE | 100,000 |
| 11/1/2014 | 3/31/2015 | DEWARD DELIVERY | 506,500 |
| 4/1/2015 | 10/31/2015 | DEWARD DELIVERY | 207,000 |
| 11/1/2015 | 3/31/2016 | DEWARD DELIVERY | 506,500 |
| 11/1/2015 | 3/31/2016 | FARWELL DELIVERY | 506,500 |
| 11/1/2015 | 3/31/2016 | OTISVILLE | 100,000 |
| 11/1/2015 | 3/31/2016 | MUTTONVILLE DELIVERY | 100,000 |
| 4/1/2016 | 10/31/2016 | DEWARD DELIVERY | 207,000 |

| | | | |
|---|---|---|---|
| 11/1/2016 | 3/31/2017 | DEWARD DELIVERY | 506,500 |
| 11/1/2016 | 3/31/2017 | OTISVILLE | 100,000 |
| 11/1/2016 | 3/31/2017 | MUTTONVILLE DELIVERY | 100,000 |
| 11/1/2016 | 3/31/2017 | FARWELL DELIVERY | 506,500 |
| 4/1/2017 | 10/31/2017 | DEWARD DELIVERY | 207,000 |
| 11/1/2017 | 3/31/2018 | FARWELL DELIVERY | 506,500 |
| 11/1/2017 | 3/31/2018 | DEWARD DELIVERY | 506,500 |
| 11/1/2017 | 3/31/2018 | MUTTONVILLE DELIVERY | 100,000 |
| 11/1/2017 | 3/31/2018 | OTISVILLE | 100,000 |
| 11/1/2017 | 3/31/2018 | SOUTH CHESTER DELIVERY | 100,000 |
| 4/1/2018 | 10/31/2018 | DEWARD DELIVERY | 207,000 |
| 11/1/2018 | 3/31/2019 | DEWARD DELIVERY | 506,500 |
| 11/1/2018 | 3/31/2019 | FARWELL DELIVERY | 506,500 |
| 11/1/2018 | 3/31/2019 | OTISVILLE | 100,000 |
| 11/1/2018 | 3/31/2019 | MUTTONVILLE DELIVERY | 100,000 |
| 11/1/2018 | 3/31/2019 | SOUTH CHESTER DELIVERY | 100,000 |
| 4/1/2019 | 10/31/2019 | DEWARD DELIVERY | 207,000 |

| | | | |
|---|---|---|---|
| 11/1/2019 | 3/31/2020 | DEWARD DELIVERY | 506,500 |
| 11/1/2019 | 3/31/2020 | FARWELL DELIVERY | 506,500 |
| 11/1/2019 | 3/31/2020 | OTISVILLE | 100,000 |
| 11/1/2019 | 3/31/2020 | MUTTONVILLE DELIVERY | 100,000 |
| 11/1/2019 | 3/31/2020 | SOUTH CHESTER DELIVERY | 100,000 |
| 4/1/2020 | 10/31/2020 | DEWARD DELIVERY | 207,000 |
| 11/1/2020 | 3/31/2021 | DEWARD DELIVERY | 506,500 |
| 11/1/2020 | 3/31/2021 | FARWELL DELIVERY | 506,500 |
| 11/1/2020 | 3/31/2021 | OTISVILLE | 100,000 |
| 11/1/2020 | 3/31/2021 | MUTTONVILLE DELIVERY | 100,000 |
| 11/1/2020 | 3/31/2021 | SOUTH CHESTER DELIVERY | 100,000 |
| 4/1/2021 | 10/31/2021 | DEWARD DELIVERY | 207,000 |
| 11/1/2021 | 3/31/2022 | DEWARD DELIVERY | 506,500 |
| 11/1/2021 | 3/31/2022 | FARWELL DELIVERY | 506,500 |
| 11/1/2021 | 3/31/2022 | OTISVILLE | 100,000 |
| 11/1/2021 | 3/31/2022 | MUTTONVILLE DELIVERY | 100,000 |

| | | | |
|---|---|---|---|
| 11/1/2021 | 3/31/2022 | SOUTH CHESTER DELIVERY | 100,000 |
| 4/1/2022 | 10/31/2022 | DEWARD DELIVERY | 207,000 |

# GLGT FT-18659

**Contract ID.:** FT18659
**Amendment No:** 2

# FORM OF TRANSPORTATION SERVICE AGREEMENT

This Transportation Service Agreement (Agreement) is entered into by Great Lakes Gas Transmission Limited Partnership (Transporter) and ANR Pipeline Company (Shipper).

WHEREAS, Shipper has requested Transporter to transport Gas on its behalf and Transporter represents that it is willing to transport Gas under the terms and conditions of this Agreement.

NOW, THEREFORE, Transporter and Shipper agree that the terms below constitute the transportation service to be provided and the rights and obligations of Shipper and Transporter.

1. EFFECTIVE DATE: November 01, 2020

2. CONTRACT IDENTIFICATION: FT18659

3. RATE SCHEDULE: FT

4. SHIPPER TYPE: Other

5. STATE/PROVINCE OF INCORPORATION: Delaware

6. TERM: April 01, 2017 to October 31, 2021

   Right of First Refusal:

   Regulatory (in accordance with Section 6.16 of the General Terms and Conditions of Transporter's FERC Gas Tariff)

7. EFFECT ON PREVIOUS CONTRACTS:
   This Agreement supersedes, cancels and terminates, as of the effective date stated above, the following contract(s): Service Agreement dated November 01, 2019 with Contract Identification FT18659.

8. MAXIMUM DAILY QUANTITY (Dth/Day):
   Please see Appendix A for further detail.

9. RATES:
   Unless Shipper and Transporter have agreed to a rate other than the maximum rate, rates shall be Transporter's maximum rates and charges plus all applicable surcharges in effect from time to time under the applicable Rate Schedule (as stated above) on file with the Commission unless otherwise agreed to by the parties in writing. Provisions governing a Rate other than the maximum shall be set forth in this Paragraph 9.

10. POINTS OF RECEIPT AND DELIVERY:
The primary receipt and delivery points are set forth on Appendix A.

11. RELEASED CAPACITY: N/A

12. INCORPORATION OF TARIFF INTO AGREEMENT:
This Agreement shall incorporate and in all respects be subject to the "General Terms and Conditions" and the applicable Rate Schedule (as stated above) set forth in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, as may be revised from time to time. Transporter may file and seek Commission approval under Section 4 of the Natural Gas Act (NGA) at any time and from time to time to change any rates, charges or provisions set forth in the applicable Rate Schedule (as stated above) and the "General Terms and Conditions" in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, and Transporter shall have the right to place such changes in effect in accordance with the NGA, and this Agreement shall be deemed to include such changes and any such changes which become effective by operation of law and Commission Order, without prejudice to Shipper's right to protest the same.

13. MISCELLANEOUS:
No waiver by either party to this Agreement of any one or more defaults by the other in the performance of this Agreement shall operate or be construed as a waiver of any continuing or future default(s), whether of a like or a different character.

Any controversy between the parties arising under this Agreement and not resolved by the parties shall be determined in accordance with the laws of the State of Michigan.

14. OTHER PROVISIONS (As necessary):
It is agreed that no personal liability whatsoever shall attach to, be imposed on or otherwise be incurred by any Partner, agent, management official or employee of the Transporter or any director, officer or employee of any of the foregoing, for any obligation of the Transporter arising under this Agreement or for any claim based on such obligation and that the sole recourse of Shipper under this Agreement is limited to assets of the Transporter.

Upon termination of this Agreement, Shipper's and Transporter's obligations to each other arising under this Agreement, prior to the date of termination, remain in effect and are not being terminated by any provision of this Agreement.

15. NOTICES AND COMMUNICATIONS:
All notices and communications with respect to this Agreement shall be in writing by mail, e-mail, or other means as agreed to by the parties, and sent to the addresses stated below or to any other such address(es) as may be designated in writing by mail, e-mail, or other means similarly agreed to:

ADMINISTRATIVE MATTERS:

Great Lakes Gas Transmission Limited
Partnership
Commercial Operations
700 Louisiana Street, Suite 700
Houston, TX 77002-2700

ANR Pipeline Company
700 Louisiana St., Suite 700
Houston, TX 77002-2700

Attn: Colin Lindley

AGREED TO BY:

GREAT LAKES GAS TRANSMISSION
LIMITED PARTNERSHIP
By: Great Lakes Gas Transmission Company

By:

Title: Director, Transportation Accounting and Contracts

JMD

ANR Pipeline Company

By:

Title: Director, Short Term Marketing

DJ
12/6/19
CW 12-6-19

# APPENDIX A
# CONTRACT IDENTIFICATION: FT18659

Date: November 01, 2020
Supersedes Appendix Dated: November 01, 2019

Shipper: ANR Pipeline Company

Maximum Daily Quantity (Dth/Day) per Location:

| Begin Date | End Date | Point(s) of Primary Receipt | Point(s) of Primary Delivery | MDQ |
|---|---|---|---|---|
| 4/1/2017 | 10/31/2017 | DEWARD RECEIPT | FARWELL DELIVERY | 0 |
| 11/1/2017 | 3/31/2018 | DEWARD RECEIPT | FARWELL DELIVERY | 202,464 |
| 4/1/2018 | 10/31/2018 | DEWARD RECEIPT | FARWELL DELIVERY | 0 |
| 11/1/2018 | 3/31/2019 | DEWARD RECEIPT | FARWELL DELIVERY | 202,464 |
| 4/1/2019 | 10/31/2019 | DEWARD RECEIPT | FARWELL DELIVERY | 0 |
| 11/1/2019 | 3/31/2020 | DEWARD RECEIPT | FARWELL DELIVERY | 202,464 |
| 4/1/2020 | 10/31/2020 | DEWARD RECEIPT | FARWELL DELIVERY | 0 |
| 11/1/2020 | 3/31/2021 | DEWARD RECEIPT | FARWELL DELIVERY | 202,464 |
| 4/1/2021 | 10/31/2021 | DEWARD RECEIPT | FARWELL DELIVERY | 0 |
| 11/1/2017 | 3/31/2018 | SOUTH CHESTER RECEIPT | | 115,771 |

| | | | |
|---|---|---|---|
| 11/1/2018 | 3/31/2019 | SOUTH CHESTER RECEIPT | 115,771 |
| 11/1/2019 | 3/31/2020 | SOUTH CHESTER RECEIPT | 115,771 |
| 11/1/2020 | 3/31/2021 | SOUTH CHESTER RECEIPT | 115,771 |

**Contract ID.:** FT18659
**Amendment No:** 3

# FORM OF TRANSPORTATION SERVICE AGREEMENT

This Transportation Service Agreement (Agreement) is entered into by Great Lakes Gas Transmission Limited Partnership (Transporter) and ANR Pipeline Company (Shipper).

WHEREAS, Shipper has requested Transporter to transport Gas on its behalf and Transporter represents that it is willing to transport Gas under the terms and conditions of this Agreement.

NOW, THEREFORE, Transporter and Shipper agree that the terms below constitute the transportation service to be provided and the rights and obligations of Shipper and Transporter.

1. EFFECTIVE DATE: November 01, 2021

2. CONTRACT IDENTIFICATION: FT18659

3. RATE SCHEDULE: FT

4. SHIPPER TYPE: Other

5. STATE/PROVINCE OF INCORPORATION: Delaware

6. TERM: April 01, 2017 to October 31, 2022

   Right of First Refusal:

   Transporter and Shipper agree that Shipper may extend the primary term of this Agreement by exercising a Contractual Right of First Refusal, pursuant to the procedures set forth in Section 6.16 of the General Terms and Conditions of Transporter's FERC Gas Tariff.

7. EFFECT ON PREVIOUS CONTRACTS:
   This Agreement supersedes, cancels and terminates, as of the effective date stated above, the following contract(s): Service Agreement dated November 01, 2020 with Contract Identification FT18659.

8. MAXIMUM DAILY QUANTITY (Dth/Day):
   Please see Appendix A for further detail.

9. RATES:
   Unless Shipper and Transporter have agreed to a rate other than the maximum rate, rates shall be Transporter's maximum rates and charges plus all applicable surcharges in effect from time to time under the applicable Rate Schedule (as stated above) on file with the Commission unless otherwise agreed to by the parties in writing. Provisions governing a Rate other than

the maximum shall be set forth in this Paragraph 9.

10. POINTS OF RECEIPT AND DELIVERY:
The primary receipt and delivery points are set forth on Appendix A.

11. RELEASED CAPACITY: N/A

12. INCORPORATION OF TARIFF INTO AGREEMENT:
This Agreement shall incorporate and in all respects be subject to the "General Terms and Conditions" and the applicable Rate Schedule (as stated above) set forth in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, as may be revised from time to time. Transporter may file and seek Commission approval under Section 4 of the Natural Gas Act (NGA) at any time and from time to time to change any rates, charges or provisions set forth in the applicable Rate Schedule (as stated above) and the "General Terms and Conditions" in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, and Transporter shall have the right to place such changes in effect in accordance with the NGA, and this Agreement shall be deemed to include such changes and any such changes which become effective by operation of law and Commission Order, without prejudice to Shipper's right to protest the same.

13. MISCELLANEOUS:
No waiver by either party to this Agreement of any one or more defaults by the other in the performance of this Agreement shall operate or be construed as a waiver of any continuing or future default(s), whether of a like or a different character.

Any controversy between the parties arising under this Agreement and not resolved by the parties shall be determined in accordance with the laws of the State of Michigan.

14. OTHER PROVISIONS (As necessary):
It is agreed that no personal liability whatsoever shall attach to, be imposed on or otherwise be incurred by any Partner, agent, management official or employee of the Transporter or any director, officer or employee of any of the foregoing, for any obligation of the Transporter arising under this Agreement or for any claim based on such obligation and that the sole recourse of Shipper under this Agreement is limited to assets of the Transporter.

Upon termination of this Agreement, Shipper's and Transporter's obligations to each other arising under this Agreement, prior to the date of termination, remain in effect and are not being terminated by any provision of this Agreement.

15. NOTICES AND COMMUNICATIONS:
All notices and communications with respect to this Agreement shall be in writing by mail, e-mail, or other means as agreed to by the parties, and sent to the addresses stated below or to any other such address(es) as may be designated in writing by mail, e-mail, or other means similarly agreed to:

ADMINISTRATIVE MATTERS:

Great Lakes Gas Transmission Limited Partnership
Commercial Operations
700 Louisiana Street, Suite 700
Houston, TX 77002-2700

ANR Pipeline Company
700 Louisiana St., Suite 700
Houston, TX 77002-2700

Attn: Eric Miller

AGREED TO BY:

GREAT LAKES GAS TRANSMISSION LIMITED PARTNERSHIP
By: Great Lakes Gas Transmission Company

By: DocuSigned by: Kay Dennison A0EF51A630C148B...

Title: Director, Trans. Acct.& Contracts

ANR Pipeline Company

By: DocuSigned by: Eric Miller 9D0AFD9B3F124EA...

Title: Director, Marketing West

DS

DS DJ

DS CW

# APPENDIX A
# CONTRACT IDENTIFICATION: FT18659

Date: November 01, 2021
Supersedes Appendix Dated: November 01, 2020

Shipper: ANR Pipeline Company

Maximum Daily Quantity (Dth/Day) per Location:

| Begin Date | End Date | Point(s) of Primary Receipt | Point(s) of Primary Delivery | MDQ |
|---|---|---|---|---|
| 4/1/2017 | 10/31/2017 | DEWARD RECEIPT | FARWELL DELIVERY | 0 |
| 11/1/2017 | 3/31/2018 | DEWARD RECEIPT | FARWELL DELIVERY | 202,464 |
| 4/1/2018 | 10/31/2018 | DEWARD RECEIPT | FARWELL DELIVERY | 0 |
| 11/1/2018 | 3/31/2019 | DEWARD RECEIPT | FARWELL DELIVERY | 202,464 |
| 4/1/2019 | 10/31/2019 | DEWARD RECEIPT | FARWELL DELIVERY | 0 |
| 11/1/2019 | 3/31/2020 | DEWARD RECEIPT | FARWELL DELIVERY | 202,464 |
| 4/1/2020 | 10/31/2020 | DEWARD RECEIPT | FARWELL DELIVERY | 0 |
| 11/1/2020 | 3/31/2021 | DEWARD RECEIPT | FARWELL DELIVERY | 202,464 |
| 4/1/2021 | 10/31/2021 | DEWARD RECEIPT | FARWELL DELIVERY | 0 |
| 11/1/2021 | 3/31/2022 | DEWARD RECEIPT | FARWELL DELIVERY | 202,464 |
| 4/1/2022 | 10/31/2022 | DEWARD RECEIPT | FARWELL DELIVERY | 0 |

| | | | |
|---|---|---|---|
| 11/1/2017 | 3/31/2018 | SOUTH CHESTER RECEIPT | 115,771 |
| 11/1/2018 | 3/31/2019 | SOUTH CHESTER RECEIPT | 115,771 |
| 11/1/2019 | 3/31/2020 | SOUTH CHESTER RECEIPT | 115,771 |
| 11/1/2020 | 3/31/2021 | SOUTH CHESTER RECEIPT | 115,771 |
| 11/1/2021 | 3/31/2022 | SOUTH CHESTER RECEIPT | 115,771 |

# GLGT FT-18150

**Contract ID.:** FT18150
**Amendment No:** 2

# FORM OF TRANSPORTATION SERVICE AGREEMENT

This Transportation Service Agreement (Agreement) is entered into by Great Lakes Gas Transmission Limited Partnership (Transporter) and ANR Pipeline Company (Shipper).

WHEREAS, Shipper has requested Transporter to transport Gas on its behalf and Transporter represents that it is willing to transport Gas under the terms and conditions of this Agreement.

NOW, THEREFORE, Transporter and Shipper agree that the terms below constitute the transportation service to be provided and the rights and obligations of Shipper and Transporter.

1. EFFECTIVE DATE: November 01, 2020

2. CONTRACT IDENTIFICATION: FT18150

3. RATE SCHEDULE: FT

4. SHIPPER TYPE: Other

5. STATE/PROVINCE OF INCORPORATION: Delaware

6. TERM: November 01, 2014 to October 31, 2021

   Right of First Refusal:

   Regulatory (in accordance with Section 6.16 of the General Terms and Conditions of Transporter's FERC Gas Tariff)

7. EFFECT ON PREVIOUS CONTRACTS:
   This Agreement supersedes, cancels and terminates, as of the effective date stated above, the following contract(s): Service Agreement dated November 01, 2019 with Contract Identification FT18150.

8. MAXIMUM DAILY QUANTITY (Dth/Day):
   Please see Appendix A for further detail.

9. RATES:
   Unless Shipper and Transporter have agreed to a rate other than the maximum rate, rates shall be Transporter's maximum rates and charges plus all applicable surcharges in effect from time to time under the applicable Rate Schedule (as stated above) on file with the Commission unless otherwise agreed to by the parties in writing. Provisions governing a Rate other than the maximum shall be set forth in this Paragraph 9.

10. POINTS OF RECEIPT AND DELIVERY:
The primary receipt and delivery points are set forth on Appendix A.

11. RELEASED CAPACITY: N/A

12. INCORPORATION OF TARIFF INTO AGREEMENT:
This Agreement shall incorporate and in all respects be subject to the "General Terms and Conditions" and the applicable Rate Schedule (as stated above) set forth in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, as may be revised from time to time. Transporter may file and seek Commission approval under Section 4 of the Natural Gas Act (NGA) at any time and from time to time to change any rates, charges or provisions set forth in the applicable Rate Schedule (as stated above) and the "General Terms and Conditions" in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, and Transporter shall have the right to place such changes in effect in accordance with the NGA, and this Agreement shall be deemed to include such changes and any such changes which become effective by operation of law and Commission Order, without prejudice to Shipper's right to protest the same.

13. MISCELLANEOUS:
No waiver by either party to this Agreement of any one or more defaults by the other in the performance of this Agreement shall operate or be construed as a waiver of any continuing or future default(s), whether of a like or a different character.

Any controversy between the parties arising under this Agreement and not resolved by the parties shall be determined in accordance with the laws of the State of Michigan.

14. OTHER PROVISIONS (As necessary):
It is agreed that no personal liability whatsoever shall attach to, be imposed on or otherwise be incurred by any Partner, agent, management official or employee of the Transporter or any director, officer or employee of any of the foregoing, for any obligation of the Transporter arising under this Agreement or for any claim based on such obligation and that the sole recourse of Shipper under this Agreement is limited to assets of the Transporter.

Upon termination of this Agreement, Shipper's and Transporter's obligations to each other arising under this Agreement, prior to the date of termination, remain in effect and are not being terminated by any provision of this Agreement.

15. NOTICES AND COMMUNICATIONS:
All notices and communications with respect to this Agreement shall be in writing by mail, e-mail, or other means as agreed to by the parties, and sent to the addresses stated below or to any other such address(es) as may be designated in writing by mail, e-mail, or other means similarly agreed to:

ADMINISTRATIVE MATTERS:

Great Lakes Gas Transmission Limited Partnership
Commercial Operations
700 Louisiana Street, Suite 700
Houston, TX 77002-2700

ANR Pipeline Company
700 Louisiana St., Suite 700
Houston, TX 77002-2700
Attn: ~~Colin Lindley~~ Jon Hause

AGREED TO BY:

GREAT LAKES GAS TRANSMISSION LIMITED PARTNERSHIP
By: Great Lakes Gas Transmission Company

By: Kay Dennison

Title: Director, Transportation Accounting and Contracts

ANR Pipeline Company

By: Jon Hause

Title: Director, Short Term Marketing

12/6/19

CW 12-6-19

# APPENDIX A
# CONTRACT IDENTIFICATION: FT18150

Date: November 01, 2020
Supersedes Appendix Dated: November 01, 2019

Shipper: ANR Pipeline Company

Maximum Daily Quantity (Dth/Day) per Location:

| Begin Date | End Date | Point(s) of Primary Receipt | Point(s) of Primary Delivery | MDQ |
|---|---|---|---|---|
| 11/1/2014 | 3/31/2015 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 101,300 |
| 4/1/2015 | 10/31/2015 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 0 |
| 11/1/2015 | 3/31/2016 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 101,300 |
| 4/1/2016 | 10/31/2016 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 0 |
| 11/1/2016 | 3/31/2017 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 101,300 |
| 4/1/2017 | 10/31/2017 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 0 |
| 11/1/2017 | 3/31/2018 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 101,300 |
| 4/1/2018 | 10/31/2018 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 0 |

| | | | | |
|---|---|---|---|---|
| 11/1/2018 | 3/31/2019 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 101,300 |
| 4/1/2019 | 10/31/2019 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 0 |
| 11/1/2019 | 3/31/2020 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 101,300 |
| 4/1/2020 | 10/31/2020 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 0 |
| 11/1/2020 | 3/31/2021 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 101,300 |
| 4/1/2021 | 10/31/2021 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 0 |
| 11/1/2014 | 3/31/2015 | DEWARD RECEIPT | | 101,300 |
| 11/1/2015 | 3/31/2016 | DEWARD RECEIPT | | 101,300 |
| 11/1/2016 | 3/31/2017 | DEWARD RECEIPT | | 101,300 |
| 11/1/2017 | 3/31/2018 | DEWARD RECEIPT | | 101,300 |
| 11/1/2018 | 3/31/2019 | DEWARD RECEIPT | | 101,300 |
| 11/1/2019 | 3/31/2020 | DEWARD RECEIPT | | 101,300 |
| 11/1/2020 | 3/31/2021 | DEWARD RECEIPT | | 101,300 |

**Contract ID.:** FT18150
**Amendment No:** 3

# FORM OF TRANSPORTATION SERVICE AGREEMENT

This Transportation Service Agreement (Agreement) is entered into by Great Lakes Gas Transmission Limited Partnership (Transporter) and ANR Pipeline Company (Shipper).

WHEREAS, Shipper has requested Transporter to transport Gas on its behalf and Transporter represents that it is willing to transport Gas under the terms and conditions of this Agreement.

NOW, THEREFORE, Transporter and Shipper agree that the terms below constitute the transportation service to be provided and the rights and obligations of Shipper and Transporter.

1. EFFECTIVE DATE: November 01, 2021

2. CONTRACT IDENTIFICATION: FT18150

3. RATE SCHEDULE: FT

4. SHIPPER TYPE: Other

5. STATE/PROVINCE OF INCORPORATION: Delaware

6. TERM: November 01, 2014 to October 31, 2022

   Right of First Refusal:

   Transporter and Shipper agree that Shipper may extend the primary term of this Agreement by exercising a Contractual Right of First Refusal, pursuant to the procedures set forth in Section 6.16 of the General Terms and Conditions of Transporter's FERC Gas Tariff.

7. EFFECT ON PREVIOUS CONTRACTS:
   This Agreement supersedes, cancels and terminates, as of the effective date stated above, the following contract(s): Service Agreement dated November 01, 2020 with Contract Identification FT18150.

8. MAXIMUM DAILY QUANTITY (Dth/Day):
   Please see Appendix A for further detail.

9. RATES:
   Unless Shipper and Transporter have agreed to a rate other than the maximum rate, rates shall be Transporter's maximum rates and charges plus all applicable surcharges in effect from time to time under the applicable Rate Schedule (as stated above) on file with the Commission unless otherwise agreed to by the parties in writing. Provisions governing a Rate other than

the maximum shall be set forth in this Paragraph 9.

10. POINTS OF RECEIPT AND DELIVERY:
The primary receipt and delivery points are set forth on Appendix A.

11. RELEASED CAPACITY: N/A

12. INCORPORATION OF TARIFF INTO AGREEMENT:
This Agreement shall incorporate and in all respects be subject to the "General Terms and Conditions" and the applicable Rate Schedule (as stated above) set forth in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, as may be revised from time to time. Transporter may file and seek Commission approval under Section 4 of the Natural Gas Act (NGA) at any time and from time to time to change any rates, charges or provisions set forth in the applicable Rate Schedule (as stated above) and the "General Terms and Conditions" in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, and Transporter shall have the right to place such changes in effect in accordance with the NGA, and this Agreement shall be deemed to include such changes and any such changes which become effective by operation of law and Commission Order, without prejudice to Shipper's right to protest the same.

13. MISCELLANEOUS:
No waiver by either party to this Agreement of any one or more defaults by the other in the performance of this Agreement shall operate or be construed as a waiver of any continuing or future default(s), whether of a like or a different character.

Any controversy between the parties arising under this Agreement and not resolved by the parties shall be determined in accordance with the laws of the State of Michigan.

14. OTHER PROVISIONS (As necessary):
It is agreed that no personal liability whatsoever shall attach to, be imposed on or otherwise be incurred by any Partner, agent, management official or employee of the Transporter or any director, officer or employee of any of the foregoing, for any obligation of the Transporter arising under this Agreement or for any claim based on such obligation and that the sole recourse of Shipper under this Agreement is limited to assets of the Transporter.

Upon termination of this Agreement, Shipper's and Transporter's obligations to each other arising under this Agreement, prior to the date of termination, remain in effect and are not being terminated by any provision of this Agreement.

**Contract ID.:** FT18150
**Amendment No:** 3

15. NOTICES AND COMMUNICATIONS:
All notices and communications with respect to this Agreement shall be in writing by mail, e-mail, or other means as agreed to by the parties, and sent to the addresses stated below or to any other such address(es) as may be designated in writing by mail, e-mail, or other means similarly agreed to:

ADMINISTRATIVE MATTERS:

Great Lakes Gas Transmission Limited Partnership
Commercial Operations
700 Louisiana Street, Suite 700
Houston, TX 77002-2700

ANR Pipeline Company
700 Louisiana St., Suite 700
Houston, TX 77002-2700

Attn: Eric Miller

AGREED TO BY:

GREAT LAKES GAS TRANSMISSION LIMITED PARTNERSHIP
By: Great Lakes Gas Transmission Company

By: DocuSigned by: Kay Dennison A0EF51A630C148B...

Title: Director, Trans. Acct.& Contracts

ANR Pipeline Company

By: DocuSigned by: Eric Miller 9D0AFD9B3F124EA...

Title: Director, Marketing West

DS DS DJ DS CW

# APPENDIX A
# CONTRACT IDENTIFICATION: FT18150

Date: November 01, 2021
Supersedes Appendix Dated: November 01, 2020

Shipper: ANR Pipeline Company

Maximum Daily Quantity (Dth/Day) per Location:

| Begin Date | End Date | Point(s) of Primary Receipt | Point(s) of Primary Delivery | MDQ |
|---|---|---|---|---|
| 11/1/2014 | 3/31/2015 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 101,300 |
| 4/1/2015 | 10/31/2015 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 0 |
| 11/1/2015 | 3/31/2016 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 101,300 |
| 4/1/2016 | 10/31/2016 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 0 |
| 11/1/2016 | 3/31/2017 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 101,300 |
| 4/1/2017 | 10/31/2017 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 0 |
| 11/1/2017 | 3/31/2018 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 101,300 |
| 4/1/2018 | 10/31/2018 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 0 |

| | | | | |
|---|---|---|---|---|
| 11/1/2018 | 3/31/2019 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 101,300 |
| 4/1/2019 | 10/31/2019 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 0 |
| 11/1/2019 | 3/31/2020 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 101,300 |
| 4/1/2020 | 10/31/2020 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 0 |
| 11/1/2020 | 3/31/2021 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 101,300 |
| 4/1/2021 | 10/31/2021 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 0 |
| 11/1/2021 | 3/31/2022 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 101,300 |
| 4/1/2022 | 10/31/2022 | SOUTH CHESTER RECEIPT | FARWELL DELIVERY | 0 |
| 11/1/2014 | 3/31/2015 | DEWARD RECEIPT | | 101,300 |
| 11/1/2015 | 3/31/2016 | DEWARD RECEIPT | | 101,300 |
| 11/1/2016 | 3/31/2017 | DEWARD RECEIPT | | 101,300 |
| 11/1/2017 | 3/31/2018 | DEWARD RECEIPT | | 101,300 |
| 11/1/2018 | 3/31/2019 | DEWARD RECEIPT | | 101,300 |
| 11/1/2019 | 3/31/2020 | DEWARD RECEIPT | | 101,300 |

| | | | |
|---|---|---|---|
| 11/1/2020 | 3/31/2021 | DEWARD RECEIPT | 101,300 |
| 11/1/2021 | 3/31/2022 | DEWARD RECEIPT | 101,300 |

# GLGT FT-18147

# FORM OF TRANSPORTATION SERVICE AGREEMENT

This Transportation Service Agreement (Agreement) is entered into by Great Lakes Gas Transmission Limited Partnership (Transporter) and ANR Pipeline Company (Shipper).

WHEREAS, Shipper has requested Transporter to transport Gas on its behalf and Transporter represents that it is willing to transport Gas under the terms and conditions of this Agreement.

NOW, THEREFORE, Transporter and Shipper agree that the terms below constitute the transportation service to be provided and the rights and obligations of Shipper and Transporter.

1. EFFECTIVE DATE: November 01, 2020

2. CONTRACT IDENTIFICATION: FT18147

3. RATE SCHEDULE: FT

4. SHIPPER TYPE: Other

5. STATE/PROVINCE OF INCORPORATION: Delaware

6. TERM: November 01, 2014 to October 31, 2021

   Right of First Refusal:

   Regulatory (in accordance with Section 6.16 of the General Terms and Conditions of Transporter's FERC Gas Tariff)

7. EFFECT ON PREVIOUS CONTRACTS:
   This Agreement supersedes, cancels and terminates, as of the effective date stated above, the following contract(s): Service Agreement dated November 01, 2019 with Contract Identification FT18147.

8. MAXIMUM DAILY QUANTITY (Dth/Day):
   Please see Appendix A for further detail.

9. RATES:
   Unless Shipper and Transporter have agreed to a rate other than the maximum rate, rates shall be Transporter's maximum rates and charges plus all applicable surcharges in effect from time to time under the applicable Rate Schedule (as stated above) on file with the Commission unless otherwise agreed to by the parties in writing. Provisions governing a Rate other than the maximum shall be set forth in this Paragraph 9.

10. POINTS OF RECEIPT AND DELIVERY:
The primary receipt and delivery points are set forth on Appendix A.

11. RELEASED CAPACITY: N/A

12. INCORPORATION OF TARIFF INTO AGREEMENT:
This Agreement shall incorporate and in all respects be subject to the "General Terms and Conditions" and the applicable Rate Schedule (as stated above) set forth in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, as may be revised from time to time. Transporter may file and seek Commission approval under Section 4 of the Natural Gas Act (NGA) at any time and from time to time to change any rates, charges or provisions set forth in the applicable Rate Schedule (as stated above) and the "General Terms and Conditions" in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, and Transporter shall have the right to place such changes in effect in accordance with the NGA, and this Agreement shall be deemed to include such changes and any such changes which become effective by operation of law and Commission Order, without prejudice to Shipper's right to protest the same.

13. MISCELLANEOUS:
No waiver by either party to this Agreement of any one or more defaults by the other in the performance of this Agreement shall operate or be construed as a waiver of any continuing or future default(s), whether of a like or a different character.

Any controversy between the parties arising under this Agreement and not resolved by the parties shall be determined in accordance with the laws of the State of Michigan.

14. OTHER PROVISIONS (As necessary):
It is agreed that no personal liability whatsoever shall attach to, be imposed on or otherwise be incurred by any Partner, agent, management official or employee of the Transporter or any director, officer or employee of any of the foregoing, for any obligation of the Transporter arising under this Agreement or for any claim based on such obligation and that the sole recourse of Shipper under this Agreement is limited to assets of the Transporter.

Upon termination of this Agreement, Shipper's and Transporter's obligations to each other arising under this Agreement, prior to the date of termination, remain in effect and are not being terminated by any provision of this Agreement.

15. NOTICES AND COMMUNICATIONS:
All notices and communications with respect to this Agreement shall be in writing by mail, e-mail, or other means as agreed to by the parties, and sent to the addresses stated below or to any other such address(es) as may be designated in writing by mail, e-mail, or other means similarly agreed to:

ADMINISTRATIVE MATTERS:

Great Lakes Gas Transmission Limited Partnership
Commercial Operations
700 Louisiana Street, Suite 700
Houston, TX 77002-2700

ANR Pipeline Company
700 Louisiana St., Suite 700
Houston, TX 77002-2700

Attn: Pearline McMahon

AGREED TO BY:

GREAT LAKES GAS TRANSMISSION LIMITED PARTNERSHIP
By: Great Lakes Gas Transmission Company

By: Kay Dennison

Title: Director, Transportation Accounting and Contracts

ANR Pipeline Company

By: Jon Howe

Title: Director, Short Term Marketing

DJ
12/6/19

CW 12-6-19

# APPENDIX A
# CONTRACT IDENTIFICATION: FT18147

Date: November 01, 2020
Supersedes Appendix Dated: November 01, 2019

Shipper: ANR Pipeline Company

Maximum Daily Quantity (Dth/Day) per Location:

| Begin Date | End Date | Point(s) of Primary Receipt | Point(s) of Primary Delivery | MDQ |
|---|---|---|---|---|
| 11/1/2014 | 3/31/2015 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 303,900 |
| 4/1/2015 | 10/31/2015 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 0 |
| 11/1/2015 | 3/31/2016 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 303,900 |
| 4/1/2016 | 10/31/2016 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 0 |
| 11/1/2016 | 3/31/2017 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 303,900 |
| 4/1/2017 | 10/31/2017 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 0 |
| 11/1/2017 | 3/31/2018 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 303,900 |
| 4/1/2018 | 10/31/2018 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 0 |

| | | | | |
|---|---|---|---|---|
| 11/1/2018 | 3/31/2019 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 303,900 |
| 4/1/2019 | 10/31/2019 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 0 |
| 11/1/2019 | 3/31/2020 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 303,900 |
| 4/1/2020 | 10/31/2020 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 0 |
| 11/1/2020 | 3/31/2021 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 303,900 |
| 4/1/2021 | 10/31/2021 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 0 |

**Contract ID.:** FT18147
**Amendment No:** 3

# FORM OF TRANSPORTATION SERVICE AGREEMENT

This Transportation Service Agreement (Agreement) is entered into by Great Lakes Gas Transmission Limited Partnership (Transporter) and ANR Pipeline Company (Shipper).

WHEREAS, Shipper has requested Transporter to transport Gas on its behalf and Transporter represents that it is willing to transport Gas under the terms and conditions of this Agreement.

NOW, THEREFORE, Transporter and Shipper agree that the terms below constitute the transportation service to be provided and the rights and obligations of Shipper and Transporter.

1. EFFECTIVE DATE: November 01, 2021

2. CONTRACT IDENTIFICATION: FT18147

3. RATE SCHEDULE: FT

4. SHIPPER TYPE: Other

5. STATE/PROVINCE OF INCORPORATION: Delaware

6. TERM: November 01, 2014 to October 31, 2022

   Right of First Refusal:

   Transporter and Shipper agree that Shipper may extend the primary term of this Agreement by exercising a Contractual Right of First Refusal, pursuant to the procedures set forth in Section 6.16 of the General Terms and Conditions of Transporter's FERC Gas Tariff.

7. EFFECT ON PREVIOUS CONTRACTS:
   This Agreement supersedes, cancels and terminates, as of the effective date stated above, the following contract(s): Service Agreement dated November 01, 2020 with Contract Identification FT18147.

8. MAXIMUM DAILY QUANTITY (Dth/Day):
   Please see Appendix A for further detail.

9. RATES:
   Unless Shipper and Transporter have agreed to a rate other than the maximum rate, rates shall be Transporter's maximum rates and charges plus all applicable surcharges in effect from time to time under the applicable Rate Schedule (as stated above) on file with the Commission unless otherwise agreed to by the parties in writing. Provisions governing a Rate other than

the maximum shall be set forth in this Paragraph 9.

10. POINTS OF RECEIPT AND DELIVERY:
The primary receipt and delivery points are set forth on Appendix A.

11. RELEASED CAPACITY: N/A

12. INCORPORATION OF TARIFF INTO AGREEMENT:
This Agreement shall incorporate and in all respects be subject to the "General Terms and Conditions" and the applicable Rate Schedule (as stated above) set forth in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, as may be revised from time to time. Transporter may file and seek Commission approval under Section 4 of the Natural Gas Act (NGA) at any time and from time to time to change any rates, charges or provisions set forth in the applicable Rate Schedule (as stated above) and the "General Terms and Conditions" in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, and Transporter shall have the right to place such changes in effect in accordance with the NGA, and this Agreement shall be deemed to include such changes and any such changes which become effective by operation of law and Commission Order, without prejudice to Shipper's right to protest the same.

13. MISCELLANEOUS:
No waiver by either party to this Agreement of any one or more defaults by the other in the performance of this Agreement shall operate or be construed as a waiver of any continuing or future default(s), whether of a like or a different character.

Any controversy between the parties arising under this Agreement and not resolved by the parties shall be determined in accordance with the laws of the State of Michigan.

14. OTHER PROVISIONS (As necessary):
It is agreed that no personal liability whatsoever shall attach to, be imposed on or otherwise be incurred by any Partner, agent, management official or employee of the Transporter or any director, officer or employee of any of the foregoing, for any obligation of the Transporter arising under this Agreement or for any claim based on such obligation and that the sole recourse of Shipper under this Agreement is limited to assets of the Transporter.

Upon termination of this Agreement, Shipper's and Transporter's obligations to each other arising under this Agreement, prior to the date of termination, remain in effect and are not being terminated by any provision of this Agreement.

**Contract ID.:** FT18147
**Amendment No:** 3

15. NOTICES AND COMMUNICATIONS:
All notices and communications with respect to this Agreement shall be in writing by mail, e-mail, or other means as agreed to by the parties, and sent to the addresses stated below or to any other such address(es) as may be designated in writing by mail, e-mail, or other means similarly agreed to:

ADMINISTRATIVE MATTERS:

Great Lakes Gas Transmission Limited Partnership
Commercial Operations
700 Louisiana Street, Suite 700
Houston, TX 77002-2700

ANR Pipeline Company
700 Louisiana St., Suite 700
Houston, TX 77002-2700

Attn: Eric Miller

AGREED TO BY:

GREAT LAKES GAS TRANSMISSION LIMITED PARTNERSHIP
By: Great Lakes Gas Transmission Company

By: DocuSigned by: Kay Dennison A0EF51A630C148B...

Title: Director, Trans. Acct.& Contracts

ANR Pipeline Company

By: DocuSigned by: Eric Miller 9D0AFD9B3F124EA...

Title: Director, Marketing West

DS DS DJ DS CW

# APPENDIX A
# CONTRACT IDENTIFICATION: FT18147

Date: November 01, 2021
Supersedes Appendix Dated: November 01, 2020

Shipper: ANR Pipeline Company

Maximum Daily Quantity (Dth/Day) per Location:

| Begin Date | End Date | Point(s) of Primary Receipt | Point(s) of Primary Delivery | MDQ |
|---|---|---|---|---|
| 11/1/2014 | 3/31/2015 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 303,900 |
| 4/1/2015 | 10/31/2015 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 0 |
| 11/1/2015 | 3/31/2016 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 303,900 |
| 4/1/2016 | 10/31/2016 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 0 |
| 11/1/2016 | 3/31/2017 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 303,900 |
| 4/1/2017 | 10/31/2017 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 0 |
| 11/1/2017 | 3/31/2018 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 303,900 |
| 4/1/2018 | 10/31/2018 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 0 |

| | | | | |
|---|---|---|---|---|
| 11/1/2018 | 3/31/2019 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 303,900 |
| 4/1/2019 | 10/31/2019 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 0 |
| 11/1/2019 | 3/31/2020 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 303,900 |
| 4/1/2020 | 10/31/2020 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 0 |
| 11/1/2020 | 3/31/2021 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 303,900 |
| 4/1/2021 | 10/31/2021 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 0 |
| 11/1/2021 | 3/31/2022 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 303,900 |
| 4/1/2022 | 10/31/2022 | SOUTH CHESTER RECEIPT | FORTUNE LAKE | 0 |

# GLGT FT-9141

**Contract ID.:** FT9141
**Amendment No:** 1

# FORM OF TRANSPORTATION SERVICE AGREEMENT

This Transportation Service Agreement (Agreement) is entered into by Great Lakes Gas Transmission Limited Partnership (Transporter) and ANR Pipeline Company (Shipper).

WHEREAS, Shipper has requested Transporter to transport Gas on its behalf and Transporter represents that it is willing to transport Gas under the terms and conditions of this Agreement.

NOW, THEREFORE, Transporter and Shipper agree that the terms below constitute the transportation service to be provided and the rights and obligations of Shipper and Transporter.

1. EFFECTIVE DATE: April 01, 2020

2. CONTRACT IDENTIFICATION: FT9141

3. RATE SCHEDULE: FT

4. SHIPPER TYPE: Other

5. STATE/PROVINCE OF INCORPORATION: Delaware

6. TERM: November 01, 2008 to March 31, 2021

   Right of First Refusal:

   Regulatory (in accordance with Section 6.16 of the General Terms and Conditions of Transporter's FERC Gas Tariff)

7. EFFECT ON PREVIOUS CONTRACTS:
   This Agreement supersedes, cancels and terminates, as of the effective date stated above, the following contract(s): Service Agreement dated March 12, 2008 with Contract Identification FT9141.

8. MAXIMUM DAILY QUANTITY (Dth/Day):
   Please see Appendix A for further detail.

9. RATES:
   Unless Shipper and Transporter have agreed to a rate other than the maximum rate, rates shall be Transporter's maximum rates and charges plus all applicable surcharges in effect from time to time under the applicable Rate Schedule (as stated above) on file with the Commission unless otherwise agreed to by the parties in writing. Provisions governing a Rate other than the maximum shall be set forth in this Paragraph 9.

10. POINTS OF RECEIPT AND DELIVERY:
The primary receipt and delivery points are set forth on Appendix A.

11. RELEASED CAPACITY: N/A

12. INCORPORATION OF TARIFF INTO AGREEMENT:
This Agreement shall incorporate and in all respects be subject to the "General Terms and Conditions" and the applicable Rate Schedule (as stated above) set forth in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, as may be revised from time to time. Transporter may file and seek Commission approval under Section 4 of the Natural Gas Act (NGA) at any time and from time to time to change any rates, charges or provisions set forth in the applicable Rate Schedule (as stated above) and the "General Terms and Conditions" in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, and Transporter shall have the right to place such changes in effect in accordance with the NGA, and this Agreement shall be deemed to include such changes and any such changes which become effective by operation of law and Commission Order, without prejudice to Shipper's right to protest the same.

13. MISCELLANEOUS:
No waiver by either party to this Agreement of any one or more defaults by the other in the performance of this Agreement shall operate or be construed as a waiver of any continuing or future default(s), whether of a like or a different character.

Any controversy between the parties arising under this Agreement and not resolved by the parties shall be determined in accordance with the laws of the State of Michigan.

14. OTHER PROVISIONS (As necessary):
It is agreed that no personal liability whatsoever shall attach to, be imposed on or otherwise be incurred by any Partner, agent, management official or employee of the Transporter or any director, officer or employee of any of the foregoing, for any obligation of the Transporter arising under this Agreement or for any claim based on such obligation and that the sole recourse of Shipper under this Agreement is limited to assets of the Transporter.

Upon termination of this Agreement, Shipper's and Transporter's obligations to each other arising under this Agreement, prior to the date of termination, remain in effect and are not being terminated by any provision of this Agreement.

15. NOTICES AND COMMUNICATIONS:
All notices and communications with respect to this Agreement shall be in writing by mail, e-mail, or other means as agreed to by the parties, and sent to the addresses stated below or to any other such address(es) as may be designated in writing by mail, e-mail, or other means similarly agreed to:

ADMINISTRATIVE MATTERS:

Great Lakes Gas Transmission Limited Partnership
Commercial Operations
700 Louisiana Street, Suite 700
Houston, TX 77002-2700

ANR Pipeline Company
700 Louisiana St., Suite 700
Houston, TX 77002-2700

Attn: Pearline McMahon

AGREED TO BY:

GREAT LAKES GAS TRANSMISSION LIMITED PARTNERSHIP
By: Great Lakes Gas Transmission Company

By: Kay Dennison

Title: **Director, Transportation Accounting and Contracts**

ANR Pipeline Company

By: **Jon A. Dobson**

Title: **Corporate Secretary**

RB 5/2/19
CW 5-2-19

# APPENDIX A
# CONTRACT IDENTIFICATION: FT9141

Date: April 01, 2020
Supersedes Appendix Dated: March 12, 2008

Shipper: ANR Pipeline Company

Maximum Daily Quantity (Dth/Day) per Location:

| Begin Date | End Date | Point(s) of Primary Receipt | Point(s) of Primary Delivery | MDQ |
|---|---|---|---|---|
| 11/1/2008 | 3/31/2016 | FARWELL RECEIPT | ST CLAIR DELIVERY | 56,000 |
| 4/1/2016 | 3/31/2017 | FARWELL RECEIPT | ST CLAIR DELIVERY | 56,000 |
| 4/1/2017 | 10/31/2017 | FARWELL RECEIPT | ST CLAIR DELIVERY | 100,000 |
| 11/1/2017 | 3/31/2018 | FARWELL RECEIPT | ST CLAIR DELIVERY | 56,000 |
| 4/1/2018 | 10/31/2018 | FARWELL RECEIPT | ST CLAIR DELIVERY | 100,000 |
| 11/1/2018 | 3/31/2019 | FARWELL RECEIPT | ST CLAIR DELIVERY | 56,000 |
| 4/1/2019 | 10/31/2019 | FARWELL RECEIPT | ST CLAIR DELIVERY | 100,000 |
| 11/1/2019 | 3/31/2020 | FARWELL RECEIPT | ST CLAIR DELIVERY | 56,000 |
| 4/1/2020 | 10/31/2020 | FARWELL RECEIPT | ST CLAIR DELIVERY | 100,000 |
| 11/1/2020 | 3/31/2021 | FARWELL RECEIPT | ST CLAIR DELIVERY | 56,000 |

**Contract ID.:** FT9141
**Amendment No:** 2

# FORM OF TRANSPORTATION SERVICE AGREEMENT

This Transportation Service Agreement (Agreement) is entered into by Great Lakes Gas Transmission Limited Partnership (Transporter) and ANR Pipeline Company (Shipper).

WHEREAS, Shipper has requested Transporter to transport Gas on its behalf and Transporter represents that it is willing to transport Gas under the terms and conditions of this Agreement.

NOW, THEREFORE, Transporter and Shipper agree that the terms below constitute the transportation service to be provided and the rights and obligations of Shipper and Transporter.

1. EFFECTIVE DATE: April 01, 2021

2. CONTRACT IDENTIFICATION: FT9141

3. RATE SCHEDULE: FT

4. SHIPPER TYPE: Other

5. STATE/PROVINCE OF INCORPORATION: Delaware

6. TERM: November 01, 2008 to March 31, 2022

   Right of First Refusal:

   Regulatory (in accordance with Section 6.16 of the General Terms and Conditions of Transporter's FERC Gas Tariff)

7. EFFECT ON PREVIOUS CONTRACTS:
   This Agreement supersedes, cancels and terminates, as of the effective date stated above, the following contract(s): Service Agreement dated April 01, 2020 with Contract Identification FT9141.

8. MAXIMUM DAILY QUANTITY (Dth/Day):
   Please see Appendix A for further detail.

9. RATES:
   Unless Shipper and Transporter have agreed to a rate other than the maximum rate, rates shall be Transporter's maximum rates and charges plus all applicable surcharges in effect from time to time under the applicable Rate Schedule (as stated above) on file with the Commission unless otherwise agreed to by the parties in writing. Provisions governing a Rate other than the maximum shall be set forth in this Paragraph 9.

10. POINTS OF RECEIPT AND DELIVERY:
The primary receipt and delivery points are set forth on Appendix A.

11. RELEASED CAPACITY: N/A

12. INCORPORATION OF TARIFF INTO AGREEMENT:
This Agreement shall incorporate and in all respects be subject to the "General Terms and Conditions" and the applicable Rate Schedule (as stated above) set forth in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, as may be revised from time to time. Transporter may file and seek Commission approval under Section 4 of the Natural Gas Act (NGA) at any time and from time to time to change any rates, charges or provisions set forth in the applicable Rate Schedule (as stated above) and the "General Terms and Conditions" in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, and Transporter shall have the right to place such changes in effect in accordance with the NGA, and this Agreement shall be deemed to include such changes and any such changes which become effective by operation of law and Commission Order, without prejudice to Shipper's right to protest the same.

13. MISCELLANEOUS:
No waiver by either party to this Agreement of any one or more defaults by the other in the performance of this Agreement shall operate or be construed as a waiver of any continuing or future default(s), whether of a like or a different character.

Any controversy between the parties arising under this Agreement and not resolved by the parties shall be determined in accordance with the laws of the State of Michigan.

14. OTHER PROVISIONS (As necessary):
It is agreed that no personal liability whatsoever shall attach to, be imposed on or otherwise be incurred by any Partner, agent, management official or employee of the Transporter or any director, officer or employee of any of the foregoing, for any obligation of the Transporter arising under this Agreement or for any claim based on such obligation and that the sole recourse of Shipper under this Agreement is limited to assets of the Transporter.

Upon termination of this Agreement, Shipper's and Transporter's obligations to each other arising under this Agreement, prior to the date of termination, remain in effect and are not being terminated by any provision of this Agreement.

15. NOTICES AND COMMUNICATIONS:
All notices and communications with respect to this Agreement shall be in writing by mail, e-mail, or other means as agreed to by the parties, and sent to the addresses stated below or to any other such address(es) as may be designated in writing by mail, e-mail, or other means similarly agreed to:

ADMINISTRATIVE MATTERS:

Great Lakes Gas Transmission Limited Partnership
Commercial Operations
700 Louisiana Street, Suite 700
Houston, TX 77002-2700

ANR Pipeline Company
700 Louisiana St., Suite 700
Houston, TX 77002-2700

Attn: Pearline McMahon

AGREED TO BY:

GREAT LAKES GAS TRANSMISSION LIMITED PARTNERSHIP
By: Great Lakes Gas Transmission Company

By: Kay Dennison

Title: Director, Trans. Accounting & Contracts

ANR Pipeline Company

By: Colin Lindley

Title:

# APPENDIX A
# CONTRACT IDENTIFICATION: FT9141

Date: April 01, 2021
Supersedes Appendix Dated: April 01, 2020

Shipper: ANR Pipeline Company

Maximum Daily Quantity (Dth/Day) per Location:

| Begin Date | End Date | Point(s) of Primary Receipt | Point(s) of Primary Delivery | MDQ |
|---|---|---|---|---|
| 11/1/2008 | 3/31/2016 | FARWELL RECEIPT | ST CLAIR DELIVERY | 56,000 |
| 4/1/2016 | 3/31/2017 | FARWELL RECEIPT | ST CLAIR DELIVERY | 56,000 |
| 4/1/2017 | 10/31/2017 | FARWELL RECEIPT | ST CLAIR DELIVERY | 100,000 |
| 11/1/2017 | 3/31/2018 | FARWELL RECEIPT | ST CLAIR DELIVERY | 56,000 |
| 4/1/2018 | 10/31/2018 | FARWELL RECEIPT | ST CLAIR DELIVERY | 100,000 |
| 11/1/2018 | 3/31/2019 | FARWELL RECEIPT | ST CLAIR DELIVERY | 56,000 |
| 4/1/2019 | 10/31/2019 | FARWELL RECEIPT | ST CLAIR DELIVERY | 100,000 |
| 11/1/2019 | 3/31/2020 | FARWELL RECEIPT | ST CLAIR DELIVERY | 56,000 |
| 4/1/2020 | 10/31/2020 | FARWELL RECEIPT | ST CLAIR DELIVERY | 100,000 |
| 11/1/2020 | 3/31/2021 | FARWELL RECEIPT | ST CLAIR DELIVERY | 56,000 |
| 4/1/2021 | 10/31/2021 | FARWELL RECEIPT | ST CLAIR DELIVERY | 100,000 |

| | | | | |
|---|---|---|---|---|
| 11/1/2021 | 3/31/2022 | FARWELL RECEIPT | ST CLAIR DELIVERY | 56,000 |

**Contract ID.:** FT9141
**Amendment No:** 3

# FORM OF TRANSPORTATION SERVICE AGREEMENT

This Transportation Service Agreement (Agreement) is entered into by Great Lakes Gas Transmission Limited Partnership (Transporter) and ANR Pipeline Company (Shipper).

WHEREAS, Shipper has requested Transporter to transport Gas on its behalf and Transporter represents that it is willing to transport Gas under the terms and conditions of this Agreement.

NOW, THEREFORE, Transporter and Shipper agree that the terms below constitute the transportation service to be provided and the rights and obligations of Shipper and Transporter.

1. EFFECTIVE DATE: April 01, 2022

2. CONTRACT IDENTIFICATION: FT9141

3. RATE SCHEDULE: FT

4. SHIPPER TYPE: Other

5. STATE/PROVINCE OF INCORPORATION: Delaware

6. TERM: November 01, 2008 to March 31, 2023

   Right of First Refusal:

   Regulatory (in accordance with Section 6.16 of the General Terms and Conditions of Transporter's FERC Gas Tariff)

7. EFFECT ON PREVIOUS CONTRACTS:
   This Agreement supersedes, cancels and terminates, as of the effective date stated above, the following contract(s): Service Agreement dated April 01, 2021 with Contract Identification FT9141.

8. MAXIMUM DAILY QUANTITY (Dth/Day):
   Please see Appendix A for further detail.

9. RATES:
   Unless Shipper and Transporter have agreed to a rate other than the maximum rate, rates shall be Transporter's maximum rates and charges plus all applicable surcharges in effect from time to time under the applicable Rate Schedule (as stated above) on file with the Commission unless otherwise agreed to by the parties in writing. Provisions governing a Rate other than the maximum shall be set forth in this Paragraph 9.

10. POINTS OF RECEIPT AND DELIVERY:
The primary receipt and delivery points are set forth on Appendix A.

11. RELEASED CAPACITY: N/A

12. INCORPORATION OF TARIFF INTO AGREEMENT:
This Agreement shall incorporate and in all respects be subject to the "General Terms and Conditions" and the applicable Rate Schedule (as stated above) set forth in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, as may be revised from time to time. Transporter may file and seek Commission approval under Section 4 of the Natural Gas Act (NGA) at any time and from time to time to change any rates, charges or provisions set forth in the applicable Rate Schedule (as stated above) and the "General Terms and Conditions" in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, and Transporter shall have the right to place such changes in effect in accordance with the NGA, and this Agreement shall be deemed to include such changes and any such changes which become effective by operation of law and Commission Order, without prejudice to Shipper's right to protest the same.

13. MISCELLANEOUS:
No waiver by either party to this Agreement of any one or more defaults by the other in the performance of this Agreement shall operate or be construed as a waiver of any continuing or future default(s), whether of a like or a different character.

    Any controversy between the parties arising under this Agreement and not resolved by the parties shall be determined in accordance with the laws of the State of Michigan.

14. OTHER PROVISIONS (As necessary):
It is agreed that no personal liability whatsoever shall attach to, be imposed on or otherwise be incurred by any Partner, agent, management official or employee of the Transporter or any director, officer or employee of any of the foregoing, for any obligation of the Transporter arising under this Agreement or for any claim based on such obligation and that the sole recourse of Shipper under this Agreement is limited to assets of the Transporter.

    Upon termination of this Agreement, Shipper's and Transporter's obligations to each other arising under this Agreement, prior to the date of termination, remain in effect and are not being terminated by any provision of this Agreement.

15. NOTICES AND COMMUNICATIONS:
All notices and communications with respect to this Agreement shall be in writing by mail, e-mail, or other means as agreed to by the parties, and sent to the addresses stated below or to any other such address(es) as may be designated in writing by mail, e-mail, or other means similarly agreed to:

ADMINISTRATIVE MATTERS:

Great Lakes Gas Transmission Limited Partnership
Commercial Operations
700 Louisiana Street, Suite 700
Houston, TX 77002-2700

ANR Pipeline Company
700 Louisiana St., Suite 700
Houston, TX 77002-2700

Attn: Eric Miller

AGREED TO BY:

GREAT LAKES GAS TRANSMISSION LIMITED PARTNERSHIP
By: Great Lakes Gas Transmission Company

By: Kay Dennison

Title: Director, Trans. Accounting & Contracts

ANR Pipeline Company

By: Eric Miller

Title:

# APPENDIX A
# CONTRACT IDENTIFICATION: FT9141

Date: April 01, 2022
Supersedes Appendix Dated: April 01, 2021

Shipper: ANR Pipeline Company

Maximum Daily Quantity (Dth/Day) per Location:

| Begin Date | End Date | Point(s) of Primary Receipt | Point(s) of Primary Delivery | MDQ |
|---|---|---|---|---|
| 11/1/2008 | 3/31/2016 | FARWELL RECEIPT | ST CLAIR DELIVERY | 56,000 |
| 4/1/2016 | 3/31/2017 | FARWELL RECEIPT | ST CLAIR DELIVERY | 56,000 |
| 4/1/2017 | 10/31/2017 | FARWELL RECEIPT | ST CLAIR DELIVERY | 100,000 |
| 11/1/2017 | 3/31/2018 | FARWELL RECEIPT | ST CLAIR DELIVERY | 56,000 |
| 4/1/2018 | 10/31/2018 | FARWELL RECEIPT | ST CLAIR DELIVERY | 100,000 |
| 11/1/2018 | 3/31/2019 | FARWELL RECEIPT | ST CLAIR DELIVERY | 56,000 |
| 4/1/2019 | 10/31/2019 | FARWELL RECEIPT | ST CLAIR DELIVERY | 100,000 |
| 11/1/2019 | 3/31/2020 | FARWELL RECEIPT | ST CLAIR DELIVERY | 56,000 |
| 4/1/2020 | 10/31/2020 | FARWELL RECEIPT | ST CLAIR DELIVERY | 100,000 |
| 11/1/2020 | 3/31/2021 | FARWELL RECEIPT | ST CLAIR DELIVERY | 56,000 |
| 4/1/2021 | 10/31/2021 | FARWELL RECEIPT | ST CLAIR DELIVERY | 100,000 |

| | | | | |
|---|---|---|---|---|
| 11/1/2021 | 3/31/2022 | FARWELL RECEIPT | ST CLAIR DELIVERY | 56,000 |
| 4/1/2022 | 10/31/2022 | FARWELL RECEIPT | ST CLAIR DELIVERY | 100,000 |
| 11/1/2022 | 3/31/2023 | FARWELL RECEIPT | ST CLAIR DELIVERY | 56,000 |

# **GLGT FT-5223**

**Contract ID.:** FT5223
**Amendment No:** 2

# FORM OF TRANSPORTATION SERVICE AGREEMENT

This Transportation Service Agreement (Agreement) is entered into by Great Lakes Gas Transmission Limited Partnership (Transporter) and ANR Pipeline Company (Shipper).

WHEREAS, Shipper has requested Transporter to transport Gas on its behalf and Transporter represents that it is willing to transport Gas under the terms and conditions of this Agreement.

NOW, THEREFORE, Transporter and Shipper agree that the terms below constitute the transportation service to be provided and the rights and obligations of Shipper and Transporter.

1. EFFECTIVE DATE: December 01, 2019

2. CONTRACT IDENTIFICATION: FT5223

3. RATE SCHEDULE: FT

4. SHIPPER TYPE: Other

5. STATE/PROVINCE OF INCORPORATION: Delaware

6. TERM: November 10, 2006 to November 30, 2020

   Right of First Refusal:

   Regulatory (in accordance with Section 6.16 of the General Terms and Conditions of Transporter's FERC Gas Tariff)

7. EFFECT ON PREVIOUS CONTRACTS:
   This Agreement supersedes, cancels and terminates, as of the effective date stated above, the following contract(s): Service Agreement dated May 27, 2005 with Contract Identification FT5223.

8. MAXIMUM DAILY QUANTITY (Dth/Day):
   Please see Appendix A for further detail.

9. RATES:
   Unless Shipper and Transporter have agreed to a rate other than the maximum rate, rates shall be Transporter's maximum rates and charges plus all applicable surcharges in effect from time to time under the applicable Rate Schedule (as stated above) on file with the Commission unless otherwise agreed to by the parties in writing. Provisions governing a Rate other than the maximum shall be set forth in this Paragraph 9.

10. POINTS OF RECEIPT AND DELIVERY:
The primary receipt and delivery points are set forth on Appendix A.

11. RELEASED CAPACITY: N/A

12. INCORPORATION OF TARIFF INTO AGREEMENT:
This Agreement shall incorporate and in all respects be subject to the "General Terms and Conditions" and the applicable Rate Schedule (as stated above) set forth in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, as may be revised from time to time. Transporter may file and seek Commission approval under Section 4 of the Natural Gas Act (NGA) at any time and from time to time to change any rates, charges or provisions set forth in the applicable Rate Schedule (as stated above) and the "General Terms and Conditions" in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, and Transporter shall have the right to place such changes in effect in accordance with the NGA, and this Agreement shall be deemed to include such changes and any such changes which become effective by operation of law and Commission Order, without prejudice to Shipper's right to protest the same.

13. MISCELLANEOUS:
No waiver by either party to this Agreement of any one or more defaults by the other in the performance of this Agreement shall operate or be construed as a waiver of any continuing or future default(s), whether of a like or a different character.

Any controversy between the parties arising under this Agreement and not resolved by the parties shall be determined in accordance with the laws of the State of Michigan.

14. OTHER PROVISIONS (As necessary):
It is agreed that no personal liability whatsoever shall attach to, be imposed on or otherwise be incurred by any Partner, agent, management official or employee of the Transporter or any director, officer or employee of any of the foregoing, for any obligation of the Transporter arising under this Agreement or for any claim based on such obligation and that the sole recourse of Shipper under this Agreement is limited to assets of the Transporter.

Upon termination of this Agreement, Shipper's and Transporter's obligations to each other arising under this Agreement, prior to the date of termination, remain in effect and are not being terminated by any provision of this Agreement.

**Contract ID.:** FT5223
**Amendment No:** 2

15. NOTICES AND COMMUNICATIONS:
All notices and communications with respect to this Agreement shall be in writing by mail, e-mail, or other means as agreed to by the parties, and sent to the addresses stated below or to any other such address(es) as may be designated in writing by mail, e-mail, or other means similarly agreed to:

ADMINISTRATIVE MATTERS:

Great Lakes Gas Transmission Limited Partnership
Commercial Operations
700 Louisiana Street, Suite 700
Houston, TX 77002-2700

ANR Pipeline Company
700 Louisiana St., Suite 700
Houston, TX 77002-2700

Attn: Pearline McMahon

AGREED TO BY:

| | |
|---|---|
| GREAT LAKES GAS TRANSMISSION LIMITED PARTNERSHIP<br>By: Great Lakes Gas Transmission Company | ANR Pipeline Company |
| By: Kay Dennison | By: Colin Lindley |
| Title: Director, Trans. Accounting & Contracts | Title: |

# APPENDIX A
# CONTRACT IDENTIFICATION: FT5223

Date: December 01, 2019
Supersedes Appendix Dated: May 27, 2005

Shipper: ANR Pipeline Company

Maximum Daily Quantity (Dth/Day) per Location:

| Begin Date | End Date | Point(s) of Primary Receipt | Point(s) of Primary Delivery | MDQ |
|---|---|---|---|---|
| 11/10/2006 | 3/31/2016 | FARWELL RECEIPT | FORTUNE LAKE | 125,000 |
| 4/1/2016 | 11/9/2017 | FARWELL RECEIPT | FORTUNE LAKE | 125,000 |
| 11/10/2017 | 11/30/2018 | FARWELL RECEIPT | FORTUNE LAKE | 125,000 |
| 12/1/2018 | 11/30/2019 | FARWELL RECEIPT | FORTUNE LAKE | 125,000 |
| 12/1/2019 | 11/30/2020 | FARWELL RECEIPT | FORTUNE LAKE | 125,000 |

**Contract ID.:** FT5223
**Amendment No:** 3

# FORM OF TRANSPORTATION SERVICE AGREEMENT

This Transportation Service Agreement (Agreement) is entered into by Great Lakes Gas Transmission Limited Partnership (Transporter) and ANR Pipeline Company (Shipper).

WHEREAS, Shipper has requested Transporter to transport Gas on its behalf and Transporter represents that it is willing to transport Gas under the terms and conditions of this Agreement.

NOW, THEREFORE, Transporter and Shipper agree that the terms below constitute the transportation service to be provided and the rights and obligations of Shipper and Transporter.

1. EFFECTIVE DATE: December 01, 2020

2. CONTRACT IDENTIFICATION: FT5223

3. RATE SCHEDULE: FT

4. SHIPPER TYPE: Other

5. STATE/PROVINCE OF INCORPORATION: Delaware

6. TERM: November 10, 2006 to November 30, 2021

   Right of First Refusal:

   Regulatory (in accordance with Section 6.16 of the General Terms and Conditions of Transporter's FERC Gas Tariff)

7. EFFECT ON PREVIOUS CONTRACTS:
   This Agreement supersedes, cancels and terminates, as of the effective date stated above, the following contract(s): Service Agreement dated December 01, 2019 with Contract Identification FT5223.

8. MAXIMUM DAILY QUANTITY (Dth/Day):
   Please see Appendix A for further detail.

9. RATES:
   Unless Shipper and Transporter have agreed to a rate other than the maximum rate, rates shall be Transporter's maximum rates and charges plus all applicable surcharges in effect from time to time under the applicable Rate Schedule (as stated above) on file with the Commission unless otherwise agreed to by the parties in writing. Provisions governing a Rate other than the maximum shall be set forth in this Paragraph 9.

10. POINTS OF RECEIPT AND DELIVERY:
The primary receipt and delivery points are set forth on Appendix A.

11. RELEASED CAPACITY: N/A

12. INCORPORATION OF TARIFF INTO AGREEMENT:
This Agreement shall incorporate and in all respects be subject to the "General Terms and Conditions" and the applicable Rate Schedule (as stated above) set forth in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, as may be revised from time to time. Transporter may file and seek Commission approval under Section 4 of the Natural Gas Act (NGA) at any time and from time to time to change any rates, charges or provisions set forth in the applicable Rate Schedule (as stated above) and the "General Terms and Conditions" in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, and Transporter shall have the right to place such changes in effect in accordance with the NGA, and this Agreement shall be deemed to include such changes and any such changes which become effective by operation of law and Commission Order, without prejudice to Shipper's right to protest the same.

13. MISCELLANEOUS:
No waiver by either party to this Agreement of any one or more defaults by the other in the performance of this Agreement shall operate or be construed as a waiver of any continuing or future default(s), whether of a like or a different character.

Any controversy between the parties arising under this Agreement and not resolved by the parties shall be determined in accordance with the laws of the State of Michigan.

14. OTHER PROVISIONS (As necessary):
It is agreed that no personal liability whatsoever shall attach to, be imposed on or otherwise be incurred by any Partner, agent, management official or employee of the Transporter or any director, officer or employee of any of the foregoing, for any obligation of the Transporter arising under this Agreement or for any claim based on such obligation and that the sole recourse of Shipper under this Agreement is limited to assets of the Transporter.

Upon termination of this Agreement, Shipper's and Transporter's obligations to each other arising under this Agreement, prior to the date of termination, remain in effect and are not being terminated by any provision of this Agreement.

15. NOTICES AND COMMUNICATIONS:
All notices and communications with respect to this Agreement shall be in writing by mail, e-mail, or other means as agreed to by the parties, and sent to the addresses stated below or to any other such address(es) as may be designated in writing by mail, e-mail, or other means similarly agreed to:

ADMINISTRATIVE MATTERS:

Great Lakes Gas Transmission Limited Partnership
Commercial Operations
700 Louisiana Street, Suite 700
Houston, TX 77002-2700

ANR Pipeline Company
700 Louisiana St., Suite 700
Houston, TX 77002-2700

Attn: Colin Lindley

AGREED TO BY:

GREAT LAKES GAS TRANSMISSION LIMITED PARTNERSHIP
By: Great Lakes Gas Transmission Company

By:

Title: **Director, Transportation Accounting and Contracts**

ANR Pipeline Company

By: Colin Lindley

Title: Director, Marketing

DB
12/23/19
CW 1-14-20
JRD
1/14/2020

# APPENDIX A
# CONTRACT IDENTIFICATION: FT5223

Date: December 01, 2020
Supersedes Appendix Dated: December 01, 2019

Shipper: ANR Pipeline Company

Maximum Daily Quantity (Dth/Day) per Location:

| Begin Date | End Date | Point(s) of Primary Receipt | Point(s) of Primary Delivery | MDQ |
|---|---|---|---|---|
| 11/10/2006 | 3/31/2016 | FARWELL RECEIPT | FORTUNE LAKE | 125,000 |
| 4/1/2016 | 11/9/2017 | FARWELL RECEIPT | FORTUNE LAKE | 125,000 |
| 11/10/2017 | 11/30/2018 | FARWELL RECEIPT | FORTUNE LAKE | 125,000 |
| 12/1/2018 | 11/30/2019 | FARWELL RECEIPT | FORTUNE LAKE | 125,000 |
| 12/1/2019 | 11/30/2020 | FARWELL RECEIPT | FORTUNE LAKE | 125,000 |
| 12/1/2020 | 11/30/2021 | FARWELL RECEIPT | FORTUNE LAKE | 125,000 |

**Contract ID.:** FT5223
**Amendment No:** 4

# FORM OF TRANSPORTATION SERVICE AGREEMENT

This Transportation Service Agreement (Agreement) is entered into by Great Lakes Gas Transmission Limited Partnership (Transporter) and ANR Pipeline Company (Shipper).

WHEREAS, Shipper has requested Transporter to transport Gas on its behalf and Transporter represents that it is willing to transport Gas under the terms and conditions of this Agreement.

NOW, THEREFORE, Transporter and Shipper agree that the terms below constitute the transportation service to be provided and the rights and obligations of Shipper and Transporter.

1. EFFECTIVE DATE: December 01, 2021

2. CONTRACT IDENTIFICATION: FT5223

3. RATE SCHEDULE: FT

4. SHIPPER TYPE: Other

5. STATE/PROVINCE OF INCORPORATION: Delaware

6. TERM: November 10, 2006 to November 30, 2022

   Right of First Refusal:

   Regulatory (in accordance with Section 6.16 of the General Terms and Conditions of Transporter's FERC Gas Tariff)

7. EFFECT ON PREVIOUS CONTRACTS:
   This Agreement supersedes, cancels and terminates, as of the effective date stated above, the following contract(s): Service Agreement dated December 01, 2020 with Contract Identification FT5223.

8. MAXIMUM DAILY QUANTITY (Dth/Day):
   Please see Appendix A for further detail.

9. RATES:
   Unless Shipper and Transporter have agreed to a rate other than the maximum rate, rates shall be Transporter's maximum rates and charges plus all applicable surcharges in effect from time to time under the applicable Rate Schedule (as stated above) on file with the Commission unless otherwise agreed to by the parties in writing. Provisions governing a Rate other than the maximum shall be set forth in this Paragraph 9.

10. POINTS OF RECEIPT AND DELIVERY:
The primary receipt and delivery points are set forth on Appendix A.

11. RELEASED CAPACITY: N/A

12. INCORPORATION OF TARIFF INTO AGREEMENT:
This Agreement shall incorporate and in all respects be subject to the "General Terms and Conditions" and the applicable Rate Schedule (as stated above) set forth in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, as may be revised from time to time. Transporter may file and seek Commission approval under Section 4 of the Natural Gas Act (NGA) at any time and from time to time to change any rates, charges or provisions set forth in the applicable Rate Schedule (as stated above) and the "General Terms and Conditions" in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, and Transporter shall have the right to place such changes in effect in accordance with the NGA, and this Agreement shall be deemed to include such changes and any such changes which become effective by operation of law and Commission Order, without prejudice to Shipper's right to protest the same.

13. MISCELLANEOUS:
No waiver by either party to this Agreement of any one or more defaults by the other in the performance of this Agreement shall operate or be construed as a waiver of any continuing or future default(s), whether of a like or a different character.

Any controversy between the parties arising under this Agreement and not resolved by the parties shall be determined in accordance with the laws of the State of Michigan.

14. OTHER PROVISIONS (As necessary):
It is agreed that no personal liability whatsoever shall attach to, be imposed on or otherwise be incurred by any Partner, agent, management official or employee of the Transporter or any director, officer or employee of any of the foregoing, for any obligation of the Transporter arising under this Agreement or for any claim based on such obligation and that the sole recourse of Shipper under this Agreement is limited to assets of the Transporter.

Upon termination of this Agreement, Shipper's and Transporter's obligations to each other arising under this Agreement, prior to the date of termination, remain in effect and are not being terminated by any provision of this Agreement.

15. NOTICES AND COMMUNICATIONS:

All notices and communications with respect to this Agreement shall be in writing by mail, e-mail, or other means as agreed to by the parties, and sent to the addresses stated below or to any other such address(es) as may be designated in writing by mail, e-mail, or other means similarly agreed to:

ADMINISTRATIVE MATTERS:

Great Lakes Gas Transmission Limited Partnership
Commercial Operations
700 Louisiana Street, Suite 700
Houston, TX 77002-2700

ANR Pipeline Company
700 Louisiana St., Suite 700
Houston, TX 77002-2700

Attn: Eric Miller

AGREED TO BY:

GREAT LAKES GAS TRANSMISSION LIMITED PARTNERSHIP
By: Great Lakes Gas Transmission Company

By: DocuSigned by: Kay Dennison A0EF51A630C148B...

Title: Director, Trans. Acct.& Contracts

ANR Pipeline Company

By: DocuSigned by: Eric Miller 9D0AFD9B3F124EA...

Title: Director, Marketing West

DS

DS DJ

DS CW

# APPENDIX A
# CONTRACT IDENTIFICATION: FT5223

Date: December 01, 2021
Supersedes Appendix Dated: December 01, 2020

Shipper: ANR Pipeline Company

Maximum Daily Quantity (Dth/Day) per Location:

| Begin Date | End Date | Point(s) of Primary Receipt | Point(s) of Primary Delivery | MDQ |
|---|---|---|---|---|
| 11/10/2006 | 3/31/2016 | FARWELL RECEIPT | FORTUNE LAKE | 125,000 |
| 4/1/2016 | 11/9/2017 | FARWELL RECEIPT | FORTUNE LAKE | 125,000 |
| 11/10/2017 | 11/30/2018 | FARWELL RECEIPT | FORTUNE LAKE | 125,000 |
| 12/1/2018 | 11/30/2019 | FARWELL RECEIPT | FORTUNE LAKE | 125,000 |
| 12/1/2019 | 11/30/2020 | FARWELL RECEIPT | FORTUNE LAKE | 125,000 |
| 12/1/2020 | 11/30/2021 | FARWELL RECEIPT | FORTUNE LAKE | 125,000 |
| 12/1/2021 | 11/30/2022 | FARWELL RECEIPT | FORTUNE LAKE | 125,000 |

# **GLGT FT-18759**

**Contract ID.:** FT18759
**Amendment No:** 1

# FORM OF TRANSPORTATION SERVICE AGREEMENT

This Transportation Service Agreement (Agreement) is entered into by Great Lakes Gas Transmission Limited Partnership (Transporter) and ANR Pipeline Company (Shipper).

WHEREAS, Shipper has requested Transporter to transport Gas on its behalf and Transporter represents that it is willing to transport Gas under the terms and conditions of this Agreement.

NOW, THEREFORE, Transporter and Shipper agree that the terms below constitute the transportation service to be provided and the rights and obligations of Shipper and Transporter.

1. EFFECTIVE DATE: April 01, 2020

2. CONTRACT IDENTIFICATION: FT18759

3. RATE SCHEDULE: FT

4. SHIPPER TYPE: Other

5. STATE/PROVINCE OF INCORPORATION: Delaware

6. TERM: April 01, 2018 to March 31, 2021

   Right of First Refusal:

   Regulatory (in accordance with Section 6.16 of the General Terms and Conditions of Transporter's FERC Gas Tariff)

7. EFFECT ON PREVIOUS CONTRACTS:
   This Agreement supersedes, cancels and terminates, as of the effective date stated above, the following contract(s): Service Agreement dated April 26, 2017 with Contract Identification FT18759.

8. MAXIMUM DAILY QUANTITY (Dth/Day):
   Please see Appendix A for further detail.

9. RATES:
   Unless Shipper and Transporter have agreed to a rate other than the maximum rate, rates shall be Transporter's maximum rates and charges plus all applicable surcharges in effect from time to time under the applicable Rate Schedule (as stated above) on file with the Commission unless otherwise agreed to by the parties in writing. Provisions governing a Rate other than the maximum shall be set forth in this Paragraph 9.

10. POINTS OF RECEIPT AND DELIVERY:
The primary receipt and delivery points are set forth on Appendix A.

11. RELEASED CAPACITY: N/A

12. INCORPORATION OF TARIFF INTO AGREEMENT:
This Agreement shall incorporate and in all respects be subject to the "General Terms and Conditions" and the applicable Rate Schedule (as stated above) set forth in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, as may be revised from time to time. Transporter may file and seek Commission approval under Section 4 of the Natural Gas Act (NGA) at any time and from time to time to change any rates, charges or provisions set forth in the applicable Rate Schedule (as stated above) and the "General Terms and Conditions" in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, and Transporter shall have the right to place such changes in effect in accordance with the NGA, and this Agreement shall be deemed to include such changes and any such changes which become effective by operation of law and Commission Order, without prejudice to Shipper's right to protest the same.

13. MISCELLANEOUS:
No waiver by either party to this Agreement of any one or more defaults by the other in the performance of this Agreement shall operate or be construed as a waiver of any continuing or future default(s), whether of a like or a different character.

Any controversy between the parties arising under this Agreement and not resolved by the parties shall be determined in accordance with the laws of the State of Michigan.

14. OTHER PROVISIONS (As necessary):
It is agreed that no personal liability whatsoever shall attach to, be imposed on or otherwise be incurred by any Partner, agent, management official or employee of the Transporter or any director, officer or employee of any of the foregoing, for any obligation of the Transporter arising under this Agreement or for any claim based on such obligation and that the sole recourse of Shipper under this Agreement is limited to assets of the Transporter.

Upon termination of this Agreement, Shipper's and Transporter's obligations to each other arising under this Agreement, prior to the date of termination, remain in effect and are not being terminated by any provision of this Agreement.

15. NOTICES AND COMMUNICATIONS:
All notices and communications with respect to this Agreement shall be in writing by mail, e-mail, or other means as agreed to by the parties, and sent to the addresses stated below or to any other such address(es) as may be designated in writing by mail, e-mail, or other means similarly agreed to:

ADMINISTRATIVE MATTERS:

Great Lakes Gas Transmission Limited
Partnership
Commercial Operations
700 Louisiana Street, Suite 700
Houston, TX 77002-2700

ANR Pipeline Company
700 Louisiana St., Suite 700
Houston, TX 77002-2700

Attn: Pearline McMahon

AGREED TO BY:

GREAT LAKES GAS TRANSMISSION
LIMITED PARTNERSHIP
By: Great Lakes Gas Transmission Company

By: Kay Dennison

Title: **Director, Transportation Accounting and Contracts**

ANR Pipeline Company

By: **Jon A. Dobson**

Title: **Corporate Secretary**

5/2/19

CW 5-2-19

# APPENDIX A
## CONTRACT IDENTIFICATION: FT18759

Date: April 01, 2020
Supersedes Appendix Dated: April 26, 2017

Shipper: ANR Pipeline Company

Maximum Daily Quantity (Dth/Day) per Location:

| Begin Date | End Date | Point(s) of Primary Receipt | Point(s) of Primary Delivery | MDQ |
|---|---|---|---|---|
| 4/1/2018 | 3/31/2020 | FARWELL RECEIPT | FORTUNE LAKE | 10,100 |
| 4/1/2020 | 3/31/2021 | FARWELL RECEIPT | FORTUNE LAKE | 10,100 |

**Contract ID.:** FT18759
**Amendment No:** 2

# FORM OF TRANSPORTATION SERVICE AGREEMENT

This Transportation Service Agreement (Agreement) is entered into by Great Lakes Gas Transmission Limited Partnership (Transporter) and ANR Pipeline Company (Shipper).

WHEREAS, Shipper has requested Transporter to transport Gas on its behalf and Transporter represents that it is willing to transport Gas under the terms and conditions of this Agreement.

NOW, THEREFORE, Transporter and Shipper agree that the terms below constitute the transportation service to be provided and the rights and obligations of Shipper and Transporter.

1. EFFECTIVE DATE: April 01, 2021

2. CONTRACT IDENTIFICATION: FT18759

3. RATE SCHEDULE: FT

4. SHIPPER TYPE: Other

5. STATE/PROVINCE OF INCORPORATION: Delaware

6. TERM: April 01, 2018 to March 31, 2022

   Right of First Refusal:

   Regulatory (in accordance with Section 6.16 of the General Terms and Conditions of Transporter's FERC Gas Tariff)

7. EFFECT ON PREVIOUS CONTRACTS:
   This Agreement supersedes, cancels and terminates, as of the effective date stated above, the following contract(s): Service Agreement dated April 01, 2020 with Contract Identification FT18759.

8. MAXIMUM DAILY QUANTITY (Dth/Day):
   Please see Appendix A for further detail.

9. RATES:
   Unless Shipper and Transporter have agreed to a rate other than the maximum rate, rates shall be Transporter's maximum rates and charges plus all applicable surcharges in effect from time to time under the applicable Rate Schedule (as stated above) on file with the Commission unless otherwise agreed to by the parties in writing. Provisions governing a Rate other than the maximum shall be set forth in this Paragraph 9.

10. POINTS OF RECEIPT AND DELIVERY:
The primary receipt and delivery points are set forth on Appendix A.

11. RELEASED CAPACITY: N/A

12. INCORPORATION OF TARIFF INTO AGREEMENT:
This Agreement shall incorporate and in all respects be subject to the "General Terms and Conditions" and the applicable Rate Schedule (as stated above) set forth in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, as may be revised from time to time. Transporter may file and seek Commission approval under Section 4 of the Natural Gas Act (NGA) at any time and from time to time to change any rates, charges or provisions set forth in the applicable Rate Schedule (as stated above) and the "General Terms and Conditions" in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, and Transporter shall have the right to place such changes in effect in accordance with the NGA, and this Agreement shall be deemed to include such changes and any such changes which become effective by operation of law and Commission Order, without prejudice to Shipper's right to protest the same.

13. MISCELLANEOUS:
No waiver by either party to this Agreement of any one or more defaults by the other in the performance of this Agreement shall operate or be construed as a waiver of any continuing or future default(s), whether of a like or a different character.

Any controversy between the parties arising under this Agreement and not resolved by the parties shall be determined in accordance with the laws of the State of Michigan.

14. OTHER PROVISIONS (As necessary):
It is agreed that no personal liability whatsoever shall attach to, be imposed on or otherwise be incurred by any Partner, agent, management official or employee of the Transporter or any director, officer or employee of any of the foregoing, for any obligation of the Transporter arising under this Agreement or for any claim based on such obligation and that the sole recourse of Shipper under this Agreement is limited to assets of the Transporter.

Upon termination of this Agreement, Shipper's and Transporter's obligations to each other arising under this Agreement, prior to the date of termination, remain in effect and are not being terminated by any provision of this Agreement.

15. NOTICES AND COMMUNICATIONS:
All notices and communications with respect to this Agreement shall be in writing by mail, e-mail, or other means as agreed to by the parties, and sent to the addresses stated below or to any other such address(es) as may be designated in writing by mail, e-mail, or other means similarly agreed to:

ADMINISTRATIVE MATTERS:

Great Lakes Gas Transmission Limited Partnership
Commercial Operations
700 Louisiana Street, Suite 700
Houston, TX 77002-2700

ANR Pipeline Company
700 Louisiana St., Suite 700
Houston, TX 77002-2700

Attn: Pearline McMahon

AGREED TO BY:

GREAT LAKES GAS TRANSMISSION LIMITED PARTNERSHIP
By: Great Lakes Gas Transmission Company

By: Kay Dennison

Title: Director, Trans. Accounting & Contracts

ANR Pipeline Company

By: Colin Lindley

Title:

# APPENDIX A
## CONTRACT IDENTIFICATION: FT18759

Date: April 01, 2021
Supersedes Appendix Dated: April 01, 2020

Shipper: ANR Pipeline Company

Maximum Daily Quantity (Dth/Day) per Location:

| Begin Date | End Date | Point(s) of Primary Receipt | Point(s) of Primary Delivery | MDQ |
|---|---|---|---|---|
| 4/1/2018 | 3/31/2020 | FARWELL RECEIPT | FORTUNE LAKE | 10,100 |
| 4/1/2020 | 3/31/2021 | FARWELL RECEIPT | FORTUNE LAKE | 10,100 |
| 4/1/2021 | 3/31/2022 | FARWELL RECEIPT | FORTUNE LAKE | 10,100 |

**Contract ID.:** FT18759
**Amendment No:** 3

# FORM OF TRANSPORTATION SERVICE AGREEMENT

This Transportation Service Agreement (Agreement) is entered into by Great Lakes Gas Transmission Limited Partnership (Transporter) and ANR Pipeline Company (Shipper).

WHEREAS, Shipper has requested Transporter to transport Gas on its behalf and Transporter represents that it is willing to transport Gas under the terms and conditions of this Agreement.

NOW, THEREFORE, Transporter and Shipper agree that the terms below constitute the transportation service to be provided and the rights and obligations of Shipper and Transporter.

1. EFFECTIVE DATE: April 01, 2022

2. CONTRACT IDENTIFICATION: FT18759

3. RATE SCHEDULE: FT

4. SHIPPER TYPE: Other

5. STATE/PROVINCE OF INCORPORATION: Delaware

6. TERM: April 01, 2018 to March 31, 2023

   Right of First Refusal:

   Regulatory (in accordance with Section 6.16 of the General Terms and Conditions of Transporter's FERC Gas Tariff)

7. EFFECT ON PREVIOUS CONTRACTS:
   This Agreement supersedes, cancels and terminates, as of the effective date stated above, the following contract(s): Service Agreement dated April 01, 2021 with Contract Identification FT18759.

8. MAXIMUM DAILY QUANTITY (Dth/Day):
   Please see Appendix A for further detail.

9. RATES:
   Unless Shipper and Transporter have agreed to a rate other than the maximum rate, rates shall be Transporter's maximum rates and charges plus all applicable surcharges in effect from time to time under the applicable Rate Schedule (as stated above) on file with the Commission unless otherwise agreed to by the parties in writing. Provisions governing a Rate other than the maximum shall be set forth in this Paragraph 9.

10. POINTS OF RECEIPT AND DELIVERY:
The primary receipt and delivery points are set forth on Appendix A.

11. RELEASED CAPACITY: N/A

12. INCORPORATION OF TARIFF INTO AGREEMENT:
This Agreement shall incorporate and in all respects be subject to the "General Terms and Conditions" and the applicable Rate Schedule (as stated above) set forth in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, as may be revised from time to time. Transporter may file and seek Commission approval under Section 4 of the Natural Gas Act (NGA) at any time and from time to time to change any rates, charges or provisions set forth in the applicable Rate Schedule (as stated above) and the "General Terms and Conditions" in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, and Transporter shall have the right to place such changes in effect in accordance with the NGA, and this Agreement shall be deemed to include such changes and any such changes which become effective by operation of law and Commission Order, without prejudice to Shipper's right to protest the same.

13. MISCELLANEOUS:
No waiver by either party to this Agreement of any one or more defaults by the other in the performance of this Agreement shall operate or be construed as a waiver of any continuing or future default(s), whether of a like or a different character.

Any controversy between the parties arising under this Agreement and not resolved by the parties shall be determined in accordance with the laws of the State of Michigan.

14. OTHER PROVISIONS (As necessary):
It is agreed that no personal liability whatsoever shall attach to, be imposed on or otherwise be incurred by any Partner, agent, management official or employee of the Transporter or any director, officer or employee of any of the foregoing, for any obligation of the Transporter arising under this Agreement or for any claim based on such obligation and that the sole recourse of Shipper under this Agreement is limited to assets of the Transporter.

Upon termination of this Agreement, Shipper's and Transporter's obligations to each other arising under this Agreement, prior to the date of termination, remain in effect and are not being terminated by any provision of this Agreement.

15. NOTICES AND COMMUNICATIONS:

All notices and communications with respect to this Agreement shall be in writing by mail, e-mail, or other means as agreed to by the parties, and sent to the addresses stated below or to any other such address(es) as may be designated in writing by mail, e-mail, or other means similarly agreed to:

ADMINISTRATIVE MATTERS:

Great Lakes Gas Transmission Limited Partnership
Commercial Operations
700 Louisiana Street, Suite 700
Houston, TX 77002-2700

ANR Pipeline Company
700 Louisiana St., Suite 700
Houston, TX 77002-2700

Attn: Eric Miller

AGREED TO BY:

GREAT LAKES GAS TRANSMISSION LIMITED PARTNERSHIP
By: Great Lakes Gas Transmission Company

By: Kay Dennison

Title: Director, Trans. Accounting & Contracts

ANR Pipeline Company

By: Eric Miller

Title:

# APPENDIX A
# CONTRACT IDENTIFICATION: FT18759

Date: April 01, 2022
Supersedes Appendix Dated: April 01, 2021

Shipper: ANR Pipeline Company

Maximum Daily Quantity (Dth/Day) per Location:

| Begin Date | End Date | Point(s) of Primary Receipt | Point(s) of Primary Delivery | MDQ |
|---|---|---|---|---|
| 4/1/2018 | 3/31/2020 | FARWELL RECEIPT | FORTUNE LAKE | 10,100 |
| 4/1/2020 | 3/31/2021 | FARWELL RECEIPT | FORTUNE LAKE | 10,100 |
| 4/1/2021 | 3/31/2022 | FARWELL RECEIPT | FORTUNE LAKE | 10,100 |
| 4/1/2022 | 3/31/2023 | FARWELL RECEIPT | FORTUNE LAKE | 10,100 |

# **GLGT FT-17196**

Great Lakes
Gas Transmission Company

## TRANSPORTATION SERVICE AGREEMENT
## Contract Identification FT17196

This Transportation Service Agreement (Agreement) is entered into by Great Lakes Gas Transmission Limited Partnership (Transporter) and ANR PIPELINE COMPANY(Shipper).

WHEREAS, Shipper has requested Transporter to transport Gas on its behalf and Transporter represents that it is willing to transport Gas under the terms and conditions of this Agreement.

NOW, THEREFORE, Transporter and Shipper agree that the terms below constitute the transportation service to be provided and the rights and obligations of Shipper and Transporter.

1. **EFFECTIVE DATE:** May 17, 2013

2. **CONTRACT IDENTIFICATION:** FT17196

3. **RATE SCHEDULE:** FT

4. **SHIPPER TYPE:** Interstate Pl

5. **STATE/PROVINCE OF INCORPORATION:** Delaware

6. **TERM:** November 01, 2012 to October 31, 2032

7. **EFFECT ON PREVIOUS CONTRACTS:**
This Agreement supersedes, cancels and terminates, as of the effective date stated above, the following contract(s): Service Agreement dated December 03, 2012 with Contract Identification FT17196.

8. **MAXIMUM DAILY QUANTITY (Dth/Day):** 1,700
Please see Appendix A for further detail.

9. **RATES:**
Unless Shipper and Transporter have agreed to a rate other than the maximum rate, rates shall be Transporter's maximum rates and charges plus all applicable surcharges in effect from time to time under the applicable Rate Schedule (as stated above) on file with the Commission unless otherwise agreed to by the parties in writing. Provisions governing a Rate other than the maximum shall be set forth in this Paragraph 9 and/or on Appendix B hereto.

10. POINTS OF RECEIPT AND DELIVERY:
The primary receipt and delivery points are set forth on Appendix A.

11. RELEASED CAPACITY:
N/A

12. INCORPORATION OF TARIFF INTO AGREEMENT:
This Agreement shall incorporate and in all respects be subject to the "General Terms and Conditions" and the applicable Rate Schedule (as stated above) set forth in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, as may be revised from time to time. Transporter may file and seek Commission approval under Section 4 of the Natural Gas Act (NGA) at any time and from time to time to change any rates, charges or provisions set forth in the applicable Rate Schedule (as stated above) and the "General Terms and Conditions" in Transporter's FERC Gas Tariff, Third Revised Volume No. 1, and Transporter shall have the right to place such changes in effect in accordance with the NGA, and this Agreement shall be deemed to include such changes and any such changes which become effective by operation of law and Commission Order, without prejudice to Shipper's right to protest the same.

13. MISCELLANEOUS:
No waiver by either party to this Agreement of any one or more defaults by the other in the performance of this Agreement shall operate or be construed as a waiver of any continuing or future default(s), whether of a like or a different character.

Any controversy between the parties arising under this Agreement and not resolved by the parties shall be determined in accordance with the laws of the State of Michigan.

14. OTHER PROVISIONS:
It is agreed that no personal liability whatsoever shall attach to, be imposed on or otherwise be incurred by any Partner, agent, management official or employee of the Transporter or any director, officer or employee of any of the foregoing, for any obligation of the Transporter arising under this Agreement or for any claim based on such obligation and that the sole recourse of Shipper under this Agreement is limited to assets of the Transporter.

Upon termination of this Agreement, Shipper's and Transporter's obligations to each other arising under this Agreement, prior to the date of termination, remain in effect and are not being terminated by any provision of this Agreement.

**Contract ID: FT17196**

15. NOTICES AND COMMUNICATIONS:
All notices and communications with respect to this Agreement shall be in writing by mail, e-mail, or fax, or other means as agreed to by the parties, and sent to the addresses stated below or to any other such address(es) as may be designated in writing by mail, e-mail, or fax, or other means similarly agreed to:

ADMINISTRATIVE MATTERS
Great Lakes Gas Transmission Limited
Partnership
Commercial Services
717 Texas Street
Houston, TX 77002-2761

ANR PIPELINE COMPANY
717 Texas Avenue
Suite 2500
Houston, TX 77002-2761
Attn:

AGREED TO BY:

**GREAT LAKES GAS TRANSMISSION LIMITED PARTNERSHIP**
**By: Great Lakes Gas Transmission Company**

By: Joseph E. Pollard
Joseph E. Pollard
Title: Director, Commercial Services

**ANR PIPELINE COMPANY**

By:
Signature
Gary Charette
VP US Commercial Operations
Please Print

AB 6-3-13
CC 6-3-13

Title:
Please Print

## APPENDIX A
## Contract Identification FT17196

Date: May 17, 2013
Supersedes Appendix Dated: December 03, 2012

Shipper: ANR PIPELINE COMPANY

Maximum Daily Quantity (Dth/Day) per Location:

| Begin Date | End Date | Point(s) of Primary Receipt | Point(s) of Primary Delivery | MDQ | Maximum Allowable Operating Pressure (MAOP) |
|---|---|---|---|---|---|
| 11/01/2012 | 12/02/2012 | FARWELL | | 0 | 974 |
| 12/03/2012 | 03/31/2013 | FARWELL | | 500 | 974 |
| 04/01/2013 | 10/31/2013 | FARWELL | | 1,700 | 974 |
| 11/01/2013 | 03/31/2014 | FARWELL | | 500 | 974 |
| 04/01/2014 | 10/31/2014 | FARWELL | | 1,700 | 974 |
| 11/01/2014 | 03/31/2015 | FARWELL | | 500 | 974 |
| 04/01/2015 | 10/31/2015 | FARWELL | | 1,700 | 974 |
| 11/01/2015 | 03/31/2016 | FARWELL | | 500 | 974 |
| 04/01/2016 | 10/31/2016 | FARWELL | | 1,700 | 974 |
| 11/01/2016 | 03/31/2017 | FARWELL | | 500 | 974 |
| 04/01/2017 | 10/31/2017 | FARWELL | | 1,700 | 974 |
| 11/01/2017 | 03/31/2018 | FARWELL | | 500 | 974 |
| 04/01/2018 | 10/31/2018 | FARWELL | | 1,700 | 974 |
| 11/01/2018 | 03/31/2019 | FARWELL | | 500 | 974 |
| 04/01/2019 | 10/31/2019 | FARWELL | | 1,700 | 974 |
| 11/01/2019 | 03/31/2020 | FARWELL | | 500 | 974 |
| 04/01/2020 | 10/31/2020 | FARWELL | | 1,700 | 974 |
| 11/01/2020 | 03/31/2021 | FARWELL | | 500 | 974 |
| 04/01/2021 | 10/31/2021 | FARWELL | | 1,700 | 974 |
| 11/01/2021 | 03/31/2022 | FARWELL | | 500 | 974 |
| 04/01/2022 | 10/31/2022 | FARWELL | | 1,700 | 974 |
| 11/01/2022 | 03/31/2023 | FARWELL | | 500 | 974 |
| 04/01/2023 | 10/31/2023 | FARWELL | | 1,700 | 974 |
| 11/01/2023 | 03/31/2024 | FARWELL | | 500 | 974 |
| 04/01/2024 | 10/31/2024 | FARWELL | | 1,700 | 974 |
| 11/01/2024 | 03/31/2025 | FARWELL | | 500 | 974 |
| 04/01/2025 | 10/31/2025 | FARWELL | | 1,700 | 974 |
| 11/01/2025 | 03/31/2026 | FARWELL | | 500 | 974 |
| 04/01/2026 | 10/31/2026 | FARWELL | | 1,700 | 974 |
| 11/01/2026 | 03/31/2027 | FARWELL | | 500 | 974 |
| 04/01/2027 | 10/31/2027 | FARWELL | | 1,700 | 974 |
| 11/01/2027 | 03/31/2028 | FARWELL | | 500 | 974 |
| 04/01/2028 | 10/31/2028 | FARWELL | | 1,700 | 974 |
| 11/01/2028 | 03/31/2029 | FARWELL | | 500 | 974 |
| 04/01/2029 | 10/31/2029 | FARWELL | | 1,700 | 974 |
| 11/01/2029 | 03/31/2030 | FARWELL | | 500 | 974 |
| 04/01/2030 | 10/31/2030 | FARWELL | | 1,700 | 974 |

**Contract ID: FT17196**

| | | | | | |
|---|---|---|---|---|---|
| 11/01/2030 | 03/31/2031 | FARWELL | | 500 | 974 |
| 04/01/2031 | 10/31/2031 | FARWELL | | 1,700 | 974 |
| 11/01/2031 | 03/31/2032 | FARWELL | | 500 | 974 |
| 04/01/2032 | 10/31/2032 | FARWELL | | 1,700 | 974 |
| 11/01/2012 | 12/02/2012 | | DEWARD | 0 | 974 |
| 12/03/2012 | 03/31/2013 | | DEWARD | 500 | 974 |
| 04/01/2013 | 10/31/2013 | | DEWARD | 1,700 | 974 |
| 11/01/2013 | 03/31/2014 | | DEWARD | 500 | 974 |
| 04/01/2014 | 10/31/2014 | | DEWARD | 1,700 | 974 |
| 11/01/2014 | 03/31/2015 | | DEWARD | 500 | 974 |
| 04/01/2015 | 10/31/2015 | | DEWARD | 1,700 | 974 |
| 11/01/2015 | 03/31/2016 | | DEWARD | 500 | 974 |
| 04/01/2016 | 10/31/2016 | | DEWARD | 1,700 | 974 |
| 11/01/2016 | 03/31/2017 | | DEWARD | 500 | 974 |
| 04/01/2017 | 10/31/2017 | | DEWARD | 1,700 | 974 |
| 11/01/2017 | 03/31/2018 | | DEWARD | 500 | 974 |
| 04/01/2018 | 10/31/2018 | | DEWARD | 1,700 | 974 |
| 11/01/2018 | 03/31/2019 | | DEWARD | 500 | 974 |
| 04/01/2019 | 10/31/2019 | | DEWARD | 1,700 | 974 |
| 11/01/2019 | 03/31/2020 | | DEWARD | 500 | 974 |
| 04/01/2020 | 10/31/2020 | | DEWARD | 1,700 | 974 |
| 11/01/2020 | 03/31/2021 | | DEWARD | 500 | 974 |
| 04/01/2021 | 10/31/2021 | | DEWARD | 1,700 | 974 |
| 11/01/2021 | 03/31/2022 | | DEWARD | 500 | 974 |
| 04/01/2022 | 10/31/2022 | | DEWARD | 1,700 | 974 |
| 11/01/2022 | 03/31/2023 | | DEWARD | 500 | 974 |
| 04/01/2023 | 10/31/2023 | | DEWARD | 1,700 | 974 |
| 11/01/2023 | 03/31/2024 | | DEWARD | 500 | 974 |
| 04/01/2024 | 10/31/2024 | | DEWARD | 1,700 | 974 |
| 11/01/2024 | 03/31/2025 | | DEWARD | 500 | 974 |
| 04/01/2025 | 10/31/2025 | | DEWARD | 1,700 | 974 |
| 11/01/2025 | 03/31/2026 | | DEWARD | 500 | 974 |
| 04/01/2026 | 10/31/2026 | | DEWARD | 1,700 | 974 |
| 11/01/2026 | 03/31/2027 | | DEWARD | 500 | 974 |
| 04/01/2027 | 10/31/2027 | | DEWARD | 1,700 | 974 |
| 11/01/2027 | 03/31/2028 | | DEWARD | 500 | 974 |
| 04/01/2028 | 10/31/2028 | | DEWARD | 1,700 | 974 |
| 11/01/2028 | 03/31/2029 | | DEWARD | 500 | 974 |
| 04/01/2029 | 10/31/2029 | | DEWARD | 1,700 | 974 |
| 11/01/2029 | 03/31/2030 | | DEWARD | 500 | 974 |
| 04/01/2030 | 10/31/2030 | | DEWARD | 1,700 | 974 |
| 11/01/2030 | 03/31/2031 | | DEWARD | 500 | 974 |
| 04/01/2031 | 10/31/2031 | | DEWARD | 1,700 | 974 |
| 11/01/2031 | 03/31/2032 | | DEWARD | 500 | 974 |
| 04/01/2032 | 10/31/2032 | | DEWARD | 1,700 | 974 |

# DTE FT-90509

**DTE Energy**
MichCon

#90509 (Blue Lake)

**Level of Service:**
☒ **Firm**
☐ **Interruptible**

**Service:**
☒ **Transportation**
☐ **Exchanges**
☐ **Swap**
☐ **Storage**

## Interstate Services Transaction
## Exhibit B

**MichCon:** Michigan Consolidated Gas Company
2000 Second Avenue, Suite 1600
Detroit, MI 48226

**Attention:** Michael Morrison

**Phone:** 313-235-1009
**Fax:** 313-235-1065

**Customer:** ANR Pipeline Company
9 Greenway Plaza
Houston, TX 77046

**Attention:** Stan Chapman

**Phone:** 713-420-1707
**Fax:** 713-420-4354

1. The gas Transportation or Storage Service ("Service") provided hereunder is governed by the General Services Agreement GSA0001 dated July 1, 2005 between MichCon and Customer. MichCon agrees to provide and Customer agrees to pay for such Service.

2. This Exhibit, the General Services Agreement and MichCon's Operating Statement on file with FERC, as amended from time to time, (together the "Agreement") are the entire agreement between the parties concerning the subject matter hereof. Any prior understandings, representations, promises, undertakings, agreements or inducements, whether written or oral, concerning the subject matter hereof not contained herein shall have no force and effect. The Agreement may be modified or amended only by writing duly executed by both parties.

3. The term for the Service provided under this Exhibit shall be effective on July 1, 2005 and terminate on March 31, 2013.

4. The term for this Service ☒ shall ☐ shall not automatically extend for successive periods of one year, unless terminated by either party upon 36 months prior written notice to the other party, or as otherwise agreed in writing by the parties.

**PRIMARY RECEIPT POINT(S):**

| | **Interconnect Company** | **Interconnect Name** | **MDQ** |
|---|---|---|---|
| **Primary Receipt Points:** | ANR Pipeline Company | Woolfolk | 456,750 MMBtu |
| | ANR Pipeline Company | Kalkaska | 456,750 MMBtu |
| **Receipt Provisions:** | Customer may deliver gas to MichCon, up to the MDQ, on any day during May through April. | | |

## PRIMARY DELIVERY POINT(S):

| | Interconnect Company | Interconnect Name | MDQ |
|---|---|---|---|
| **Primary Delivery Points:** | ANR Pipeline Company | Kalkaska | 456,750 MMBtu |
| | ANR Pipeline Company | Woolfolk | 456,750 MMBtu |
| | ANR Pipeline Company | South Chester | 126,875 MMBtu |
| | ANR Pipeline Company | Central Charlton One (Heatherton) | 30,450 MMBtu |
| **Delivery Provisions:** | Customer may receive gas from MichCon, up to the MDQ, on any day during May through April. | | |

## CHARGES:

| | |
|---|---|
| **Transportation Charge:** | Demand Charge: $566,500 per month<br>Commodity Charge: N/A |
| **Storage Charge:** | Demand Charge: N/A<br>Commodity Charge: N/A |
| **Fuel:** | Per MichCon's Tariff. |
| **Penalty:** | Per MichCon's Operating Statement. |

## CREDIT:

| | |
|---|---|
| **Credit Assurances:** | Per MichCon's Operating Statement. |

## ADDITIONAL PROVISIONS:

1. "Annual" shall mean the twelve (12) month period beginning April 1 each year.
2. Customer shall make deliveries to MichCon at Woolfolk at MichCon's prevailing line pressure, but at no time shall be obligated to make deliveries greater than 830 Psig.
3. MichCon shall make deliveries to Customer at Kalkaska at MichCon's prevailing line pressure, but in no event shall the delivery pressure be less than 750 Psig.
4. Customer shall make deliveries to MichCon at Kalkaska at MichCon's prevailing line pressure, but at no time shall be obligated to make deliveries greater than 960 Psig.
5. MichCon shall make deliveries to Customer at Woolfolk at MichCon's prevailing line pressure, but in no event shall the delivery pressure be less than 550 Psig.

6. When Customer is transporting to Kalkaska, and as an alternative to the Kalkaska delivery point, MichCon shall have the option to make deliveries to Customer at the South Chester and/or Central Charlton One delivery points at Customer's prevailing line pressure.
7. MichCon shall use commercially reasonable efforts to schedule any maintenance during the period between April and October.

| | | | |
|---|---|---|---|
| **Agreed to And this** [illegible] **day of** [illegible]**, 200**[illegible] | **MichCon:**<br>Mike Morrison [illegible] | **By:** | Stephen Ewing |
| | | **Title:** | |
| | **Customer:** | **By:** | |
| | | **Title:** | V.P. MARKETING – ANR |

# DTE Gas FT-90511

DTE Energy
MichCon

#90511 (Willow-Woolfolk)

Level of Service:
☒ Firm
☐ Interruptible

Service:
☒ Transportation
☐ Exchanges
☐ Swap
☐ Storage

## Interstate Services Transaction
## Exhibit B

| | | | |
|---|---|---|---|
| MichCon: | Michigan Consolidated Gas Company<br>2000 Second Avenue, Suite 1600<br>Detroit, MI 48226 | Customer: | ANR Pipeline Company<br>9 Greenway Plaza<br>Houston, TX 77046 |
| Attention: | Michael Morrison | Attention: | Stan Chapman |
| Phone: | 313-235-1009 | Phone: | 713-420-1707 |
| Fax: | 313-235-1065 | Fax: | 713-420-4354 |

1. The gas Transportation or Storage Service ("Service") provided hereunder is governed by the General Services Agreement GSA0001 dated July 1, 2005 between MichCon and Customer. MichCon agrees to provide and Customer agrees to pay for such Service.

2. This Exhibit, the General Services Agreement and MichCon's Operating Statement on file with FERC, as amended from time to time, (together the "Agreement") are the entire agreement between the parties concerning the subject matter hereof. Any prior understandings, representations, promises, undertakings, agreements or inducements, whether written or oral, concerning the subject matter hereof not contained herein shall have no force and effect. The Agreement may be modified or amended only by writing duly executed by both parties.

3. The term for the Service provided under this Exhibit shall be effective on July 1, 2005 and terminate on June 1, 2011.

4. The term for this Service ☒ shall ☐ shall not have the option of extending the Exhibit for two (2) twenty (20) year periods by giving MichCon written notice not less than thirty-six (36) months prior to the expiration of the initial term or extended term as the case may be.

PRIMARY RECEIPT POINT(S):

| | Interconnect Company | Interconnect Name | MDQ |
|---|---|---|---|
| Primary Receipt Points: | ANR Pipeline Company | Willow Run<br>April – October | 253,750 MMBtu |
| | ANR Pipeline Company | Woolfolk<br>November-March | 609,000 MMBtu |
| Receipt Provisions: | Customer may deliver gas to MichCon, up to the MDQ, on any day during May through April of each year.<br>Aggregate volume delivered at the Receipt Point(s) varies by Month as shown above. | | |

PRIMARY DELIVERY POINT(S):

| | Interconnect Company | Interconnect Name | MDQ |
|---|---|---|---|
| Primary Delivery Points: | ANR Pipeline Company | Woolfolk<br>April-October | 253,750 MMBtu |
| | ANR Pipeline Company | Willow Run<br>November-March | 609,000 MMBtu |
| Delivery Provisions: | Customer may receive gas from MichCon, up to the MDQ, on any day during May through April of each year.<br>Aggregate volume delivered at the Delivery Point(s) varies by month as shown above. | | |

CHARGES:

| | |
|---|---|
| Transportation Charge: | Demand Charge:<br>$755,950 per month from April-October<br>$1,055,950 per month from November-March<br>Commodity Charge: N/A |
| Storage Charge: | Demand Charge: N/A<br>Commodity Charge: N/A |
| Fuel: | Per MichCon's Tariff. |
| Penalty: | Per MichCon's Operating Statement. |

CREDIT:

| | |
|---|---|
| Credit Assurances: | Per MichCon's Operating Statement. |

ADDITIONAL PROVISIONS:

1. "Annual" shall mean the twelve (12) month period beginning April 1st each year.
2. Annual Contract Quantity (ACQ) is equal to 81,200,000 MMBtu. If deliveries exceed 81,200,000 MMBtu annually, customer shall pay $0.0275 per MMBtu on all quantities in excess of 81,200,000 MMBtu annually. If transport volumes exceed 50,750,000 MMBtu in the Summer (April-October) or 55,825,000 MMBtu in the Winter (November-March) periods, Customer shall pay $0.0275 per MMBtu in excess of these quantities.
3. MichCon shall make deliveries to Customer at Woolfolk, at MichCon's prevailing line pressure, but in no event shall the delivery pressure be less than 550 Psig;
4. Customer shall make deliveries to MichCon at Willow, at Customer's prevailing line pressure, but in no event shall the delivery pressure be less than 650 Psig.
5. Customer shall deliver gas to MichCon at Woolfolk at MichCon's prevailing line pressure, but at no time shall be obligated to make deliveries greater than 675 Psig, except when Customer is transporting to Kalkaska on contract #90509 (Blue Lake Agreement), when Customer shall deliver gas to MichCon at

Woolfolk at MichCon's prevailing line pressure, but at no time shall be obligated to make deliveries greater than 830 Psig.

6. The following pressure requirements shall be applicable to MichCon's delivery to Customer at Willow:
    a. When physical deliveries to Customer are less than or equal to 507,500 MMbtu per day, MichCon shall deliver gas at MichCon's prevailing line pressure, but in no event shall the delivery pressure be less than 600 Psig;
    b. When physical deliveries to Customer are greater than 507,500 MMbtu per day, MichCon shall deliver gas at MichCon's prevailing line pressure, but in no event shall the delivery pressure be less than 650 Psig.
7. MichCon shall use commercially reasonable efforts to transport in excess of Customer's MDQ.

| | | |
|---|---|---|
| Agreed to And this 1st day of July, 2005 | MichCon:<br>Mike Morrison | By:<br>Title: |
| | Customer: | By:<br>Title: V.P. MARKETING - ANR |

TransCanada
*In business to deliver*

May 29, 2008

Mr. William Gratopp
Michigan Consolidated Gas Company
2000 Second Avenue
Suite 1600
Detroit, MI 48226

Terminates 3/31/28
need 36 mos notifictn to extend add'l 20 yrs.

Mr. Gratopp:

Per the language in contract #90511 (Willow – Woolfolk) executed on July 1, 2005, ANR Pipeline ("ANR") is hereby providing written notice that ANR is electing to exercise the option to extend the agreement at the terms stated in the Exhibit for the first of the two (2) twenty (20) year periods. ANR is reserving its right to extend contract #90511 for the second twenty (20) year period and will provide written notice of its intent to exercise that option not less than thirty-six months prior to the expiration of the first extended term.

If you have any questions, please feel free to contact me.

Sincerely,

Jeffery Keck

Jeffery Keck
Manager Operations Control and Planning
717 Texas Ave.
Houston, TX 77002-2712
Ph: 832-320-5820

DTE Energy
MichCon

November 1, 2005

Gary Skarb
ANR Pipeline Company
Suite 200, 27725 Stansbury Blvd
Farmington Hills, MI 48334

RE: Cancellation and replacement of various ANR Contracts

Dear Mr. Skarb,

This letter serves as official notice of cancellation and replacement of the following contracts between ANR Pipeline Company and Michigan Consolidated Gas Company.

> The agreement known as "Willow-Woolfolk" dated June 3, 1991 has been terminated and replaced with contract #90511 dated July 1, 2005.
>
> The agreement known as the "Cold Weather Agreement" dated June 3, 1991 has been terminated and all services provided under this agreement have been combined within contract #90511 dated July 1, 2005.
>
> The agreement known as "Blue Lake" dated August 1, 1991 has been terminated and replaced with contract #90509 dated July 1, 2005.
>
> The agreement known as "Pembine" dated June 3, 1991 has been terminated and replaced with contract #90510 dated July 1, 2005.

Please feel free to give me a call at 313-235-1009 if you have any questions.

Sincerely,

Michael Morrison
Manager, Midstream Services

# Consumers Interconnection and Operating Agreement

# AMENDED AND RESTATED INTERCONNECTION AND OPERATING AGREEMENT

This AMENDED AND RESTATED INTERCONNECTION AND OPERATING AGREEMENT ("Agreement"), is made and entered into this 25th day of March, 2005, by and between ANR PIPELINE COMPANY, 1001 Louisiana Street, Houston, Texas 77005, a Delaware corporation, hereinafter referred to as "ANR", and CONSUMERS ENERGY COMPANY, formerly known as Consumers Power Company, 1945 W. Parnall Road, Jackson, Michigan 49201, a Michigan corporation, hereinafter referred to as "Consumers".

## RECITALS

**WHEREAS,** ANR and Consumers entered into an Interconnection and Operating Agreement dated May 14, 1990, as amended August 4, 1992 and November 1, 1996 ("1990 Agreement"), to provide for an additional point of delivery by ANR to the natural gas transmission facilities of Consumers at Otisville, Michigan ("Otisville Delivery Point"), and for certain operational purposes as ANR explained in it's Order No. 636 proceeding, FERC Docket No. RS92-1, et al.; and

**WHEREAS,** the 1990 Agreement will terminate in part, pursuant to its terms, on November 1, 2005; and

**WHEREAS,** Consumers and ANR desire to extend the 1990 Agreement through this amendment and restatement.

**NOW THEREFORE,** in consideration of the premises and the mutual covenants herein exchanged, Consumers and ANR, each for itself and for its successors and assigns, hereby agree as follows:

## ARTICLE I
## INTERCONNECTION FACILITIES

ANR owns and operates a connecting gas pipeline, a tap and associated measurement, separation and flow control facilities located in Section 30 of Forest Township (T9N, R8E), Genesee County, Michigan, that connect the existing pipeline facilities owned by Great Lakes Transmission Company ("Great Lakes") to Consumers' transmission facilities, all of which are hereinafter referred to as the ANR Interconnection Facilities. Consumers owns and operates the tap facilities that connect the ANR Interconnection Facilities to Consumers' gas transmission pipeline and such tap facilities are hereinafter referred to as the Consumers Interconnection Facilities. The point of ownership change is at the insulating flange on the inlet of Consumers' Interconnection Facilities. The ANR Interconnection Facilities and the Consumers Interconnection Facilities are hereinafter referred to collectively as the "The Interconnection Facilities". Consumers understands that operational constraints may require a minimum amount of natural gas (an average hourly rate of 1,000 Mcf per hour) to be transported through the ANR Interconnection Facilities in order to operate the ANR Interconnection Facilities in a proper manner and that if such minimum flow is not maintained, ANR will not transport any natural gas to Consumers through the ANR Interconnection Facilities.

## ARTICLE II
## LOSS OR DAMAGE

ANR and Consumers shall each be responsible for, and shall protect and indemnify the other and hold the other harmless from, any and all claims and causes of action arising out of any injury, including death, or damage to property sustained by any person as a result of the operation of The Interconnection Facilities for which such party is responsible except for claims and causes of action attributable to the negligence or willful misconduct of the other party, its employees, agents or nominees.

## ARTICLE III
## DELIVERY PRESSURE

ANR shall use due care and diligence to furnish, or cause to be furnished, gas at such uniform pressure as Consumers may require but shall be obligated to deliver gas to Consumers at a pressure not greater than 750 pounds per square inch gauge at the Consumers Interconnection Facilities.

## ARTICLE IV
## OPERATION OF INTERCONNECTION

ANR shall have the sole right to determine the quantity of gas it will deliver to Consumers at the Otisville Delivery Point, and Consumers will, subject to the other provisions of this Agreement, be obligated to receive any volumes so determined, up to a maximum of 100 MMcf per day, during the months of November, December, January, February and March. ANR may deliver volumes in excess of 100 MMcf per day, but less than 300 MMcf per day, subject to Consumers' agreement prior to commencement of such deliveries. The maximum quantity that ANR may elect to deliver to Consumers at the Otisville Delivery Point shall at no time exceed the total quantity that ANR has scheduled to deliver, during the same period of time, under all agreements, whether with Consumers or with third parties, which require delivery of gas in Michigan to Consumers. Consumers recognizes and agrees that ANR's deliveries to the Otisville Delivery Point are dependent upon the operation of ANR's storage facilities, which fluctuate due to market load. As consideration for the operational flexibilities provided to ANR for the term of this Agreement, ANR shall pay Consumers the sum of $2,000,000 (US). Consumers shall invoice ANR for such payment no later than October 1, 2005 and ANR shall pay the invoice no later than November 1, 2005.

Measurement of gas and enforcement of gas quality standards shall be per ANR's FERC Tariff. Each Party shall be responsible for securing any governmental approvals or regulatory permits for the operation or maintenance of its facilities under this Agreement.

## ARTICLE V
## NOMINATIONS

ANR and Consumers agree that ANR's election to deliver gas at the Otisville Delivery Point pursuant to the provisions of this Agreement will not require any change in the current nomination procedures. Gas volumes will continue to be nominated by shippers at existing delivery points under shippers' transportation agreements with ANR ("Nominated Delivery Points") under ANR's existing nomination procedures. Gas delivered at Otisville through ANR's election under this Agreement will be allocated to the Nominated Delivery Points and billings will be based on the nominated volumes at the Nominated Delivery Points. ANR will notify Consumers prior to changes in the volumes of gas ANR elects to deliver at the Otisville Interconnection.

## ARTICLE VI

## FORCE MAJEURE

If by reason of Force Majeure, as defined in Section 7 of the General Terms and Conditions of ANR's FERC Gas Tariff, either Consumers or ANR is rendered unable, wholly or in part, to carry out its obligations under this Agreement, it is agreed that upon such party giving notice in full particulars of such Force Majeure in writing or by other electronic means to the other party within a reasonable time after the occurrence of the cause relied on, the party giving such notice, so far as and to the extent that it is affected by such Force Majeure, shall not be liable in damages during the continuance of any inability so caused, but for no longer period, and such cause shall so far as possible be remedied with all reasonable dispatch. Such Force Majeure affecting the performance hereunder by either Consumers or ANR, however, shall not relieve such party of liability in the event of failure to use due diligence to remedy the situation and to remove the cause in an adequate manner and with all reasonable dispatch.

## ARTICLE VII

## TERM

The term of this Agreement, insofar as it relates to ANR's right to deliver gas to the Otisville Delivery Point shall be effective as of November 1, 2005, and shall remain in full force and effect through March 31, 2007, unless further extended by written agreement of Consumers and ANR.

## ARTICLE VIII
## TRANSFERS AND ASSIGNMENTS

Any person which succeeds by purchase, merger, or consolidation to substantially all of the gas transmission properties of either ANR or Consumers shall be entitled to the rights and shall be subject to the obligations of its predecessor in title under this Agreement. No assignment of this Agreement or any right or obligation hereunder shall be made without prior written notice to, and consent of, the other party. Such consent shall not be unreasonably withheld. Written consent to the assignment, or the basis for any objections thereto, shall be provided within thirty (30) days of receipt of the request for such consent. The previous sentence notwithstanding, any assignor shall remain obligated to make any payments or reimbursements due and owing hereunder where such payment is not immediately made by the assignee or nominee of the assignor within the timing requirements provided herein. This Agreement shall be binding upon and will inure to the benefit of the successors, nominees and assigns of the parties.

## ARTICLE IX
## NOTICES

Any notice required or permitted to be given under to this Agreement, or any notice which ANR or Consumers may desire to give to the other, shall be in writing and shall be considered as duly delivered when mailed by post-paid mail addressed to the party at its post office address or such other addresses as either party may designate for itself in writing. The post office addresses of the parties are as follows:

Consumers Energy Company
1945 Parnall Road
Jackson, Michigan 49201
Attention: Manager of Gas Control and System Planning

ANR Pipeline Company
P.O. Box 2511
Houston, Texas 77252-2511
Attention: Director, Transportation Services

## ARTICLE X
## APPLICABLE LAW

This Agreement shall be construed according to the laws of the State of Michigan.

## ARTICLE XI
## HEADINGS

The numbering and titling of particular provisions of this Agreement is for the purpose of facilitating administration and shall not be construed as having any substantive effect on the terms of this Agreement.

## ARTICLE XII
## SEVERABILITY

The various articles, sections, provisions, and clauses of this Agreement are severable. The invalidity of any portion hereof shall not affect the validity of any other portion or the entire Agreement.

## ARTICLE XIII
## NON-WAIVER OF FUTURE DEFAULTS

No waiver by either ANR or Consumers of any default by the other in the performance of this Agreement shall operate or be construed as a waiver of any future default whether or a like or different character.

## ARTICLE XIV
## CONCLUSIVENESS OF AGREEMENT

This Agreement constitutes the entirety of the understanding of ANR and Consumers with respect to the subject matter dealt with herein. No modification or alteration of this Agreement shall be effective unless first reduced to writing and fully executed by both ANR and Consumers.

IN WITNESS WHEREOF, ANR and Consumers have executed this Agreement, in duplicate, effective as of the date first written above.

**Attest:**

Arlette Rachele Combs
4-25-2008

**ANR PIPELINE COMPANY**

By: V.L. Smith

Name: V. L. Smith

Title: V.P. Commercial Operations

MAD
MWD

**Attest:**

Lurenda A Burgener
7-18-2011

**CONSUMERS ENERGY COMPANY**

By: W E Garrity

Name: W E GARRITY

Title: VICE PRESIDENT ELECTRIC & GAS SUPPLY

KQD

6544873

# AMENDMENT TO AMENDED AND RESTATED INTERCONNECTION AND OPERATING AGREEMENT

This Amendment to the Amended and Restated Interconnection and Operating Agreement ("Amended Agreement"), is made and entered into this 21st day of February, 2007, by and between ANR Pipeline Company, 1001 Louisiana Street, Houston, Texas 77002, a Delaware corporation, hereinafter referred to as "ANR," and Consumers Energy Company, 1945 W. Parnall Road, Jackson, Michigan 49201, a Michigan corporation, hereinafter referred to as "Consumers."

**WHEREAS**, ANR and Consumers entered into an Interconnect and Operating Agreement dated May 14, 1990, as amended August 4, 1992 and November 1, 1996 ("1990 Agreement"), to provide for an additional point of delivery by ANR to the natural gas transmission facilities of Consumers at Otisville, Michigan ("Otisville Delivery Point") and for certain operational purposes as ANR explained in its Order No. 636 proceeding, FERC Docket No. RS92-1 et al.;

**WHEREAS,** ANR and Consumers entered into an Amended and Restated Interconnection and Operating Agreement dated March 28, 2005which amended and restated the 1990 Agreement;

**WHEREAS**, the Amended and Restated Interconnection and Operating Agreement could terminate, pursuant to its terms on March 31, 2007;

**WHEREAS,** Consumers and ANR desire to extend the Amended and Restated Interconnection and Operating Agreement through this Amended Agreement.

**NOW THEREFORE**, in consideration of the premises and the mutual covenants herein exchanged, Consumers and ANR each for itself and for its successors and assigns, hereby agree to further amend the Amended and Restated Interconnection and Operating Agreement as follows:

1. ANR and Consumers agree to amend Article IV, Operation of Interconnection, by deleting the last two sentences of the first paragraph in their entirety and inserting the following: "Subject to Article VII, as consideration for the operational flexibilities provided to ANR for the term of this Amended

Agreement, ANR shall pay Consumers the sum of $1,700,000 (US) annually for the term of this Amended Agreement. Consumers shall invoice ANR for such payment no later than October 1 each year for the term of this Amended Agreement and ANR shall pay the invoice no later than November 1 each year for the term of this Amended Agreement. In the event this Amended Agreement is extended pursuant to the Five Year Extension Period or the Ten Year Extension Period as defined below in Article VII, then Consumers shall invoice ANR for such payment no later than October 1 of each year of the Five Year Extension Period or the Ten Year Extension Period, as applicable, and ANR shall pay the invoice no later than November 1 of each year of the Five Year Extension Period or the Ten Year Extension Period, as applicable."

2. ANR and Consumers agree to amend Article VII, the Term, by deleting the entire sentence and inserting the following: "The term of this Amended Agreement, insofar as it relates to ANR's rights to deliver gas to the Otisville Delivery Point shall be effective as of April 1, 2007, and shall remain in full force and effect through March 31, 2012; provided however, ANR, at its sole option, shall have the right to: 1) extend the term of this Amended Agreement for an additional five years and in such event ANR shall pay Consumers $1,850,000 (US) annually for each year of the five year extension period ("Five Year Extension Period") pursuant to the invoice timeline stated in Article IV; or 2) extend the term of this Amended Agreement for an additional ten years and in such event ANR shall pay Consumers $1,850,000 (US) annually for each year of the first five years and $1,950,000 annually for each year of the last five years of the ten year extension period ("Ten Year Extension Period") pursuant to the invoice timeline stated in Article IV or 3) allow the agreement to terminate effective March 31, 2012. ANR will inform Consumers in writing of its intention to extend this Amendment no later than October 1, 2011. Unless extended by mutual agreement of the parties, this Amended Agreement shall terminate as stated herein."

Except as amended herein, the terms of the Amended and Restated Interconnection and Operating Agreement shall remain in full force and effect through the term of this Amended Agreement.

| | |
|---|---|
| ANR PIPELINE COMPANY | CONSUMERS ENERGY CO. |
| By: Joseph E Pollard | By: WE Garrity |
| Name: Joseph Pollard | Name: W E GARRITY |
| Title: Director,-Transportation Services | Title: SENIOR VICE PRESIDENT |

TransCanada
*In business to deliver*

**ANR Pipeline Company**
717 Texas Street, Suite 2400
Houston, TX 77002-2761

Dean Patry
Vice President

**Tel** 832.320.5655
**Fax** 832.320.6655
**Email** dean_patry@transcanada.com

September 29, 2011

Consumers Energy Company
1945 Pamall Road
Jackson, Michigan 49201
Attn: Manager of Gas Control and System Planning

RE: ANR Pipeline Company
Notice of Intent to Extend Term of Contract

Dear Sir:

ANR Pipeline Company and Consumers Energy Company entered into an Amended and Restated Interconnection and Operating Agreement dated March 28, 2005, as amended on February 21, 2007 (the "Amended Agreement") which expires on March 31, 2012. This letter shall serve as notice that ANR Pipeline Company intends, in accordance with the terms of the Amended Agreement, to extend the term of the Amended Agreement for ten years to expire on March 31, 2022.

Please indicate your acknowledgement by signing below and returning the original of this document to this office via U.S. mail.

Respectfully submitted,
**ANR Pipeline Company**

Dean Patry
~~Vice President US~~ Pipelines Central

Acknowledged by:
**Consumers Energy Company**

Kevin J Daly
Name:
Title: Executive Director
Date: Oct 3, 2011

# DTE Gas IT-90510

DTE Energy
MichCon

#90510 (Pembine)

Level of Service:
☐ Firm
☒ Interruptible

Service:
☒ Transportation
☐ Exchanges
☐ Swap
☐ Storage

## Interstate Services Transaction
## Exhibit B

| | |
|---|---|
| MichCon: Michigan Consolidated Gas Company<br>2000 Second Avenue, Suite 1600<br>Detroit, MI 48226 | Customer: ANR Pipeline Company<br>9 Greenway Plaza<br>Houston, TX 77046 |
| Attention: Michael Morrison | Attention: Stan Chapman |
| Phone: 313-235-1009<br>Fax: 313-235-1065 | Phone: 713-420-1707<br>Fax: 713-420-4354 |

1. The gas Transportation or Storage Service ("Service") provided hereunder is governed by the General Services Agreement GSA0001 dated July 1, 2005 between MichCon and Customer. MichCon agrees to provide and Customer agrees to pay for such Service.

2. This Exhibit, the General Services Agreement and MichCon's Operating Statement on file with FERC, as amended from time to time, (together the "Agreement") are the entire agreement between the parties concerning the subject matter hereof. Any prior understandings, representations, promises, undertakings, agreements or inducements, whether written or oral, concerning the subject matter hereof not contained herein shall have no force and effect. The Agreement may be modified or amended only by writing duly executed by both parties.

3. The term for the Service provided under this Exhibit shall be effective on July 1, 2005 and terminate on May 31, 2008.

4. The term for this Service ☒ shall ☐ shall not automatically extend for successive periods of one year, unless terminated by either party upon one years prior written notice to the other party, or as otherwise agreed in writing by the parties.

PRIMARY RECEIPT POINT(S):

| | Interconnect Company | Interconnect Name | MDQ |
|---|---|---|---|
| Primary Receipt Points: | ANR Pipeline Company | Menominee<br>Crystal Falls<br>Willow Run | 2,650 MMBtu<br>2,650 MMBtu<br>2,650 MMBtu |
| Receipt Provisions: | Customer may deliver gas to MichCon, up to the MDQ, on any day during May through April.<br>Aggregate volume delivered at the Receipt Point(s) may not exceed 2,650 MMBtu per day. | | |

6. When Customer is transporting to Kalkaska, and as an alternative to the Kalkaska delivery point, MichCon shall have the option to make deliveries to Customer at the South Chester and/or Central Charlton One delivery points at Customer's prevailing line pressure.
7. MichCon shall use commercially reasonable efforts to schedule any maintenance during the period between April and October.

| | | |
|---|---|---|
| Agreed to And this 1st day of July, 2005 | MichCon:<br>Mike Morrison | By:<br>Title: |
| | Customer: | By:<br>Title: V.P. MARKETING - ANR |

PRIMARY DELIVERY POINT(S):

| | Interconnect Company | Interconnect Name | MDQ |
|---|---|---|---|
| Primary Delivery Points: | ANR Pipeline Company | Vulcan | 2,650 MMBtu |
| Delivery Provisions: | Customer may receive gas from MichCon, up to the MDQ, on any day during May through April.<br>Aggregate volume delivered at the Delivery Point(s) may not exceed 2,650 MMBtu per day. | | |

CHARGES:

| | |
|---|---|
| Transportation Charge: | Demand Charge: N/A<br>Commodity Charge: $ 0.0375 per MMBtu |
| Storage Charge: | Demand Charge: N/A<br>Commodity Charge: N/A |
| Fuel: | Per MichCon's Tariff. |
| Penalty: | Per MichCon's Operating Statement. |

CREDIT:

| | |
|---|---|
| Credit Assurances: | Per MichCon's Operating Statement. |

ADDITIONAL PROVISIONS:

1. Customer shall nominate this Service on MichCon's Electronic Bulletin Board ("EBB").

| | | |
|---|---|---|
| Agreed to And this 1st day of July, 2005 | MichCon: | By:<br>Title: |
| | Customer: | By:<br>Title: V.P. MARKETING - ANR |

**DTE Energy**
MichCon

November 1, 2005

Gary Skarb
ANR Pipeline Company
Suite 200, 27725 Stansbury Blvd
Farmington Hills, MI 48334

RE: Cancellation and replacement of various ANR Contracts

Dear Mr. Skarb,

This letter serves as official notice of cancellation and replacement of the following contracts between ANR Pipeline Company and Michigan Consolidated Gas Company.

The agreement known as "Willow-Woolfolk" dated June 3, 1991 has been terminated and replaced with contract #90511 dated July 1, 2005.

The agreement known as the "Cold Weather Agreement" dated June 3, 1991 has been terminated and all services provided under this agreement have been combined within contract #90511 dated July 1, 2005.

The agreement known as "Blue Lake" dated August 1, 1991 has been terminated and replaced with contract #90509 dated July 1, 2005.

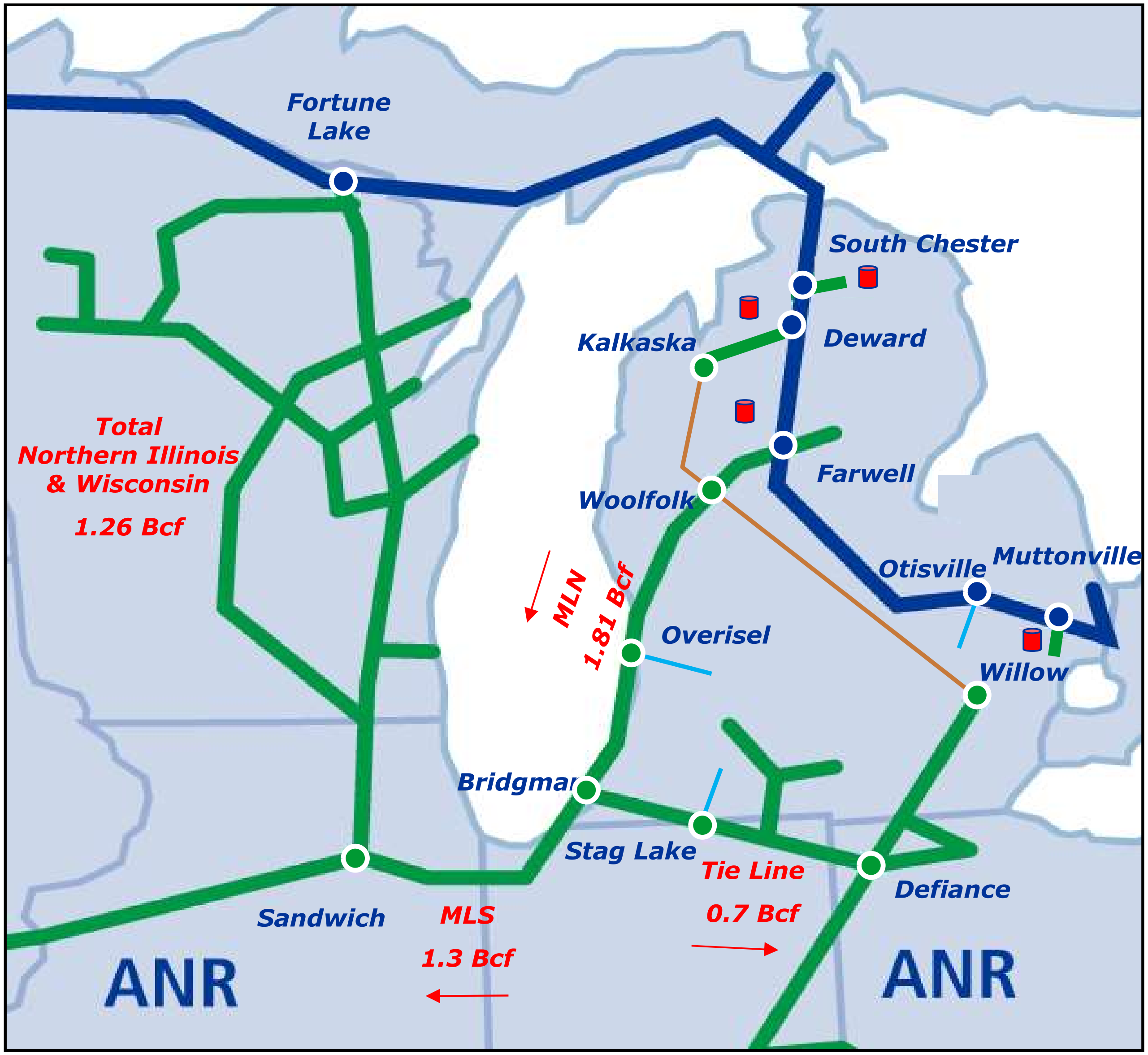
The agreement known as "Pembine" dated June 3, 1991 has been terminated and replaced with contract #90510 dated July 1, 2005.

Please feel free to give me a call at 313-235-1009 if you have any questions.

Sincerely,

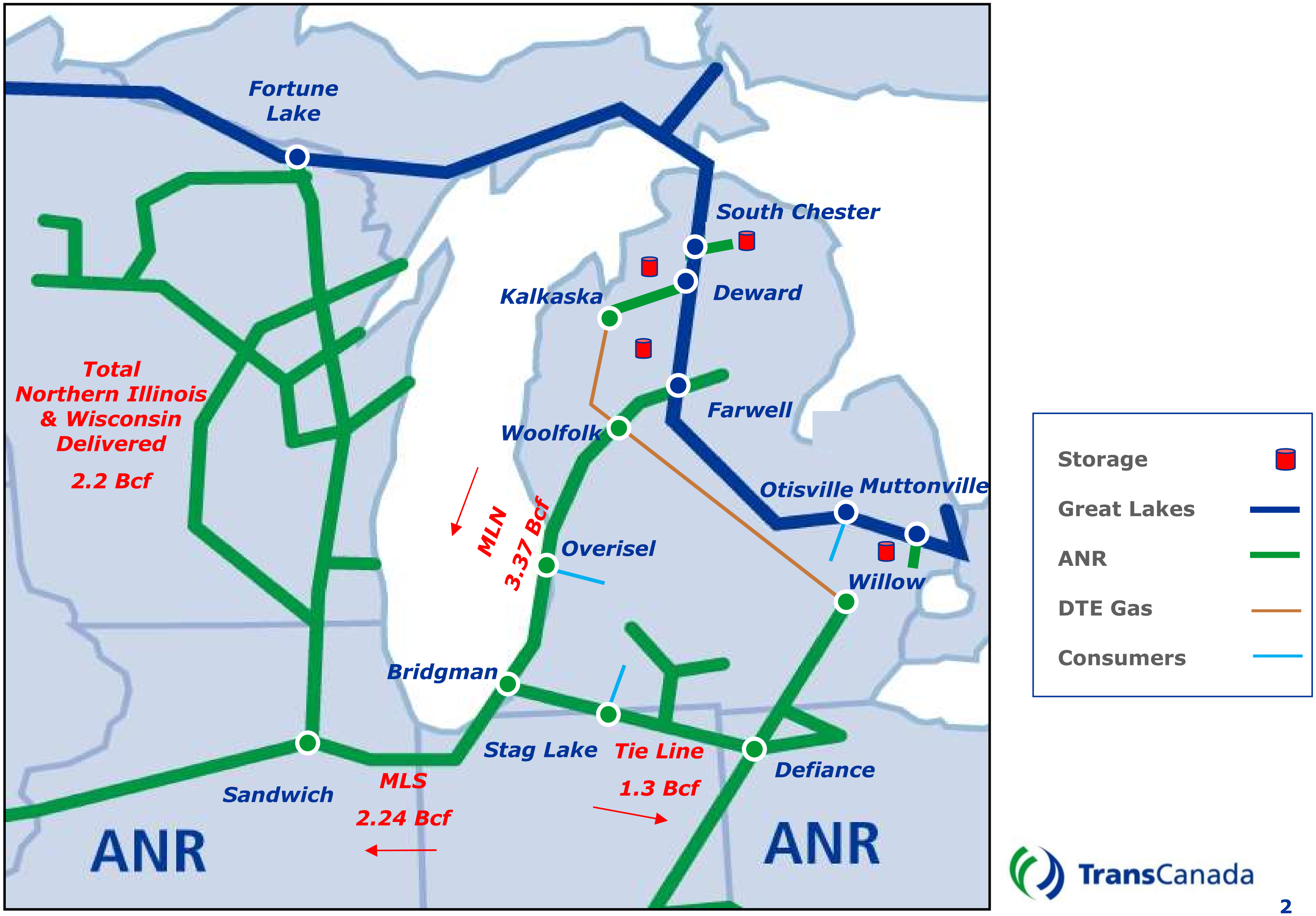
Michael Morrison
Manager, Midstream Services

# Winter Capacity without TBOs



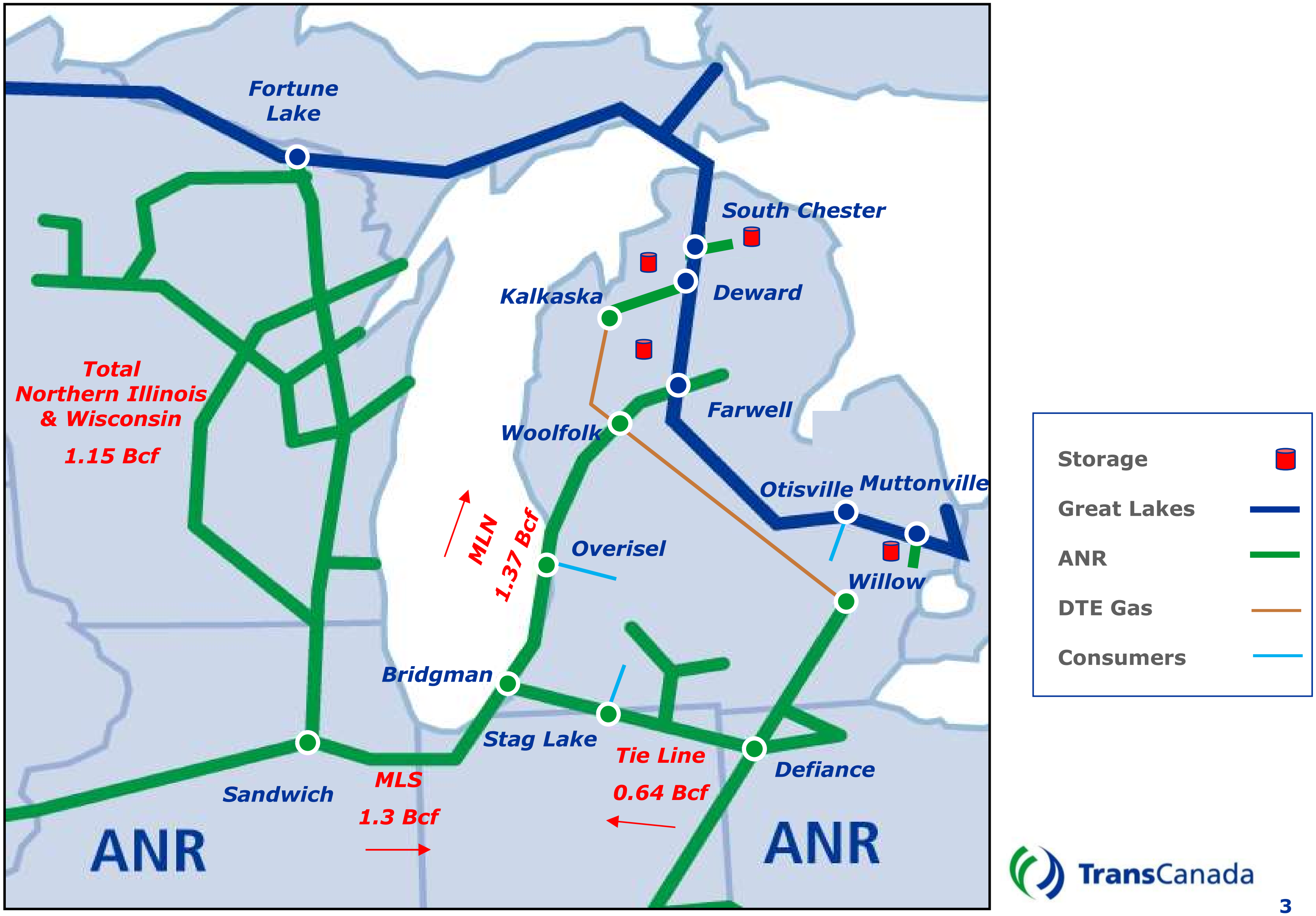
| | |
|---|---|
| Storage | 🟥 |
| Great Lakes | ━ |
| ANR | ━ |
| DTE Gas | ━ |
| Consumers | ━ |

# Winter Capacity with TBOs



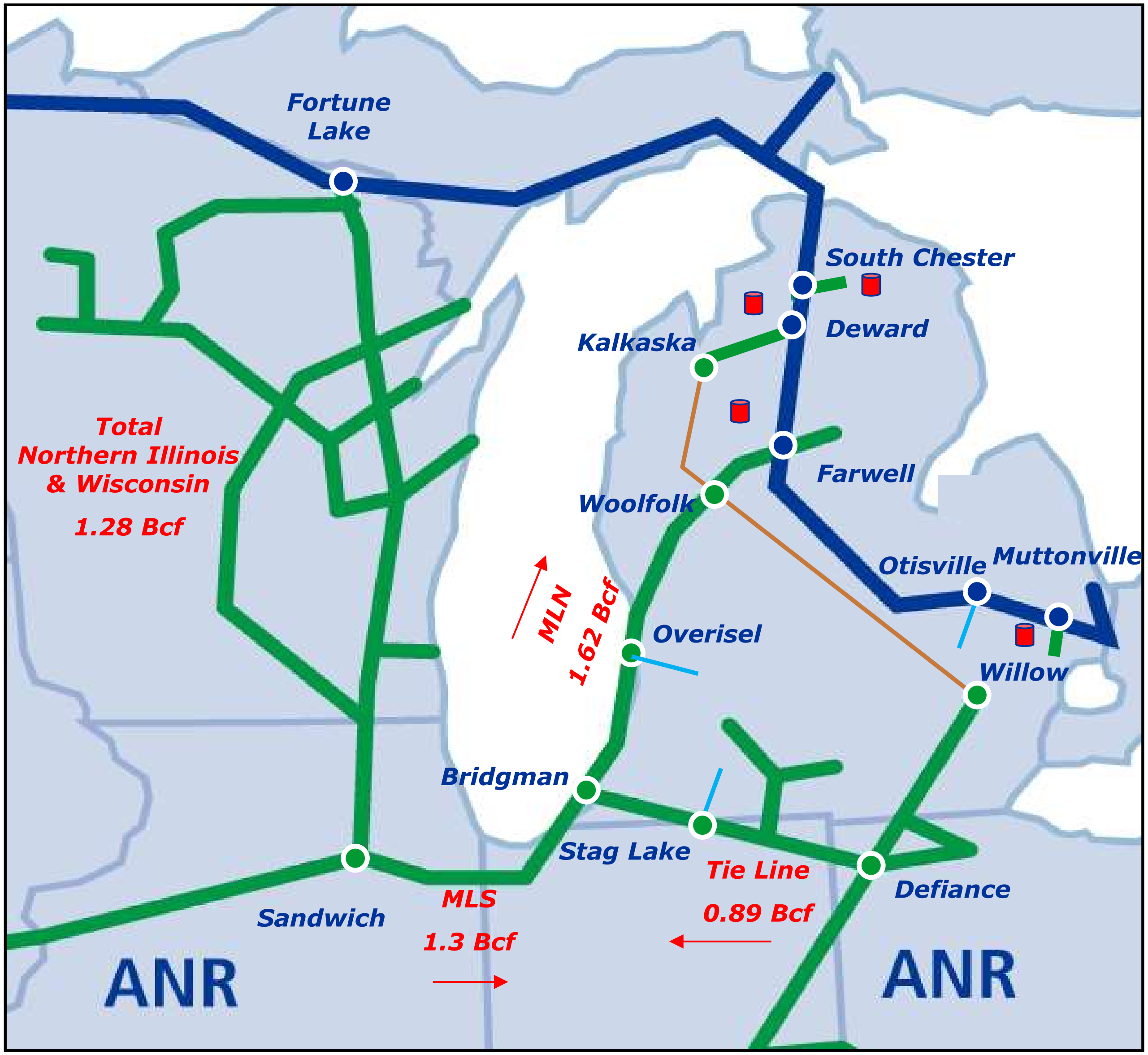
TransCanada

# Summer Capacity without TBOs



TransCanada

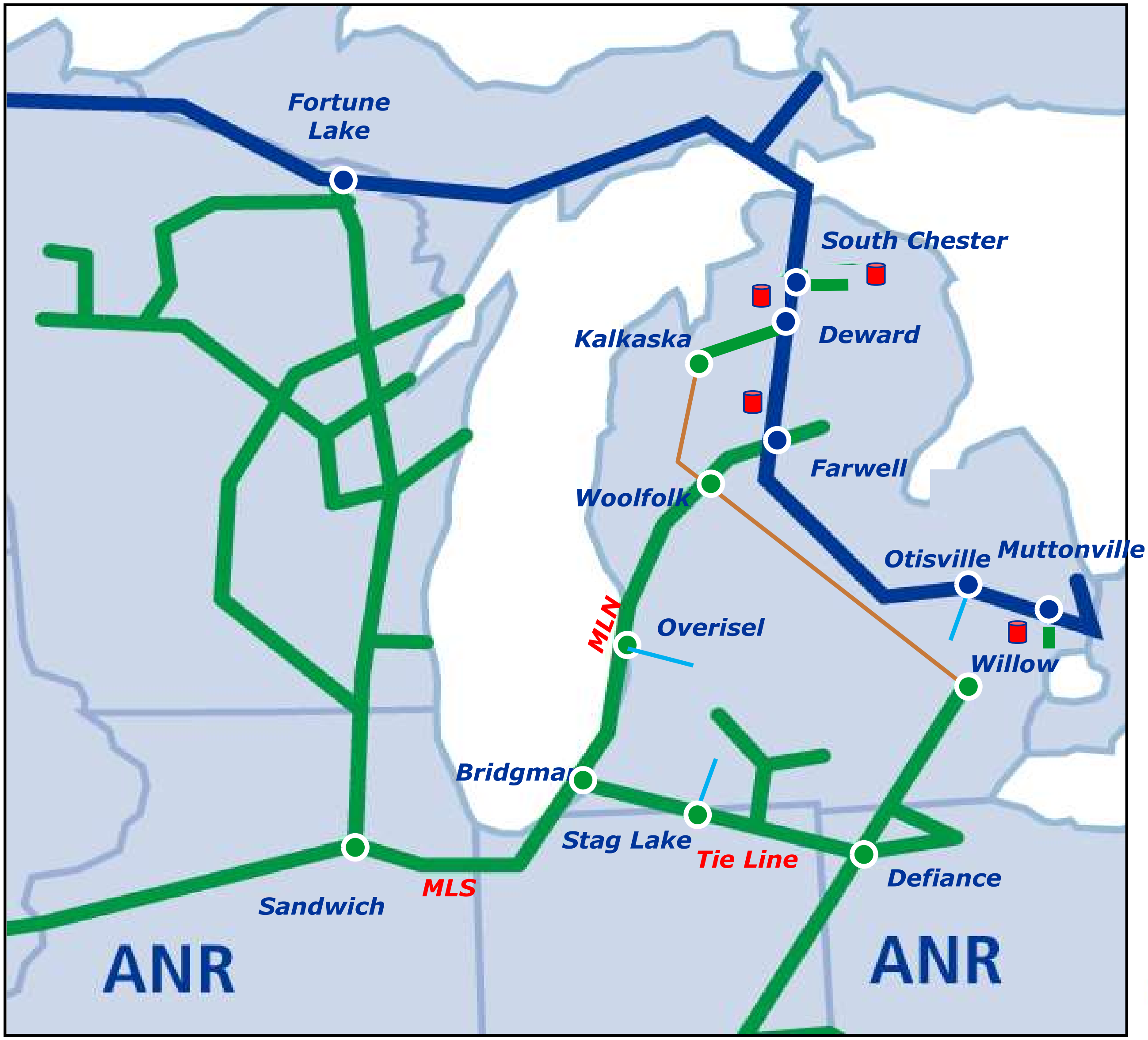
# Summer Capacity with TBOs



Storage 🟥
Great Lakes ▬
ANR ▬
DTE Gas ▬
Consumers ▬

TransCanada

# Map of Storage Area



| | |
|---|---|
| Storage | 🟥 |
| Great Lakes | ━ |
| ANR | ━ |
| DTE Gas | ━ |
| Consumers | ━ |

TransCanada

# Description of TBO Differences

**Rate Schedule FT-9141, FT-18228 and FT-18388 comparison to FT-9141:** Rate Schedule FT-18228 was a Firm Transportation Service Agreement between Great Lakes and ANR dated March 31, 2015. This contract was utilized by ANR to move gas from its on-system facilities at the Farwell Interconnection into discontinguous storage fields and to make deliveries in Southeastern Michigan. Pursuant to this Transportation Agreement, during the summer, Great Lakes receives gas from ANR at the Farwell Interconnection up to a maximum quantity of 44,000 Dth per day and redelivers the gas to ANR at the St. Clair Interconnection in St. Clair County, Michigan. Although the contract provided for a firm delivery to the St. Clair Interconnection, ANR utilized this contract to receive gas from Great Lakes at its Muttonville Interconnection which is just upstream of the St. Clair Interconnection. This contract terminated on October 31, 2015 and was replaced with contract FT-18388, a Firm Transportation Service Agreement between Great Lakes and ANR dated March 31, 2016. ANR required this capacity to provide the same integration function; this contract was utilized by ANR for the same purpose as contract FT-18228, and the capacity and primary points remained the same. Pursuant to this Transportation Agreement, during the summer, Great Lakes received gas from ANR at the Farwell Interconnection up to a maximum quantity of 44,000 Dth per day and redelivered the gas to ANR at the St. Clair Interconnection in St. Clair County, Michigan. This contract was terminated on October 31, 2016.

Rate Schedule FT-9141 was a Firm Transportation Service Agreement between Great Lakes and ANR dated April 1, 2015. This contract was utilized by ANR to move gas from its on-system facilities at the Farwell Interconnection into discontinguous storage fields and to make deliveries in Southeastern Michigan. Pursuant to this Transportation Agreement, on an annual basis, Great Lakes receives gas from ANR at the Farwell Interconnection up to a maximum quantity of 56,000 Dth per day and redelivers the gas to ANR at the St. Clair Interconnection in St. Clair County, Michigan. Although the contract provides for a firm delivery to the St. Clair Interconnection, ANR utilizes this contract to receive gas from Great Lakes at its Muttonville Interconnection which is just upstream of the St. Clair Interconnection. As agreed between Great Lakes and ANR effective on April 1, 2017, contract FT-18388 was combined into contract FT-9141 such that contract FT-9141 now provides the exact same service with a combined summer maximum capacity of 100,000 Dth per day and a maximum winter capacity of 56,000 Dth per day that was previously provided by contracts FT-18388 and FT-9141. ANR determined that it needed all of the combined capacity to continue providing service and reliability benefits to the system.

**Rate Schedule FT-18138 and FT-18139 Comparison to FT-18659:** Rate Schedule FT-18138 was a Gas Transportation Agreement between Great Lakes and ANR effective November 1, 2014. Pursuant to this Agreement, during the winter period, Great Lakes, receives up to 115,771 Dth per day from ANR at the Deward Interconnection and transports a thermally equivalent quantity to ANR at the Farwell Interconnection. Rate Schedule FT-18139 was a Gas Transportation Agreement between Great Lakes and ANR effective November 1, 2014. Pursuant to this Agreement, during the winter period, Great Lakes receives up to 178,440 Dth per day from ANR at the Deward Interconnection and transports a thermally equivalent quantity to ANR at the Farwell Interconnection. Rate Schedules FT-

18138 and FT-18139 were combined into Rate Schedule FT-18659 effective April 1, 2017. Pursuant to this Agreement, during the winter period, Great Lakes now receives up to 202,464 Dth per day from ANR at the Deward Interconnection and transports a thermally equivalent quantity to ANR at the Farwell Interconnection. Overall, this reduced the total transport volume by 91,747 Dth per day.

**Pine Prairie ANR02511S:** A new Firm Storage Agreement between Pine Prairie and ANR for service beginning April 2021. ANR initially contracted for 2 MMDth of storage capacity which ANR utilizes for operational balancing services it provides under its FERC Gas Tariff. Beginning April 1, 2022, the contracted capacity increases to 3 MMdth of storage capacity. The Pine Prairie storage field is located in Louisiana near ANR's Eunice Compressor Station. It is directly connected to ANR's pipeline system and is intended to be used to balance operational needs such as OBA's, line pack management and to aid with planning maintenance.

**ANR Storage Company Rate Schedule 10000129:** A Firm Storage Agreement between ANR Storage Company and ANR for service beginning January 12, 1990. Effective April 1 2018, ANR expanded the contracted volume from 30.53 MMDth to 32.39 MMDth of storage capacity in late 2016. ANR utilizes this capacity for storage and balancing services it provides under its FERC Gas Tariff as part of its integrated storage operations.

Docket No. RP22-___-000
Exhibit No. ANR-0047
Page 1 of 1

**TBO Replacement Build Cost Estimate** 2021

### Northern Storage to Woolfolk

| | Capital Cost<br>($millions) | COS Factor | Estimated Cost |
|---|---|---|---|
| Deward /Chester to Farwell | | | |
| 68 miles, 36"pipe at $10.25M/mile | $697 | | |
| Two new CS, One unit per station | $136 | | |
| Other Ancillary facilities including meter | $25 | | |
| | | | |
| Muttonville to Farwell | | | |
| 145 miles, 24"pipe at 7.75M/mile | $1,124 | | |
| Two new CS, One unit per station | $110 | | |
| | | | |
| 60 miles, 30"pipe at $9M/mile | $540 | | |
| | | | |
| Farwell CS: New Unit | $68 | | |
| | $2,700 | 18% | $486 |

GLGT contracts from Storage Fields to Farwell
FT17196
FT18150
FT18659
FT9141

DTE contract from Woolfolk to Willow
FIRM 90511

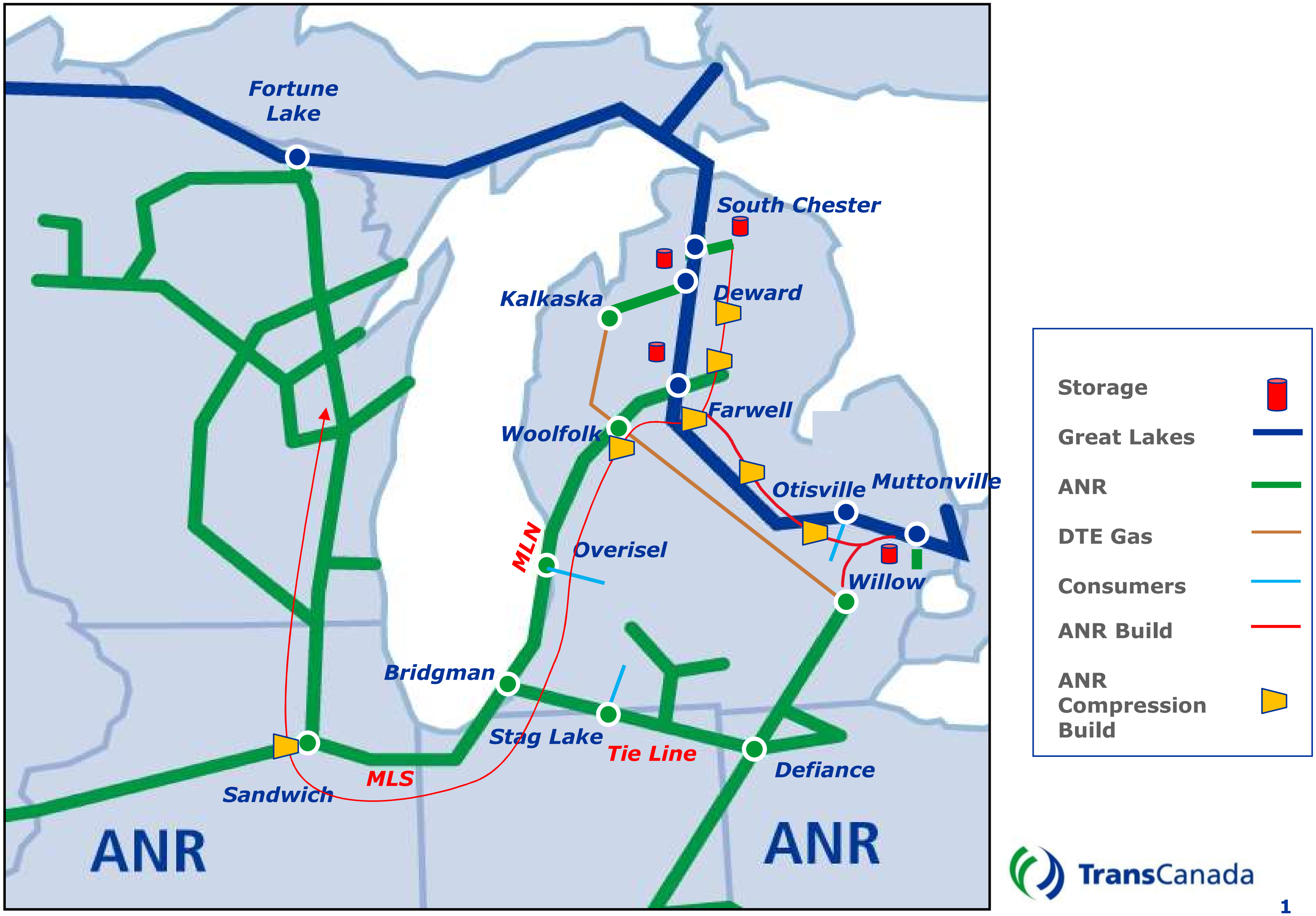
DTE contract from Kalkaska to Farwell
FIRM 90509

### Woolfolk to Wisconsin

| | Capital Cost<br>($millions) | COS Factor | Estimated Cost |
|---|---|---|---|
| Farwell to Woolfolk | | | |
| Woolfolk CS: New Unit | $62 | | |
| Michigan Leg North | | | |
| 61 miles 42" pipe at $12.75M/mile | $778 | | |
| Michigan Leg South | | | |
| 51 miles 42" pipe at $12.75M/mile | $650 | | |
| Wisconsin | | | |
| Sandwich CS: New Unit | $62 | | |
| 47 miles 36" pipe at $10.25M/mile | $482 | | |
| 97 miles 42" pipe at $12.75M/mile | $1,237 | | |
| | $3,271 | 18% | $589 |

GLGT contracts for transport back to Crystal Falls
FT17593
FT18147
FT18759
FT5223

# TBO Replacement Build Map



TransCanada

Docket No. RP22-__-000
Exhibit No. ANR-0049

# UNITED STATES OF AMERICA
# BEFORE THE
# FEDERAL ENERGY REGULATORY COMMISSION

ANR Pipeline Company ) Docket No. RP22 -___-000

## Summary of the Prepared Direct Testimony of Burton D. Cole

Mr. Cole is the Director, U.S. Pipeline Accounting for TransCanada USA Services Inc. His testimony presents data to support ANR Pipeline Company's ("ANR") proposed $1,125,011,869 cost-of-service. Mr. Cole sponsors the various cost-of-service statements and schedules containing data supporting Columbia's proposed cost-of-service. He identifies the Base Period used in his statements and schedules as the period from November 1, 2020 through October 31, 2021 and the Adjustment Period as the period from November 1, 2021 through July 31, 2022.

Docket No. RP22-___-000
Exhibit No. ANR-0049

**UNITED STATES OF AMERICA**
**BEFORE THE**
**FEDERAL ENERGY REGULATORY COMMISSION**

ANR Pipeline Company ) Docket No. RP22-___-000

# PREPARED DIRECT TESTIMONY OF BURTON D. COLE ON BEHALF OF ANR PIPELINE COMPANY

January 28, 2022

Docket No. RP22-___-000
Exhibit No. ANR-0049

# Glossary of Terms

| | |
|---|---|
| A&G | Administrative and General |
| Adjustment Period | The nine-month period ending July 31, 2022 |
| ADIT | Accumulated Deferred Income Tax |
| ANR | ANR Pipeline Company |
| AFUDC | Allowance for Funds Used During Construction |
| ARAM | Average Rate Assumption Method |
| Base Period | The twelve-month period ending October 31, 2021 |
| Commission | Federal Energy Regulatory Commission |
| DTAs | Deferred Tax Assets |
| EDIT | Excess Deferred Income Taxes |
| FERC | Federal Energy Regulatory Commission |
| FTE | Full Time Equivalent |
| TC Energy | TC Energy Corporation |
| Test Period | The Base Period and Adjustment Period |

**UNITED STATES OF AMERICA**
**BEFORE THE**
**FEDERAL ENERGY REGULATORY COMMISSION**

ANR Pipeline Company ) Docket No. RP22-___-000

## Prepared Direct Testimony of Burton D. Cole

**Q: What is your name and business address?**

A: My name is Burton D. Cole. My business address is TC Energy Corporation ("TC Energy"), 700 Louisiana Street, Houston, Texas 77002.

**Q: What is your principal occupation?**

A: I am employed by TransCanada USA Services Inc., an indirect subsidiary of TC Energy, as the Director, U.S. Pipeline Accounting. TransCanada USA Services Inc. employs all personnel in the United States who are involved in the operation and maintenance of TC Energy's U.S. energy systems and facilities, including ANR Pipeline Company ("ANR"). I am filing testimony on behalf of ANR.

**Q: Please describe your educational background and your occupational experience as they are related to your testimony in this proceeding.**

A: I was appointed the Director, U.S. Pipeline Accounting of TC Energy's U.S. natural gas pipelines in November 2018. As Director, I am responsible for the accounting and financial reporting function and support the planning and budgeting, commercial, compliance, and regulatory functions for ANR. Prior to joining TC Energy, I spent 12 years in public accounting, held various positions at Spectra Energy, including Corporate Controller and Head of Counterparty Credit and Enterprise Risk Management, and I most recently served as Chief Accounting Officer at Talos Energy. I have a Master of Business

Administration in Accounting from the University of St. Thomas, and I am a Certified Public Accountant in Texas, originally licensed in 2000.

**Q: Have you ever testified before the Federal Energy Regulatory Commission ("FERC" or "Commission") or any other regulatory commissions?**

A: Yes. I provided testimony in *Columbia Gas Transmission, LLC*, Docket No. RP20-1060-000.

**Q: What is the purpose of your testimony in this proceeding?**

A: The purpose of my direct testimony in this proceeding is to support ANR's cost-of-service and cost allocations utilized in support of ANR's revenue requirement in ANR's general section 4 rate filing.

**Q: What is the Test Period utilized by ANR in this proceeding?**

A: Pursuant to 18 C.F.R. § 154.303(a), the Test Period is a consecutive twelve-month base period followed by an adjustment period of up to nine months. ANR is utilizing a base period reflecting actual data for the twelve months ended October 31, 2021 ("Base Period"). ANR is utilizing an adjustment period that began on November 1, 2021 (immediately following the Base Period) and which extends for nine months succeeding the end of the base period, or through July 31, 2022 (the "Adjustment Period") (together the Base Period and Adjustment Period are referred to as the "Test Period"). Adjustment Period data will be used to make adjustments to the Base Period data for those changes that are known and measurable through the end of the Test Period.

**Q: What are the sources of the Test Period data utilized by ANR in this proceeding?**

A: Base Period and Adjustment Period data were taken from ANR's books and records, which are maintained in conformity with the Uniform System of Accounts prescribed by the Commission.

**Q: Please identify the statements and schedules that you sponsor and explain in your testimony.**

A: I am sponsoring the statements and schedules listed below. I describe and, where appropriate, explain the following items included in ANR's rate filing:

| | |
|---|---|
| Exhibit No. ANR-0065 | Statement A (Cost-of-Service Summary) |
| Exhibit No. ANR-0066 | Statement B (Rate Base and Return Summary) |
| Exhibit No. ANR-0067 | Schedule B-1 (Summary of Accumulated Deferred Income Taxes |
| Exhibit No. ANR-0068 | Schedule B-2 (Regulatory Asset and Liability) |
| Exhibit No. ANR-0069 | Statement C (Cost of Plant Summary) |
| Exhibit No. ANR-0070 | Schedule C-1 (Gas Plant by Account) |
| Exhibit No. ANR-0071 | Schedule C-2 (Gas Plant Additions Claimed in Rate Base) |
| Exhibit No. ANR-0072 | Schedule C-3 (Storage Plant by Major Function) |
| Exhibit No. ANR-0073 | Schedule C-4 (Methods and Procedures Used in Capitalizing AFUDC and Other Construction Overheads) |
| Exhibit No. ANR-0074 | Schedule C-5 (Gas Plant in Service Not Being Used in Rendering Gas Service) |
| Exhibit No. ANR-0075 | Statement D (Accumulated Provision for Onshore Book Depreciation, Depletion, and Amortization) |
| Exhibit No. ANR-0076 | Schedule D-1 (Difference Between Present Book Depreciation Rates and Depreciation Rates Not Yet Approved by FERC) |
| Exhibit No. ANR-0077 | Schedule D-2 (Methods and Procedures Followed in Depreciating, Depleting or Amortizing Plant and Recording Abandonment) |
| Exhibit No. ANR-0078 | Statement E (Working Capital) |
| Exhibit No. ANR-0079 | Schedule E-1 (Cash Working Capital Computation) |
| Exhibit No. ANR-0080 | Schedule E-2 (Materials & Supplies and Prepayments) |

| | |
|---|---|
| Exhibit No. ANR-0081 | Schedule E-3 (Gas Stored Underground for Resale) |
| Exhibit No. ANR-0082 | Statement F-1 (Claimed Rate of Return on Equity) |
| Exhibit No. ANR-0083 | Statement F-2 (Capitalization and Cost of Capital) |
| Exhibit No. ANR-0084 | Statement F-3 (Long Term Debt (Debt Capital)) |
| Exhibit No. ANR-0085 | Statement F-4 (Preferred Stock Capital) |
| Exhibit No. ANR-0090 | Schedule G-4 (At-Risk Revenue) |
| Exhibit No. ANR-0091 | Schedule G-5 (Other Revenues) |
| Exhibit No. ANR-0092 | Schedule G-6 (Miscellaneous Revenues) |
| Exhibit No. ANR-0093 | Statement H-1 (Operation and Maintenance Expenses Summary) |
| Exhibit No. ANR-0094 | Schedule H-1(1) (Summary of System Labor, Materials and Other Expenses, and Expenses Applicable to Accounts 810 and 812) |
| Exhibit No. ANR-0095 | Schedule H-1(1)(a) (Total System Labor Costs) |
| Exhibit No. ANR-0096 | Schedule H-1(1)(b) (Total Material and Other Expenses Excluding Gas Costs) |
| Exhibit No. ANR-0097 | Schedule H-1(1)(c) (Gas Operation and Maintenance Expenses) |
| Exhibit No. ANR-0098 | Schedule H-1(2) (Detail of Administrative and General Expenses) |
| Exhibit No. ANR-0099 | Schedule H-1(2)(a) (Gas Operation and Maintenance Expenses |
| Exhibit No. ANR-0100 | Schedule H-1(2)(b) (Advertising Expenses) |
| Exhibit No. ANR-0101 | Schedule H-1(2)(c) (Office Supplies and Expenses) |
| Exhibit No. ANR-0102 | Schedule H-1(2)(d) (Administrative Expenses Transferred Credit) |
| Exhibit No. ANR-0103 | Schedule H-1(2)(e) (Outside Services Employed) |
| Exhibit No. ANR-0104 | Schedule H-1(2)(f) (Employee Pensions and Benefits) |

| | |
|---|---|
| Exhibit No. ANR-0105 | Schedule H-1(2)(g) (Regulatory Commission Expenses) |
| Exhibit No. ANR-0106 | Schedule H-1(2)(h) (Duplicate Charges – Credit) |
| Exhibit No. ANR-0107 | Schedule H-1(2)(i) (Miscellaneous General Expenses) |
| Exhibit No. ANR-0108 | Schedule H-1(2)(j) (Intercompany Transactions) |
| Exhibit No. ANR-0109 | Schedule H-1(2)(k) (Lease Expense) |
| Exhibit No. ANR-0110 | Statement H-2 (Depreciation, Depletion, Amortization and Negative Salvage Expense) |
| Exhibit No. ANR-0111 | Schedule H-2(1) (Reconciliation of Depreciable Plant to Total Gas Plant) |
| Exhibit No. ANR-0112 | Statement H-3 (Federal and State Income Taxes) |
| Exhibit No. ANR-0113 | Schedule H-3(1) (State Income Taxes) |
| Exhibit No. ANR-0114 | Schedule H-3(2) (Reconciliation of Net Book Plant and Net Tax Plant) |
| Exhibit No. ANR-0115 | Statement H-4 (Summary of Other Taxes) |
| Exhibit No. ANR-0116 | Schedule H-4 (Adjustment to Other Taxes) |
| Exhibit No. ANR-0117 | Statement I (Functionalized Cost-of-Service – Explanatory Notes) |
| Exhibit No. ANR-0118 | Schedule I-1 (Overall Cost-of-Service) |
| Exhibit No. ANR-0119 | Schedule I-1(a) (Cost of Service by Function) |
| Exhibit No. ANR-0120 | Schedule I-1(b) (Functionalized Cost of Service by Incremental and Non-Incremental) |
| Exhibit No. ANR-0121 | Schedule I-1(c) (Cost of Service by Zone) |
| Exhibit No. ANR-0122 | Schedule I-1(d) (Allocation of Non-Direct Costs to Functions) |
| Exhibit No. ANR-0125 | Schedule I-4 (Transmission and Compression of Gas by Others) |
| Exhibit No. ANR-0126 | Schedule I-5 (Gas Balance) |
| Exhibit No. ANR-0130 | Statement L (Comparative Balance Sheets) |

| | |
|---|---|
| Exhibit No. ANR-0131 | Statement M (Income Statement for the twelve months ended October 31, 2021) |

**Q: Please explain Statement A.**

A: Statement A, Column (c), shows ANR's overall cost-of-service of $1,125,011,869 for the Base Period, as adjusted for known and measurable changes that will become effective through the end of the Test Period. The overall cost-of-service consists of: operations and maintenance expense; depreciation and amortization expense; income taxes; taxes other than income taxes; and revenue credits and return allowance.

**Q: Please explain Statement B.**

A: Statement B is a summary of ANR's Base Period rate base as adjusted for known and measurable changes becoming effective through the end of the Test Period, and ANR's total return on rate base computed at the total weighted cost of capital (of 11.76 percent) derived on Statement F-2 as supported by ANR witness Villadsen. ANR's total rate base is $3,440,598,411 as shown on line 16, Column (c) of Statement B. Total rate base includes gas plant in service, gas stored – base gas, and system balancing gas as provided in Statement C, a deduction for accumulated provision for depreciation and amortization as provided in Statement D, net corporate assets as provided in Schedule I-1(d) page 3, working capital as provided in Statement E, a deduction for accumulated deferred income taxes as provided in Schedule B-1, and regulatory assets and liabilities as provided in Schedule B-2, as explained below. The various items comprising the rate base are supported in the supporting Statements or Schedules referenced in Column (b).

**Q: Please provide support for the addition to rate base of $7,268,805 on Statement B, line 11 labeled "Net Corporate Assets."**

A: The addition of $7,268,805 represents net depreciable corporate assets that are owned by TC Energy through the end of the Test Period, both of which provide physical and intangible assets used by ANR in providing services to shippers. Schedule I-1(d), page 3, provides support for the allocation of these corporate assets to ANR. I provide additional discussion of inclusion of these assets in ANR's rate base in my testimony addressing administrative and general ("A&G") expenses allocated from ANR's parent on Schedule H-1.

**Q: Please explain Schedule B-1.**

A: Schedule B-1 shows actual accumulated deferred income tax ("ADIT") account balances and activity for the Base Period, as well as adjustments to forecasted ADIT balances and activity that will become effective through the end of the Test Period. The ADIT shown in Schedule B-1, totaling $506,420,921, represents the net deferred tax liability recorded in Account Nos. 190, 282, and 283. This amount is included in rate base, as shown on line 13, Column (c) of Statement B.

**Q: What do ADIT balances represent?**

A: ADIT arises from differences between the method of computing taxable income for reporting to the IRS ("tax treatment") and the method for computing income for financial accounting and ratemaking purposes ("book treatment"). ADIT is recorded on a company's books to account for this difference and represents future tax consequences.

**Q: How is this benefit reflected in customer rates?**

A: Typically, a utility's rate base is reduced by the appropriate ADIT balance.

**Q: Are all ADIT amounts used in ratemaking to reduce rate base?**

A: No. Some book-tax treatment temporary differences are deferred tax assets ("DTAs") where book expense recognition occurs earlier than the tax deduction. In that way, ADIT can serve to increase rate base. ANR reflects such DTAs on Schedule B-1, page 2.

**Q: Are all ADIT balances included in the rate base adjustment?**

A: No. ADIT associated with items not recovered in rates is not included in the rate base adjustment. ANR's ADIT amounts are reflected on Schedule B-1, page 2.

**Q: What are excess deferred income taxes ("EDIT")?**

A: A company's ADIT balances represent future taxes payable, which, prior to passage of the Tax Cuts and Jobs Act of 2017 ("Tax Act"), was expected to be at a 35% federal income tax rate. Upon enactment of the Tax Act, all of ANR's then-existing ADIT balances were re-measured in its financial reporting records to reflect the newly-enacted federal income tax rate for corporations of 21%. This re-measurement, or reduction in ADIT produced either a reduction to deferred tax expense or, for items included in ANR's cost-of-service-based ratemaking, a reclassification of amounts as a regulatory liability called EDIT.

**Q: What impact did the Tax Act have upon ANR's ADIT and EDIT balances?**

A: The reduction in income tax rates resulted in ANR's ADIT balance as of December 31, 2017 being greater than the amount needed to meet ANR's income tax obligations due in future years. ANR's EDIT balances are reflected in Schedule B-2, pg. 2, Column (b).

**Q: What is FERC's policy when the ADIT is deficient or in excess?**

A: The Commission's current regulations and precedent, the IRS normalization rules, and Section 1561(d) of the Tax Act govern the treatment of ADIT for both cost-of-service and accounting purposes, including how ADIT should be adjusted to account for tax rate changes. Specifically, when ADIT is remeasured due to a tax rate reduction, the pipeline flows through EDIT as an adjustment to the income tax component of its cost-of-service, as shown on Statement H-3. EDIT flow-throughs to customers must be consistent with tax normalization requirements. In keeping with normalization requirements, any method for flowing through EDIT to ratepayers by reducing the income tax component may be done "no more rapidly than ratably over the remaining life of the underlying assets," a requirement that was reiterated in Section 1561(d) of the Tax Act.

**Q: Did the Tax Act mandate how regulated entities are to flow back EDIT?**

A: Yes. The Tax Act required regulated public utilities, including natural gas pipelines, to use the Average Rate Assumption Method ("ARAM") to flow through EDIT to ratepayers over the regulatory lives of the property that gave rise to the ADIT. ARAM computes flow back based on an individual vintage year's tax plant. However, FERC-regulated gas pipelines' use of composite depreciation rates (*i.e.*, the same book rate for each functional service) in most cases does not give the pipelines sufficient data to be able to reflect ARAM. In such cases, the IRS has issued Rev Proc. Ruling 88-12, which permits FERC-regulated pipelines to use the Reverse South Georgia Method to flow back EDIT.

**Q: How has ANR treated EDIT on its books?**

A: As of December 31, 2017, ANR reclassified the then-calculated EDIT out of Account No. 282 and into Account No. 254, Other Regulatory Liabilities. The EDIT addition to Account No. 254, is "grossed-up" for the impact of income taxes, which is a credit entry, and a debit entry to Account No. 190 that offsets the dollar impact of the gross-up. The EDIT is reflected in Schedule B-2, page 2, Column (b), line 16, and is included in the computation of rate base.

**Q: How is ANR proposing to flow back its EDIT balance in Account No. 254 to its shippers?**

A: ANR has adopted the Reverse South Georgia Method for the flow back of EDIT. An adjustment for the annual amortization associated with this amount is reflected in Statement H-3, line 8.

**Q: Is the unamortized EDIT used as a rate base deduction?**

A: Yes. The remaining unamortized EDIT at the end of the Test Period is $168,265,420 and is included in the balance shown in Statement B, line 15.

**Q: Please provide ANR's estimated annual amortization of these EDIT balances.**

A: The annual amortization of EDIT is $13,879,543, which was calculated using ANR's remaining undepreciated plant and annual depreciation expense at January 1, 2018, to determine its remaining depreciable life, which is in accordance with tax normalization rules. The remaining life is 16.63 years. The plant numbers from the beginning of 2018 are the appropriate plant numbers to use when calculating the remaining life related to the calculated EDIT.

**Q: Do the procedures used in the computation of the annual amortized EDIT comply with both Commission and tax normalization regulations and policy?**

A: Yes. The EDIT balance has been properly computed and is fully compliant with the requirements of tax normalization, the Uniform Systems of Accounts, and Commission guidance on EDIT.

**Q: Please explain Schedule B-2.**

A: Schedule B-2 reflects regulatory assets and liabilities recorded in Account Nos. 182.3 and 254 that ANR is requesting to include or exclude in this proceeding in ANR's rate base.

**Q: What is the nature of the regulatory assets included in Schedule B-2?**

A: Column (b) reflects the estimated balance of ASC 740, gross-up for equity Allowance for Funds Used During Construction ("AFUDC") in Gas Plant in Service and Construction Work in Progress, for the Test Period. This regulatory asset is offset by corresponding deferred tax amounts in FERC Account Nos. 282 and 283. Both the regulatory asset and the associated offsetting deferred taxes are removed from rate base. Column (b) also reflects the estimated balance of the deferred income tax expense gross-up for equity

AFUDC in Construction Work In Progress. Because the equity AFUDC is attributable to non-utility facilities, an adjustment has been made to remove the entire balance from regulatory assets in rate base.

**Q: Please continue with your explanation of the rate treatment for the balance of ANR's regulatory assets and liabilities.**

A: Column (c) reflects the total estimated regulatory expenses that ANR expects to incur for the current rate proceeding. ANR proposes to amortize such amount over a three-year period as a proxy for the anticipated term of the rates that will become effective in this proceeding. The annual amortization is reflected as an adjustment to Account No. 928. Regulatory expenses reflected in Account No. 928 capture expenses related to ongoing regulatory filings and do not include costs associated with the current rate proceedings.

Columns (d) and (e) represent the balance of ANR's electric and gas fuel tracker regulatory assets.

Column (b) on Statement B-2, page 2 is the regulatory liability balance representing the impact of the 2017 Tax Cuts and Jobs Act as applied to businesses subject to rate regulation. This balance is currently being amortized based on the Reverse South Georgia Method over the life of the underlying assets and recorded in Account No. 411.1, reflected on Statement H-3, line 8. ANR proposes to include this balance in rate base.

Columns (c) and (d) of Statement B-2, page 2 reflect the pre-TC Energy balances of post-employment benefits and post-retirement benefits.

Column (e) of Statement B-2, page 2 is the balance representing the cumulative position of ANR's system cashout mechanism. This mechanism represents the difference between the value of "in-kind" natural gas received from customers for compressor station fuel, other utility purposes, and unaccounted-for gas and the actual amount of natural gas used by ANR for these purposes. Columns (f) and (g) represent the balance of ANR's electric and gas fuel tracker regulatory liabilities.

Column (h) of Statement B-2, page 2 is the balance representing the refundable penalties collected during the year that will be refunded to non-offending customers. Because these penalties are paid to customers, an adjustment has been made to remove the entire balance from the regulatory liability in the rate base.

**Q: Please explain Statement C and supporting Schedules C-1 through C-3.**

A: Statement C summarizes the beginning and ending balances as well as the changes in the plant accounts during the Base Period. The Base Period amounts are then adjusted for known and measurable changes that will become effective by the end of the Test Period. Test Period adjustments reflected on line 1, in Column (i) represent additions to Gas Plant in Service of $1,815,162,430. This amount includes new additions of $1,022,302,931, which are expected to be in service by July 31, 2022, and the transfer of existing assets from Completed Construction-Not Classified of $792,859,499 as reflected on line 3, Column (j). Column (j) represents retirements of $17,703,470 during the Test Period. Test Period additions and retirements are reflected on Schedule C-1 by plant account and by incremental project. Schedule C-2 sets forth a listing of additions by project included in Account No. 107 as of the end of the Test Period. Schedule C-3 summarizes the cost of storage plant by major function and facility location.

**Q: Please explain the breakout of plant by function and incremental facility.**

A: For purposes of identifying the appropriate level of detail around the cost of incrementally-priced facilities and separate functions for use in this proceeding, Schedule C-1, page 2 and Schedule C-2, page 4, lines 17 through 24, include additional detail to separately identify the relevant balances. Schedule C-3, pages 1-6 includes storage plant balances listed by facility, including Cold Springs 1 ("CS1").

**Q: Describe any changes in the methods and procedures used in capitalizing AFUDC and other construction overheads.**

A: These methods have not changed since ANR's last filed 2020 FERC Form No. 2 Annual Report (see p. 218) and therefore Schedule C-4 is not applicable.

**Q: Does ANR have any gas plant in service being used for activities other than rendering gas services?**

A: No, therefore Schedule C-5 is not applicable.

**Q: What is contained in Statement D and supporting schedules?**

A: Statement D summarizes the beginning balance, changes and ending balance in Accumulated Provision for Depreciation and Amortization for the Base Period. The Base Period amounts are then adjusted for known and measurable changes that will become effective by the end of the Test Period. Columns (g) and (h) show the estimated provisions for depreciation and net retirements to arrive at the resulting Test Period balances in column (i). The Test Period balance of $2,670,706,294 reflected in Column (i) is included in Rate Base and has been carried forward to Statement B. Schedule D-1 sets forth the difference between present book depreciation rates and depreciation rates that have yet to be approved by FERC. ANR has not changed its methods for calculating depreciation, depletion, and amortization of plant and abandonments since ANR's last filed 2020 FERC Form No. 2 Annual Report, and therefore Schedule D-2 is not applicable.

**Q: How is Accumulated Provision for Depreciation and Amortization for the Base and Test Periods identified by function and incremental facility?**

A: A summary of the related balances by function and incrementally-priced facility is included on Statement D on line 12.

**Q: Please describe Statement E and supporting Schedules E-1 to E-3.**

A: Statement E is a summary of the items comprising the working capital for materials and supplies, and prepayments at the end of the Test Period. The detail is set forth on supporting Schedule E-2 as referenced in Columns (b) through (f). Schedule E-2 shows the 13 monthly balances of materials and supplies, and prepayments for the Base Period with adjustments to reflect expected balances through the end of the Test Period. The total working capital amount on Statement E, line 8 has been carried forward to Statement B. ANR is not including an allowance for cash working capital and therefore Schedule E-1 is not applicable. ANR has no gas stored underground for resale, and therefore Schedule E-3 is not applicable.

**Q: How much working capital does ANR require?**

A: Based on known and measurable changes occurring during the Adjustment Period, ANR requires a working capital allowance of $46,025,807.

**Q: Is ANR proposing to use its own capital structure in this proceeding?**

A: Yes, consistent with Commission policy, ANR proposes to use its own actual capital structure, as projected through the end of the Test Period.

**Q: Does ANR's capitalization comply with the Commission's policy?**

A: Yes. First, ANR issues its own non-guaranteed debt. Second, ANR has its own debt ratings that are separate from those of its parent, TC Energy, and that is currently rated by Moody's Investors Service. Finally, ANR's equity ratio of 66 percent is in line with capital structures previously approved by FERC.

**Q: What is contained in Statements F-2 and F-3?**

A: Statement F-2 sets forth the capital structure that ANR used to calculate the overall rate of return. The Base Period balances were adjusted for known and measurable changes becoming effective by the end of the Test Period. ANR witness Villadsen supports a 15.70% return on common equity for purposes of calculating ANR's overall rate of return. ANR's filed capital structure comprises 66% equity and 34% debt. As shown in Statement F-1, the Overall Rate of Return is 11.76%. This return is computed using an embedded cost of debt of 4.11% and a return on equity of 15.70%.

**Q: What is the basis for ANR's capital structure used to calculate the overall return allowance?**

A: Statement F-2 sets forth the calculation of the capital structure utilized in developing the overall rate of return in this filing. The capital structure reflects ANR's actual capital structure as of October 31, 2021 (the end of the Base Period), adjusted for known and measurable changes through the end of the Test Period.

**Q: What is the basis for ANR's 4.11% cost of debt?**

A: The calculation of ANR's 4.11% cost of debt is set forth on Statement F-3. As shown on Statement F-3, ANR's cost of debt relates to $1.2 billion of long-term debt projected to be outstanding as of July 31, 2022. The debt as of October 31, 2021 of $672.5 million of senior unsecured notes comprised four existing issuances: (1) $300 million of 9.625% senior unsecured notes due and paid November 1, 2021; (2) $125 million of 7.375% senior unsecured notes due 2024; (3) $7.5 million of 7.00% senior unsecured notes due 2025; and (4) $240 million of 4.14% senior unsecured notes due 2026. During the Adjustment Period, debt is projected to increase by $550 million to reflect the addition of the anticipated balance of new long-term debt entered into during the Test Period. ANR anticipates the interest rate for this borrowing will be approximately 3.5% based upon market analysis and communications with lenders. In addition, the annual amortization of discounts and premiums on reacquired debts is included in the calculation of the net weighted average cost of debt capital, as provided in General Instruction 17B of the Uniform System of Accounts.

**Q: Are you sponsoring Statement G?**

A: No, I am only sponsoring Schedules G-4 to G-6. However, Schedule G-4 is not applicable and with respect to Schedule G-6, ANR has no miscellaneous revenues to report. ANR witness Miller is sponsoring Statement G and Schedules G-1 to G-3.

**Q: Please explain Schedule G-5.**

A: Schedule G-5 sets forth other revenues by type and month recognized. Footnotes in Schedule G-5 provide additional detail regarding adjustments to these balances to arrive at amounts in Column (q) for inclusion in Statement A.

**Q: Please explain Statement H-1 and related Schedules.**

A: Statement H-1 shows the summary of monthly operation and maintenance expenses by FERC Account for the Base Period, adjusted for known and measurable changes that will occur by the end of the Test Period. Column (o) shows the Base Period amounts. Column (p) shows the projected adjustments during the Adjustment Period. Column (q), as adjusted, reflects the operation and maintenance expenses by FERC Account included in ANR's cost-of-service adjusted for known and measurable changes that will occur by the end of the Test Period. The total Test Period operation and maintenance expenses included in the cost-of-service shown in Column (q), line 70, is carried forward to Statement A.

**Q: Please compare adjusted operating and maintenance expenses to the unadjusted Base Period operating and maintenance expenses.**

A: Total Adjusted Operating and Maintenance expenses (line 70, Column (q)) are $338,529,656 million. This represents an increase of $8,320,593 million compared with the Base Period. A summary of the changes is provided on pages 7-9 of Statement H-1.

**Q: Please describe detailed adjustments to ANR's operation and maintenance expenses.**

A: The H-1 Schedules contain explanations of the adjustments, as well as details supporting the costs reflected in Statement H-1. Specifically, Schedule H-1(1)(a) shows labor costs, Schedule H-1(1)(b) shows material and other expenses (exclusive of gas costs), and Schedule H-1(1)(c) shows gas operation and maintenance expense. Each of these schedules includes detail related to the incrementally-priced facilities.

**Q: Please explain ANR's proposed adjustment for self-insurance.**

A: ANR is creating a reserve account for self-insurance. Currently, ANR has implemented a cost-saving self-insurance strategy in which ANR has adjusted its insurance premiums to reduce overall costs. Thus, while ANR maintains insurance, its insurance coverage begins only after a set amount of loss occurs. When this loss occurs, ANR currently has no means to recover in rates the losses it incurs before its insurance coverage applies.

**Q: What is the proposal for the self-insurance reserve in this proceeding?**

A: The reserve account for self-insurance would be started at a reasonable level of annual cost of $1,200,000 per year. The proposed rates in this proceeding will include the $1,200,000 annual cost in the cost-of-service. ANR would charge insurance expense, Account No. 924, annually for the $1,200,000 and credit Account No. 228.1, Accumulated Provision for Property Insurance, by the same $1,200,000. If an insurable loss occurs after the rates become effective, ANR will debit the reserve and credit cash for the payment.

**Q: What is the benefit of this reserve account to ANR's ratepayers?**

A: ANR has had several instances over the last two years where the pipeline has experienced loss events covered by insurance that required ANR to incur the self-insured portion of its coverage. The self-insured portion of the losses over the last two years averaged $1,200,000. ANR incurred these losses without any potential of recovery from its shippers.

Based on ANR's history of losses over this two-year period, this average loss of $1,200,000 is an appropriate representative amount of dollars to establish the self-insurance reserve account.

If ANR is unable to establish this reserve in the instant proceeding, ANR would consider reducing its self-insurance exposure, which would result in ANR incurring higher insurance premium costs. ANR has had conversations with its insurers that indicate that the added coverage would cost more than $1,200,000 per year. Thus, the reserve account would ultimately be less costly for ANR's customers going forward.

Further, the reserve account provides a benefit to ratepayers because in ANR's next rate case filing, the balance in Account No. 228.1 will be reflected in the computation of rate base. Therefore, if Account No. 228.1 is under- or over-funded, the results will be recognized in future rates.

**Q: What do the H-1(2) Schedules provide?**

A: Schedule H-1(2)(a) contains detail of gas operation and maintenance expense applicable to the accounts that relate to fuel use and gas loss. Schedule H-1(2)(c) contains amounts associated with office supplies and expenses. Schedule H-1(2)(e) contains detail for outside services employed. Schedule H-1(2)(f) contains detail for employee benefits. Schedule H-1(2)(g) contains detail for regulatory commission expenses. Schedule H-1(2)(i) contains detail of miscellaneous general expenses. Schedule H-1(2)(j) contains detail of intercompany transactions. Schedule H-1(2)(k) contains detail of lease expenses.

**Q: Please explain the method by which ANR records operation and maintenance expenses.**

A: TC Energy's business operations are performed by functional areas that provide integrated services to ANR. TC Energy uses cost centers to directly assign costs to ANR where possible. Where costs are not directly assigned, an allocated portion of the shared support service costs are assigned to ANR. ANR's operation and maintenance expenses include expenses that are directly charged to ANR, as well as an allocated portion of the shared support service costs by TC Energy.

**Q: What is the nature of shared support service costs and the methodology used for determining the portion applicable to ANR?**

A: Shared support services costs have been included in Account No. 923, Outside Services Employed, on Statement H-1. TC Energy operates a shared services organization that supports multiple lines of business. Costs included in this category represent departmental and general expenses common to, and shared by, the entire enterprise. In order to ensure that costs are reasonably charged to the appropriate line of business, a two-step process is utilized. Costs that can be identified as attributable to a specific line of business are charged directly to that business. Residual costs are allocated among the various lines of business using cost drivers to allocate remaining shared and common enterprise costs. The primary drivers are time, the number of full-time equivalent staff ("FTE"), and the amount of capital employed in each line of business.

**Q: How does the TC Energy cost allocation methodology compare with other methodologies adopted or accepted by the FERC?**

A: The TC Energy methodology addresses both shared services costs and residual administrative and general costs. After removal of time-based shared services costs from the pool, the residual costs would be similar to those utilized in the generally accepted Distrigas and modified Massachusetts formulas. TC Energy's use of FTEs and capital employed to allocate residual costs are conceptually similar to the use of labor and plant in the Distrigas and modified Massachusetts methodologies.

**Q: Do the costs of corporate assets owned by ANR's parent that are shared by ANR and its affiliates include a return of A&G costs assigned to ANR?**

A: Yes. The assigned A&G costs only include a return of the capital costs incurred for the corporate assets (which is the depreciation expense). Including only depreciation of the corporate assets in the assigned and allocated corporate A&G forecloses all affiliates from recovering a return on the remaining depreciable costs of these assets. It is important to note that if the corporate parent did not make available the subject common assets, each one of the affiliates would have to acquire similar assets of their own. The parent company's ownership of these required assets thus results in significant capital savings to each of the affiliates sharing the assets.

**Q: Are the costs of the corporate assets owned by ANR's parent that are shared by ANR and its affiliates included in ANR's rate base?**

A: ANR is proposing that $7,268,805, which represents ANR's proportionate beneficial ownership share of the corporate assets, be included in rate base, as shown on Statement B, line 11. The calculation of this amount is shown on Schedule I-1(d), page 3. ANR has the beneficial use of these common corporate assets and uses these assets to provide reliable service to its customers. It was a business decision to have common assets owned directly by a corporate parent, because this ownership provides financial efficiencies to all affiliates. Although the common assets are not physically owned by ANR, ANR's customers benefit from the use of these assets and the lower costs afforded by the ownership structure; accordingly, ANR's customers should be responsible for these costs through their inclusion in rate base.

**Q: Please provide an example of what these corporate assets consist of.**

A: The corporate assets consist primarily of airplanes used for transportation and inspection of pipeline right-of-ways, office buildings including furniture, computers, desks, and accounting and operational software. All of these assets are necessary for a stand-alone pipeline company to operate; having a parent company own these assets provides cost savings due to the economy-of-scale. Centralized accounting and operational software provide operational efficiencies as well.

**Q: How are the costs assignable to ANR determined?**

A: The calculations are shown on Schedule I-1(d), page 3.

**Q: What does Statement H-2 contain?**

A: Statement H-2 sets forth by plant account the Depreciation and Amortization expense for the Base Period, adjusted for known and measurable changes anticipated to become effective by the end of the Test Period. The resulting Test Period expense is shown on Statement A, Column (c), line 2. The depreciation, depletion, and amortization rates are supported in the testimony of ANR witness Crowley. As explained by Mr. Crowley, ANR proposes to change the depreciation rates for its facilities and other assets as reflected on Statement H-2, Column (e) for the various asset types detailed therein. Schedule H-2(1) contains a reconciliation of depreciable plant to total gas plant.

**Q: Is ANR proposing a change to its currently-effective depreciation and negative salvage rates?**

A: ANR witnesses Crowley, Kirk, and Fall support the following depreciation and negative salvage rates: (1) for transmission plant, a depreciation rate of 2.59 percent and a negative salvage rate of 1.41 percent; (2) for underground storage plant, a depreciation rate of 2.24 percent and a negative salvage rate of 1.08 percent; and (3) for gathering plant, a depreciation rate of 1.16 percent and a negative salvage rate of 1.19 percent.

**Q: Please explain Statement H-3.**

A: Statement H-3 sets forth the federal and state income tax calculations supported by schedules H-3(1) and H-(3)(2). The computation of income taxes is based on a gross-up calculation on the taxable portion of the return allowance that also reflects a gross-up for the Reverse South Georgia Method adjustment. This calculation begins with the Rate Base as shown on line 16 of Statement B and applies the return on rate base also shown on Statement B, line 20. Deducted from this amount is the income deduction for the cost of debt from Statement B. The resulting amount represents the Taxable Portion of Return. Line 9 represents the Total Tax Adjustments to the Taxable Portion of Return to arrive at the Taxable Base, or taxable income after income taxes, and reflects the annual amortization of EDIT based on the Reverse South Georgia Method. This Taxable Base is then grossed-up to a pre-tax number by dividing by 0.7544 (one minus the composite income tax rate of 24.56 percent) to arrive at the Taxable Income Before income taxes on line 12. State income taxes are then calculated using the currently-effective state income tax rates. The State income taxes are then deducted from the Taxable Base to arrive at the Taxable Net income After State Income Taxes. Federal income tax is then calculated on this subtotal using the appropriate Federal income tax rate. The sum of State income taxes and Federal income taxes is then carried forward to Statement A, line 3.

**Q: Is ANR's proposal to receive an income tax allowance consistent with Commission policy?**

A: Yes. Commission policy allows a federal income tax allowance in a pipeline's cost of service rates when federal income tax liability arises from providing jurisdictional service. ANR is a Subchapter C corporation, and longstanding Commission policy allows the recovery of corporate income tax costs arising from its income when such tax liability is reflected on federal and state tax returns.

**Q: Please explain Statement H-4.**

A: Statement H-4 summarizes ANR's Other Taxes by Function for the Base Period with adjustments through the end of the Test Period (as supported by Schedule H-4), which comprises the following categories: (1) ad valorem taxes, (2) use tax, (3) gross receipts tax, (4) franchise tax, (5) severance tax, and (6) other taxes.

**Q: What level of Other Taxes has ANR filed for in this proceeding?**

A: As supported in Statement H-4, ANR has filed for Other Taxes of $47,688,344.

**Q: Are you sponsoring Statement I?**

A: I am sponsoring Statement I and Schedules I-1, I-4, and I-5.

**Q: Please explain Schedule I-1.**

A: Schedule I-1 and related sub-schedules detail the breakdown of the overall cost-of-service into the mainline and the incremental facilities.

**Q: Please explain Schedule I-4.**

A: Schedule I-4 and related sub-schedules detail the Transmission and Compression of Gas by Others.

**Q: Please explain Schedule I-5.**

A: Schedule I-5 provides detail of the volumetric balances of gas accounts for the twelve months ended October 31, 2021.

**Q: Please describe how the cost-of-service for the incrementally-priced facilities was determined.**

A: ANR is proposing to retain incremental pricing treatment for the CS1 Storage Project facility. The rate derived for the incremental rate schedule reflects all costs incurred and reflected in the cost of service for this incremental project. ANR has allocated Administrative and General expenses based on the KN allocation methodology. The allocation of costs to this incrementally-priced facility is necessary to properly assign cost responsibility and rate levels for this separately priced facility within the ANR system.

**Q: What do Statements L and M contain?**

A: Statement L contains the Balance Sheets for ANR as of October 31, 2021, and October 31, 2020. Statement M is the Income Statement for ANR for the twelve months ended October 31, 2021.

**Q: Does this conclude your Prepared Direct Testimony?**

A: Yes.

# UNITED STATES OF AMERICA
# BEFORE THE
# FEDERAL ENERGY REGULATORY COMMISSION

ANR Pipeline Company ) Docket No. RP22-____-000

State of Texas )
) ss.
County of Harris )

## AFFIDAVIT OF BURTON D. COLE

Burton D. Cole, being first duly sworn, on oath states that he is the witness whose testimony appears on the preceding pages entitled "Prepared Direct Testimony of Burton D. Cole"; that, if asked the questions which appear in the text of said testimony, he would give the answers that are therein set forth; and that affiant adopts the aforesaid testimony as Burton D. Cole's sworn testimony in this proceeding.

DocuSigned by:
Burton Cole
93019BC79190496...

Burton D. Cole

SWORN TO AND SUBSCRIBED BEFORE ME THIS 18th DAY OF January, 2022. This notarial act was an online notarization.

**Notary Seal**

SHELIA O. COPUS
Notary ID
976876
My Commission Expires
2/22/2023

**Digital Certificate**

DocuSigned by:
Shelia Copus
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Docket No. RP22-__-000
Exhibit No. ANR-0050

# UNITED STATES OF AMERICA
# BEFORE THE
# FEDERAL ENERGY REGULATORY COMMISSION

ANR Pipeline Company ) Docket No. RP22 -___-000

## Summary of the Prepared Direct Testimony of Gregory S. Barry

Mr. Barry is the Manager of Rates for TransCanada U.S.A. Services Inc. His testimony explains the design of ANR Pipeline Company's ("ANR") proposed transportation, storage, and gathering rates as well as the classification and allocation of costs used in the design of those rates.

Mr. Barry first discusses cost classification, including ANR's transportation and storage costs, noting that costs are initially classified as either fixed or variable, with fixed costs being further classified as either mileage or non-mileage, while transportation function variable costs are classified as mileage costs. Mr. Barry next discusses cost allocation, explaining that mileage-related transportation costs are allocated across ANR's seven rate zones based upon a dekatherm-mile allocation. Following these preliminary allocations, costs associated with gathering, transportation, and storage functions are allocated to ANR's various services based upon projected units of service through various rate design steps.

In describing these various rate design steps, Mr. Barry discusses certain rate design modifications, explains why ANR is seeking a discount-type adjustment for certain negotiated rate contracts, and describes the methodologies ANR has used to adjust billing determinants to reflect discounted and below-maximum rate negotiated rate contracts. Finally, Mr. Barry provides an overview of the rate design for each of ANR's rate schedules.

Docket No. RP22-___-000
Exhibit No. ANR-0050

**UNITED STATES OF AMERICA**
**BEFORE THE**
**FEDERAL ENERGY REGULATORY COMMISSION**

ANR Pipeline Company ) Docket No. RP22-___-000

# PREPARED DIRECT TESTIMONY OF GREGORY S. BARRY ON BEHALF OF ANR PIPELINE COMPANY

January 28, 2022

Docket No. RP22-___-000
Exhibit No. ANR-0050

# **Glossary of Terms**

| | |
|---|---|
| 2HNS | 2-Hour Notice Service |
| A&G | Administrative and General |
| ANR | ANR Pipeline Company |
| Bcf | Billion cubic feet |
| Commission | Federal Energy Regulatory Commission |
| DB | Daily Balance |
| Dth | Dekatherm |
| Dth/d | Dekatherms per day |
| ES | Enhancement Services |
| FE | Flexible Entitlements |
| FSS | Firm Storage Service |
| IPLS | Interruptible Park and Lend Service |
| IWS | Interruptible Wheeling Service |
| LDC | Local Distribution Company |
| MDIQ | Maximum Daily Injection Quantity |
| MDWQ | Maximum Daily Withdrawal Quantity |
| MHQ | Maximum Hourly Quantity |
| MBS | Market Balancing Service |
| MSQ | Maximum Storage Quantity |
| NNE | No-Notice Entitlements |

Docket No. RP22-___-000
Exhibit No. ANR-0050

| | |
|---|---|
| NNS | No-Notice Service |
| O&M | Operation and Maintenance |
| SFV | Straight-Fixed Variable |
| STS | Small Transportation Service |
| TC Energy | TC Energy Corporation |

# UNITED STATES OF AMERICA
# BEFORE THE
# FEDERAL ENERGY REGULATORY COMMISSION

ANR Pipeline Company ) Docket No. RP22-___-000

## Prepared Direct Testimony of Gregory S. Barry

**Q: Please state your name and business address.**

A: My name is Gregory S. Barry. My business address is TransCanada Corporation, 700 Louisiana Street, Suite 1600, Houston, Texas, 77002.

**Q: What is your occupation?**

A: I am the Manager of Rates employed by TransCanada USA Services Inc., a division of TC Energy Corporation. TransCanada USA Services Inc. employs all personnel in the United States who are involved in the operation and maintenance of TC Energy's U.S. energy systems and facilities, including ANR Pipeline Company ("ANR"). I am filing testimony on behalf of ANR.

**Q: Please describe your educational background and experience as they are related to your testimony in this proceeding.**

A: I earned a Bachelor of Business Administration in Economics from New Mexico State University in 2007, and a Master of Arts in Economics specializing in Utility Regulation from New Mexico State University in 2008. I have been employed by TC Energy, formerly TransCanada Corporation, from 2010 to 2018 as a Rate Analyst, and as the Manager of Rates from 2018 to the present, in the Rates, Tariffs, and Modernization Department. In this role I am responsible for the design of ANR's gathering, transmission, and storage rates.

**Q: Have you ever testified before the Federal Energy Regulatory Commission or any other regulatory commission or agency?**

A: Yes. I have filed testimony with the Commission in *ANR Pipeline Company*, Docket No. RP16-440-000, *Great Lakes Gas Transmission Limited Partnership*, Docket No. RP17-598-000, and *Columbia Gas Transmission, LLC*, Docket No. RP20-1060-000.

**Q: What is the purpose of your testimony in this proceeding?**

A: The purpose of my testimony is to explain the design of ANR's gathering, transportation, and storage rates, in addition to the classification and allocation of costs related to the rate design process.

**Q: Are you sponsoring any statements or schedules related to cost allocation and rate design?**

A: Yes, I am sponsoring the following schedules:

| | |
|---|---|
| Exhibit No. ANR-0123 | Schedule I-2 (Classification of Cost of Service) |
| Exhibit No. ANR-0124 | Schedule I-3 (Allocation of Cost of Service) |
| Exhibit No. ANR-0127 | Statement J (Comparison and Reconciliation of Estimated Operating Revenues with Cost of Service) |
| Exhibit No. ANR-0128 | Schedule J-1 (Summary of Billing Determinants) |
| Exhibit No. ANR-0129 | Schedule J-2 (Derivation of Rates) |

## **Cost Classification**

**Q. How are costs classified generally?**

A. All costs are initially classified as either fixed or variable. Under the Commission's current straight-fixed-variable ("SFV") rate design method, fixed costs are then classified as reservation costs while variable costs are classified as delivery or, in the case of ANR, "commodity" costs. ANR's variable costs consist of nonlabor compression related operation and maintenance ("O&M") expenses. All other costs are fixed and consequently classified as reservation. Because ANR employs a distance-sensitive transportation rate design, transportation function fixed costs are further classified as either mileage or non-mileage, while transportation function variable costs are classified as mileage costs.

**Q. Which of ANR's transportation costs are classified as non-mileage?**

A. Non-mileage transportation costs include administrative and general ("A&G") expenses, Account No. 850 and 858 expenses, and storage function costs associated with transportation system balancing.

**Q. How are storage function costs classified?**

A. Consistent with current Commission policy, I have classified ANR's storage function costs under the Equitable method, whereby 50 percent of fixed costs are classified as deliverability costs and 50 percent as capacity costs. Variable costs are classified as injection/withdrawal costs.

## Cost Allocation

**Q. In general, how are functionalized, classified costs proposed to be allocated to ANR's various services?**

A. As discussed in greater detail below, mileage-related transportation costs are allocated across ANR's seven rate zones based upon a dekatherm ("Dth")-mile allocation. In addition, certain storage function costs are allocated to transportation balancing and no-notice service ("NNS"). Once these preliminary allocations have occurred, costs associated with the gathering, transportation, and storage functions are further allocated to ANR's various services based upon projected units of service through various rate design steps discussed further below.

**Q. How are storage function costs associated with balancing allocated to the transportation function?**

A. The amount of storage dedicated to transportation system balancing is equal to 5 billion cubic feet ("Bcf") of working gas, 100,000 Dth per day ("Dth/d") of maximum daily withdrawal quantity ("MDWQ"), and 10 Bcf of maximum storage quantity ("MSQ"). Fixed costs associated with the working gas portion are equal to ANR's proposed pre-tax cost of capital multiplied by the book value of the 5 Bcf of working gas. Fixed costs associated with the capacity quantities dedicated to system balancing are quantified by deriving ratios of MDWQ, MSQ, and injection/withdrawal associated with balancing to total MDWQ, MSQ, and injection/withdrawal rate design units, respectively. These ratios are then applied to the deliverability, capacity, and injection/withdrawal cost categories of the storage function cost-of-service to determine the costs of storage capacity dedicated to transportation system balancing. Total balancing costs are then included in the non-mileage category of transportation costs as discussed above.

**Q. Please explain how storage function costs are allocated to NNS.**

A. The amount of storage dedicated to NNS, and derivative rates thereof, is equal to 5 Bcf of working gas and 5 Bcf of MSQ.[1] The fixed cost associated with the working gas portion is equal to ANR's proposed pre-tax cost of capital times the book value of the 5 Bcf of working gas. Unlike the balancing cost allocations described above, fixed storage capacity costs are not separately carved out for NNS. Instead, fixed storage capacity costs are allocated to NNS, and derivative rates thereof, through the design of the firm storage service ("FSS") rates.

**Q. Please explain how mileage-related transportation costs are allocated among ANR's rate zones.**

A. Consistent with the testimony of ANR witness Miller, I first credited ANR's transportation cost-of-service with revenues generated from transportation service agreements for which ANR is seeking a discount adjustment. Net mileage-related transportation function costs

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[1] The MDWQ units imputed for NNS are based upon no-notice entitlements ("NNE").

were then allocated to ANR's rate zones on a Dth-mile basis, making use of Dth-miles attributable to both discounted and undiscounted contracts.

**<u>Rate Design</u>**

**Q. Please provide a general overview of ANR's gathering rate design.**

A. ANR's gathering rate design is straightforward. As described above, gathering function costs are classified to reservation and commodity, and reservation and commodity rates are designed based upon projected units of service.

**Q. Are ANR's gathering rates discount-adjusted?**

A. No. ANR is not proposing a discount adjustment for gathering function service. There are no gathering function maximum rate test period billing determinants, therefore a discount adjustment yields an undefined result arithmetically.

**Q. Please provide a general overview of ANR's transportation rate design.**

A. As discussed above, ANR's transportation function costs are classified to three cost categories, including non-mileage reservation, mileage reservation, and mileage commodity. As further described below, ANR credits transportation function costs that are classified as reservation mileage and reservation non-mileage as a means of implementing: (1) a discount adjustment for discounted transportation agreements; and (2) a discount-type adjustment for certain negotiated rate transportation agreements. Non-mileage transportation costs are divided by *system-wide* non-mileage reservation rate design units in order to design a non-mileage rate that applies equally to all affected rate schedules, regardless of contract length-of-haul. As discussed by ANR witness Linder, this rate design results in an allocation of non-mileage costs to all rate zones. Mileage reservation costs, on the other hand, are allocated to ANR's various rate zones by means of a Dth-mile allocation. Such costs are then divided by associated mileage reservation rate design units *in each respective zone* to derive the mileage reservation rate components for each zone. Mileage commodity costs are allocated to ANR's various rate zones by means of a Dth-mile allocation as well, and such costs are then divided by associated mileage commodity units *in each respective zone*, to derive the commodity rate components for each zone.

**Q. Please provide a general overview of ANR's storage rate design.**

A. Storage function costs are classified to three cost categories, as described above, including deliverability reservation, capacity reservation, and injection/withdrawal. In general, deliverability reservation costs are divided by MDWQ rate design units to derive the deliverability reservation rate component for storage. Similarly, capacity reservation and injection/withdrawal costs are divided by MSQ and injection/withdrawal quantities, respectively, to derive the associated rate components. As further described below, ANR makes use of an iterative discount adjustment method when designing storage rates.

**Q: Is ANR proposing discount-type adjustments for negotiated rate contracts, which specify reservation rates below ANR's otherwise applicable maximum recourse reservation rate(s)?**

A: Yes, consistent with Commission policy, ANR is proposing to discount-adjust negotiated rate contracts, which specify reservation rates that are below the otherwise applicable maximum recourse reservation rate(s).

**Q: Does Commission policy permit discount-type adjustments for negotiated rate contracts?**

A: Yes, it is my understanding that the Commission articulated its policy with respect to pipelines' ability to seek discount-type adjustments for negotiated rate contracts in section 4 rate cases, stating:

> Although the Commission is not promulgating a *per se* rule against discount-type adjustments to recourse rates to reflect negotiated rates, the Commission does require

> that a pipeline's negotiated rate proposal protect the recourse rate-paying shippers against inappropriate cost-shifting. . . Thus, without protective measures in place, the Commission will not permit discount adjustments for negotiated rates.[2]

The Commission subsequently reaffirmed this policy when it accepted specific tariff language that established protective measures that the Commission deemed consistent with the policy.[3]

**Q: Please describe the specific tariff provision accepted by the Commission reflecting this policy.**

A: The Commission accepted tariff language that established the burden of proof that a pipeline must satisfy in order to obtain a discount-type adjustment for negotiated rate contracts, specifying that a pipeline must meet the standards required of an affiliate discount adjustment. Additionally, the accepted tariff provision specifically required pipelines to demonstrate that any discount-type adjustment does not have an adverse impact on maximum rate shippers.

**Q: What is the standard required to obtain an affiliate discount adjustment?**

A: The Commission has held that, in order to obtain a discount adjustment for a discounted rate contract with an affiliate, the pipeline must show that competition required the discounted rate to the affiliate.

**Q: How does a pipeline demonstrate that a discount-type adjustment for negotiated rate contracts does not have an adverse impact on maximum rate shippers?**

A: In addition to demonstrating the competitive need for negotiated rate contracts, a pipeline must demonstrate that it has not shifted the costs that would otherwise be allocated to below

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[2] *CNG Transmission Corp.*, 80 FERC ¶ 61,401 at 62,328 (1997).
[3] *Wyoming Interstate Co., Ltd.*, 117 FERC ¶ 61,150 (2006).

maximum rate negotiated rate contracts to its maximum rate shippers, while retaining excess revenue from above maximum rate negotiated rate contracts.

**Q: Does ANR have tariff language that explicitly permits the pipeline to seek discount-type adjustments for negotiated rate contracts in section 4 rate proceedings?**

A: Yes. Section 6.29(d) of ANR's tariff states:

> A discount-type adjustment to recourse rates for Negotiated Rate agreements shall only be allowed to the extent that Transporter can meet the standards required of an affiliate discount-type adjustment including requiring that Transporter shall have the burden of proving that any discount granted is required to meet competition.
>
> Transporter shall be required to demonstrate that any discount-type adjustment for Negotiated Rate agreements does not have an adverse impact on recourse rate shippers.
>
> > (1) Demonstrating that, in the absence of Transporter's entering into such Negotiated Rate agreement providing for such discount, Transporter would not have been able to contract for such capacity at any higher rate, and that recourse rates would otherwise be as high or higher than recourse rates which result after applying the discount adjustment; or
> >
> > (2) Making another comparable showing that the Negotiated Rate discount contributes more fixed costs to the system than could have been achieved without the discount.

**Q: Has ANR met the standards required of an affiliate discount adjustment with respect to negotiated rate contracts below the otherwise applicable maximum rate?**

A: Yes, ANR witness Miller presents detailed evidence demonstrating that, with respect to each of the negotiated rate contracts for which ANR is proposing a discount-type adjustment, ANR agreed to the negotiated rate in order to meet competition for the shipper's business.

**Q: Can ANR demonstrate that its proposed discount-type adjustments for negotiated rate agreements do not have an adverse impact on maximum rate shippers?**

A: Yes, based upon ANR's filed transmission reservation rates, ANR has four negotiated rate contracts for which the stated reservation rates are above ANR's proposed, otherwise applicable maximum reservation rates, all of which are indexed to ANR's maximum reservation rates. For Contract No. 125082, the contract reservation rate is set equal to the applicable maximum reservation rate for a path that is longer than the current primary path, and for rate design purposes the contract is treated *as if* its primary path was the longer path.[4] As such, this particular negotiated rate contract does not have an adverse impact, through rate design, on ANR's maximum rate shippers. Additionally, Contract Nos. 126278, 126279, and 126587 are structured such that the shipper is charged the applicable maximum reservation rate for its primary path, plus an additional fixed rate increment. Accordingly, ANR is reflecting each of these three contracts *as if* they are maximum rate contracts for rate design purposes, while also crediting the fixed rate increment to the cost-of-service on schedule G-5. As such, these three negotiated rate contracts do not have an adverse impact, through rate design, on ANR's maximum rate shippers. With respect to storage rate design, ANR is including negotiated rate contracts for which the negotiated reservation rate(s) are above the otherwise applicable maximum reservation rate(s) in the iterative discount adjustment process. When a negotiated rate contract's storage reservation rate(s) exceed(s) the otherwise applicable maximum reservation rate(s), *additional* volumes are imputed through the iterative process thereby allocating additional costs to such negotiated rate contracts. Therefore, through rate design, ANR has ensured that negotiated rate contracts do not have an adverse impact on maximum rate shippers.

**Q: Please discuss the methods that the Commission has used to derive an appropriate discount adjustment.**

A: The FERC's *Cost-of-Service Rates Manual*, which is available through the FERC's internet website at https://cms.ferc.gov/sites/default/files/2020-04/cost-of-service-manual.doc,

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[4] This contract was originally a maximum rate contract for the longer primary path, but the primary path was subsequently shortened due to the shipper's request for a point shift. Therefore, ANR's proposed treatment of this contract reflects the original maximum rate nature of the contract.

states that there are three methodologies the Commission has used in deriving an appropriate discount adjustment. These are the (1) Revenue Crediting Method, (2) Proportional/Fractional Method, and (3) Iterative Method.

**Q: Which discount adjustment method has ANR utilized?**

A: ANR has utilized the revenue crediting method in the design of ANR's transmission rates, and the iterative method in the design of ANR's storage rates.

**Q: Does the *Cost-of-Service Rates Manual* describe how to apply a discount adjustment through the revenue crediting method?**

A: Yes. The *Cost-of-Service Rates Manual* provides, in part, the following explanation (at p. 46):

> Under [the revenue crediting] method, the revenue generated from discounted transactions is computed. For example, if 25,000,000 Dth of throughput were transported at a discounted rate of 40 cents per Dth, then the revenue generated from discounted transactions would be $10 million. This amount would then be credited to the pipeline's cost-of-service. Next, the discounted volumes of 25,000,000 Dth would be deducted from the total rate design determinants. Thus, rates would be computed by dividing the total cost of service adjusted for discounted revenues, by the total billing determinants adjusted for discounted volumes[.]

**Q: Why does ANR utilize the revenue crediting method in the design of ANR's transmission rates?**

A: In this case, I used the revenue crediting method in the design of transmission rates for three reasons: (1) the method, according to FERC's *Cost-of-Service Rates Manual*, may be used to derive an "appropriate" discount adjustment; (2) ANR is proposing increases to all transmission reservation rates, and therefore it is appropriate to use the crediting method to discount-adjust ANR's discounted transmission reservation rate contracts and below-maximum reservation rate negotiated rate contracts; and (3) use of the revenue crediting method removes, relative to use of the iterative method, a significant amount of complexity from an already complex rate design. The elimination of a significant amount of complexity from ANR's rate design, where possible, will facilitate a better understanding of ANR's rate design and the calculation of ANR's rates by FERC Staff and parties to this proceeding.

**Q: Why does ANR utilize the iterative method in the design of ANR's storage rates?**

A: The important distinction in the design of ANR's maximum storage reservation rates is that certain of the deliverability reservation rates are decreasing relative to the currently-effective deliverability reservation rates. Therefore, when a discounted contract's stated deliverability reservation rate is higher than the proposed maximum deliverability reservation rate, the revenue crediting method would result in too many dollars being credited to the applicable cost-of-service.[5] Under these circumstances, the revenue crediting method is not an appropriate discount-adjustment method to apply.

**Q. Please describe Rate Schedule FTS-1.**

A. FTS-1 is ANR's standard firm transportation service.

**Q. How does ANR design its FTS-1 rates?**

A. FTS-1 is the base upon which all other transportation service rates are derived. The FTS-1 rates are comprised of a monthly non-mileage reservation charge, a monthly mileage reservation charge, and a commodity unit rate. Mileage reservation and commodity rate components are designed for each rate zone based upon the mileage-related reservation and commodity costs allocated to each rate zone. The non-mileage reservation charge, or access fee, which does not vary by rate zone, is added to these mileage-based components.

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[5] This is due to the protection afforded a discounted rate shipper, wherein the reservation rate assessed to a shipper is bound by the applicable maximum and minimum reservation rate(s). Therefore, the pipeline would collect relatively less revenue from a discounted rate contract when the proposed maximum reservation rate is reduced to a level below the shipper's contractually stated discounted reservation rate.

**Q. Please describe Rate Schedule ITS.**

A. ITS is ANR's standard interruptible service.

**Q. How does ANR design its ITS rates?**

A. ITS rates are derived from the FTS-1 rates and are designed as unit rates set equal to the 100 percent load factor equivalent of the FTS-1 rates. In order to allocate fixed costs to ITS, daily reservation units are initially imputed by dividing annual ITS commodity units by 365. Monthly FTS-1 mileage and non-mileage reservation rates are converted to daily unit rates and added to the FTS-1 commodity unit rates to derive one-part unit rates applicable to ITS service in ANR's various rate zones.

**Q. Please describe Rate Schedule FTS-2.**

A. FTS-2 is a firm transportation service that is subject to interruption up to ten days of the month.

**Q. How does ANR design its FTS-2 rates?**

A. In order to reflect the possibility of up to ten days of interruption, FTS-2 recovers a portion of fixed costs through the commodity charge so that on days when service is interrupted, the shipper is effectively not subject to a reservation fee. The shifting of fixed costs from the FTS-1 reservation component (collectively mileage and non-mileage components) to the commodity component is accomplished by converting the FTS-1 monthly reservation rate into a daily rate (multiplying by 12 then dividing by 365) and then multiplying this unit rate by 20, which represents the number of days per month that FTS-2 service cannot be interrupted. The FTS-2 commodity rate is the sum of (1) the FTS-1 commodity rate and (2) the difference between the FTS-1 reservation rate and the FTS-2 reservation rate. Through this approach, approximately one-third of fixed costs are recovered through the commodity charge.

**Q. Please describe Rate Schedule FTS-3.**

A. FTS-3 is a firm transportation service that addresses the needs of power generation shippers. FTS-3 provides shippers the right to non-ratable takes throughout the gas day. An FTS-3 shipper's contract specifies a Maximum Hourly Quantity ("MHQ") which is typically greater than 1/24th of MDQ, but not in excess of 1/4th. FTS-3 also provides three enhancement options, which I discuss below.

**Q. How does ANR design its FTS-3 rates?**

A. The rate components of the FTS-3 rate are derived from the FTS-1 rate. Under FTS-3, fixed costs are recovered through two types of reservation charges: a deliverability charge and a capacity charge.

**Q. Please describe the FTS-3 deliverability charge.**

A. The deliverability charge is equal to 1/2 of the FTS-1 reservation charge, stated as a monthly rate. The deliverability charge is applicable to an FTS-3 shipper's Billing MHQ, which is the product of each dekatherm of a shipper's MHQ and 24 (this expresses the MHQ on an MDQ-equivalent basis). Therefore, the deliverability charge reflects a shipper's higher hourly take to the extent the shipper's MHQ exceeds 1/24th of the MDQ.

**Q. Please describe the capacity charge.**

A. The capacity charge is equal to one half of the FTS-1 reservation charge, stated as a daily rate (*i.e.*, multiplied by 12 then divided by 365). The capacity charge is applicable to an FTS-3 shipper's Billing MDQ, which is equal to an FTS-3 shipper's MDQ multiplied by 365 then divided by 12. Despite the conversion to a daily rate, the capacity charge is designed to recover fixed costs equivalent to 1/2 of the fixed costs that the FTS-1 reservation charge is designed to recover for a given MDQ. The FTS-3 commodity charge is equal to the FTS-1 commodity charge.

**Q. Please describe the Rate Schedule FTS-3 service enhancements.**

A. ANR offers two service enhancement options to FTS-3 shippers including: (1) a 2-Hour Notice Service ("2HNS"); and (2) a Balancing Service. Shippers opting for one or both service enhancements must also pay the Enhancement Service ("ES") rate, which is a third rate component within the service enhancements of FTS-3 that is required if either of the enhancement options is chosen. 2HNS provides shippers the right to start-up and shut-down service upon providing ANR with two (2) hour(s) notice. Balancing Service provides shippers the right to a 25 percent imbalance tolerance between receipts and deliveries, as opposed to ANR's standard ten percent tolerance for all other services. Both 2HNS and Balancing Service are supported by storage, and the ES rate reflects the need for transportation to and from storage. Storage and transportation are both necessary in order to provide the flexibility each service enhancement requires.

**Q. How are the FTS-3 service enhancement rates designed?**

A. As with the base reservation rates for FTS-3, the service enhancement reservation rates are likewise composed of both a deliverability and capacity charge. The 2HNS reservation rates are derivatives of the storage component of the NNS reservation rate. The storage component of the NNS reservation rate recovers fixed costs associated with annual unratcheted Firm Storage Service ("FSS") and a return on working gas. The 2HNS deliverability rate is equal to one-half the aforementioned NNS storage component, while the capacity rate is likewise equal to 1/2 of the NNS storage component. As with the base FTS-3 capacity rate, the 2HNS capacity rate is stated as a daily rate (*i.e.*, multiplied by 12 then divided by 365). The 2HNS commodity rate is similarly equal to the NNS storage component commodity rate, which is in turn equal to the FSS commodity rate.

The Balancing Service reservation rates are derivatives of the system balancing component of the access fee applicable to all transportation services on ANR. The derivation of the system balancing component is more fully described below; however this rate component recovers the cost of providing shippers a ten percent imbalance threshold. FTS-3 shippers not subscribing to the Balancing Service are entitled to this same ten percent imbalance threshold. The Balancing Service provides a *total* imbalance threshold of 25 percent, meaning an additional 15 percent is provided for FTS-3 shippers subscribing to this service enhancement. This ratio of 15 percent to ten percent forms the net multiplier for the rate design units used to allocate costs to the Balancing Service. Therefore, costs are allocated to the Balancing Service on the basis of rate design units which have been assigned a net multiplier of 1.5, as applicable to the cost of system balancing only. The Balancing Service deliverability rate is equal to 3/4th (1.5 multiplied by 1/2) of the system balancing component of the access fee – although this is not a separately stated rate in ANR's tariff. Accordingly, the Balancing Service capacity rate is also equal to 3/4th of the system balancing component of the access fee. The variable costs assigned to system balancing are recovered through ANR's generally applicable mileage-based commodity rates. A small portion of this variable cost is allocated to the Balancing Service on the basis of rate design units, which have been assigned a multiplier of 1.5.

The ES deliverability and capacity reservation rates are derivatives of the NNS transportation rate component, which in turn is the Northern Segment FTS-1 reservation rate multiplied by 7/12th, which reflects the transportation capacity required for NNS shippers to execute summer (seven months of twelve) injection into storage. The ES deliverability rate is equal to 1/2 the aforementioned NNS transportation component, while the capacity rate is likewise also equal to 1/2 of the NNS transportation component. As with the base FTS-3 capacity rate, however, the ES capacity rate is stated as a daily rate (*i.e.*, multiplied by 12 then divided by 365). The ES commodity rate is similarly equal to the NNS transportation component commodity rate, which is in turn equal to the Northern Segment FTS-1 commodity rate.

**Q. Please describe Rate Schedule ITS-3.**

A. ITS-3 is an interruptible service that addresses the needs of power generation shippers that assumes an MHQ of one-sixth of imputed MDQ. The ITS-3 rate is a 100 percent load factor, bundled, postage stamp version of the FTS-3 rate, including service enhancements.

**Q. How does ANR design its ITS-3 rates?**

A. The ITS-3 maximum rate is designed as a bundle of three principal rate components including: (1) NNS, representing 2HNS and ES; (2) FTS-1, based on the arithmetic mean of three transportation paths;[6] and (3) Balancing Service. As with the FTS-3 reservation rates, each ITS-3 deliverability rate component is equal to 1/2 of the rate from which it is derived. The sum of the monthly deliverability rate components is then stated as a daily rate (*i.e.*, multiplied by 12 then divided by 365), and multiplied by the product of 1/6th and 24, the hourly flow multiplier. As with the FTS-3 reservation rates, each ITS-3 capacity rate component is equal to 1/2 of the rate from which it is derived, although stated as a daily rate (*i.e.*, multiplied by 12 then divided by 365). Each commodity rate component is equal to the commodity rate from which it is derived. The one-part ITS-3 rate is yielded by the sum of (1) the daily deliverability rate, (2) the sum of the daily capacity rate components, and (3) the sum of the commodity rate components.

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[6] The three transportation paths are: (1) Northern Segment to Northern Segment, (2) Southeast Area to Northern Segment, and (3) Southwest Area to Northern Segment.

**Q. Please describe Rate Schedules FTS-4 and FTS-4L.**

A. FTS-4 and FTS-4L are offsetting firm transportation services designed to promote the efficient use of capacity on ANR given a fully subscribed segment of capacity on a discrete portion of ANR's pipeline network.[7] FTS-4 and FTS-4L shippers are subject to a "must-flow condition," thereby allowing ANR to provide service on both sides of the capacity constraint on a firm basis by offsetting each shipper's respective flows.

**Q. How does ANR design its FTS-4 and FTS-4L rates?**

A. FTS-4 and FTS-4L rates are designed on an identical basis as FTS-1.

**Q. Please describe Rate Schedule ETS.**

A. ETS is a firm transportation service designed specifically for local distribution company ("LDC") shippers. ETS service is similar to FTS-1 service, although it provides two additional service enhancements. ETS service provides shippers the ability to aggregate multiple delivery points – often multiple city gates – under a single ETS contract, thus providing an ETS shipper the ability to move delivery point volumes among multiple gate stations. Additionally, ANR's tariff provides ETS shippers the right to deliver up to 1/16th of their MDQ on an hourly basis.

**Q. How does ANR design its ETS rates?**

A. As more fully explained by ANR witness Linder, ETS rates reflect a 1.5x multiplier to the mileage reservation charge in the zone of delivery for a given path, with all other rate components being equal to FTS-1 service.

**Q. Please describe Rate Schedule PTS-1.**

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[7] The capacity constraint between Bridgman and Defiance – commonly referred to as the "Tie-Line" – is that for which FTS-4 and FTS-4L is designed.

A. PTS-1 is a pooling service that is only permitted to deliver gas to a logical pooling point, known as a "Headstation," in either the Southeast or Southwest Areas. PTS-1 shippers are not assessed a charge for pooling; rather, downstream shippers that receive gas from PTS-1 contracts at a Headstation pay for the costs associated with PTS-1 pooling through either a firm or interruptible contract. Similarly, the priority of PTS-1 service is derived from the downstream shipper nominating from the Headstation. In that regard, transportation service rendered under PTS-1 is firm up to the quantities of firm transportation nominated under the corresponding downstream transportation service contracts. All other PTS-1 quantities are transported on an interruptible basis. The majority of pooling on ANR occurs under PTS-1.

**Q. How does ANR allocate costs to the downstream shippers that benefit from PTS-1 service?**

A. As described above, costs associated with PTS-1 activity are recovered through firm and interruptible (*i.e.*, FTS-1, ITS, etc.) contract rates applicable to downstream shippers receiving gas at a Headstation in either of the Southeast or Southwest Areas. Rate design units associated with downstream contracts that receive gas at a Headstation are included in the design of the Southeast and Southwest Area firm and interruptible rates. Mileage rate design units within the Southeast and Southwest Areas are imputed for these downstream contracts and are set equal to the average miles of haul associated with PTS-1 nominations within the respective Areas.

**Q. Please describe Rate Schedule PTS-2.**

A. PTS-2 is a firm point-to-point pooling service offered for receipt and delivery points within the Southeast Area and the Southwest Area.

**Q. How does ANR design its PTS-2 rates?**

A. As more fully explained by ANR witness Linder, the PTS-2 rates are equal to either the Southeast Area FTS-1 mileage rate or the Southwest Area FTS-1 mileage rate, for both reservation and commodity

**Q. Please describe Rate Schedule PTS-3.**

A. PTS-3 is an interruptible point-to-point pooling service offered for receipt and delivery points within the Southeast Area and the Southwest Area.

**Q. How does ANR design its PTS-3 rates?**

A. As more fully explained by ANR witness Linder, the PTS-3 rate is equal to the mileage component of either the Southeast Area ITS rate or the Southwest Area ITS rate.

**Q. How, in general, does ANR design its Rate Schedule FSS rates?**

A. As discussed earlier in my testimony, ANR applies the Equitable method to the overall storage cost-of-service, net of storage costs directly allocated to system balancing and NNS, when classifying storage function costs for purposes of designing firm storage rates. Under the Equitable method, ANR's FSS rates are comprised of a deliverability reservation charge, a capacity reservation charge, and a commodity injection/withdrawal rate. The deliverability charge is designed as a monthly charge that is based upon contract MDWQ. The capacity charge is designed as an annual charge that is based upon contract MSQ, although customers are billed on a monthly basis.[8] The commodity charge is based upon a shipper's respective injection and withdrawal quantities.

**Q. Please describe the various Rate Schedule FSS service offerings.**

A. The FSS service offerings include combinations of the following features:

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[8] For billing purposes, FSS shippers' monthly FSS capacity charge is applied to 1/12th of MSQ.

a) Seasonal storage rights: firm injection rights between April 1 and October 31 and firm withdrawal rights between November 1 and March 31;

b) Annual storage rights: referred to in the tariff as Flexible Entitlements ("FE"), these rights allow customers to inject and withdraw gas at any time during the calendar year and to cycle up to approximately 140 percent of a shipper's MSQ;

c) Ratcheted storage rights: has a maximum daily injection quantity ("MDIQ") equal to 1/175th of the MSQ. However, a shipper's MDIQ and MDWQ rights are adjusted (ratcheted) downward at certain thresholds as a shipper's actual quantity of stored gas approaches MSQ limits in either direction (*i.e.*, nearly full or nearly empty); and

d) Unratcheted storage rights: has an MDIQ equal to 1/200th of the MSQ, and a customer can inject the full MDIQ and withdraw the full MDWQ during the applicable injection and withdrawal periods without being subject to ratchets.

FSS service options that make use of these features include: (1) seasonal ratcheted; (2) seasonal unratcheted; (3) annual ratcheted; and (4) annual unratcheted service.

**Q. Please describe in general how these various service offerings are distinguished through rate design.**

A. As described in greater detail below, the annual storage services receive a greater allocation of fixed storage compression costs than the seasonal storage services, reflecting that the annual service options require greater use of compression in order to allow customers to inject and withdraw gas year-round and cycle gas up to approximately 140 percent of MSQ. In addition, the ratcheted storage service deliverability rates are designed at 80 percent of the rate levels applicable to the unratcheted storage service deliverability rates to reflect the fact that unratcheted storage service is a premium service relative to ratcheted storage service.

**Q. Please describe how storage compression plant costs are identified.**

A. In order to determine fixed compression-related costs from the overall storage cost-of-service, I identify property plant and equipment reflected in FERC Account Nos. 351.2 (Storage Compressor Station Structures) and 354 (Storage Compressor Equipment) as compression-related plant, while all other 350 series (*i.e.*, storage function) plant accounts are deemed "wells and laterals."

**Q. How are compression-related costs allocated to the storage services with annual "flexible entitlement" rights?**

A. First, the cost-of-service is classified under the Equitable method. Second, I calculated the ratio of compression-related gross plant to total storage plant. Third, I applied the resulting percentage to the overall deliverability cost-of-service to determine the compression-related cost allocation. Consistent with historic practice, this compression-related cost allocation is only recovered on a deliverability basis. Fourth, maximum rate design units for annual storage services, in addition to maximum rate design units associated with derivative services NNS and DDS, are expressed as a percentage of *all* maximum storage services, including seasonal service options.[9] This percentage is then multiplied by the compression-related deliverability costs yielding the allocation to annual (*i.e.*, Flexible Entitlement) storage services.

**Q. How does ANR design FSS rates for each of the four service types discussed above?**

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[9] In this calculation, unratcheted equivalents are used (*i.e.*, ratcheted deliverability rate design units are assigned a multiplier of one, rather than 8/10th) to reflect the fact that only the *base* deliverability charge, not the Flexible Entitlement premium, is reduced for ratcheted service options (refer to testimony below for a discussion of the calculation of the base deliverability charge for ratcheted service).

A. Deliverability reservation costs, net of compression costs allocated to annual services, are divided by total deliverability rate design units for all four service types to arrive at base deliverability charges for each of the four service types. The rate design units associated with the ratcheted FSS service options are subject to a multiplier of 8/10th, reflecting the reductions to MDIQ and MDWQ due to ratcheting. The rate design units of both unratcheted FSS service options are subject to a multiplier of one, reflecting these services' entitlement to full MDIQ and MDWQ rights, regardless of the associated storage balance. Both annual (or Flexible Entitlement) FSS options are charged a premium deliverability rate component, based upon assigned compression-related costs, in addition to the applicable base deliverability charge. The compression-related deliverability costs associated with the Flexible Entitlement service premium are divided by total Flexible Entitlement service rate design units, yielding the Flexible Entitlement deliverability rate component. The capacity reservation charges do not vary between FSS service types. Capacity reservation costs are divided by the total capacity rate design units, which do not have a ratcheting feature. Similarly, injection/withdrawal charges do not vary between FSS service types. Injection/withdrawal commodity costs are divided by annual injection/withdrawal quantities, which also do not have a ratcheting feature.

**Q. Please describe Rate Schedule DDS.**

A. DDS is an interruptible storage service. DDS agreements specify a contract MSQ, however DDS MDIQ and MDWQ are set forth in ANR's tariff. DDS MDIQ is fixed at 1/30th of a shipper's MSQ. MDWQ varies on a monthly basis and is based upon the number of days in the current service month. This effectively defines DDS as a 30.42 day service.[10]

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[10] The average number of days per month is 365 days / 12 months = 30.42 days.

**Q. Is ANR proposing any changes to the DDS rate design?**

A. Yes, ANR is effectively proposing a unit change from a monthly rate to a daily rate. The daily rate design for DDS will provide shippers with greater transparency as to the calculation of DDS invoices by separately identifying each day's DDS balance and applying a daily rate to such balance, rather than identifying only an average daily balance over a month and applying a monthly rate to such balance. Accordingly, ANR is proposing to modify Section Part 5.13.3(1)–General Terms and Conditions–Rate Schedule DDS of its Tariff to align with the change in rate design. ANR anticipates the unit change will be revenue neutral.

**Q. Given this change, how does ANR design its DDS rate?**

A. The DDS rate is a one-part rate comprised of a deliverability component, a capacity component, an injection component, and a withdrawal component. A daily rate is applied to the Dth of gas stored on each day (Daily Balance or "DB"). The deliverability component of the DB rate is calculated by dividing the monthly annual unratcheted FSS deliverability rate by the tariff-defined 30.42 days of service, then multiplied by twelve and divided by 365, yielding a daily rate component that reflects the average days of service for DDS. The capacity component of the DB rate is calculated by dividing the annual FSS capacity rate by 365, yielding a daily rate component. Both the injection rate and the withdrawal rate are equal to the respective FSS rates divided by 365, reflecting the imputed capacity utilization. Summing the deliverability, capacity, injection, and withdrawal components yields a single daily DB rate.

**Q. Please describe Rate Schedule NNS.**

A. Designed primarily for customers with unpredictable load requirements, NNS is a firm "no-notice" service that provides shippers the flexibility to take more or less gas at a delivery point than the quantity nominated under a transportation agreement. Flexibility is provided up to a shipper’s no-notice entitlement, without advance notification to ANR. NNS is only available to shippers who hold both firm transportation and firm storage agreements.

**Q. How does ANR design its NNS rates?**

A. NNS is a two-part rate comprised of a monthly reservation charge and a commodity charge. The reservation charge is comprised of four rate components including: (1) an FSS deliverability component; (2) an FSS capacity component; (3) a working gas component; and (4) an FTS-1 transportation component.

**Q. Please describe the design of the NNS reservation charge.**

A. An annual dollar amount related to NNS’s reliance on firm storage is first determined by applying FSS deliverability and capacity charges to NNS no-notice entitlements and capacity dedicated to NNS, respectively. This annual dollar amount is then added to the fixed costs associated with working gas dedicated to NNS, addressed earlier in my testimony. This total dollar amount is then divided by the NNS no-notice entitlements multiplied by 12, to arrive at a monthly charge representing three of the four reservation components. This three-component monthly charge is then added to a fourth component; the FTS-1 Northern Segment rate multiplied by 7/12th (reflecting the number of summer months in the gas year). The result is the monthly reservation rate applicable to NNS.

**Q. Please describe the design of the NNS commodity rate.**

A. The NNS commodity rate is the sum of the FSS injection/withdrawal rate and the FTS-1 Northern Segment commodity rate, the designs of each of which are discussed above.

**Q. Please describe the design of the NNS overrun rate.**

A. The NNS overrun rate is calculated by converting the NNS reservation rate to a daily rate (*i.e.*, multiplied by 12 then divided by 365) then multiplying by 1.5. The result is then summed with the commodity rate. The overrun rate design methodology comports with Commission findings during ANR's Order No. 636 restructuring proceeding.

**Q. Please describe Rate Schedule MBS.**

A. Market Balancing Service ("MBS") is an interruptible service designed to allow shippers to manage imbalances. This balancing service is effectuated when ANR either withdraws gas from a shipper's MBS storage account to supplement gas supply or injects excess gas supply into the MBS storage account.

**Q. How does ANR design its MBS rates?**

A. ANR designs the MBS rate consistent with the historical design that was developed in ANR's restructuring docket. The historical design results in three MBS path rates to and from storage, including the Northern Segment to Northern Segment path, the Northern Segment to Southeast Mainline path, and the Northern Segment to Southwest Mainline path. Each MBS path rate is a three-part rate comprised of a daily deliverability rate, a monthly capacity rate, and a commodity rate.

**Q. Please describe the design of the MBS daily deliverability rate.**

A. The daily delivery rate is comprised of ITS and FSS components that reflect the transportation of gas from the city-gate to storage, or from storage to the city-gate. To arrive at this rate, the FSS annual unratcheted monthly deliverability rate is converted to a daily rate (*i.e.*, multiply by twelve and divide by 365) and added to components of the ITS rate for the applicable path (50 percent of the ITS access component plus total ITS mileage components less the MBS commodity rate, described below).

**Q. Please describe the design of the MBS monthly capacity rate.**

A. The MBS capacity rate is the monthly equivalent (*i.e.*, divided by 365) of the FSS capacity rate, which is an annual rate.

**Q. Please describe the design of the MBS commodity rate.**

A. The commodity rate recovers the variable transportation costs related to MBS and the variable injection/withdrawal charges related to MBS. Thus, the MBS commodity rate is the sum of the applicable ITS minimum rate, multiplied by 50 percent,[11] and the FSS injection/withdrawal rate.

**Q. Please describe Rate Schedule IPLS**

A. Interruptible Park and Lend Service ("IPLS") is designed to allow shippers, on an interruptible basis, to park gas on ANR or borrow gas from ANR.

**Q. How does ANR design its IPLS rates?**

A. The IPLS rate is a one-part rate calculated as the arithmetic mean of three ITS transportation paths, including: (1) the Northern Segment to Northern Segment path; (2) the Southeast Area to Northern Segment path; and (3) the Southwest Area to Northern Segment path.

**Q. Please describe Rate Schedule IWS.**

A. Interruptible Wheeling Service ("IWS") is offered at the Joliet Hub and the Lebanon Hub. It is comprised of short-haul interruptible transportation (wheeling) to and from Joliet Hub points located between ANR's Sandwich, Illinois compressor station and the Crown Point, Indiana interconnection, in addition to Lebanon Hub points along the Lebanon Lateral in Ohio.

**Q. How does ANR design its IWS rates?**

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[11] The remaining 50 percent of the appliable ITS minimum rate is recovered through the daily delivery rate as described above.

A. The IWS rate is a one-part rate which equals the ITS rate for the single zone in which the wheeling hub resides.[12]

**Q. Please describe Rate Schedule STS.**

A. Small Transportation Service ("STS") was created to replace the pre-restructuring SGS-1 service for the benefit of low load factor customers. STS bundles transportation, storage, and no-notice service for customers requiring at most 10,000 Dth/d into a single, one-part commodity rate. Service under STS is provided across three distinct areas of the ANR system, including the Southeast Mainline (zones ML-2 and ML-3), the Southwest Mainline (zones ML-5 and ML-6), and the Northern Segment (zone ML-7). STS service does not allow for delivery to the Southeast or Southwest Areas.

**Q. How does ANR design its STS rates?**

A. The STS rate continues to be designed as a one-part, 33 percent load factor rate comprised of an FSS seasonal ratcheted storage service component, an ETS transportation component (reflecting the movement of gas to a shipper's city-gate and to-and-from storage), and an NNS component. Transportation costs are allocated to STS based upon actual commodity quantities and reservation quantities that are imputed based upon a 33 percent load factor assumption, while storage costs are based upon a 50-day service assumption. STS component rates for each service used to support STS are subsequently added together in order to arrive at STS rates applicable to the various paths noted above.

**Q. Does this conclude your testimony?**

A. Yes.

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[12] The Lebanon Hub IWS rate equals the Southeast Central Segment ITS rate, and the Joliet Hub IWS rate equals the Northern Segment ITS rate.

# UNITED STATES OF AMERICA
# BEFORE THE
# FEDERAL ENERGY REGULATORY COMMISSION

ANR Pipeline Company ) Docket No. RP22-____-000

State of Texas )
) ss.
County of Harris )

## AFFIDAVIT OF GREGORY S. BARRY

Gregory S. Barry, being first duly sworn, on oath states that he is the witness whose testimony appears on the preceding pages entitled "Prepared Direct Testimony of Gregory S. Barry"; that, if asked the questions which appear in the text of said testimony, he would give the answers that are therein set forth; and that affiant adopts the aforesaid testimony as Gregory S. Barry's sworn testimony in this proceeding.

DocuSigned by:
Greg Barry
6FE21D188B2D4AB...

Gregory S. Barry

SWORN TO AND SUBSCRIBED BEFORE ME THIS 20th DAY OF January, 2022. This notarial act was an online notarization.

**Notary Seal**

SHELIA O. COPUS
Notary ID
976876
My Commission Expires
2/22/2023

**Digital Certificate**

DocuSigned by:
Shelia Copus
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Docket No. RP22-__-000
Exhibit No. ANR-0051

# UNITED STATES OF AMERICA
# BEFORE THE
# FEDERAL ENERGY REGULATORY COMMISSION

ANR Pipeline Company ) Docket No. RP22 -___-000

## Summary of the Prepared Direct Testimony of Eric J. Miller, Jr.

Eric J. Miller, Jr. is the Director, Commercial West of TransCanada USA Services, Inc. Mr. Miller's testifies regarding various components of Statement G on behalf of ANR Pipeline Company ("ANR"). His testimony addresses the actual revenues and billing determinants for the 12-month base period ending October 31, 2021, as adjusted to reflect known and measurable changes anticipated to occur during the adjustment period, which ends on July 31, 2022. Mr. Miller identifies and explains the discounted rate contracts for which ANR is seeking a discount adjustment. He also addresses the negotiated rate contracts for which ANR is seeking a discount-type adjustment, and explains the competitive reasons that led ANR to agree to negotiated rates. Finally, Mr. Miller provides support for ANR's proposal to eliminate term-differentiated rates for storage services.

Docket No. RP22-___-000
Exhibit No. ANR-0051

# UNITED STATES OF AMERICA
# BEFORE THE
# FEDERAL ENERGY REGULATORY COMMISSION

ANR Pipeline Company ) Docket No. RP22-___-000

# PREPARED DIRECT TESTIMONY OF ERIC J. MILLER, JR. ON BEHALF OF ANR PIPELINE COMPANY

January 28, 2022

# Glossary of Terms

| | |
|---|---|
| Adjustment Period | The nine-month period ending July 31, 2022 |
| ANR | ANR Pipeline Company |
| Antero | Antero Resources |
| Base Period | The twelve-month period ending October 31, 2021 |
| CGC | City Gas Company |
| Commission | Federal Energy Regulatory Commission |
| Dth | Dekatherms |
| Dth/d | Dekatherms per day |
| FERC | Federal Energy Regulatory Commission |
| FSS | Rate Schedule FSS, firm storage service |
| GBF | George B. Franklin & Sons |
| Guardian | Guardian Pipeline, L.L.C. |
| IGC | Indiana Gas Company |
| IPL | Interstate Power & Light Company |
| IPLS | Interruptible Park and Lend Service |
| MDQ | Maximum Daily Quantity |
| MDWQ | Maximum Daily Withdrawal Quantity |
| MSQ | Maximum Storage Quantity |
| NBPL | Northern Border Pipeline Company |
| NEXUS | NEXUS Gas Transmission |

| | |
|---|---|
| NGPL | Natural Gas Pipe Line Company of America |
| Nicor | Nicor Gas Company |
| Northern | Northern Natural Gas Company |
| NSG | North Shore Gas Company |
| Peoples | Peoples Gas |
| Rover | Rover Pipeline |
| SEHS | Southeast Headstation |
| TC Energy | TC Energy Corporation |
| Test Period | The Base Period and the Adjustment Period |
| Vector | Vector Pipeline |
| Viking | Viking Gas Transmission Company |
| WEP | Wisconsin Electric Power |
| WG | Wisconsin Gas |
| WPL | Wisconsin Power and Light |
| WPSC | Wisconsin Public Service Corporation |

# UNITED STATES OF AMERICA
# BEFORE THE
# FEDERAL ENERGY REGULATORY COMMISSION

ANR Pipeline Company ) Docket No. RP22-___-000

## Prepared Direct Testimony of Eric J. Miller, Jr.

**Q: What is your name and business address?**

A: My name is Eric J. Miller, Jr. My business address is TC Energy Corporation ("TC Energy"), 700 Louisiana Street, Houston, Texas 77002.

**Q: What is your occupation?**

A: I am employed by TransCanada USA Services Inc., an indirect subsidiary of TC Energy, as the Director, Commercial West. TransCanada USA Services Inc. employs all personnel in the United States who are involved in the operation and maintenance of TC Energy's U.S. energy systems and facilities, including ANR Pipeline Company ("ANR"). I am filing testimony on behalf of ANR.

**Q: Please describe your educational background and your occupational experience as they are related to your testimony in this proceeding.**

A: I graduated from the University of Tulsa in 2002 with a Bachelor of Science degree in Mechanical Engineering. I received a Master of Business Administration degree from the University of Phoenix in 2008. I am a licensed Professional Engineer in the state of Texas. Beginning in 2014, I was employed by NiSource Corporation, then Columbia Pipeline Group ("CPG"), in a Facility Planning role working on the Columbia system. My duties for this role included providing the hydraulic design and modeling for pipeline expansion projects and verifying existing capacity available for posting and capacity sales. In 2016, as part of the purchase of the CPG assets, I came to work at TransCanada

Corporation (now TC Energy). In 2018, I transitioned into a business development role, which duties included executing commercial documents for expansion projects along the TC Energy's U.S. pipeline networks. In my current role as Director, Marketing West, I focus on the customer and system aspects of TC Energy's western U.S. pipeline infrastructure.

**Q: Have you ever testified before the Federal Energy Regulatory Commission ("Commission") or any other energy regulatory commission?**

A: No.

**Q: What is the purpose of your testimony in this proceeding?**

A: I am providing testimony regarding various components of Statement G, as set forth in 18 C.F.R. § 154.312. In particular, my testimony addresses ANR's reporting of actual revenues and billing determinants for the 12-month base period ending October 31, 2021 ("Base Period"), as adjusted to reflect known and measurable changes anticipated to occur within the nine-month adjustment period, which concludes on July 31, 2022 ("Adjustment Period") (together, the "Test Period"). I will also identify the discounted rate contracts for which ANR is seeking a discount adjustment in this case, and explain the circumstances which lead ANR to discount its services. I also address the negotiated rate contracts for which ANR is seeking a discount-type adjustment and explain the competitive circumstances which led ANR to agree to the negotiated rates for these contracts. Finally, I will provide support for ANR's proposal to eliminate term-differentiated rates for its storage services.

**Q. Are you sponsoring any statements or schedules?**

A. Yes, I am sponsoring the following statement and schedules:

| | |
|---|---|
| Exhibit No. ANR-0086 | Statement G (Summary Data) |

| | |
|---|---|
| Exhibit No. ANR-0087 | Schedule G-1 (Base Period) |
| Exhibit No. ANR-0088 | Schedule G-2 (Adjustment Period) |
| Exhibit No. ANR-0089 | Schedule G-3 (Reconciliation of Base Period to Adjustment Period) |

**Q: Are you sponsoring any exhibits in addition to your testimony?**

A: Yes, I am sponsoring the following exhibits:

| | |
|---|---|
| Exhibit No. ANR-0052 | ANR Contract Changes During Test Period |
| Exhibit No. ANR-0053 | Discounted Firm Transportation Contracts |
| Exhibit No. ANR-0054 | Discounted Interruptible Transportation Contracts |
| Exhibit No. ANR-0055 | Negotiated Rate Contracts for Discount-Type Adjustment |
| Exhibit No. ANR-0056 | Wisconsin Public Service Commission Letter |
| Exhibit No. ANR-0057 | Interstate Pipeline Deliveries Into Wisconsin |
| Exhibit No. ANR-0058 | Excerpts from Guardian Certificate Applications |
| Exhibit No. ANR-0059 | IPL Portfolio Correspondence |
| Exhibit No. ANR-0060 | George B Franklin & Sons Extension Request |
| Exhibit No. ANR-0061 | MPSC Michigan Natural Gas Active Storage Field Summary |

## I. REVENUE AND BILLING DETERMINANTS ANALYSIS

### Statement G (Summary Data)

**Q: What does Statement G contain?**

A. Statement G summarizes and compares on a monthly and annual basis ANR’s Base Period and Adjustment Period monthly revenues and billing determinant totals as shown in Schedules G-1 and G-2, respectively. The reconciliation of differences between the Base Period and Adjustment Period totals is provided in detail in Schedule G-3.

**Schedule G-1 (Base Period)**

**Q: What does Schedule G-1 contain?**

A. Schedule G-1 sets forth ANR's Base Period actual revenues and billing determinants on a monthly basis, categorized by rate schedule, and therein grouped by shipper, contract, and transportation path.

**Q: How are temporary capacity release revenues and billing determinants treated in Schedule G-1?**

A. In Schedule G-1, commodity billing determinants, and related revenues associated with capacity release activity are reflected by contract. Reservation billing determinants are not reflected because the released capacity is directly offset by the replacement capacity.

**Q: Were there any discounted firm transportation contracts in place during the base period?**

A. Yes. Please see Exhibit No. ANR-0053 for a list of discounted firm transportation contracts organized on the basis of whether they are long-term or short-term contracts.

**Q: Did ANR discount interruptible transportation service during the base period?**

A. Yes. Exhibit No. ANR-0054 lists ANR's discounted interruptible transportation contracts that were in effect during the Base Period.

**Q: Were any of these discounts granted to affiliates?**

A. No, there were no discounts granted to affiliates**.**

**Q: Were there any negotiated rate contracts in place during the base period?**

A. Yes, the negotiated rate contracts are identified in Schedule G-1.

**Schedule G-2 (Adjustment Period)**

**Q: What does Schedule G-2 contain?**

A. Schedule G-2 contains ANR's Base Period revenues and billing determinants, adjusted for known and measurable changes that are expected to occur during the Adjustment Period.

**Q: Please describe the adjustments associated with long-term firm transportation contracts.**

A: I have adjusted reservation quantities associated with long-term firm transportation contracts to reflect several known and measurable developments. I have divided these long-term firm transportation contracts into categories describing the known and measurable developments which are listed below and detailed in Exhibit No. ANR-0052:

- Contract Turnback

  Shippers holding 19 long-term firm transportation contracts (winter, summer, or annual) with expiration dates before or during the Adjustment Period and that possess renewal rights did not renew (or are anticipated not to renew) all or a portion of their contracts. The reservation quantities for these contracts have been removed in the Adjustment Period to reflect shipper turnback of these contract volumes.

- Contract Expiration

  Shippers holding 76 long-term firm contracts with expiration dates before or during the Adjustment Period and that do not contain right of first refusal ("ROFR") provisions have been removed in the Adjustment Period.

- New Contracts

  Shippers hold 28 long-term firm contracts that will begin during the Adjustment Period. These contracts will be annualized for the period.

- Maximum Daily Quantity ("MDQ") Changes

  Shippers hold 22 long-term firm contracts that extend beyond the Test Period but amended the MDQ before or during the Adjustment Period. These contracts will be annualized for the period.

**Q: Please describe the adjustments associated with long-term firm storage contracts.**

A: I have adjusted reservation quantities associated with long-term firm storage contracts to reflect several known and measurable developments. I have divided these long-term firm storage contracts into categories describing known and measurable developments which are listed below and detailed in Exhibit No. ANR-0052:

- Contract Turnback

  Shippers holding two long-term firm storage contracts (winter, summer, or annual) with expiration dates before or during the Adjustment Period and that possess renewal rights did not renew (or are anticipated not to renew) all or a portion of their contracts.

- Contract Expiration

  Shippers hold 47 discounted long-term firm storage contracts with expiration dates before or during the Adjustment Period and that do not contain ROFR provisions. These contracts have been removed in the Adjustment Period.

- New Contracts

  There are five long-term storage contracts that will begin during the Adjustment Period. These contracts will be annualized for the period.

- Maximum Storage Quantity (“MSQ”) and Maximum Daily Withdrawal Quantity (“MDWQ”) Changes

  Shippers hold four long-term firm contracts that extend beyond the Test Period but amended the MSQ and MDWQ before or during the Adjustment Period. These contracts will be annualized for the period.

**Q: Are there any adjustments associated with short-term firm transportation or interruptible contracts?**

A. No, there are no such adjustments.

### Schedule G-3 (Reconciliation of Base Period to Adjustment Period)

**Q**: **What does Schedule G-3 contain?**

A. Schedule G-3 provides a line item reconciliation of the base and adjustment periods. Categorized by rate schedule, specific contractual adjustments and assumptions leading to all other adjustments are shown as additions or subtractions to the original base period determinants and revenues in order to show how the adjustment period totals in Schedule G-2 were derived.

**Q**: **Why are Interruptible Park and Lend Service ("IPLS") volumes and revenues normalized?**

A. IPLS revenues during the Base Period were significantly higher than normal compared to what is typical for ANR. From November 1, 2020 to the end of the Base Period, IPLS revenues amounted to more than $27.7 million, which is more than the combined IPLS revenue from the entire three-year period 2018-2020. These anomalous IPLS revenues and quantities were primarily due to gas shortages as a result of Winter Storm Uri, which occurred February 13-17, 2021. The impact of the winter storm was felt in the Midwest for weeks after the actual storm. During this period, ANR used its ability to draw gas from its storage facilities and its IPLS service to meet the high demand across the pipeline's footprint. As a result, IPLS revenues and volumes during the Base Period are substantially in excess of those experienced by ANR in a typical year. This phenomenon is primarily the result of an extreme polar vortex event, which is rare and is not anticipated to recur on a routine basis. For these reasons, it is appropriate to normalize IPLS revenue using a three-year average of revenues for the immediately preceding years (2018-2020).

## II. DISCOUNT ADJUSTMENTS

**Q: Is ANR proposing any discount adjustments for discounted rate contracts?**

A. Yes, ANR is proposing a discount adjustment for its discounted rate contracts. ANR witness Barry describes the crediting methodology used by ANR in calculating the discount adjustment.

**Q: Can you discuss ANR's process for approving discounts?**

A. ANR discounts on a short-term and long-term basis in order to meet competition and thus to maximize usage of its pipeline capacity. Utilizing our pipeline flow models, ANR may be able to offer capacity from certain requested receipt locations to certain delivery points. In those areas where competitive pressure may exist, ANR may choose to honor requests for discounted transportation contracts on a not unduly discriminatory basis. Factors that are considered in determining whether to approve a discount, whether short-term or long-term, may include: the type of transport that would be available; pipe-on-pipe competition in the area; total capacity length versus market interest in the requested transportation path; the growing trend of end users looking for a more diversified supply mix, including production from different supply basins or the transition to renewable energy; and the threat of producers moving to serve demand that would not translate into more transport on ANR. ANR makes the determination to enter into discounted transportation contracts, whether short-term or long-term, on a case-by-case basis and based on market conditions prevailing at the time ANR considers the request for a discount.

**Q: Is ANR proposing any discount-type adjustments for negotiated rate contracts?**

A. Yes. ANR has 36 active negotiated rate contracts for which it is seeking a discount-type adjustment. Below, I discuss the varying circumstances which required ANR to enter into a negotiated rate agreement. Generally speaking, the negotiated rate contracts were executed in order to retain existing demand, to avoid load leaving ANR, or to obtain additional load for the system. As I stated with respect to discounted contracts, ANR makes the determination to enter into negotiated rate contracts on a case-by-case basis and based on market conditions prevailing at the time ANR considers the request for a negotiated rate. Factors that impact ANR's determination include items such as the existence of pipe-on-pipe competition in the relevant area, the potential for end users to seek a more diversified supply mix, and the ability of producers to serve demand in other areas. Exhibit No. ANR-0055 provides relevant details for each contract (*e.g.*, term start and end dates, points of receipt and delivery, negotiated rate, and Shipper Information).

**Q: Are there any negotiated rate contracts for which ANR is not seeking a discount-type adjustment?**

A: No.

**Q: Are you knowledgeable about the circumstances that led ANR to enter into the negotiated rate contracts for which it is seeking a discount-type adjustment?**

A. Yes. While I was not directly involved in the negotiations of the contracts that are the subject of my testimony, I am very familiar with the relevant competitive environment and have reviewed documentation that supported ANR's decisions to agree to the negotiated rate arrangements.

**Q: Please explain why ANR entered into the negotiated rate contracts for which it is seeking a discount-type adjustment.**

A. As a threshold matter, ANR gains business only when it meets or beats competition. ANR competes with numerous options available to shippers, and the services that it provides can be provided by, or supplanted by, a variety of alternatives. Competition is what drives the decision by shippers to contract on ANR or to pursue other options available to them, and thus ANR earns its business by being the preferred provider of service in a very competitive market.

ANR faces several sources of competition. There are several interstate natural gas pipelines that historically have competed with ANR for deliveries into the Wisconsin and Chicago markets, which are the two largest markets on ANR's system. These pipelines are Guardian Pipeline, L.L.C. ("Guardian"), Natural Gas Pipe Line Company of America ("NGPL"), Northern Border Pipeline Company ("NBPL"), Northern Natural Gas Company ("Northern"), Vector Pipeline ("Vector"), and Viking Gas Transmission Company ("Viking"). Furthermore, ANR is experiencing added competition in its Northern Area (ML-7) from two pipelines, Rover Pipeline ("Rover") and NEXUS Gas Transmission ("NEXUS"), that have recently become operational. In addition to competition from other pipelines, ANR's competition also includes different fuel sources, such as renewable energy (*i.e.*, wind and solar), and the changing dynamic related to carbon emissions and associated state and federal initiatives continue to shape the future energy needs of end users, as described in greater detail by ANR witnesses Lakhani and Kirk. If our services are too expensive in this highly competitive market area, end users may choose to be served by another pipeline or by another fuel altogether. Utilizing negotiated rates and (as well as discounted rates, as appropriate) allows ANR to stay competitive.

**Q: Can you describe the market conditions under which ANR entered into the negotiated rate arrangements you discuss in your testimony?**

A. Most of the negotiated rate contracts for which ANR is seeking a discount adjustment are with local distribution companies in ANR's Northern Area rate zone which spans Wisconsin, northern Illinois (including the Chicago market), northern Indiana, Michigan, and northwest Ohio. By way of background, at the time that ANR restructured its operations pursuant to Order No. 636, it entered into ten-year contracts with the vast majority of its shippers. As a result, ANR faced a situation in 2003 where most of its load was under contracts that were coming up for renewal, and its shippers were free to pursue competitive options at that time. This had a particular impact on ANR's load in Wisconsin. The Commission had certificated the initial construction of a new greenfield pipeline, Guardian, from Joliet, Illinois to Ixonia, Wisconsin, in 2001, and those facilities ("G-I") went into service in 2002. Exhibit No. ANR-0056 is a 1999 Wisconsin Public Service Commission analysis of a request by Wisconsin Gas Company to change its gas supply plan to include transportation on Guardian. The exhibit demonstrates that Guardian was constructed to provide a competitive alternative to ANR.

When Guardian was proposed, ANR sought to compete with Guardian to add and retain load, but was unsuccessful and lost load in Wisconsin to Guardian as a result. As shown on Exhibit No. ANR-0057, which presents data compiled by the Wisconsin State Energy Office, by 2004 Guardian was supplying over ten percent of the natural gas delivered into Wisconsin, and much of its growth came at ANR's expense. Guardian subsequently expanded its Joliet-to-Ixonia segment and further extended its facilities from Ixonia to Green Bay, Wisconsin, with these facilities ("G-II") going into service in 2009. Again, ANR competed with Guardian to add and retain load, but Guardian was successful in supporting its expansion.

In response to these developments, ANR undertook two significant expansions in Wisconsin, in 2006 and 2009, and also renegotiated a portfolio of contracts with one of its major shippers in Wisconsin. The resulting contracts reflected the willingness of shippers to pay ANR's then-existing maximum tariff rates, but also their unwillingness to expose themselves to the risk that ANR could file for a rate increase at some point during longer contract terms. The contracts also reflected ANR's awareness that these shippers could pursue other options, such as Guardian, and of its need to offer competitive deals in order to gain and retain load. Exhibit No. ANR-0058 consists of excerpts from the G-I and G-II certificate applications, showing that Guardian was also entering into fixed rate contracts with its shippers, demonstrating that this was what the market was demanding at the time. This competitive environment has continued into the present day, and has required ANR to enter into negotiated rate arrangements to remain competitive.

**Q: Are there other factors that have led ANR to enter into negotiated rate agreements?**

A. Yes. As ANR witness Lakhani explains in greater detail, the development of Utica/Marcellus production has changed the supply and market dynamics on the entire ANR system, resulting in different transportation options on ANR, as well as expansions of existing pipelines and the development of new pipelines such as Rover and NEXUS. Specifically, flows on ANR's SE Mainline have reversed as ANR competes to serve growing and highly competitive markets in the Texas and Louisiana Gulf Coast region, and particularly markets for natural gas to be used as feedstock for LNG exports.

**Q: Can you describe ANR's specific reasons for agreeing to the negotiated rate contracts for which ANR is seeking a discount-type adjustment?**

A. ANR has 36 active negotiated rate contracts for which it is seeking a discount-type adjustment. I will provide the justifications underlying each negotiated rate arrangement, organized in the following categories: (1) load retention/bypass avoidance; (2) capacity expansion projects; and (3) Hoover/Diana supply attachment. Exhibit No. ANR-0055 itemizes these contracts in their respective groups as well as each contract's rate schedule, volume, term dates, and negotiated rates.

**Q: As a result of the foregoing, in your view, does ANR meet the tariff requirements for discount-type adjustments for negotiated rate agreements?**

A. Yes. As I demonstrate below, ANR was required to agree to the negotiated rates reflected in these agreements in order to meet competition, and absent ANR entering into these negotiated rate agreements, ANR would not have been able to contract for the capacity at any higher rate at the time the agreements were executed.

**Q: What impacts do the negotiated rate agreements identified in Exhibit No. ANR-0055 have on recourse rate shippers?**

A. As discussed in greater detail by ANR witness Barry, ANR's recourse rate shippers are better off than they would be if ANR did not enter into these negotiated rate agreements. That is, these negotiated rate agreements provide additional system billing determinants and revenues, permitting ANR to spread its fixed costs over more units of service, thereby benefitting ANR's recourse rate shippers. Without these contracts, recourse rate shippers would need to pay a higher transportation rate in order for ANR to have an opportunity to recover its cost-of-service. Accordingly, granting a discount-type adjustment for these negotiated rate agreements will not have an adverse impact on ANR's recourse rate shippers. Had ANR not entered into these negotiated rate agreements, ANR would not have been able to contract for the capacity at any higher rate, and recourse rates would otherwise be as high or higher than the recourse rates which result after applying the discount-type adjustment.

**Q: Are there above-maximum rate revenues for mainline transportation service from negotiated rate transactions for mainline transportation service that offset the below-maximum rate revenues from the negotiated rate transactions for mainline transportation service for which ANR seeks a discount-type adjustment?**

A. No. The rates under Contract Nos. 125082, 126278, 126279, and 126587 are above the maximum rate for their applicable transportation service. ANR witness Barry explains how these contracts are treated in his testimony.

**Load Retention/Bypass Avoidance**

**Q: Please discuss the specific negotiated rate contracts that were entered into in order to retain load or avoid bypass for which ANR is seeking a discount-type adjustment.**

A. ANR entered into several negotiated rate contracts in order to earn or retain the customer's business in the face of competitive alternatives available to the customer. I will discuss the contracts and negotiations involved by customer. First, I will discuss why ANR entered into certain negotiated rate agreements with Wisconsin Public Service Corporation ("WPSC"), Wisconsin Power and Light ("WPL"), Wisconsin Electric Power ("WEP"), North Shore Gas Company ("NSG"), Nicor Gas Company ("Nicor"), Peoples Gas ("Peoples"), Wisconsin Gas LLC ("WG"), and City Gas Company ("CGC"). Second, I will discuss why ANR entered into certain negotiated rate agreements with Vectren (now CenterPoint Energy), Antero Resources ("Antero"), and Interstate Power & Light Company ("IPL"). Third, I will discuss why ANR entered into individual negotiated rate agreements with Indiana Gas Company ("IGC") and George B. Franklin & Sons ("GBF"). I will also discuss why ANR entered into certain negotiated rate agreements for storage services.

**Q: What were the competitive circumstances that led ANR to enter into the identified negotiated rate agreements with WPSC, WEP, WG, WEP, Nicor, NSG, and CGC?**

A. ANR is seeking a discount-type adjustment for the following contracts: WPSC ETS Contract Nos. 5500 and 126333 and FTS-1 Contract No. 12000; WG ETS Contract No. 108014; WPL ETS Contract Nos. 126335, 126336, and 126340; WEP ETS Contract Nos. 107896, 111703, and 124627; Nicor ETS Contract No. 127117; NSG FTS-1 Contract No. 109024; and CGC FTS-1 Contract No. 109610. As I noted previously, ANR is one of five pipelines that serve the state of Wisconsin. Guardian, ANR's largest competitor into the Wisconsin market, was built relatively recently, and as shown on Exhibit No. ANR-0057, ANR lost a very significant portion of its Wisconsin business when G-I and G-II went into service. ANR vigorously competes for business against Guardian as well as other pipes delivering into the Wisconsin market area. ANR was at risk of losing more of the Wisconsin market and vigorously competed to reduce the impact to ANR and its remaining shipper base. ANR offered to extend the contracts identified at competitive rates for a long term. Because of this, and as part of the carefully balanced negotiations with this group of customers, ANR agreed to provide long-term rate certainty through negotiated rates fixed in an effort to gain secure extensions and execute new contracts. Extending/executing these agreements provided benefits to ANR and its remaining shipper base because ANR was able to successfully compete to retain significant contract demand.

**Q: What were the competitive circumstances that led ANR to enter into the seven identified negotiated rate agreements with WEP, WPL, WG, and Peoples?**

A. ANR is seeking a discount-type adjustment for the following contracts: WG FTS-1 Contract Nos. 129887 and 134403; WPL ETS Contract No. 126334; WEP FTS-1 Contract Nos. 122700 and 134394; and Peoples FTS-1 Contract No. 134662. The same competitive drivers that create the competitive environment in Wisconsin also drive competition in the Chicago market area. ANR is one of five pipelines that serve the Chicago market area outside the state of Wisconsin. Due to the competitive nature for the Chicago market, ANR believed itself to be at risk of losing this market. As a result, ANR entered into these negotiated rate contracts to compete with other pipelines for the purpose of reducing the impact to ANR and its remaining shipper base. Because of this, and as part of the carefully balanced negotiations with this group of customers, ANR agreed to provide long-term rate certainty through negotiated rates fixed in an effort to gain secure extensions and execute new contracts. Extending/executing these agreements provided benefits to ANR and its remaining shipper base because ANR was able to successfully compete to retain significant contract demand.

**Q: What were the competitive circumstances that led ANR to enter into the four identified negotiated rate agreements with Vectren and IGC?**

A. ANR is seeking a discount-type adjustment for the following contracts: Vectren ETS Contract Nos. 126278 and 126279; and IGC ETS Contract No. 126587. Under each of these contracts, the reservation rate for the shipper's primary path is the maximum Rate Schedule ETS recourse reservation rate, plus an additional charge of $0.7604/dekatherm ("Dth"). As part of the carefully balanced negotiations with these customers, in order to secure this additional load, ANR agreed to provide long-term rate certainty through fixed negotiated rates. Executing these agreements provided benefits to ANR and its remaining shipper base because ANR was able to successfully compete to gain additional contract demand.

**Q: What were the competitive circumstances that led ANR to enter into the identified negotiated rate agreement with Antero?**

A. ANR is seeking a discount-type adjustment for Antero FTS-1 Contract No. 125082. Antero's reservation rate for its primary transportation path is the maximum ML-3 to Southeast Area (SE) reservation rate under ANR's FTS-1 Rate Schedule, even though the primary transportation path is from ML-3 to ML-2. Originally, the primary delivery point was ANR's Southeast Headstation ("SEHS"). The increased contract rate is due to Antero requesting a primary delivery point located in the ML-2 zone and secondary access to ANR's SEHS, which is located in the Southeast Area. The negotiated rate will be greater than the recourse rate for the actual primary transportation path throughout the term of the contract, and the contract thereby provided benefits to ANR and its existing customer base by enabling ANR to successfully compete to add new contract demand to the system. As part of the carefully balanced negotiations with this customer, ANR agreed to provide long-term rate certainty through fixed negotiated rates.

**Q: What were the competitive circumstances that led ANR to enter into the identified negotiated rate agreement with IPL?**

A. ANR is seeking a discount-type adjustment for the following contract: IPL ETS Contract No. 118249. The original primary receipt point, Fayetteville, is located in ANR's ML-2 rate zone. Supply feeding this point of receipt has historically been from the Fayetteville Shale play. Because closer supply options had become readily available, particularly from ANR Storage and the Joliet Hub, located in ANR's ML-7 rate zone, IPL requested a receipt point change to shorten the path, as shown in Exhibit No. ANR-0059. To limit the financial impact of shortening the transportation path, ANR and IPL agreed to the current negotiated rate shown in Exhibit No. ANR-0055, which is greater than an ML-7 to ML-6 transportation rate but less than an ML-3 to ML-6 transportation rate. Executing this agreement provided benefits to ANR and its remaining shipper base because ANR was able to successfully compete to limit the loss of contract demand through multiple zones.

**Q: What were the competitive circumstances that led ANR to enter into the identified negotiated rate agreements with GBF?**

A. ANR is seeking a discount-type adjustment for GBF FTS-2 Contract No. 126063. ANR agreed to a negotiated rate contract in order to earn the customer's business and to add load to the system on a transportation path where ANR had ample capacity available and where the ability to market the capacity was limited (as shown in Exhibit No. ANR-0060). Therefore, the contract provided benefits to ANR and its existing customer base by adding new contract demand to the system. As part of the carefully balanced negotiations with this customer, ANR agreed to provide long-term rate certainty through negotiated fixed rates.

**Q: What were the competitive circumstances that led ANR to enter into the eight identified negotiated rate storage agreements with NSG, WPSC, WEP, WPL, WG, and Peoples?**

A. ANR is seeking a discount-type adjustment for the following FSS contracts: NSG Contract No. 129493; WPSC Contract Nos. 114369 and 114370; WEP Contract Nos. 134400 and 134401; WEP Contract Nos. 107870 and 107871; and Peoples Contract No. 125055. The natural gas storage market in Michigan is very saturated, with numerous active storage field competitors, as shown in Exhibit No. ANR-0061. Shippers have a number of options for their storage needs and a number of ANR's large customers, such as Consumers Energy, DTE, and WEC, own and operate their own storage fields. In addition, the competitive transportation environment in Wisconsin and Chicago market areas also contributes to the need for ANR to offer negotiated rate storage contracts, because a customer that purchases storage will also purchase transport for injection and withdrawal purposes, and as a result, customers will look at both services together rather than separately. ANR is one of five pipelines that serve the Chicago market area outside of the state of Wisconsin. Due to the competitive nature of the Wisconsin and Chicago markets, ANR was at risk of losing significant transportation and storage load in this market. As a result, ANR entered into these negotiated rate storage contracts, which are related to certain negotiated rate transportation contracts with these same customers that I discuss above. Because of this, and as part of the carefully balanced negotiations with this group of customers, ANR agreed to provide long-term rate certainty through fixed negotiated rates in an effort to secure extensions and execute new contracts. Extending/executing these agreements provided benefits to ANR and its remaining shipper base because ANR was able to successfully compete to retain significant contract demand.

**Capacity Expansion Projects**

**Q: For which negotiated rate contracts related to capacity expansion projects is ANR seeking a discount adjustment?**

**A.** ANR is seeking a discount-type adjustment for negotiated rate contracts that supported two capital expansion projects on ANR: the Collierville Expansion and Grand Chenier Project.

**Q: Why did ANR enter into these negotiated rate contracts with capacity expansion project shippers?**

**A.** ANR entered into these negotiated rate contracts in order to gain business by meeting competition. In the case of the Collierville Expansion, ANR was specifically trying to obtain new business by presenting the most competitive economical rate while competing with other pipelines for TVA's business. Finally, in the case of Venture Global, the need to be competitive to secure long-term contracts for growing LNG demand was vital to the use and usefulness of this part of ANR's system.

**Q: What were the competitive circumstances that led ANR to enter into the identified negotiated rate agreement with TVA?**

**A.** ANR is seeking a discount-type adjustment for TVA FTS-3 Contract No. 126586. ANR agreed to this negotiated rate contract in order to earn TVA's business over competitive alternatives available to this customer. Specifically, TVA was conducting a competitive supply acquisition process, and ANR agreed to the referenced negotiated rate agreement (and constructed the Collierville expansion) in order to serve TVA, and thereby provided benefits to ANR and its existing customer base by successfully competing to add new contract demand to the system. As part of the carefully balanced negotiations with this customer, ANR agreed to enter into long-term rate certainty through negotiated rates fixed in an effort to execute this new contract.

**Q: What were the competitive circumstances that led ANR to enter into the identified negotiated rate agreements with Venture Global?**

**A.** ANR is seeking a discount adjustment for Venture Global FTS-1 Contract No. 133755. At the time ANR entered the agreement with Venture Global, there was great demand for LNG export capability from the Gulf of Mexico (and that demand continues today). Venture Global approached many competitor pipelines, including ANR, seeking the most economical option for transportation of supply for its operations. During the negotiations, Venture Global made clear that it sought a fixed-rate arrangement, and ANR concluded that it would need to meet this request in order to secure the additional load for its system. As a result, ANR executed an agreement with Venture Global to provide 700,000 Dth/d of firm transportation service from the SEHS to a new connection with the TransCameron Pipeline for a twenty-year term, and agreed to a negotiated rate of $0.10/Dth that would be just above the then system recourse rate for the specified transportation path.

**Hoover/Diana Supply Attachment**

**Q: What were the competitive circumstances which led ANR to enter into the Hoover/Diana negotiated rate agreements?**

A. ANR is seeking a discount-type adjustment for PTS-2 Contract No. 106776 with ExxonMobil Gas & Power. At the time ANR entered into this contract, gas supply from offshore Gulf of Mexico was a critical supply source for ANR and other competitor natural gas transportation pipelines. The Hoover/Diana production platform was a new find located in the Deepwater Area of the Gulf of Mexico and was well within the reach of numerous competing pipelines located in Louisiana, Texas, and Mexico. As a result, the competitive environment for this supply was intense and allowed ExxonMobil to extract the best commercial terms from any number of interested parties. Producers in this area, such as ExxonMobil, insisted on three things: (1) the lowest possible transportation rates; (2) rate certainty; and (3) flexible firm service. Given these considerations, ANR made a proposal with a rate close to its minimum rates and provided a firm PTS-2 service to ANR's SEHS which, paired with a backhaul ITS service contract, makes it very unlikely that service would be curtailed or interrupted. ANR shaped its offer to be competitive with other transportation providers, as ExxonMobil had numerous options to transport their supply to onshore markets.

## III. ELIMINATION OF TERM-DIFFERENTIATED STORAGE RATES

**Q: Please describe ANR's term-differentiated storage rates.**

A. ANR currently has different recourse rates for its Rate Schedule FSS firm storage service, based upon the term of the customer's contract. Specifically, the reservation rate for FSS service varies by term length, such that the recourse reservation rate is lowest for a contract term of greater than three years; higher for a contract term that is greater than one year up to three years; and highest for a contract term of one year or less. ANR proposed term-differentiated storage rates in its last rate case, and the current mechanism was agreed to as part of the settlement of that rate case.

**Q: What was the rationale for ANR adopting term-differentiated storage rates?**

**A:** In its last rate case filing, ANR proposed to implement term-differentiated storage rates in order to more accurately reflect the risk difference, and in turn value difference, between short-term contracts (term of four years or less) and longer-term contracts (ten years or more). The final parameters of the term-differentiated storage rate program were different from the parameters originally proposed, as I described above. However, the intent of implementing term-differentiated storage rates was the same: to encourage shippers to secure longer-term contracts by rewarding those firm shippers with a lower rate while shorter-term customers would be subject to higher maximum tariff rates. Securing more long-term contracts would then reduce the overall pipeline risk from a financial and planning perspective.

**Q:** **In your opinion, has the intended benefit of implementing term-differentiated storage rates been realized?**

**A:** No, I believe that term-differentiated rates have been ineffective in achieving the intended goal of promoting longer-term storage contracting. The table below summarizes the revenues from ANR storage contracts effective as of April 1 for each year represented, categorized by the applicable contract terms of the term-differentiated rate program. Through 2017 – 2020 the annual revenue from realized from long-term FSS contracted volumes has not exceeded the revenue prior to the implementation of term-differentiated rates, as represented by 2016 revenues. As reflected in the table, there was a small increase in longer-term FSS revenue in 2021. I believe that this uptick was caused primarily by the incremental value placed on storage in the aftermath of Winter Storm Uri, rather than shippers being incented by the term-differentiated rate program.

| **Storage Revenues by Years Contracted** | | | |
|---|---|---|---|
| Year | < 1 Yrs | 1 - 3 Yrs | > 3 Yrs |
| 2016 | $ 35,137,231 | $ 40,725,788 | $ 50,408,536 |
| 2017 | $ 32,019,827 | $ 62,917,137 | $ 30,986,301 |
| 2018 | $ 35,741,019 | $ 53,146,467 | $ 26,632,497 |
| 2019 | $ 43,690,757 | $ 39,613,375 | $ 34,459,334 |
| 2020 | $ 47,483,608 | $ 34,830,791 | $ 37,559,934 |
| 2021 | $ 20,042,017 | $ 29,513,620 | $ 51,685,149 |

Moreover, due to the competitive environment, ANR has continued to experience a significant level of discounting of short-term contracts since the settlement of the last rate case. For these reasons, the term-differentiated rate program is not achieving its intended purposes.

**Q: Does this conclude your testimony?**

A: Yes, it does.

# UNITED STATES OF AMERICA
# BEFORE THE
# FEDERAL ENERGY REGULATORY COMMISSION

ANR Pipeline Company ) Docket No. RP22-____-000

State of Texas )
) ss.
County of Harris )

## AFFIDAVIT OF ERIC J. MILLER, JR.

Eric J. Miller, Jr., being first duly sworn, on oath states that he is the witness whose testimony appears on the preceding pages entitled "Prepared Direct Testimony of Eric J. Miller, Jr."; that, if asked the questions which appear in the text of said testimony, he would give the answers that are therein set forth; and that affiant adopts the aforesaid testimony as Eric J. Miller, Jr.'s sworn testimony in this proceeding.

DocuSigned by:
Eric Miller Jr.
FB644021C85A4DE...

Eric J. Miller, Jr.

SWORN TO AND SUBSCRIBED BEFORE ME THIS 20th DAY OF January, 2022. This notarial act was an online notarization.

**Notary Seal**

SHELIA O. COPUS
Notary ID
976876
My Commission Expires
2/22/2023

**Digital Certificate**

DocuSigned by:
Shelia Copus
6B60C3597ADE4AD...

| Contracts Expiring On Or Before Adjustment Period | | | | | | |
|---|---|---|---|---|---|---|
| **Count** | **Contract No.** | **Start Date** | **End Date** | **Party Name** | **RATE SCHED** | **ROFR** |
| 1 | 107895 | 11/1/2003 | 10/31/2021 | WISCONSIN ELECTRIC POWER COMPANY | ETS | **N** |
| 2 | 107898 | 11/1/2003 | 3/31/2021 | WISCONSIN ELECTRIC POWER COMPANY | ETS | **N** |
| 3 | 108032 | 8/1/2002 | 5/31/2021 | CITY OF JASPER, INDIANA | GF-1 | **N** |
| 4 | 110505 | 11/1/2004 | 3/31/2021 | INTERSTATE GAS SUPPLY, INC. | FTS-1 | **N** |
| 5 | 110506 | 11/1/2004 | 3/31/2021 | INTERSTATE GAS SUPPLY, INC. | FTS-1 | **N** |
| 6 | 110507 | 11/1/2004 | 3/31/2021 | INTERSTATE GAS SUPPLY, INC. | FTS-1 | **N** |
| 7 | 113710 | 11/1/2008 | 3/31/2021 | WISCONSIN GAS LLC | ETS | **N** |
| 8 | 114091 | 11/1/2008 | 3/31/2021 | WISCONSIN ELECTRIC POWER COMPANY | ETS | **N** |
| 9 | 114657 | 6/1/2012 | 5/31/2022 | TENNESSEE VALLEY AUTHORITY | GF-1 | **N** |
| 10 | 122005 | 4/1/2013 | 3/31/2021 | SEMCO ENERGY, INC., DBA SEMCO ENERGY GAS | ETS | **N** |
| 11 | 122247 | 11/1/2013 | 3/31/2022 | DTE GAS COMPANY | FTS-1 | **N** |
| 12 | 126507 | 11/1/2016 | 3/31/2022 | NRG POWER MARKETING LLC | FTS-1 | **N** |
| 13 | 126736 | 11/1/2015 | 10/31/2021 | MACQUARIE ENERGY LLC | FTS-1 | **N** |
| 14 | 127105 | 11/1/2016 | 3/31/2022 | ELWOOD ENERGY LLC | FTS-3 | **N** |
| 15 | 127183 | 4/1/2016 | 3/31/2021 | INTERSTATE GAS SUPPLY, INC. | FTS-1 | **N** |
| 16 | 127184 | 4/1/2016 | 3/31/2021 | INTERSTATE GAS SUPPLY, INC. | FTS-1 | **N** |
| 17 | 129163 | 4/1/2017 | 3/31/2022 | SHELL ENERGY NORTH AMERICA (US), L.P. | FTS-1 | **N** |
| 18 | 131176 | 11/1/2018 | 3/31/2021 | CONOCOPHILLIPS COMPANY | FTS-1 | **N** |
| 19 | 131177 | 11/1/2018 | 3/31/2022 | CONOCOPHILLIPS COMPANY | FTS-1 | **N** |
| 20 | 131179 | 11/1/2018 | 3/31/2021 | CONOCOPHILLIPS COMPANY | PTS-2 | **N** |
| 21 | 131221 | 11/1/2018 | 3/31/2022 | BP CANADA ENERGY MARKETING CORP. | FTS-1 | **N** |
| 22 | 131270 | 11/1/2018 | 3/31/2021 | EDF ENERGY SERVICES, LLC | FTS-1 | **N** |
| 23 | 131281 | 11/1/2018 | 3/31/2022 | WISCONSIN PUBLIC SERVICE CORPORATION | FTS-1 | **N** |
| 24 | 131356 | 11/1/2018 | 3/31/2022 | BP ENERGY COMPANY | PTS-2 | **N** |
| 25 | 131436 | 11/1/2018 | 3/31/2021 | EDF ENERGY SERVICES, LLC | FTS-1 | **N** |
| 26 | 131459 | 11/1/2018 | 3/31/2021 | WISCONSIN POWER AND LIGHT COMPANY | ETS | **N** |
| 27 | 131565 | 11/1/2018 | 3/31/2021 | EDF ENERGY SERVICES, LLC | FTS-1 | **N** |
| 28 | 131644 | 4/1/2019 | 3/31/2021 | EDF TRADING NORTH AMERICA, LLC | FTS-1 | **N** |
| 29 | 131998 | 11/1/2019 | 3/31/2022 | DTE ENERGY TRADING, INC. | ETS | **N** |
| 30 | 132137 | 11/1/2019 | 10/31/2021 | CONOCOPHILLIPS COMPANY | FTS-1 | **N** |
| 31 | 132158 | 1/1/2019 | 3/31/2021 | TARGA GAS MARKETING LLC | FTS-1 | **N** |

| | | | | | | |
|---|---|---|---|---|---|---|
| 32 | 132401 | 4/1/2019 | 10/31/2021 | ELEMENT MARKETS RENEWABLE NATURAL GAS, L | FTS-1 | **N** |
| 33 | 132610 | 11/1/2019 | 3/31/2021 | SEQUENT ENERGY MANAGEMENT, L.P. | FTS-1 | **N** |
| 34 | 132620 | 11/1/2019 | 3/31/2021 | KOCH ENERGY SERVICES, LLC | FTS-1 | **N** |
| 35 | 132621 | 11/1/2019 | 10/31/2021 | REDCLIFF MIDSTREAM, LLC | FTS-1 | **N** |
| 36 | 132623 | 11/1/2019 | 10/31/2021 | REDCLIFF MIDSTREAM, LLC | PTS-2 | **N** |
| 37 | 132725 | 5/1/2019 | 4/30/2021 | EDF ENERGY SERVICES, LLC | FTS-1 | **N** |
| 38 | 132742 | 12/1/2019 | 3/31/2021 | MERCURIA ENERGY AMERICA, LLC. | FTS-1 | **N** |
| 39 | 132805 | 11/1/2019 | 3/31/2021 | REPSOL ENERGY NORTH AMERICA CORPORATION | FTS-1 | **N** |
| 40 | 132904 | 11/1/2019 | 3/31/2021 | TIDAL ENERGY MARKETING (U.S.) L.L.C. | FTS-1 | **N** |
| 41 | 133000 | 8/1/2019 | 3/31/2022 | PRESIDIO FINANCE, LLC | PTS-2 | **N** |
| 42 | 133107 | 11/1/2019 | 3/31/2021 | ENLINK GAS MARKETING, LP | PTS-2 | **N** |
| 43 | 133108 | 11/1/2019 | 3/31/2021 | ENLINK GAS MARKETING, LP | FTS-1 | **N** |
| 44 | 133193 | 11/1/2019 | 10/31/2021 | CONEXUS ENERGY, LLC | PTS-2 | **N** |
| 45 | 133260 | 11/1/2019 | 3/31/2022 | BP CANADA ENERGY MARKETING CORP. | FTS-1 | **N** |
| 46 | 133261 | 11/1/2019 | 3/31/2022 | BP CANADA ENERGY MARKETING CORP. | FTS-1 | **N** |
| 47 | 133262 | 11/1/2019 | 3/31/2022 | BP CANADA ENERGY MARKETING CORP. | FTS-1 | **N** |
| 48 | 133263 | 11/1/2019 | 3/31/2022 | BP CANADA ENERGY MARKETING CORP. | FTS-1 | **N** |
| 49 | 133264 | 11/1/2019 | 3/31/2022 | BP CANADA ENERGY MARKETING CORP. | FTS-1 | **N** |
| 50 | 133265 | 11/1/2019 | 3/31/2022 | BP CANADA ENERGY MARKETING CORP. | FTS-1 | **N** |
| 51 | 133662 | 1/1/2020 | 12/31/2021 | ROESLEIN ALTERNATIVE ENERGY OF MISSOURI, | FTS-1 | **N** |
| 52 | 133750 | 4/1/2020 | 3/31/2022 | NORTHERN INDIANA PUBLIC SERVICE COMPANY | FTS-1 | **N** |
| 53 | 133751 | 4/1/2020 | 3/31/2022 | NORTHERN INDIANA PUBLIC SERVICE COMPANY | FTS-1 | **N** |
| 54 | 133924 | 4/1/2020 | 3/31/2021 | CIMA ENERGY, LP | FTS-1 | **N** |
| 55 | 133933 | 4/1/2020 | 3/31/2021 | EDF TRADING NORTH AMERICA, LLC | FTS-1 | **N** |
| 56 | 133934 | 4/1/2020 | 3/31/2021 | ECO-ENERGY NATURAL GAS, LLC | FTS-1 | **N** |
| 57 | 134069 | 11/1/2020 | 3/31/2022 | GREEN PLAINS TRADE GROUP LLC | FTS-1 | **N** |
| 58 | 134291 | 4/1/2020 | 3/31/2021 | CONEXUS ENERGY, LLC | FTS-1 | **N** |
| 59 | 134311 | 4/1/2020 | 3/31/2021 | DIRECT ENERGY BUSINESS MARKETING, LLC | NNS | **N** |
| 60 | 134314 | 4/1/2020 | 3/31/2021 | EXELON GENERATION COMPANY, LLC | NNS | **N** |
| 61 | 134750 | 1/1/2021 | 3/31/2022 | ROESLEIN ALTERNATIVE ENERGY OF MISSOURI, | FTS-1 | **N** |
| 62 | 134773 | 11/1/2020 | 10/31/2021 | EDF TRADING NORTH AMERICA, LLC | FTS-1 | **N** |
| 63 | 134854 | 11/1/2020 | 10/31/2021 | DTE ENERGY TRADING, INC. | NNS | **N** |
| 64 | 134857 | 11/1/2020 | 3/31/2022 | DTE ENERGY TRADING, INC. | FTS-1 | **N** |
| 65 | 134974 | 11/1/2020 | 3/31/2022 | NJR ENERGY SERVICES COMPANY | FTS-1 | **N** |

| | | | | | | |
|---|---|---|---|---|---|---|
| 66 | 134975 | 11/1/2020 | 3/31/2022 | NJR ENERGY SERVICES COMPANY | FTS-1 | **N** |
| 67 | 134976 | 4/1/2021 | 3/31/2022 | ECO-ENERGY NATURAL GAS, LLC | FTS-1 | **N** |
| 68 | 135144 | 11/1/2020 | 10/31/2021 | DIRECT ENERGY BUSINESS MARKETING, LLC | NNS | **N** |
| 69 | 135168 | 12/31/2020 | 12/31/2021 | LEHIGH CEMENT COMPANY LLC | FTS-1 | **N** |
| 70 | 135264 | 1/1/2021 | 12/31/2021 | BRIGHTMARK CASTOR RNG LLC. | FTS-1 | **N** |
| 71 | 135559 | 4/1/2021 | 3/31/2022 | CIMA ENERGY, LP | FTS-1 | **N** |
| 72 | 135561 | 4/1/2021 | 3/31/2022 | EDF TRADING NORTH AMERICA, LLC | FTS-1 | **N** |
| 73 | 135562 | 4/1/2021 | 3/31/2022 | SEMPRA GAS & POWER MARKETING, LLC | FTS-1 | **N** |
| 74 | 135845 | 4/1/2021 | 3/31/2022 | EDF TRADING NORTH AMERICA, LLC | FTS-1 | **N** |
| 75 | 135848 | 4/1/2021 | 3/31/2022 | DIRECT ENERGY BUSINESS MARKETING, LLC | NNS | **N** |
| 76 | 135861 | 4/1/2021 | 3/31/2022 | CONOCOPHILLIPS COMPANY | FTS-1 | **N** |

**ROFR Turn Back Contracts Ending On Or Before Adjustment Period**

| Count | Contract No. | Start Date | End Date | Party Name | RATE SCHED | ROFR |
|---|---|---|---|---|---|---|
| 1 | 106054 | 4/1/2001 | 10/31/2021 | VERSO MINNESOTA WISCONSIN LLC | FTS-1 | **Y** |
| 2 | 114655 | 6/1/2012 | 5/31/2022 | TENNESSEE VALLEY AUTHORITY | FTS-3 | **Y** |
| 3 | 114823 | 11/1/2008 | 10/31/2021 | SAPUTO CHEESE USA INC. | FTS-1 | **Y** |
| 4 | 123253 | 3/1/2014 | 10/8/2021 | GULFPORT ENERGY CORPORATION | FTS-1 | **Y** |
| 5 | 123254 | 3/1/2014 | 10/8/2021 | GULFPORT ENERGY CORPORATION | FTS-1 | **Y** |
| 6 | 123255 | 3/1/2014 | 10/8/2021 | GULFPORT ENERGY CORPORATION | FTS-1 | **Y** |
| 7 | 123625 | 8/1/2014 | 10/8/2021 | GULFPORT ENERGY CORPORATION | FTS-1 | **Y** |
| 8 | 123626 | 8/1/2014 | 10/8/2021 | GULFPORT ENERGY CORPORATION | FTS-1 | **Y** |
| 9 | 123627 | 8/1/2014 | 10/8/2021 | GULFPORT ENERGY CORPORATION | FTS-1 | **Y** |
| 10 | 123628 | 8/1/2014 | 10/8/2021 | GULFPORT ENERGY CORPORATION | FTS-1 | **Y** |
| 11 | 123629 | 8/1/2014 | 10/8/2021 | GULFPORT ENERGY CORPORATION | FTS-1 | **Y** |
| 12 | 124156 | 11/1/2014 | 10/8/2021 | GULFPORT ENERGY CORPORATION | FTS-1 | **Y** |
| 13 | 124157 | 11/1/2014 | 10/8/2021 | GULFPORT ENERGY CORPORATION | FTS-1 | **Y** |
| 14 | 124158 | 11/1/2014 | 10/8/2021 | GULFPORT ENERGY CORPORATION | FTS-1 | **Y** |
| 15 | 124160 | 11/1/2014 | 10/8/2021 | GULFPORT ENERGY CORPORATION | FTS-1 | **Y** |
| 16 | 124690 | 6/1/2014 | 10/8/2021 | GULFPORT ENERGY CORPORATION | FTS-1 | **Y** |
| 17 | 132342 | 3/1/2019 | 10/8/2021 | GULFPORT ENERGY CORPORATION | FTS-1 | **Y** |
| 18 | 133932 | 4/1/2020 | 10/31/2021 | ENLINK GAS MARKETING, LP | FTS-1 | **Y** |
| 19 | 133958 | 1/1/2021 | 12/31/2021 | WISCONSIN POWER AND LIGHT COMPANY | FTS-1 | **Y** |

## New Contracts Beginning During the Adjustment Period

| Count | Contract No. | Start Date | End Date | Party Name | RATE SCHED | ROFR |
|---|---|---|---|---|---|---|
| 1 | 133756 | 1/1/2022 | 12/31/2041 | VENTURE GLOBAL CALCASIEU PASS, LLC | FTS-1 | **N** |
| 2 | 133756 | 1/1/2022 | 12/31/2041 | VENTURE GLOBAL CALCASIEU PASS, LLC | FTS-1 | **N** |
| 3 | 133757 | 6/15/2022 | 6/14/2029 | INDECK NILES, LLC | FTS-3 | **Y** |
| 4 | 133757 | 6/15/2022 | 6/14/2029 | INDECK NILES, LLC | FTS-3 | **Y** |
| 5 | 135194 | 11/1/2021 | 3/31/2023 | HARTREE PARTNERS, LP | FTS-1 | **N** |
| 6 | 135194 | 11/1/2021 | 3/31/2023 | HARTREE PARTNERS, LP | FTS-1 | **N** |
| 7 | 135196 | 11/1/2021 | 3/31/2023 | KOCH ENERGY SERVICES, LLC | FTS-1 | **N** |
| 8 | 135196 | 11/1/2021 | 3/31/2023 | KOCH ENERGY SERVICES, LLC | FTS-1 | **N** |
| 9 | 135197 | 11/1/2021 | 3/31/2023 | CONEXUS ENERGY, LLC | FTS-1 | **N** |
| 10 | 135197 | 11/1/2021 | 3/31/2023 | CONEXUS ENERGY, LLC | FTS-1 | **N** |
| 11 | 135354 | 11/1/2021 | 3/31/2023 | GREEN PLAINS TRADE GROUP LLC | FTS-1 | **N** |
| 12 | 135354 | 11/1/2021 | 3/31/2023 | GREEN PLAINS TRADE GROUP LLC | FTS-1 | **N** |
| 13 | 135356 | 11/1/2021 | 3/31/2023 | DTE ENERGY TRADING, INC. | FTS-1 | **N** |
| 14 | 135356 | 11/1/2021 | 3/31/2023 | DTE ENERGY TRADING, INC. | FTS-1 | **N** |
| 15 | 135371 | 11/1/2021 | 3/31/2023 | REPSOL ENERGY NORTH AMERICA CORPORATION | FTS-1 | **N** |
| 16 | 135371 | 11/1/2021 | 3/31/2023 | REPSOL ENERGY NORTH AMERICA CORPORATION | FTS-1 | **N** |
| 17 | 135444 | 11/1/2021 | 3/31/2023 | GOLDEN TRIANGLE ENERGY, L.L.C. | FTS-1 | **Y** |
| 18 | 135444 | 11/1/2021 | 3/31/2023 | GOLDEN TRIANGLE ENERGY, L.L.C. | FTS-1 | **Y** |
| 19 | 135616 | 11/1/2021 | 3/31/2024 | WISCONSIN GAS LLC | FTS-1 | **N** |
| 20 | 135616 | 11/1/2021 | 3/31/2024 | WISCONSIN GAS LLC | FTS-1 | **N** |
| 21 | 136144 | 11/1/2021 | 10/31/2025 | WISCONSIN ELECTRIC POWER COMPANY | FTS-3 | **N** |
| 22 | 136144 | 11/1/2021 | 10/31/2025 | WISCONSIN ELECTRIC POWER COMPANY | FTS-3 | **N** |
| 23 | 136287 | 11/1/2021 | 3/31/2028 | MICHIGAN GAS UTILITIES CORPORATION | FTS-1 | **Y** |
| 24 | 136287 | 11/1/2021 | 3/31/2028 | MICHIGAN GAS UTILITIES CORPORATION | FTS-1 | **Y** |
| 25 | 136495 | 11/1/2021 | 3/31/2026 | DTE ENERGY TRADING, INC. | NNS | **Y** |
| 26 | 136495 | 11/1/2021 | 3/31/2026 | DTE ENERGY TRADING, INC. | NNS | **Y** |
| 27 | 136595 | 11/1/2021 | 10/31/2026 | EDF TRADING NORTH AMERICA, LLC | FTS-1 | **Y** |
| 28 | 136595 | 11/1/2021 | 10/31/2026 | EDF TRADING NORTH AMERICA, LLC | FTS-1 | **Y** |

| MDQ Change | | | | | | |
|---|---|---|---|---|---|---|
| **Count** | **Contract No.** | **Start Date** | **End Date** | **Party Name** | **RATE SCHED** | **ROFR** |
| 1 | 109016 | 4/1/2004 | 3/31/2023 | THE PEOPLES GAS LIGHT AND COKE COMPANY | NNS | **Y** |
| 2 | 109024 | 11/1/2003 | 3/31/2026 | NORTH SHORE GAS COMPANY | FTS-1 | **Y** |
| 3 | 109025 | 11/1/2003 | 3/31/2028 | NORTH SHORE GAS COMPANY | FTS-1 | **Y** |
| 4 | 109025 | 11/1/2003 | 3/31/2028 | NORTH SHORE GAS COMPANY | FTS-1 | **Y** |
| 5 | 111657 | 1/1/2006 | 10/31/2023 | GOLDEN TRIANGLE ENERGY, L.L.C. | FTS-1 | **Y** |
| 6 | 111657 | 1/1/2006 | 10/31/2023 | GOLDEN TRIANGLE ENERGY, L.L.C. | FTS-1 | **Y** |
| 7 | 122003 | 4/1/2013 | 3/31/2026 | SEMCO ENERGY, INC., DBA SEMCO ENERGY GAS | ETS | **Y** |
| 8 | 122003 | 4/1/2013 | 3/31/2026 | SEMCO ENERGY, INC., DBA SEMCO ENERGY GAS | ETS | **Y** |
| 9 | 122803 | 3/1/2014 | 3/31/2025 | ATMOS ENERGY CORPORATION | FTS-1 | **Y** |
| 10 | 122803 | 3/1/2014 | 3/31/2025 | ATMOS ENERGY CORPORATION | FTS-1 | **Y** |
| 11 | 125056 | 11/1/2014 | 3/31/2028 | THE PEOPLES GAS LIGHT AND COKE COMPANY | ETS | **Y** |
| 12 | 125056 | 11/1/2014 | 3/31/2028 | THE PEOPLES GAS LIGHT AND COKE COMPANY | ETS | **Y** |
| 13 | 126418 | 11/1/2015 | 3/31/2026 | MEMPHIS LIGHT, GAS AND WATER DIVISION | FTS-1 | **N** |
| 14 | 126586 | 11/1/2017 | 11/13/2037 | TENNESSEE VALLEY AUTHORITY | FTS-3 | **Y** |
| 15 | 127693 | 4/1/2017 | 10/31/2022 | DTE ENERGY TRADING, INC. | FTS-1 | **N** |
| 16 | 133755 | 4/1/2021 | 12/31/2041 | VENTURE GLOBAL CALCASIEU PASS, LLC | FTS-1 | **N** |
| 17 | 133775 | 4/1/2020 | 3/31/2023 | DTE ENERGY TRADING, INC. | ETS | **N** |
| 18 | 134519 | 7/1/2020 | 6/30/2021 | SYMMETRY ENERGY SOLUTIONS, LLC | ETS | **N** |
| 19 | 135645 | 4/1/2021 | 3/31/2028 | THE PEOPLES GAS LIGHT AND COKE COMPANY | FTS-1 | **N** |
| 20 | 135720 | 4/1/2021 | 3/31/2025 | MIDAMERICAN ENERGY COMPANY | FTS-1 | **Y** |
| 21 | 135859 | 4/1/2021 | 3/31/2025 | WOODRIVER ENERGY LLC | FTS-1 | **Y** |
| 22 | 136141 | 7/1/2021 | 3/31/2022 | SYMMETRY ENERGY SOLUTIONS, LLC | ETS | **Y** |

| ROFR Turn Back Contracts Ending On Or Before Adjustment Period | | | | | | |
|---|---|---|---|---|---|---|
| **Count** | **Contract No.** | **Start Date** | **End Date** | **Party Name** | **RATE SCHED** | **ROFR** |
| 1 | 107900 | 4/1/2003 | 3/31/2021 | WISCONSIN ELECTRIC POWER COMPANY | FSS | N |
| 2 | 113729 | 4/1/2008 | 3/31/2021 | WISCONSIN ELECTRIC POWER COMPANY | FSS | N |
| 3 | 126505 | 4/1/2016 | 3/31/2021 | NRG POWER MARKETING LLC | FSS | N |
| 4 | 127694 | 4/1/2017 | 3/31/2021 | DTE ENERGY TRADING, INC. | FSS | N |
| 5 | 129745 | 4/1/2018 | 3/31/2021 | CITY OF DULUTH | FSS | N |
| 6 | 131273 | 4/1/2019 | 3/31/2021 | WISCONSIN ELECTRIC POWER COMPANY | FSS | N |
| 7 | 131344 | 4/1/2019 | 3/31/2022 | CONOCOPHILLIPS COMPANY | FSS | N |
| 8 | 131646 | 4/1/2019 | 3/31/2021 | EDF TRADING NORTH AMERICA, LLC | FSS | N |
| 9 | 132169 | 4/1/2019 | 3/31/2021 | SEQUENT ENERGY MANAGEMENT, L.P. | FSS | N |
| 10 | 132171 | 4/1/2019 | 3/31/2021 | TWIN EAGLE RESOURCE MANAGEMENT, LLC | FSS | N |
| 11 | 132172 | 4/1/2019 | 3/31/2021 | MERCURIA ENERGY AMERICA, LLC. | FSS | N |
| 12 | 132505 | 4/1/2019 | 3/31/2021 | DIRECT ENERGY BUSINESS MARKETING, LLC | FSS | N |
| 13 | 132607 | 4/1/2019 | 3/31/2021 | TIDAL ENERGY MARKETING (U.S.) L.L.C. | FSS | N |
| 14 | 132609 | 4/1/2019 | 3/31/2021 | SEQUENT ENERGY MANAGEMENT, L.P. | FSS | N |
| 15 | 132619 | 4/1/2019 | 3/31/2021 | KOCH ENERGY SERVICES, LLC | FSS | N |
| 16 | 132697 | 4/1/2019 | 3/31/2022 | MORGAN STANLEY CAPITAL GROUP INC. | FSS | N |
| 17 | 132739 | 5/1/2019 | 3/31/2021 | MERCURIA ENERGY AMERICA, LLC. | FSS | N |
| 18 | 132804 | 5/1/2019 | 3/31/2021 | EDF TRADING NORTH AMERICA, LLC | FSS | N |
| 19 | 132809 | 5/1/2019 | 3/31/2021 | REPSOL ENERGY NORTH AMERICA CORPORATION | FSS | N |
| 20 | 133117 | 4/1/2021 | 3/31/2022 | DTE ENERGY TRADING, INC. | FSS | N |
| 21 | 133258 | 9/28/2019 | 3/31/2021 | CASTLETON COMMODITIES MERCHANT TRADING L | FSS | N |
| 22 | 133465 | 4/1/2020 | 3/31/2022 | TWIN EAGLE RESOURCE MANAGEMENT, LLC | FSS | N |
| 23 | 133468 | 4/1/2020 | 3/31/2021 | HARTREE PARTNERS, LP | FSS | N |
| 24 | 133469 | 4/1/2020 | 3/31/2021 | J. ARON & COMPANY LLC | FSS | N |
| 25 | 133481 | 4/1/2020 | 3/31/2021 | KOCH ENERGY SERVICES, LLC | FSS | N |
| 26 | 133553 | 4/1/2020 | 3/31/2021 | CONOCOPHILLIPS COMPANY | FSS | N |
| 27 | 133753 | 4/1/2020 | 3/31/2022 | BP CANADA ENERGY MARKETING CORP. | FSS | N |
| 28 | 134063 | 4/1/2020 | 3/31/2021 | TWIN EAGLE RESOURCE MANAGEMENT, LLC | FSS | N |
| 29 | 134064 | 4/1/2020 | 3/31/2021 | TENASKA GAS STORAGE, LLC | FSS | N |
| 30 | 134067 | 4/1/2020 | 3/31/2021 | GREEN PLAINS TRADE GROUP LLC | FSS | N |
| 31 | 134070 | 4/1/2020 | 3/31/2022 | GREEN PLAINS TRADE GROUP LLC | FSS | N |

| | | | | | | |
|---|---|---|---|---|---|---|
| 32 | 134087 | 4/1/2020 | 8/31/2021 | KOCH ENERGY SERVICES, LLC | FSS | N |
| 33 | 134088 | 4/1/2020 | 8/31/2021 | UNITED ENERGY TRADING, LLC | FSS | N |
| 34 | 134221 | 4/1/2020 | 3/31/2021 | TENASKA GAS STORAGE, LLC | FSS | N |
| 35 | 134301 | 4/1/2020 | 3/31/2021 | TENASKA GAS STORAGE, LLC | FSS | N |
| 36 | 134319 | 5/1/2020 | 4/30/2021 | TENASKA GAS STORAGE, LLC | FSS | N |
| 37 | 135109 | 11/1/2020 | 10/31/2021 | DIRECT ENERGY BUSINESS MARKETING, LLC | FSS | N |
| 38 | 135110 | 11/1/2020 | 10/31/2021 | DIRECT ENERGY BUSINESS MARKETING, LLC | FSS | N |
| 39 | 135172 | 4/1/2021 | 3/31/2022 | DIRECT ENERGY BUSINESS MARKETING, LLC | FSS | N |
| 40 | 135216 | 4/1/2021 | 3/31/2022 | MERCURIA ENERGY AMERICA, LLC. | FSS | N |
| 41 | 135218 | 4/1/2021 | 3/31/2022 | TIDAL ENERGY MARKETING (U.S.) L.L.C. | FSS | N |
| 42 | 135379 | 4/1/2021 | 3/31/2022 | TWIN EAGLE RESOURCE MANAGEMENT, LLC | FSS | N |
| 43 | 135548 | 4/1/2021 | 3/31/2022 | DIRECT ENERGY BUSINESS MARKETING, LLC | FSS | N |
| 44 | 135555 | 4/1/2021 | 3/31/2022 | TENASKA GAS STORAGE, LLC | FSS | N |
| 45 | 135787 | 4/1/2021 | 3/31/2022 | DIRECT ENERGY BUSINESS MARKETING, LLC | FSS | N |
| 46 | 135821 | 4/1/2021 | 3/31/2022 | TENASKA GAS STORAGE, LLC | FSS | N |
| 47 | 135857 | 4/1/2021 | 3/31/2022 | CASTLETON COMMODITIES MERCHANT TRADING L | FSS | N |

### ROFR Turn Back Contracts Ending On Or Before Adjustment Period

| Count | Contract No. | Start Date | End Date | Party Name | RATE SCHED | ROFR |
|---|---|---|---|---|---|---|
| 1 | 106212 | 5/1/2001 | 3/31/2021 | NORTHERN STATES POWER COMPANY, A MINNESO | FSS | Y |
| 2 | 132522 | 4/1/2019 | 4/1/2021 | SEMCO ENERGY, INC., DBA SEMCO ENERGY GAS | FSS | Y |

### New Contracts Beginning During the Adjustment Period

| Count | Contract No. | Start Date | End Date | Party Name | RATE SCHED | ROFR |
|---|---|---|---|---|---|---|
| 1 | 134771 | 4/1/2022 | 3/31/2026 | MADISON GAS AND ELECTRIC COMPANY | FSS | Y |
| 2 | 135167 | 4/1/2022 | 3/31/2024 | DTE ENERGY TRADING, INC. | FSS | N |
| 3 | 135876 | 4/1/2022 | 3/31/2027 | NORTHERN STATES POWER COMPANY, A WISCONSIN | FSS | Y |
| 4 | 136407 | 4/1/2022 | 3/31/2025 | MERCURIA ENERGY AMERICA, LLC. | FSS | N |
| 5 | 136664 | 4/1/2022 | 3/31/2025 | TWIN EAGLE RESOURCE MANAGEMENT, LLC | FSS | N |

### MSQ/MDWQ Change

| Count | Contract No. | Start Date | End Date | Party Name | RATE SCHED | ROFR |
|---|---|---|---|---|---|---|
| 1 | 114370 | 4/1/2010 | 3/31/2023 | WISCONSIN PUBLIC SERVICE CORPORATION | FSS | Y |
| 2 | 125464 | 4/1/2015 | 3/31/2026 | SEMCO ENERGY, INC., DBA SEMCO ENERGY GAS | FSS | Y |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | 126344 | 4/1/2019 | 3/31/2029 | WISCONSIN POWER AND LIGHT COMPANY | FSS | Y |
| 4 | 129493 | 4/1/2018 | 3/31/2026 | NORTH SHORE GAS COMPANY | FSS | Y |

## Discounted Transportation Contracts - Base Period 11-1-20 to 10-31-21

| Contract ID | Party Name | Rate Sched | Start Date | End Date | TERM |
|---|---|---|---|---|---|
| 800 | WISCONSIN POWER AND LIGHT COMPANY | ETS | 11/1/1993 | 10/31/2022 | LT |
| 820 | WISCONSIN POWER AND LIGHT COMPANY | ETS | 11/1/1996 | 10/31/2022 | LT |
| 5450 | WISCONSIN PUBLIC SERVICE CORPORATION | ETS | 5/1/1997 | 3/31/2028 | LT |
| 104404 | WISCONSIN PUBLIC SERVICE CORPORATION | FTS-1 | 4/1/2003 | 3/31/2023 | LT |
| 106102 | MIDLAND COGENERATION VENTURE LIMITED PAR | FTS-1 | 11/1/2001 | 2/28/2025 | LT |
| 106109 | MIDLAND COGENERATION VENTURE LIMITED PAR | GF-1 | 11/1/2001 | 2/28/2025 | LT |
| 106209 | NORTHERN STATES POWER COMPANY, A MINNESO | FTS-1 | 5/1/2001 | 3/31/2024 | LT |
| 106322 | WISCONSIN PUBLIC SERVICE CORPORATION | ETS | 6/1/2001 | 3/31/2023 | LT |
| 107895 | WISCONSIN ELECTRIC POWER COMPANY | ETS | 11/1/2003 | 10/31/2021 | LT |
| 107897 | WISCONSIN ELECTRIC POWER COMPANY | ETS | 11/1/2003 | 3/31/2023 | LT |
| 107898 | WISCONSIN ELECTRIC POWER COMPANY | ETS | 11/1/2003 | 3/31/2021 | LT |
| 108031 | CITY OF JASPER, INDIANA | ETS | 8/1/2002 | 5/31/2026 | LT |
| 108268 | DTE GAS COMPANY | ETS | 11/1/2003 | 10/31/2022 | LT |
| 108304 | DTE GAS COMPANY | ETS | 11/1/2003 | 10/31/2022 | LT |
| 109422 | MICHIGAN GAS UTILITIES CORPORATION | ETS | 7/1/2003 | 3/31/2028 | LT |
| 109511 | DTE GAS COMPANY | FTS-1 | 11/1/2003 | 10/31/2022 | LT |
| 110016 | WISCONSIN PUBLIC SERVICE CORP. DBA WPSC- | FTS-3 | 11/1/2005 | 3/31/2024 | LT |
| 110024 | MICHIGAN GAS UTILITIES CORPORATION | ETS | 4/1/2004 | 3/31/2028 | LT |
| 110185 | MIDAMERICAN ENERGY SERVICES, LLC | ETS | 4/1/2004 | 3/31/2023 | LT |
| 111493 | DTE GAS COMPANY | ETS | 7/1/2005 | 6/1/2051 | LT |
| 112085 | INDIANA GAS COMPANY, INC. | ETS | 4/1/2007 | 3/31/2024 | LT |
| 112110 | DTE GAS COMPANY | ETS | 11/1/2007 | 6/1/2051 | LT |
| 112923 | WISCONSIN GAS LLC | ETS | 4/1/2007 | 3/31/2028 | LT |
| 112924 | WISCONSIN ELECTRIC POWER COMPANY | ETS | 4/1/2007 | 3/31/2028 | LT |
| 113237 | ROCK ENERGY COOPERATIVE | ETS | 4/1/2007 | 3/31/2027 | LT |
| 113238 | ROCK ENERGY COOPERATIVE | ETS | 4/1/2007 | 3/31/2027 | LT |
| 113240 | ROCK ENERGY COOPERATIVE | ETS | 4/1/2007 | 3/31/2023 | LT |
| 113546 | POET BIOREFINING - PORTLAND, LLC | FTS-1 | 8/1/2007 | 10/31/2023 | LT |
| 113709 | NORTHERN STATES POWER COMPANY, A MINNESO | FTS-3 | 4/1/2008 | 3/31/2027 | LT |
| 113710 | WISCONSIN GAS LLC | ETS | 11/1/2008 | 3/31/2021 | LT |
| 114091 | WISCONSIN ELECTRIC POWER COMPANY | ETS | 11/1/2008 | 3/31/2021 | LT |
| 114655 | TENNESSEE VALLEY AUTHORITY | FTS-3 | 6/1/2012 | 5/31/2022 | LT |

| | | | | | |
|---|---|---|---|---|---|
| 114656 | TENNESSEE VALLEY AUTHORITY | FTS-3 | 6/1/2012 | 10/31/2032 | LT |
| 114657 | TENNESSEE VALLEY AUTHORITY | GF-1 | 6/1/2012 | 5/31/2022 | LT |
| 115269 | NORTHERN ILLINOIS GAS COMPANY D/B/A NICO | ETS | 11/1/2009 | 3/31/2027 | LT |
| 115270 | NORTHERN ILLINOIS GAS COMPANY D/B/A NICO | ETS | 4/1/2010 | 3/31/2027 | LT |
| 115458 | CHESAPEAKE ENERGY MARKETING, L.L.C. | FTS-1 | 1/1/2011 | 12/31/2025 | LT |
| 116064 | WISCONSIN POWER AND LIGHT COMPANY | ETS | 4/1/2010 | 10/31/2022 | LT |
| 117332 | MADISON GAS AND ELECTRIC COMPANY | ETS | 11/1/2011 | 10/31/2026 | LT |
| 120592 | CENTRA GAS MANITOBA INC. | FTS-1 | 11/1/2013 | 3/31/2030 | LT |
| 122003 | SEMCO ENERGY, INC., DBA SEMCO ENERGY GAS | ETS | 4/1/2013 | 3/31/2026 | LT |
| 122005 | SEMCO ENERGY, INC., DBA SEMCO ENERGY GAS | ETS | 4/1/2013 | 3/31/2021 | LT |
| 122006 | SEMCO ENERGY, INC., DBA SEMCO ENERGY GAS | ETS | 11/1/2013 | 3/31/2024 | LT |
| 122803 | ATMOS ENERGY CORPORATION | FTS-1 | 3/1/2014 | 3/31/2025 | LT |
| 123256 | SEMCO ENERGY, INC., DBA SEMCO ENERGY GAS | ETS | 4/1/2014 | 3/31/2026 | LT |
| 123658 | EQT ENERGY, LLC | FTS-1 | 10/1/2014 | 9/30/2035 | LT |
| 123659 | EQT ENERGY, LLC | FTS-1 | 10/1/2014 | 9/30/2035 | LT |
| 124085 | WISCONSIN GAS LLC | FTS-1 | 4/3/2014 | 3/31/2024 | LT |
| 124086 | WISCONSIN GAS LLC | FTS-1 | 4/3/2014 | 3/31/2024 | LT |
| 124087 | WISCONSIN GAS LLC | FTS-1 | 4/1/2016 | 3/31/2028 | LT |
| 124088 | WISCONSIN GAS LLC | FTS-1 | 4/1/2016 | 3/31/2028 | LT |
| 124609 | NORTHERN INDIANA PUBLIC SERVICE COMPANY | ETS | 11/1/2016 | 3/31/2025 | LT |
| 124623 | NORTHERN INDIANA PUBLIC SERVICE COMPANY | NNS | 4/1/2015 | 3/31/2025 | LT |
| 124947 | NORTHERN INDIANA PUBLIC SERVICE COMPANY | FTS-1 | 4/1/2015 | 3/31/2025 | LT |
| 125852 | EQT ENERGY, LLC | FTS-1 | 11/1/2015 | 10/31/2025 | LT |
| 125861 | LSP UNIVERSITY PARK, LLC | FTS-3 | 11/1/2015 | 3/31/2025 | LT |
| 125886 | UNIVERSITY PARK ENERGY, LLC | FTS-3 | 11/1/2015 | 3/31/2025 | LT |
| 126181 | WISCONSIN ELECTRIC POWER COMPANY | FTS-3 | 11/1/2015 | 3/31/2024 | LT |
| 126182 | WISCONSIN ELECTRIC POWER COMPANY | FTS-3 | 11/1/2015 | 3/31/2024 | LT |
| 126338 | WISCONSIN POWER AND LIGHT COMPANY | FTS-1 | 4/1/2019 | 10/31/2028 | LT |
| 126346 | WISCONSIN POWER AND LIGHT COMPANY | NNS | 4/1/2019 | 3/31/2029 | LT |
| 126418 | MEMPHIS LIGHT, GAS AND WATER DIVISION | FTS-1 | 11/1/2015 | 3/31/2026 | LT |
| 126736 | MACQUARIE ENERGY LLC | FTS-1 | 11/1/2015 | 10/31/2021 | LT |
| 127009 | IOWA FERTILIZER COMPANY LLC | FTS-1 | 2/1/2016 | 1/31/2036 | LT |
| 127105 | ELWOOD ENERGY LLC | FTS-3 | 11/1/2016 | 3/31/2022 | LT |
| 127692 | DTE ENERGY TRADING, INC. | FTS-1 | 11/1/2017 | 3/31/2024 | LT |

| | | | | | |
|---|---|---|---|---|---|
| 127693 | DTE ENERGY TRADING, INC. | FTS-1 | 4/1/2017 | 10/31/2022 | LT |
| 127821 | NORTHERN ILLINOIS GAS COMPANY D/B/A NICO | FTS-1 | 11/1/2018 | 3/31/2028 | LT |
| 128775 | INTERSTATE POWER AND LIGHT COMPANY | FTS-1 | 11/1/2016 | 3/31/2023 | LT |
| 129163 | SHELL ENERGY NORTH AMERICA (US), L.P. | FTS-1 | 4/1/2017 | 3/31/2022 | LT |
| 129878 | WISCONSIN POWER AND LIGHT COMPANY | FTS-3 | 4/1/2018 | 3/31/2023 | LT |
| 129880 | WISCONSIN POWER AND LIGHT COMPANY | FTS-3 | 4/1/2018 | 3/31/2023 | LT |
| 129932 | MEMPHIS LIGHT, GAS AND WATER DIVISION | FTS-1 | 4/1/2018 | 10/31/2021 | LT |
| 129987 | SHELL ENERGY NORTH AMERICA (US), L.P. | FTS-1 | 11/1/2017 | 10/31/2022 | LT |
| 130009 | BASF INTERTRADE CORPORATION | FTS-1 | 11/1/2017 | 10/31/2022 | LT |
| 130071 | BASF INTERTRADE CORPORATION | FTS-1 | 11/1/2017 | 10/31/2022 | LT |
| 130462 | ROCKY ROAD POWER, LLC | FTS-1 | 11/1/2018 | 10/31/2028 | LT |
| 130504 | MINNESOTA ENERGY RESOURCES CORPORATION | FTS-1 | 11/1/2018 | 3/31/2028 | LT |
| 131177 | CONOCOPHILLIPS COMPANY | FTS-1 | 11/1/2018 | 3/31/2022 | LT |
| 131581 | THE WEST TENNESSEE PUBLIC UTILITY DISTRI | FTS-1 | 11/1/2019 | 3/31/2024 | LT |
| 131644 | EDF TRADING NORTH AMERICA, LLC | FTS-1 | 4/1/2019 | 3/31/2021 | LT |
| 131998 | DTE ENERGY TRADING, INC. | ETS | 11/1/2019 | 3/31/2022 | LT |
| 132056 | OCCIDENTAL ENERGY MARKETING, INC. | FTS-1 | 11/1/2019 | 10/31/2022 | LT |
| 132137 | CONOCOPHILLIPS COMPANY | FTS-1 | 11/1/2019 | 10/31/2021 | LT |
| 132158 | TARGA GAS MARKETING LLC | FTS-1 | 1/1/2019 | 3/31/2021 | LT |
| 132461 | DTE GAS COMPANY | FTS-1 | 11/1/2020 | 3/31/2023 | LT |
| 132529 | SEMCO ENERGY, INC., DBA SEMCO ENERGY GAS | ETS | 11/1/2019 | 3/31/2026 | LT |
| 132530 | SEMCO ENERGY, INC., DBA SEMCO ENERGY GAS | ETS | 11/1/2019 | 3/31/2026 | LT |
| 132581 | SEMCO ENERGY, INC., DBA SEMCO ENERGY GAS | FTS-1 | 4/1/2019 | 3/31/2026 | LT |
| 132621 | REDCLIFF MIDSTREAM, LLC | FTS-1 | 11/1/2019 | 10/31/2021 | LT |
| 132623 | REDCLIFF MIDSTREAM, LLC | PTS-2 | 11/1/2019 | 10/31/2021 | LT |
| 132805 | REPSOL ENERGY NORTH AMERICA CORPORATION | FTS-1 | 11/1/2019 | 3/31/2021 | LT |
| 133107 | ENLINK GAS MARKETING, LP | PTS-2 | 11/1/2019 | 3/31/2021 | LT |
| 133108 | ENLINK GAS MARKETING, LP | FTS-1 | 11/1/2019 | 3/31/2021 | LT |
| 133662 | ROESLEIN ALTERNATIVE ENERGY OF MISSOURI, | FTS-1 | 1/1/2020 | 12/31/2021 | LT |
| 133750 | NORTHERN INDIANA PUBLIC SERVICE COMPANY | FTS-1 | 4/1/2020 | 3/31/2022 | LT |
| 133751 | NORTHERN INDIANA PUBLIC SERVICE COMPANY | FTS-1 | 4/1/2020 | 3/31/2022 | LT |
| 133775 | DTE ENERGY TRADING, INC. | ETS | 4/1/2020 | 3/31/2023 | LT |
| 133846 | TROY ENERGY, LLC | FTS-3 | 4/1/2020 | 3/31/2025 | LT |
| 133924 | CIMA ENERGY, LP | FTS-1 | 4/1/2020 | 3/31/2021 | LT |

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| 133933 | EDF TRADING NORTH AMERICA, LLC | FTS-1 | 4/1/2020 | 3/31/2021 | LT |
| 133934 | ECO-ENERGY NATURAL GAS, LLC | FTS-1 | 4/1/2020 | 3/31/2021 | LT |
| 134069 | GREEN PLAINS TRADE GROUP LLC | FTS-1 | 11/1/2020 | 3/31/2022 | LT |
| 134291 | CONEXUS ENERGY, LLC | FTS-1 | 4/1/2020 | 3/31/2021 | LT |
| 134311 | DIRECT ENERGY BUSINESS MARKETING, LLC | NNS | 4/1/2020 | 3/31/2021 | LT |
| 134314 | EXELON GENERATION COMPANY, LLC | NNS | 4/1/2020 | 3/31/2021 | LT |
| 134750 | ROESLEIN ALTERNATIVE ENERGY OF MISSOURI, | FTS-1 | 1/1/2021 | 3/31/2022 | LT |
| 134773 | EDF TRADING NORTH AMERICA, LLC | FTS-1 | 11/1/2020 | 10/31/2021 | LT |
| 134780 | ENLINK GAS MARKETING, LP | FTS-1 | 11/1/2020 | 3/31/2022 | LT |
| 134854 | DTE ENERGY TRADING, INC. | NNS | 11/1/2020 | 10/31/2021 | LT |
| 134857 | DTE ENERGY TRADING, INC. | FTS-1 | 11/1/2020 | 3/31/2022 | LT |
| 134974 | NJR ENERGY SERVICES COMPANY | FTS-1 | 11/1/2020 | 3/31/2022 | LT |
| 134975 | NJR ENERGY SERVICES COMPANY | FTS-1 | 11/1/2020 | 3/31/2022 | LT |
| 134976 | ECO-ENERGY NATURAL GAS, LLC | FTS-1 | 4/1/2021 | 3/31/2022 | LT |
| 135144 | DIRECT ENERGY BUSINESS MARKETING, LLC | NNS | 11/1/2020 | 10/31/2021 | LT |
| 135264 | BRIGHTMARK CASTOR RNG LLC. | FTS-1 | 1/1/2021 | 12/31/2021 | LT |
| 135355 | GREEN PLAINS TRADE GROUP LLC | FTS-1 | 4/1/2021 | 10/31/2022 | LT |
| 135551 | KIMBERLY-CLARK CORPORATION | FTS-1 | 5/1/2021 | 10/31/2024 | LT |
| 135559 | CIMA ENERGY, LP | FTS-1 | 4/1/2021 | 3/31/2022 | LT |
| 135561 | EDF TRADING NORTH AMERICA, LLC | FTS-1 | 4/1/2021 | 3/31/2022 | LT |
| 135562 | SEMPRA GAS & POWER MARKETING, LLC | FTS-1 | 4/1/2021 | 3/31/2022 | LT |
| 135720 | MIDAMERICAN ENERGY COMPANY | FTS-1 | 4/1/2021 | 3/31/2025 | LT |
| 135845 | EDF TRADING NORTH AMERICA, LLC | FTS-1 | 4/1/2021 | 3/31/2022 | LT |
| 135847 | TENASKA GAS STORAGE, LLC | NNS | 4/1/2021 | 3/31/2024 | LT |
| 135848 | DIRECT ENERGY BUSINESS MARKETING, LLC | NNS | 4/1/2021 | 3/31/2022 | LT |
| 135859 | WOODRIVER ENERGY LLC | FTS-1 | 4/1/2021 | 3/31/2025 | LT |
| 135861 | CONOCOPHILLIPS COMPANY | FTS-1 | 4/1/2021 | 3/31/2022 | LT |
| 134009 | SEMCO ENERGY, INC., DBA SEMCO ENERGY GAS | ETS | 11/1/2020 | 3/31/2021 | ST |
| 134068 | GREEN PLAINS TRADE GROUP LLC | FTS-1 | 11/1/2020 | 3/31/2021 | ST |
| 134743 | SHELL ENERGY NORTH AMERICA (US), L.P. | FTS-1 | 11/1/2020 | 3/31/2021 | ST |
| 134753 | CONOCOPHILLIPS COMPANY | PTS-2 | 11/1/2020 | 3/31/2021 | ST |
| 134754 | CONOCOPHILLIPS COMPANY | PTS-2 | 11/1/2020 | 3/31/2021 | ST |
| 134757 | CONOCOPHILLIPS COMPANY | PTS-2 | 11/1/2020 | 3/31/2021 | ST |
| 134760 | MIDCOAST MARKETING (U.S.) L.P. | PTS-2 | 11/1/2020 | 3/31/2021 | ST |

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| 134776 | SEMPRA GAS & POWER MARKETING, LLC | FTS-1 | 11/1/2020 | 3/31/2021 | ST |
| 135063 | SHELL ENERGY NORTH AMERICA (US), L.P. | FTS-1 | 11/1/2020 | 3/31/2021 | ST |
| 135074 | CONEXUS ENERGY, LLC | FTS-1 | 12/1/2020 | 3/31/2021 | ST |
| 135137 | ELEVATION ENERGY GROUP, LLC | FTS-1 | 11/1/2020 | 11/30/2020 | ST |
| 135159 | DXT COMMODITIES NORTH AMERICA LLC | FTS-1 | 11/6/2020 | 11/30/2020 | ST |
| 135160 | GUNVOR USA LLC | FTS-1 | 11/7/2020 | 11/30/2020 | ST |
| 135161 | KOCH ENERGY SERVICES, LLC | FTS-1 | 11/7/2020 | 11/30/2020 | ST |
| 135162 | HARTREE PARTNERS, LP | FTS-1 | 11/7/2020 | 11/30/2020 | ST |
| 135163 | CONEXUS ENERGY, LLC | FTS-1 | 11/7/2020 | 11/30/2020 | ST |
| 135164 | WGL MIDSTREAM, INC. | FTS-1 | 11/7/2020 | 11/30/2020 | ST |
| 135173 | NRG POWER MARKETING LLC | FTS-1 | 4/1/2021 | 10/31/2021 | ST |
| 135174 | ELEVATION ENERGY GROUP, LLC | FTS-1 | 12/1/2020 | 12/31/2020 | ST |
| 135326 | ELEVATION ENERGY GROUP, LLC | FTS-1 | 1/1/2021 | 1/31/2021 | ST |
| 135327 | J. ARON & COMPANY LLC | FTS-1 | 1/1/2021 | 1/31/2021 | ST |
| 135430 | ELEVATION ENERGY GROUP, LLC | FTS-1 | 2/1/2021 | 2/28/2021 | ST |
| 135431 | CONEXUS ENERGY, LLC | FTS-1 | 2/3/2021 | 3/31/2021 | ST |
| 135432 | CONEXUS ENERGY, LLC | FTS-1 | 2/3/2021 | 10/31/2021 | ST |
| 135433 | TENNESSEE VALLEY AUTHORITY | FTS-1 | 2/3/2021 | 2/28/2021 | ST |
| 135437 | SHELL ENERGY NORTH AMERICA (US), L.P. | FTS-1 | 2/3/2021 | 3/31/2021 | ST |
| 135438 | HARTREE PARTNERS, LP | FTS-1 | 2/5/2021 | 2/28/2021 | ST |
| 135439 | HARTREE PARTNERS, LP | FTS-1 | 2/5/2021 | 2/28/2021 | ST |
| 135441 | HARTREE PARTNERS, LP | FTS-1 | 2/5/2021 | 2/28/2021 | ST |
| 135443 | UNITED ENERGY TRADING, LLC | FTS-1 | 2/6/2021 | 2/28/2021 | ST |
| 135446 | CITADEL ENERGY MARKETING LLC | FTS-1 | 2/9/2021 | 10/31/2021 | ST |
| 135447 | MERCURIA ENERGY AMERICA, LLC. | FTS-1 | 2/10/2021 | 2/28/2021 | ST |
| 135529 | ELEVATION ENERGY GROUP, LLC | FTS-1 | 3/1/2021 | 3/31/2021 | ST |
| 135535 | CONEXUS ENERGY, LLC | FTS-1 | 4/1/2021 | 10/31/2021 | ST |
| 135615 | TARGA GAS MARKETING LLC | FTS-2 | 4/1/2021 | 4/30/2021 | ST |
| 135733 | KOCH ENERGY SERVICES, LLC | FTS-1 | 4/1/2021 | 4/30/2021 | ST |
| 135734 | EDF TRADING NORTH AMERICA, LLC | FTS-1 | 4/1/2021 | 10/31/2021 | ST |
| 135735 | SHELL ENERGY NORTH AMERICA (US), L.P. | FTS-1 | 4/1/2021 | 10/31/2021 | ST |
| 135738 | ELEVATION ENERGY GROUP, LLC | FTS-1 | 4/1/2021 | 4/30/2021 | ST |
| 135763 | TIDAL ENERGY MARKETING (U.S.) L.L.C. | FTS-1 | 4/1/2021 | 4/30/2021 | ST |
| 135764 | CONEXUS ENERGY, LLC | FTS-1 | 3/27/2021 | 4/30/2021 | ST |

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| 135804 | REPSOL ENERGY NORTH AMERICA CORPORATION | FTS-1 | 4/1/2021 | 4/30/2021 | ST |
| 135809 | DXT COMMODITIES NORTH AMERICA LLC | FTS-1 | 4/1/2021 | 4/30/2021 | ST |
| 135818 | CITADEL ENERGY MARKETING LLC | FTS-1 | 4/1/2021 | 4/30/2021 | ST |
| 135819 | CONOCOPHILLIPS COMPANY | FTS-1 | 4/1/2021 | 10/31/2021 | ST |
| 135863 | EDF TRADING NORTH AMERICA, LLC | FTS-1 | 4/6/2021 | 4/30/2021 | ST |
| 135864 | TIDAL ENERGY MARKETING (U.S.) L.L.C. | FTS-1 | 4/6/2021 | 4/30/2021 | ST |
| 135865 | SPIRE MARKETING INC. | FTS-1 | 4/7/2021 | 4/30/2021 | ST |
| 135866 | MIECO LLC | FTS-1 | 4/7/2021 | 4/30/2021 | ST |
| 135867 | MORGAN STANLEY CAPITAL GROUP INC. | FTS-1 | 4/8/2021 | 4/30/2021 | ST |
| 135868 | MIECO LLC | FTS-1 | 5/1/2021 | 7/31/2021 | ST |
| 135869 | MIECO LLC | FTS-1 | 5/1/2021 | 3/31/2022 | ST |
| 135872 | EXELON GENERATION COMPANY, LLC | FTS-1 | 5/1/2021 | 7/31/2021 | ST |
| 135873 | EXELON GENERATION COMPANY, LLC | FTS-1 | 5/1/2021 | 7/31/2021 | ST |
| 135874 | DTE ENERGY TRADING, INC. | FTS-1 | 5/1/2021 | 5/31/2021 | ST |
| 135875 | TARGA GAS MARKETING LLC | FTS-2 | 5/1/2021 | 5/31/2021 | ST |
| 135886 | TIDAL ENERGY MARKETING (U.S.) L.L.C. | FTS-1 | 5/1/2021 | 5/31/2021 | ST |
| 135887 | KOCH ENERGY SERVICES, LLC | FTS-1 | 5/1/2021 | 5/31/2021 | ST |
| 135890 | DXT COMMODITIES NORTH AMERICA LLC | FTS-1 | 5/1/2021 | 5/31/2021 | ST |
| 135950 | ELEVATION ENERGY GROUP, LLC | FTS-1 | 5/1/2021 | 5/31/2021 | ST |
| 136003 | ECO-ENERGY NATURAL GAS, LLC | FTS-1 | 6/1/2021 | 6/30/2021 | ST |
| 136004 | VITOL INC. | FTS-1 | 6/1/2021 | 6/30/2021 | ST |
| 136016 | TARGA GAS MARKETING LLC | FTS-2 | 6/1/2021 | 6/30/2021 | ST |
| 136030 | KOCH ENERGY SERVICES, LLC | FTS-1 | 6/1/2021 | 6/30/2021 | ST |
| 136038 | CITADEL ENERGY MARKETING LLC | FTS-1 | 6/1/2021 | 6/30/2021 | ST |
| 136039 | ELEVATION ENERGY GROUP, LLC | FTS-1 | 6/1/2021 | 6/30/2021 | ST |
| 136051 | ECO-ENERGY NATURAL GAS, LLC | FTS-1 | 6/3/2021 | 6/30/2021 | ST |
| 136052 | EDF TRADING NORTH AMERICA, LLC | FTS-1 | 6/3/2021 | 6/30/2021 | ST |
| 136053 | MORGAN STANLEY CAPITAL GROUP INC. | FTS-1 | 6/3/2021 | 6/30/2021 | ST |
| 136054 | KOCH ENERGY SERVICES, LLC | FTS-1 | 6/3/2021 | 6/30/2021 | ST |
| 136055 | CITADEL ENERGY MARKETING LLC | FTS-1 | 6/8/2021 | 6/30/2021 | ST |
| 136058 | HARTREE PARTNERS, LP | FTS-1 | 6/15/2021 | 10/31/2021 | ST |
| 136061 | CASTLETON COMMODITIES MERCHANT TRADING L | FTS-1 | 7/1/2021 | 10/31/2021 | ST |
| 136062 | KOCH ENERGY SERVICES, LLC | FTS-1 | 7/1/2021 | 10/31/2021 | ST |
| 136063 | KOCH ENERGY SERVICES, LLC | FTS-1 | 7/1/2021 | 10/31/2021 | ST |

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| 136076 | ECO-ENERGY NATURAL GAS, LLC | FTS-1 | 7/1/2021 | 7/31/2021 | ST |
| 136115 | ECO-ENERGY NATURAL GAS, LLC | FTS-1 | 7/1/2021 | 10/31/2021 | ST |
| 136116 | CONEXUS ENERGY, LLC | FTS-1 | 7/1/2021 | 7/31/2021 | ST |
| 136155 | TARGA GAS MARKETING LLC | FTS-2 | 7/1/2021 | 7/31/2021 | ST |
| 136156 | ELEVATION ENERGY GROUP, LLC | FTS-1 | 7/1/2021 | 7/31/2021 | ST |
| 136177 | EXELON GENERATION COMPANY, LLC | FTS-1 | 8/1/2021 | 10/31/2021 | ST |
| 136178 | EXELON GENERATION COMPANY, LLC | FTS-1 | 8/1/2021 | 10/31/2021 | ST |
| 136197 | TARGA GAS MARKETING LLC | FTS-2 | 8/1/2021 | 8/31/2021 | ST |
| 136231 | CONEXUS ENERGY, LLC | FTS-1 | 8/1/2021 | 8/31/2021 | ST |
| 136232 | MERCURIA ENERGY AMERICA, LLC. | FTS-1 | 8/1/2021 | 8/31/2021 | ST |
| 136233 | CITADEL ENERGY MARKETING LLC | FTS-1 | 8/1/2021 | 8/31/2021 | ST |
| 136234 | CONEXUS ENERGY, LLC | FTS-1 | 8/1/2021 | 8/31/2021 | ST |
| 136241 | EDF TRADING NORTH AMERICA, LLC | FTS-1 | 8/1/2021 | 8/31/2021 | ST |
| 136242 | CARBONBETTER, LLC | FTS-1 | 8/1/2021 | 9/30/2021 | ST |
| 136251 | KOCH ENERGY SERVICES, LLC | FTS-1 | 8/1/2021 | 8/31/2021 | ST |
| 136270 | MORGAN STANLEY CAPITAL GROUP INC. | FTS-1 | 8/1/2021 | 8/31/2021 | ST |
| 136271 | HARTREE PARTNERS, LP | FTS-1 | 8/1/2021 | 8/31/2021 | ST |
| 136318 | DXT COMMODITIES NORTH AMERICA INC. | FTS-1 | 9/1/2021 | 10/1/2021 | ST |
| 136319 | CONEXUS ENERGY, LLC | FTS-1 | 9/1/2021 | 10/31/2021 | ST |
| 136320 | MERCURIA ENERGY AMERICA, LLC. | FTS-1 | 9/1/2021 | 9/30/2021 | ST |
| 136352 | CONEXUS ENERGY, LLC | FTS-1 | 9/1/2021 | 9/30/2021 | ST |
| 136361 | KOCH ENERGY SERVICES, LLC | FTS-1 | 9/1/2021 | 9/30/2021 | ST |
| 136383 | TARGA GAS MARKETING LLC | FTS-2 | 9/1/2021 | 9/30/2021 | ST |
| 136391 | MERCURIA ENERGY AMERICA, LLC. | FTS-1 | 9/1/2021 | 9/30/2021 | ST |
| 136396 | CONCORD ENERGY LLC | FTS-1 | 9/4/2021 | 9/30/2021 | ST |
| 136399 | FREEPOINT COMMODITIES LLC | FTS-1 | 9/10/2021 | 9/30/2021 | ST |
| 136402 | CONCORD ENERGY LLC | FTS-1 | 9/15/2021 | 10/31/2021 | ST |
| 136430 | FREEPOINT COMMODITIES LLC | FTS-1 | 10/1/2021 | 10/31/2021 | ST |
| 136468 | TARGA GAS MARKETING LLC | FTS-2 | 10/1/2021 | 10/31/2021 | ST |
| 136469 | CARBONBETTER, LLC | FTS-1 | 10/1/2021 | 10/31/2021 | ST |
| 136483 | KOCH ENERGY SERVICES, LLC | FTS-1 | 10/1/2021 | 10/31/2021 | ST |

| Original PROD PER | ACCT PER | SVC REQ K | SVC REQ NAME | RATE SCHED | REC LOC | REC LOC NAME | REC ZN | DEL LOC | DEL LOC NAME | DEL ZN | TOC DESC | RATE TYPE | FEE CODE | THRUPUT QTY | TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11/1/20 | 11/1/20 | 116837 | KOCH ENERGY SERVICES, LLC | ITS | 277072 | ALLIANCE/ANR INT | M7 | 153808 | ANRPL STORAGE FACILITIES | M7 | Commodity Charge | COM | BASE | 764963 | DISC |
| 11/1/20 | 11/1/20 | 116837 | KOCH ENERGY SERVICES, LLC | ITS | 277072 | ALLIANCE/ANR INT | M7 | 505587 | IPLS DETROIT A | M7 | Commodity Charge | COM | BASE | 191100 | DISC |
| 11/1/20 | 11/1/20 | 125551 | MERCURIA ENERGY AMERICA, LLC. | ITS | 866062 | IPLS WILLOW | M7 | 42078 | WILLOW RUN(TO MICHCON) | M7 | Commodity Charge | COM | BASE | 71563 | DISC |
| 11/1/20 | 11/1/20 | 119973 | MICHIGAN PUBLIC POWER AGENCY | ITS-3 | 153728 | FUEL SEGMENT 7 | M7 | 1292925 | PROUGH ROAD | M7 | Commodity Payback Charge | PBK | BASE | 5469 | DISC |
| 11/1/20 | 11/1/20 | 126997 | SHELL ENERGY NORTH AMERICA (US), L.P. | ITS | 927982 | TIGER INTERCONNECT | M2 | 345116 | S E CDP (TRANSMISSION) | SE | Commodity Charge | COM | BASE | 9882 | DISC |
| 11/1/20 | 11/1/20 | 114632 | TARGA GAS MARKETING LLC | ITS | 103565 | S E HEADSTATION | SE | 28554 | LOWRY PLANT INLET | SE | Commodity Charge | COM | BASE | 263867 | DISC |
| 11/1/20 | 11/1/20 | 114632 | TARGA GAS MARKETING LLC | ITS | 186900 | EGAN (RECEIPT) INT | SE | 28554 | LOWRY PLANT INLET | SE | Commodity Charge | COM | BASE | 55782 | DISC |
| 11/1/20 | 11/1/20 | 118861 | UNITED ENERGY TRADING, LLC | ITS | 490940 | PINE PRAIRIE NORTH REC | M2 | 345116 | S E CDP (TRANSMISSION) | SE | Commodity Charge | COM | BASE | 980 | DISC |
| 12/1/20 | 12/1/20 | 119973 | MICHIGAN PUBLIC POWER AGENCY | ITS-3 | 142164 | DEWARD - GREAT LAKES - R | M7 | 1292925 | PROUGH ROAD | M7 | Commodity Charge | COM | BASE | 1283 | DISC |
| 12/1/20 | 12/1/20 | 119973 | MICHIGAN PUBLIC POWER AGENCY | ITS-3 | 153728 | FUEL SEGMENT 7 | M7 | 1292925 | PROUGH ROAD | M7 | Commodity Payback Charge | PBK | BASE | 15481 | DISC |
| 12/1/20 | 12/1/20 | 126997 | SHELL ENERGY NORTH AMERICA (US), L.P. | ITS | 803184 | FAYETTEVILLE EXPRESS | M2 | 345116 | S E CDP (TRANSMISSION) | SE | Commodity Charge | COM | BASE | 166040 | DISC |
| 12/1/20 | 12/1/20 | 126997 | SHELL ENERGY NORTH AMERICA (US), L.P. | ITS | 927982 | TIGER INTERCONNECT | M2 | 345116 | S E CDP (TRANSMISSION) | SE | Commodity Charge | COM | BASE | 1511717 | DISC |
| 12/1/20 | 12/1/20 | 114632 | TARGA GAS MARKETING LLC | ITS | 103565 | S E HEADSTATION | SE | 28554 | LOWRY PLANT INLET | SE | Commodity Charge | COM | BASE | 104593 | DISC |
| 1/1/21 | 1/1/21 | 119973 | MICHIGAN PUBLIC POWER AGENCY | ITS-3 | 153728 | FUEL SEGMENT 7 | M7 | 1292925 | PROUGH ROAD | M7 | Commodity Payback Charge | PBK | BASE | 4748 | DISC |
| 1/1/21 | 1/1/21 | 126997 | SHELL ENERGY NORTH AMERICA (US), L.P. | ITS | 803184 | FAYETTEVILLE EXPRESS | M2 | 345116 | S E CDP (TRANSMISSION) | SE | Commodity Charge | COM | BASE | 48006 | DISC |
| 1/1/21 | 1/1/21 | 126997 | SHELL ENERGY NORTH AMERICA (US), L.P. | ITS | 927982 | TIGER INTERCONNECT | M2 | 345116 | S E CDP (TRANSMISSION) | SE | Commodity Charge | COM | BASE | 510332 | DISC |
| 1/1/21 | 1/1/21 | 114632 | TARGA GAS MARKETING LLC | ITS | 103565 | S E HEADSTATION | SE | 28554 | LOWRY PLANT INLET | SE | Commodity Charge | COM | BASE | 510482 | DISC |
| 2/1/21 | 2/1/21 | 120604 | CASTLETON COMMODITIES MERCHANT TRADING L | ITS | 153808 | ANRPL STORAGE FACILITIES | M7 | 40892 | DETROIT A (DELIVERY) | M7 | Commodity Charge | COM | BASE | 201500 | DISC |
| 2/1/21 | 2/1/21 | 116837 | KOCH ENERGY SERVICES, LLC | ITS | 277072 | ALLIANCE/ANR INT | M7 | 153905 | S W CDP | SW | Commodity Charge | COM | BASE | 75768 | DISC |
| 2/1/21 | 2/1/21 | 119973 | MICHIGAN PUBLIC POWER AGENCY | ITS-3 | 142164 | DEWARD - GREAT LAKES - R | M7 | 1292925 | PROUGH ROAD | M7 | Commodity Charge | COM | BASE | 6724 | DISC |
| 2/1/21 | 2/1/21 | 119973 | MICHIGAN PUBLIC POWER AGENCY | ITS-3 | 153728 | FUEL SEGMENT 7 | M7 | 1292925 | PROUGH ROAD | M7 | Commodity Payback Charge | PBK | BASE | 68109 | DISC |
| 2/1/21 | 2/1/21 | 126997 | SHELL ENERGY NORTH AMERICA (US), L.P. | ITS | 927982 | TIGER INTERCONNECT | M2 | 345116 | S E CDP (TRANSMISSION) | SE | Commodity Charge | COM | BASE | 14954 | DISC |
| 2/1/21 | 2/1/21 | 114632 | TARGA GAS MARKETING LLC | ITS | 103565 | S E HEADSTATION | SE | 28554 | LOWRY PLANT INLET | SE | Commodity Charge | COM | BASE | 4994 | DISC |
| 2/1/21 | 2/1/21 | 114632 | TARGA GAS MARKETING LLC | ITS | 186900 | EGAN (RECEIPT) INT | SE | 28554 | LOWRY PLANT INLET | SE | Commodity Charge | COM | BASE | 373153 | DISC |
| 2/1/21 | 2/1/21 | 118861 | UNITED ENERGY TRADING, LLC | ITS | 153808 | ANRPL STORAGE FACILITIES | M7 | 40892 | DETROIT A (DELIVERY) | M7 | Commodity Charge | COM | BASE | 52500 | DISC |
| 3/1/21 | 3/1/21 | 116837 | KOCH ENERGY SERVICES, LLC | ITS | 505587 | IPLS DETROIT A | M7 | 40892 | DETROIT A (DELIVERY) | M7 | Commodity Charge | COM | BASE | 771220 | DISC |
| 3/1/21 | 3/1/21 | 116837 | KOCH ENERGY SERVICES, LLC | ITS | 505598 | IPLS FARWELL | M7 | 11616 | FARWELL (DELIVERY) | M7 | Commodity Charge | COM | BASE | 85021 | DISC |
| 3/1/21 | 3/1/21 | 116837 | KOCH ENERGY SERVICES, LLC | ITS | 866062 | IPLS WILLOW | M7 | 42078 | WILLOW RUN(TO MICHCON) | M7 | Commodity Charge | COM | BASE | 146323 | DISC |
| 12/1/20 | 3/1/21 | 125551 | MERCURIA ENERGY AMERICA, LLC. | ITS | 513105 | WESTRICK | M3 | 505638 | IPLS WESTRICK | M3 | Commodity Charge | COM | BASE | 16882 | DISC |
| 3/1/21 | 3/1/21 | 119973 | MICHIGAN PUBLIC POWER AGENCY | ITS-3 | 153728 | FUEL SEGMENT 7 | M7 | 1292925 | PROUGH ROAD | M7 | Commodity Payback Charge | PBK | BASE | 6267 | DISC |
| 3/1/21 | 3/1/21 | 114632 | TARGA GAS MARKETING LLC | ITS | 103565 | S E HEADSTATION | SE | 28554 | LOWRY PLANT INLET | SE | Commodity Charge | COM | BASE | 119856 | DISC |
| 3/1/21 | 3/1/21 | 114632 | TARGA GAS MARKETING LLC | ITS | 186900 | EGAN (RECEIPT) INT | SE | 28554 | LOWRY PLANT INLET | SE | Commodity Charge | COM | BASE | 607170 | DISC |
| 3/1/21 | 3/1/21 | 118861 | UNITED ENERGY TRADING, LLC | ITS | 153808 | ANRPL STORAGE FACILITIES | M7 | 40892 | DETROIT A (DELIVERY) | M7 | Commodity Charge | COM | BASE | 359600 | DISC |
| 4/1/21 | 4/1/21 | 116837 | KOCH ENERGY SERVICES, LLC | ITS | 103702 | S W HEADSTATION | SW | 11566 | OVERISEL INT NO 1 | M7 | Commodity Charge | COM | BASE | 59550 | DISC |
| 4/1/21 | 4/1/21 | 116837 | KOCH ENERGY SERVICES, LLC | ITS | 103702 | S W HEADSTATION | SW | 11566 | OVERISEL INT NO 1 | M7 | Commodity Charge | COM | BASE | 2414 | DISC |
| 4/1/21 | 4/1/21 | 116837 | KOCH ENERGY SERVICES, LLC | ITS | 103702 | S W HEADSTATION | SW | 153808 | ANRPL STORAGE FACILITIES | M7 | Commodity Charge | COM | BASE | 1452 | DISC |
| 4/1/21 | 4/1/21 | 116837 | KOCH ENERGY SERVICES, LLC | ITS | 103702 | S W HEADSTATION | SW | 277072 | ALLIANCE/ANR INT | M7 | Commodity Charge | COM | BASE | 9129 | DISC |
| 4/1/21 | 4/1/21 | 116837 | KOCH ENERGY SERVICES, LLC | ITS | 103702 | S W HEADSTATION | SW | 40892 | DETROIT A (DELIVERY) | M7 | Commodity Charge | COM | BASE | 54373 | DISC |
| 4/1/21 | 4/1/21 | 116837 | KOCH ENERGY SERVICES, LLC | ITS | 103702 | S W HEADSTATION | SW | 42078 | WILLOW RUN(TO MICHCON) | M7 | Commodity Charge | COM | BASE | 36099 | DISC |
| 4/1/21 | 4/1/21 | 116837 | KOCH ENERGY SERVICES, LLC | ITS | 866062 | IPLS WILLOW | M7 | 42078 | WILLOW RUN(TO MICHCON) | M7 | Commodity Charge | COM | BASE | 40524 | DISC |
| 4/1/21 | 4/1/21 | 119973 | MICHIGAN PUBLIC POWER AGENCY | ITS-3 | 142164 | DEWARD - GREAT LAKES - R | M7 | 1292925 | PROUGH ROAD | M7 | Commodity Charge | COM | BASE | 11671 | DISC |
| 4/1/21 | 4/1/21 | 119973 | MICHIGAN PUBLIC POWER AGENCY | ITS-3 | 153728 | FUEL SEGMENT 7 | M7 | 1292925 | PROUGH ROAD | M7 | Commodity Payback Charge | PBK | BASE | 21667 | DISC |
| 4/1/21 | 4/1/21 | 126997 | SHELL ENERGY NORTH AMERICA (US), L.P. | ITS | 927982 | TIGER INTERCONNECT | M2 | 345116 | S E CDP (TRANSMISSION) | SE | Commodity Charge | COM | BASE | 297404 | DISC |
| 5/1/21 | 5/1/21 | 119973 | MICHIGAN PUBLIC POWER AGENCY | ITS-3 | 142164 | DEWARD - GREAT LAKES - R | M7 | 1292925 | PROUGH ROAD | M7 | Commodity Charge | COM | BASE | 9479 | DISC |
| 5/1/21 | 5/1/21 | 119973 | MICHIGAN PUBLIC POWER AGENCY | ITS-3 | 153728 | FUEL SEGMENT 7 | M7 | 1292925 | PROUGH ROAD | M7 | Commodity Payback Charge | PBK | BASE | 21797 | DISC |
| 5/1/21 | 5/1/21 | 126997 | SHELL ENERGY NORTH AMERICA (US), L.P. | ITS | 927982 | TIGER INTERCONNECT | M2 | 345116 | S E CDP (TRANSMISSION) | SE | Commodity Charge | COM | BASE | 46912 | DISC |
| 6/1/21 | 6/1/21 | 120604 | CASTLETON COMMODITIES MERCHANT TRADING L | ITS | 153808 | ANRPL STORAGE FACILITIES | M7 | 246067 | WILL COUNTY INT | M7 | Commodity Charge | COM | BASE | 1500 | DISC |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6/1/21 | 6/1/21 | 120604 | CASTLETON COMMODITIES MERCHANT TRADING L | ITS | 153808 | ANRPL STORAGE FACILITIES | M7 | 277072 | ALLIANCE/ANR INT | M7 | Commodity Charge | COM | BASE | 195331 | DISC |
| 6/1/21 | 6/1/21 | 116837 | KOCH ENERGY SERVICES, LLC | ITS | 103702 | S W HEADSTATION | SW | 153808 | ANRPL STORAGE FACILITIES | M7 | Commodity Charge | COM | BASE | 400 | DISC |
| 6/1/21 | 6/1/21 | 116837 | KOCH ENERGY SERVICES, LLC | ITS | 103702 | S W HEADSTATION | SW | 384134 | TIFFANY EAST | M7 | Commodity Charge | COM | BASE | 10515 | DISC |
| 6/1/21 | 6/1/21 | 116837 | KOCH ENERGY SERVICES, LLC | ITS | 103702 | S W HEADSTATION | SW | 384134 | TIFFANY EAST | M7 | Commodity Charge | COM | BASE | 8944 | DISC |
| 6/1/21 | 6/1/21 | 116837 | KOCH ENERGY SERVICES, LLC | ITS | 103702 | S W HEADSTATION | SW | 384136 | HARTFORD EAST | M7 | Commodity Charge | COM | BASE | 44410 | DISC |
| 6/1/21 | 6/1/21 | 116837 | KOCH ENERGY SERVICES, LLC | ITS | 103702 | S W HEADSTATION | SW | 384136 | HARTFORD EAST | M7 | Commodity Charge | COM | BASE | 32603 | DISC |
| 6/1/21 | 6/1/21 | 116837 | KOCH ENERGY SERVICES, LLC | ITS | 103702 | S W HEADSTATION | SW | 384136 | HARTFORD EAST | M7 | Commodity Charge | COM | BASE | 49556 | DISC |
| 6/1/21 | 6/1/21 | 116837 | KOCH ENERGY SERVICES, LLC | ITS | 103702 | S W HEADSTATION | SW | 387791 | KAUKAUNA | M7 | Commodity Charge | COM | BASE | 3478 | DISC |
| 6/1/21 | 6/1/21 | 116837 | KOCH ENERGY SERVICES, LLC | ITS | 103702 | S W HEADSTATION | SW | 40892 | DETROIT A (DELIVERY) | M7 | Commodity Charge | COM | BASE | 2074 | DISC |
| 6/1/21 | 6/1/21 | 119973 | MICHIGAN PUBLIC POWER AGENCY | ITS-3 | 142164 | DEWARD - GREAT LAKES - R | M7 | 1292925 | PROUGH ROAD | M7 | Commodity Charge | COM | BASE | 35140 | DISC |
| 6/1/21 | 6/1/21 | 119973 | MICHIGAN PUBLIC POWER AGENCY | ITS-3 | 153728 | FUEL SEGMENT 7 | M7 | 1292925 | PROUGH ROAD | M7 | Commodity Payback Charge | PBK | BASE | 42369 | DISC |
| 6/1/21 | 6/1/21 | 126997 | SHELL ENERGY NORTH AMERICA (US), L.P. | ITS | 927982 | TIGER INTERCONNECT | M2 | 345116 | S E CDP (TRANSMISSION) | SE | Commodity Charge | COM | BASE | 279064 | DISC |
| 6/1/21 | 6/1/21 | 118861 | UNITED ENERGY TRADING, LLC | ITS | 153808 | ANRPL STORAGE FACILITIES | M7 | 277072 | ALLIANCE/ANR INT | M7 | Commodity Charge | COM | BASE | 66200 | DISC |
| 7/1/21 | 7/1/21 | 120604 | CASTLETON COMMODITIES MERCHANT TRADING L | ITS | 153808 | ANRPL STORAGE FACILITIES | M7 | 246067 | WILL COUNTY INT | M7 | Commodity Charge | COM | BASE | 1903 | DISC |
| 7/1/21 | 7/1/21 | 120604 | CASTLETON COMMODITIES MERCHANT TRADING L | ITS | 153808 | ANRPL STORAGE FACILITIES | M7 | 277072 | ALLIANCE/ANR INT | M7 | Commodity Charge | COM | BASE | 49910 | DISC |
| 6/1/21 | 7/1/21 | 116837 | KOCH ENERGY SERVICES, LLC | ITS | 103702 | S W HEADSTATION | SW | 384136 | HARTFORD EAST | M7 | Commodity Charge | COM | BASE | 53643 | DISC |
| 7/1/21 | 7/1/21 | 116837 | KOCH ENERGY SERVICES, LLC | ITS | 28873 | MARSHFIELD/VIKING INT | M7 | 505599 | IPLS MARSHFIELD/VIKING | M7 | Commodity Charge | COM | BASE | 48168 | DISC |
| 7/1/21 | 7/1/21 | 125551 | MERCURIA ENERGY AMERICA, LLC. | ITS | 513105 | WESTRICK | M3 | 505638 | IPLS WESTRICK | M3 | Commodity Charge | COM | BASE | 89154 | DISC |
| 7/1/21 | 7/1/21 | 119973 | MICHIGAN PUBLIC POWER AGENCY | ITS-3 | 142164 | DEWARD - GREAT LAKES - R | M7 | 1292925 | PROUGH ROAD | M7 | Commodity Charge | COM | BASE | 65974 | DISC |
| 7/1/21 | 7/1/21 | 112605 | NRG POWER MARKETING LLC | ITS | 153808 | ANRPL STORAGE FACILITIES | M7 | 40419 | JOLIET WEST/NGPL | M7 | Commodity Charge | COM | BASE | 1042 | DISC |
| 7/1/21 | 7/1/21 | 126997 | SHELL ENERGY NORTH AMERICA (US), L.P. | ITS | 927982 | TIGER INTERCONNECT | M2 | 345116 | S E CDP (TRANSMISSION) | SE | Commodity Charge | COM | BASE | 113976 | DISC |
| 8/1/21 | 8/1/21 | 119973 | MICHIGAN PUBLIC POWER AGENCY | ITS-3 | 142164 | DEWARD - GREAT LAKES - R | M7 | 1292925 | PROUGH ROAD | M7 | Commodity Charge | COM | BASE | 68697 | DISC |
| 8/1/21 | 8/1/21 | 126997 | SHELL ENERGY NORTH AMERICA (US), L.P. | ITS | 803184 | FAYETTEVILLE EXPRESS | M2 | 345116 | S E CDP (TRANSMISSION) | SE | Commodity Charge | COM | BASE | 10711 | DISC |
| 8/1/21 | 8/1/21 | 126997 | SHELL ENERGY NORTH AMERICA (US), L.P. | ITS | 927982 | TIGER INTERCONNECT | M2 | 345116 | S E CDP (TRANSMISSION) | SE | Commodity Charge | COM | BASE | 477297 | DISC |
| 9/1/21 | 9/1/21 | 120604 | CASTLETON COMMODITIES MERCHANT TRADING L | ITS | 153808 | ANRPL STORAGE FACILITIES | M7 | 40892 | DETROIT A (DELIVERY) | M7 | Commodity Charge | COM | BASE | 29211 | DISC |
| 9/1/21 | 9/1/21 | 120604 | CASTLETON COMMODITIES MERCHANT TRADING L | ITS | 277072 | ALLIANCE/ANR INT | M7 | 153808 | ANRPL STORAGE FACILITIES | M7 | Commodity Charge | COM | BASE | 97609 | DISC |
| 9/1/21 | 9/1/21 | 120604 | CASTLETON COMMODITIES MERCHANT TRADING L | ITS | 48644 | FARWELL (RECEIPT) | M7 | 153808 | ANRPL STORAGE FACILITIES | M7 | Commodity Charge | COM | BASE | 7023 | DISC |
| 9/1/21 | 9/1/21 | 116837 | KOCH ENERGY SERVICES, LLC | ITS | 103702 | S W HEADSTATION | SW | 277072 | ALLIANCE/ANR INT | M7 | Commodity Charge | COM | BASE | 13749 | DISC |
| 9/1/21 | 9/1/21 | 125551 | MERCURIA ENERGY AMERICA, LLC. | ITS | 28873 | MARSHFIELD/VIKING INT | M7 | 505599 | IPLS MARSHFIELD/VIKING | M7 | Commodity Charge | COM | BASE | 90569 | DISC |
| 9/1/21 | 9/1/21 | 125551 | MERCURIA ENERGY AMERICA, LLC. | ITS | 513105 | WESTRICK | M3 | 505638 | IPLS WESTRICK | M3 | Commodity Charge | COM | BASE | 28358 | DISC |
| 6/1/21 | 9/1/21 | 119973 | MICHIGAN PUBLIC POWER AGENCY | ITS-3 | 153728 | FUEL SEGMENT 7 | M7 | 1292925 | PROUGH ROAD | M7 | Commodity Payback Charge | PBK | BASE | 42369 | DISC |
| 6/1/21 | 9/1/21 | 119973 | MICHIGAN PUBLIC POWER AGENCY | ITS-3 | 153728 | FUEL SEGMENT 7 | M7 | 1292925 | PROUGH ROAD | M7 | Commodity Payback Charge | PBK | BASE | -42369 | DISC |
| 7/1/21 | 9/1/21 | 119973 | MICHIGAN PUBLIC POWER AGENCY | ITS-3 | 153728 | FUEL SEGMENT 7 | M7 | 1292925 | PROUGH ROAD | M7 | Commodity Payback Charge | PBK | BASE | 14759 | DISC |
| 8/1/21 | 9/1/21 | 119973 | MICHIGAN PUBLIC POWER AGENCY | ITS-3 | 153728 | FUEL SEGMENT 7 | M7 | 1292925 | PROUGH ROAD | M7 | Commodity Payback Charge | PBK | BASE | 21479 | DISC |
| 9/1/21 | 9/1/21 | 119973 | MICHIGAN PUBLIC POWER AGENCY | ITS-3 | 142164 | DEWARD - GREAT LAKES - R | M7 | 1292925 | PROUGH ROAD | M7 | Commodity Charge | COM | BASE | 12897 | DISC |
| 9/1/21 | 9/1/21 | 119973 | MICHIGAN PUBLIC POWER AGENCY | ITS-3 | 153728 | FUEL SEGMENT 7 | M7 | 1292925 | PROUGH ROAD | M7 | Commodity Payback Charge | PBK | BASE | 13003 | DISC |
| 9/1/21 | 9/1/21 | 119817 | MIECO LLC | ITS | 742252 | REX SHELBYVILLE | M3 | 742252 | REX SHELBYVILLE | M3 | Commodity Charge | COM | BASE | 26564 | DISC |
| 9/1/21 | 9/1/21 | 126997 | SHELL ENERGY NORTH AMERICA (US), L.P. | ITS | 927982 | TIGER INTERCONNECT | M2 | 345116 | S E CDP (TRANSMISSION) | SE | Commodity Charge | COM | BASE | 83798 | DISC |
| 9/1/21 | 9/1/21 | 118861 | UNITED ENERGY TRADING, LLC | ITS | 277072 | ALLIANCE/ANR INT | M7 | 153808 | ANRPL STORAGE FACILITIES | M7 | Commodity Charge | COM | BASE | 193551 | DISC |
| 10/1/21 | 10/1/21 | 120604 | CASTLETON COMMODITIES MERCHANT TRADING L | ITS | 153808 | ANRPL STORAGE FACILITIES | M7 | 277072 | ALLIANCE/ANR INT | M7 | Commodity Charge | COM | BASE | 210100 | DISC |
| 10/1/21 | 10/1/21 | 120604 | CASTLETON COMMODITIES MERCHANT TRADING L | ITS | 153808 | ANRPL STORAGE FACILITIES | M7 | 40892 | DETROIT A (DELIVERY) | M7 | Commodity Charge | COM | BASE | 53900 | DISC |
| 10/1/21 | 10/1/21 | 119973 | MICHIGAN PUBLIC POWER AGENCY | ITS-3 | 142164 | DEWARD - GREAT LAKES - R | M7 | 1292925 | PROUGH ROAD | M7 | Commodity Charge | COM | BASE | 28935 | DISC |
| 10/1/21 | 10/1/21 | 119973 | MICHIGAN PUBLIC POWER AGENCY | ITS-3 | 153728 | FUEL SEGMENT 7 | M7 | 1292925 | PROUGH ROAD | M7 | Commodity Payback Charge | PBK | BASE | 39690 | DISC |
| 10/1/21 | 10/1/21 | 126997 | SHELL ENERGY NORTH AMERICA (US), L.P. | ITS | 927982 | TIGER INTERCONNECT | M2 | 345116 | S E CDP (TRANSMISSION) | SE | Commodity Charge | COM | BASE | 417177 | DISC |

| (A) | (B) | (C) | (D) | (E) | (F) | (G) | (H) | (I) | (J) | (K) | (L) | (M) | (N) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Count** | **Contracts** | **Shipper Name** | **Rate Schedule** | **Annual MDQ - MSQ** | **SMDQ - MDIQ** | **WMDQ - MDWQ** | **Start Date** | **End Date** | **Deliverability Rate (Storage)** | **Capacity Rate (Storage)** | **Monthly Reservation Rate** | **Daily Commodity Rate/Dth** | **Rate Type** |
| **Load Retention/ Bypass Avoidance** | | | | | | | | | | | | | |
| 1 | 5500 | WISCON PUBLIC SERV | ETS | 0 | 0 | 0 | 5/1/97 | 10/31/23 | - | - | $4.8580 | $0.0075 | Negotiated |
| 2 | 12000 | WISCON PUBLIC SERV | FTS-1 | 0 | 0 | 0 | 11/1/93 | 10/31/23 | - | - | $4.2500 | $0.0075 | Negotiated |
| 3 | 107870 | WISCONSIN GAS LLC | FSS | 1,582,250 | 9,041 | 31,645 | 11/1/20 | 3/31/27 | $2.4439 | $0.3990 | - | $0.0126 | Negotiated |
| 4 | 107871 | WISCONSIN GAS LLC | FSS | 834,900 | 4,771 | 16,698 | 11/1/20 | 3/31/27 | $2.0439 | $0.3990 | - | $0.0126 | Negotiated |
| 5 | 107896 | WISCONSIN ELECTRIC POWER | ETS | 0 | 0 | 0 | 11/1/03 | 10/31/23 | - | - | $4.8580 | $0.0075 | Negotiated |
| 6 | 108014 | WISCONSIN GAS LLC | ETS | 0 | 0 | 0 | 11/1/03 | 10/31/23 | - | - | $4.8580 | $0.0075 | Negotiated |
| 7 | 109024 | NORTH SHORE GAS CO. | FTS-1 | 0 | 9,000 | 0 | 11/1/03 | 3/31/26 | - | - | $5.7290 | $0.0101 | Negotiated |
| 8 | 109610 | CITY GAS CO | FTS-1 | 225 | 0 | 0 | 11/1/03 | 10/31/23 | - | - | $4.2500 | $0.0075 | Negotiated |
| 9 | 111730 | WISCONSIN ELECTRIC SIDE | FTS-3 | 25,008 | 0 | 0 | 11/1/07 | 5/31/23 | $2.1250 | $0.0699 | - | $0.0075 | Negotiated |
| 10 | 114369 | WISCON PUBLIC SERV | FSS | 5,326,250 | 30,436 | 106,525 | 11/1/20 | 3/31/23 | $2.4439 | $0.3990 | - | $0.0126 | Negotiated |
| 11 | 114370 | WISCON PUBLIC SERV | FSS | 2,311,300 | 13,207 | 46,226 | 11/1/20 | 3/31/23 | $2.0349 | $0.3990 | - | $0.0126 | Negotiated |
| 12 | 118249 | INTERSTATE POWER & LIGHT | ETS | 0 | 5,000 | 10,000 | 11/1/11 | 3/31/26 | - | - | $ 10.1100/$ 10.9296 | $0.0155 | Negotiated |
| 13 | 122700 | WISCONSIN ELECTRIC POWER | FTS-1 | 0 | 10,100 | 0 | 4/1/14 | 3/31/23 | - | - | $5.7290 | $0.0101 | Negotiated |
| 14 | 124627 | WISCONSIN ELECTRIC POWER | ETS | 0 | 0 | 39,124 | 11/1/14 | 3/31/27 | - | - | $6.5486 | $0.0101 | Negotiated |
| 15 | 125055 | PEOPLES GL&C | FSS | 3,368,200 | 19,247 | 67,364 | 4/1/21 | 3/31/26 | $ 2.1500/$ 2.4439 | $ 0.3740/$ 0.3990 | - | $0.0126 | Negotiated |
| 16 | 125082 | ANTERO RESOURCES | FTS-1 | 300,000 | 0 | 0 | 3/1/15 | 2/28/45 | - | - | $11.1210 | $0.0142 | Negotiated |
| 17 | 126063 | GEORGE B FRANKLIN & SONS | FTS-2 | 400 | 0 | 0 | 10/1/18 | 9/30/24 | - | - | $0.0000 | $0.2598 | Negotiated |
| 18 | 126278 | VECTREN ENERGY DELIVERY | ETS | 30,000 | 0 | 0 | 4/1/16 | 3/31/26 | - | - | $7.6460 | $0.0108 | Negotiated |
| 19 | 126279 | VECTREN ENERGY DELIVERY | ETS | 30,000 | 0 | 0 | 4/1/16 | 3/31/26 | - | - | $7.6460 | $0.0108 | Negotiated |
| 20 | 126333 | WISCON PUBLIC SERV | ETS | 4,700 | 0 | 0 | 11/1/18 | 10/31/33 | - | - | $7.6040 | $0.0075 | Negotiated |
| 21 | 126334 | WISCONSIN PWR & LGHT | ETS | 0 | 0 | 0 | 11/1/19 | 3/31/34 | - | - | $6.6920 | $0.0075 | Negotiated |
| 22 | 126335 | WISCONSIN PWR & LGHT | FTS-3 | 0 | 0 | 40,000 | 11/1/19 | 3/31/34 | $3.0000 | $0.1016 | - | $0.0075 | Negotiated |
| 23 | 126336 | WISCONSIN PWR & LGHT | FTS-3 | 40,000 | 0 | 0 | 4/1/19 | 3/31/34 | $3.0000 | $0.1016 | - | $0.0075 | Negotiated |
| 24 | 126340 | WISCONSIN PWR & LGHT | FTS-3 | 0 | 50,000 | 0 | 4/1/19 | 10/31/33 | $3.0000 | $0.1016 | - | $0.0075 | Negotiated |
| 25 | 126587 | INDIANA GAS COMPANY | ETS | 30,000 | 0 | 0 | 4/1/17 | 3/31/27 | - | - | $7.6460 | $0.0108 | Negotiated |
| 26 | 127117 | NICOR GAS CO. | ETS | 110,000 | 0 | 0 | 11/1/18 | 10/31/28 | - | - | $6.6894 | $0.0000 | Negotiated |
| 27 | 129493 | NORTH SHORE GAS CO. | FSS | 3,619,560 | 20,683 | 90,489 | 11/1/20 | 3/31/26 | $2.4439 | $0.3990 | - | $0.0126 | Negotiated |
| 28 | 129887 | WISCONSIN GAS LLC | FTS-1 | 0 | 8,562 | 0 | 4/1/18 | 3/31/27 | - | - | $ 5.7290/$ 6.6415 | $0.0101 | Negotiated |
| 29 | 134394 | WISCONSIN ELECTRIC POWER | FTS-1 | 0 | 0 | 7,082 | 4/1/21 | 3/31/27 | - | - | $5.7290 | $0.0101 | Negotiated |
| 30 | 134400 | WISCONSIN ELECTRIC POWER | FSS | 1,970,892 | 11,262 | 54,747 | 4/1/21 | 3/31/27 | $2.4439 | $0.3990 | - | $0.0126 | Negotiated |
| 31 | 134401 | WISCONSIN ELECTRIC POWER | FSS | 2,186,776 | 12,496 | 53,336 | 4/1/21 | 3/31/27 | $2.0349 | $0.3990 | - | $0.0126 | Negotiated |
| 32 | 134403 | WISCONSIN GAS LLC | FTS-1 | 0 | 0 | 48,081 | 4/1/21 | 3/31/27 | - | - | $ 5.7290/$ 6.6415 | $0.0101 | Negotiated |
| 33 | 134662 | PEOPLES GL&C | FTS-1 | 0 | 0 | 33,500 | 4/1/21 | 3/31/26 | - | - | $ 5.7290/$ 6.6415 | $0.0101 | Negotiated |
| **Collierville Expansion** | | | | | | | | | | | | | |
| 34 | 126586 | TENN VALLEY AUTH. | FTS-3 | 200,000 | 0 | 0 | 11/1/17 | 11/13/37 | $3.4990 | $0.0000 | - | $0.0105 | Negotiated |
| **Grand Cheneir XPress** | | | | | | | | | | | | | |
| 35 | 133755 | GLOBAL CALCASIEU | FTS-1 | 700,000 | 0 | 0 | 4/1/21 | 12/31/41 | - | - | $3.0430 | $0.0000 | Negotiated |
| **Hover/Diana** | | | | | | | | | | | | | |
| 36 | 106776 | EXXONMOBIL GAS&POWER | PTS-2 | 260,000 | 0 | 0 | 11/1/02 | 12/31/49 | - | - | $0.0000 | $0.0020 | Negotiated |

**Public Service Commission of Wisconsin**

**Ave M. Bie, Chairperson**
**Joseph P. Mettner, Commissioner**
**John H. Farrow, Commissioner**

**610 North Whitney Way**
**P.O. Box 7854**
**Madison, WI 53707-7854**

November 16, 1999

Mr. Peter Newman, Manager-Gas Supply
Wisconsin Gas Company
626 East Wisconsin Avenue
Milwaukee WI 53202

Re: 6650-GP-101 Request to Revise Gas Supply Plan

Dear Mr. Newman:

By an application dated April 12, 1999, Wisconsin Gas Company requested approval of a change to its three-year gas supply plan. The change involves a contract on the proposed Guardian Pipeline.

Your request is granted conditionally. The contract with Guardian is a reasonable addition to the gas supply plan if: (1) the Commission authorizes the construction of the associated lateral, and (2) the Commission approves an affiliated interest agreement between Wisconsin Gas Company and Guardian Pipeline. The basis for the approval is contained in the attachment to this letter.

If you have any questions regarding this approval, please contact Dennis Tuohy at (608) 267-9159.

Sincerely,

Anita Sprenger
Administrator
Natural Gas Division

n:\letter\newman 6-28-99

Attachment

**Telephone: (608) 266-5481** **Fax: (608) 266-3957** **TTY: (608) 267-1479**
**Home Page: http://www.psc.state.wi.us** **E-mail: pscrecs@psc.state.wi.us**

# Attachment

## Summary of PSC Analysis of Request by Wisconsin Gas Company to Modify Its 1998-2003 Gas Supply Plan

On March 15, 1999, a consortium consisting of WICOR, Inc. (WICOR), CMS Energy, and Viking Gas Transmission announced plans to construct an interstate pipeline that would provide service to southeast Wisconsin. The Guardian Pipeline (Guardian) would begin at the Chicago-Joliet Hub and terminate at Watertown, Wisconsin. It would provide between 750,000 and 1,200,000 Dth/day of capacity to customers along its route.

On March 9, 1999, Wisconsin Gas Company (WGC), a subsidiary of WICOR, entered into a precedent agreement with Guardian for 650,000 Dth/day of pipeline capacity. The term of the agreement is 10 years. WGC is asking for approval of the agreement with Guardian as an addendum to its current natural gas supply plan (supply plan).

If the WGC contract is approved, it is likely that the following benefits will flow to Wisconsin consumers:

- Guardian would result in substantial gas cost savings to WGC sales customers over the life of the pipeline.
- Guardian would provide net benefits to WGC transporters as well.
- Guardian could also provide benefits to the sales and transportation customers of other utilities that might connect with Guardian.
- Guardian would provide the infrastructure that would provide Wisconsin with a competitive alternative in the market for interstate pipeline capacity.
- Guardian would enhance the reliability of the interstate pipeline system serving the state, thereby improving the reliability of the state's natural gas system for residential and commercial customers, as well as for the state's gas-fired electrical generators.

## Benefits to WGC Sales Customers

Revenue requirement analysis suggests that Guardian will save WGC sales customers millions of dollars in present value terms over the life of the pipeline. This alone allows one to conclude that WGC's selection of the Guardian contract over other options is a reasonable and prudent decision. Consideration of other factors provides further support for the Guardian contract. For example, the terms of the Guardian contract explicitly state that the rates charged to WGC are not subject to change over the life of the contract. Other offers contain no such guarantee. This price certainty afforded by the Guardian contract provides additional real, albeit difficult-to-quantify, economic value to WGC.

## Guardian as a Long-term Investment in Utility Infrastructure

Pipelines form the backbone of the state's natural gas infrastructure, much as highways do for the state's transportation system. Since they are long-lived assets, pipelines also provide service to future generations as well as to current ones, again much as highways do. Using a long-term economic perspective, the present value of the savings from Guardian are even greater than those considered under a shorter-term perspective. This reinforces the conclusion that the selection of the Guardian alternative is reasonable and prudent.

## Impacts on Other Parties

The summary above considers net benefits to WGC sales customers only. Transporters on the WGC system would benefit from Guardian. These customers today use 40 percent of the gas delivered by WGC, so the net present value analysis discussed above considers only a little more than half the affected load on the WGC system. The analysis discussed above, therefore, understates the true net benefits of Guardian. This again provides additional support for the Guardian option.

Furthermore, both sales and transportation customers of neighboring utilities (*i.e.* other than WGC) could benefit if those utilities connected with Guardian. Both of these items suggest that although the benefits to other parties are difficult to quantify, the total potential benefits from Guardian are higher than initially estimated.

On the other hand, there are parties that might not benefit from Guardian, at least not in the short run. These would be the utilities that are served by other pipelines and that would not have access to Guardian It is possible that these pipelines could attempt to shift costs to these utilities to make up for revenue lost when WGC moves much of its load to Guardian. The potential for cost shifting is limited, however, by market forces, *i.e.*, if the pipelines shift too many costs to these utilities, new pipelines may spring up to serve those utilities.

**Guardian as a Competitive Alternative**

The potential benefits of Guardian discussed above reflect the benefits of competition. If Guardian is not built, WGC may be faced with the unenviable prospect of being served indefinitely by one dominant pipeline. ANR Pipeline currently supplies about 85 percent of WGC's pipeline capacity. The construction of Guardian would provide a true competitive alternative to ANR.

Promoting competition solely for competition's sake alone is not good public policy. A competitive pipeline alternative should be expected to produce net benefits relative to maintaining the *status quo ante*. As discussed above, it is highly likely that Guardian would produce such benefits.

**The Window of Opportunity for Constructing Pipeline Capacity to Serve Wisconsin**

It is much more difficult today to site and construct new interstate pipelines than it was when most interstate pipelines in Wisconsin were constructed many decades ago. Land use concerns often dominate public hearings on pipeline projects. Rights-of-way costs are escalating noticeably as the choice of alternative routes is narrowed. These factors make approval and construction of new pipelines become more difficult in the future.

If a new pipeline is not built in the next few years, the window of opportunity will close for at least several years as Wisconsin LDCs renew their contracts with existing pipelines. At the conclusion of that period it may no longer be possible to build another pipeline through the congested Northern Illinois-Southeast Wisconsin area. That means that if Guardian looks like an attractive option, which it does, then it should be selected now for it or something like it may not be available at a later date. This again compels one to select Guardian as the preferred option.

**Reliability Issues**

Adding new capacity that is independent of existing pipeline capacity enhances the physical reliability of natural gas service in Wisconsin. The existing pipelines serving the state have provided reliable service to date. Nonetheless, having another pipeline serving Wisconsin improves reliability. No one knows when or where there will be a *force majeure* situation on one of the existing pipelines. Guardian would help to ensure that customers ranging from residences to large factories have reliable gas service year round.

Guardian also could help to improve the reliability of the state's electrical system by increasing the capability to deliver gas to the state's gas-fired electrical generators. That will be critical as the state adds relatively large amounts of such generation over the next decade.

## Conclusion

The potential benefits of Guardian far outweigh its cost. This is true over a continuum of scenarios from the narrowest, which considers only WGC's sales customers, to successively broader perspectives that consider the benefits to other groups of customers that could be served by Guardian. WGC's supply plan addendum should, therefore, be approved.

N:\draft\attachment to newman letter

Docket No. RP22-___-000
Exhibit No. ANR-0057
Page 1 of 1

# Wisconsin Natural Gas Deliveries, by Pipeline Company

**1970-2012** TRILLIONS OF BTU AND PERCENT OF TOTAL

| Year | ANR Pipeline Co.[a] | | Viking Gas Trans. Co.[b] | | Natural Gas Pipeline Co.[c] | | Northern Natural Gas Co. | | Guardian Pipeline[d] | | Total[f,g] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1970 | 289.4 | *88.2%* | 6.0 | *1.8%* | 6.3 | *1.9%* | 26.6 | *8.1%* | | | 328.3 |
| 1975 | 323.0 | *88.5%* | 5.7 | *1.6%* | 7.1 | *1.9%* | 29.2 | *8.0%* | | | 365.0 |
| 1980 | 305.5 | *88.8%* | 3.9 | *1.1%* | 7.8 | *2.3%* | 26.8 | *7.8%* | | | 344.0 |
| 1985 | 265.8 | *87.4%* | 1.2 | *0.4%* | 7.7 | *2.5%* | 29.4 | *9.7%* | | | 304.1 |
| 1990 | 218.2 | *72.0%* | 6.0 | *2.0%* | 7.4 | *2.4%* | 53.8 | *17.7%* | | | 303.2 |
| 1995 | 264.3 | *69.6%* | 9.1 | *2.4%* | 23.5 | *6.2%* | 83.1 | *21.9%* | | | 380.0 |
| 1996 | 269.5 | *67.7%* | 9.9 | *2.5%* | 26.1 | *6.6%* | 92.3 | *23.2%* | | | 397.8 |
| 1997 | 265.8 | *68.1%* | 10.4 | *2.7%* | 23.1 | *5.9%* | 90.8 | *23.3%* | | | 390.1 |
| 1998 | 241.0 | *67.6%* | 10.2 | *2.9%* | 19.7 | *5.5%* | 85.5 | *24.0%* | | | 356.4 |
| 1999 | 256.3 | *68.8%* | 11.4 | *3.1%* | 16.3 | *4.4%* | 88.3 | *23.7%* | | | 372.3 |
| 2000 | 272.1 | *69.0%* | 11.1 | *2.8%* | 21.0 | *5.3%* | 90.0 | *22.8%* | | | 394.2 |
| 2001 | 236.4 | *66.0%* | 14.1 | *3.9%* | 23.7 | *6.6%* | 84.1 | *23.5%* | | | 358.3 |
| 2002 | 267.2 | *68.7%* | 15.1 | *3.9%* | 22.3 | *5.7%* | 82.5 | *21.2%* | 1.9 | *0.5%* | 389.0 |
| 2003 | 257.0 | *64.6%* | 16.0 | *4.0%* | 19.9 | *5.0%* | 84.8 | *21.3%* | 20.3 | *5.1%* | 398.0 |
| 2004 | 241.8 | *60.3%* | 14.8 | *3.7%* | 19.8 | *4.9%* | 84.0 | *20.9%* | 40.8 | *10.2%* | 401.2 |
| 2005 | 253.2 | *60.9%* | 16.1 | *3.9%* | 19.6 | *4.7%* | 84.0 | *20.2%* | 42.9 | *10.3%* | 415.8 |
| 2006 | 219.0 | *57.2%* | 14.6 | *3.8%* | 19.9 | *5.2%* | 88.6 | *23.2%* | 40.6 | *10.6%* | 382.7 |
| 2007 | 249.9 | *58.9%* | 18.8 | *4.4%* | 18.0 | *4.2%* | 88.4 | *20.8%* | 48.9 | *11.5%* | 424.0 |
| 2008 | 258.3 | *58.4%* | 17.9 | *4.0%* | 17.5 | *4.0%* | 94.9 | *21.4%* | 53.9 | *12.2%* | 442.5 |
| 2009 | 243.0 | *58.8%* | 17.6 | *4.3%* | 18.5 | *4.5%* | 80.6 | *19.5%* | 53.5 | *12.9%* | 413.2 |
| 2010 | 226.9 | *59.9%* | 18.8 | *5.0%* | 12.2 | *3.2%* | 77.1 | *20.3%* | 43.9 | *11.6%* | 378.7 |
| 2011 | 237.9 | *57.7%* | 18.8 | *4.6%* | 11.4 | *2.8%* | 78.0 | *18.9%* | 66.1 | *16.0%* | 412.1 |
| **2012[p]** | **240.8** | ***59.7%*** | **18.7** | ***4.6%*** | **6.6** | ***1.6%*** | **80.0[e]** | ***19.8%*** | **57.2** | ***14.2%*** | **403.3** |

The major supplier of natural gas to Wisconsin, ANR, transports most of its gas from Oklahoma and Louisiana. Northern Natural Gas Company transports its gas to Wisconsin from Texas, Oklahoma, Kansas and Alberta, Canada. Natural Gas Pipeline Company transports gas to Wisconsin primarily from Oklahoma, Louisiana and Texas. However, Viking Gas Transmission Company's gas originates primarily from Alberta, Canada. Guardian Pipeline began transporting natural gas to Wisconsin on December 7, 2002.

**a** Formerly American Natural Resources Pipeline Co.

**b** Formerly Midwest Gas Transmission Co.

**c** In 1994, Midcon Corporation became part of the Natural Gas Pipeline Co. Prior to 1994, data in this table included delivery information from Midcon Corporation.

**d** The Guardian Pipeline became operational on December 7, 2002.

**e** Estimated.

**f** Prior to 1990, deliveries represent utility gas sales. Beginning in 1990, deliveries represent total gas used in Wisconsin, including both utility and transported gas deliveries.

**g** Total purchases differ from the total sold and used by gas utilities due to inventory changes, utility production from liquefied petroleum gas and some unaccounted gas.

**p** Preliminary estimates.

**Source:** Public Service Commission of Wisconsin, Accounts and Finance Division, *Statistics of Wisconsin Public Utilities*, Bulletin #8 (1970-1993). Telephone conversations and unpublished emails with pipeline representatives 1991-2012.

Guardian is a prime example of a market participant (*e.g.*, a Wisconsin LDC, Wisconsin Gas) seeking pipeline competition and choice by contracting for an alternative to its existing pipeline service provider. Approval of this proposal fits squarely within the Commission's stated objective "to provide appropriate incentives for efficient customer choices and the optimal level of construction, without biasing those choices through regulatory policies."[25] Guardian proposes to meet the market's demands for choice, competition and additional capacity.

### 3. Guardian Has Precedent Agreements For 94 Percent Of Its Capacity.

The quintessential demonstration of market demand comprises shipper contracts. The Commission recognizes shipper contracts to be "strong evidence of market demand and potential public benefits."[26] Since Guardian was announced, shippers have executed with Guardian four (4) precedent agreements for 702,500 Dth/day of firm capacity. The precedent agreements executed for service on Guardian are indicated on the chart below:

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[25] *Statement of Policy*, 88 F.E.R.C. at 61,744.

[26] *Id.* at 61,749.

| Shippers | Volume (Dth/day) | Term (years) | Primary Delivery Point(s) |
|---|---|---|---|
| Wisconsin Gas* | 650,000 | 10 | Ixonia (500,000)<br>Eagle (150,000) |
| Alliant Energy | 10,000 | 10 | Northern Natural |
| WPS Energy Services, Inc. | 2,500 | 10 | Ixonia |
| Shipper A** | 40,000 | 10 | Northern Natural |

* Affiliate of Guardian.

** The Shipper A precedent agreement, including the identity of the shipper, has been redacted to maintain the confidentiality of the shipper, because that agreement remains subject to approval of the shipper's board of directors or management committee. In addition to protecting this shipper, Guardian believes that it will suffer competitive harm if the identity of this shipper is made public, because competing pipelines may try to interfere with Guardian's contracting efforts and relations.

These precedent agreements, included in Exhibit I, represent about 94 percent of Guardian's initial design capacity. This level of shipper commitment demonstrates market support for the proposed pipeline. Additionally, Guardian continues to negotiate with other potential shippers for firm transportation service on its pipeline. Guardian will file with the Commission additional precedent agreements after they are executed.

### C. Market Growth.

Public data demonstrate that demand for gas in Wisconsin and northern Illinois will increase substantially over the next several years. As discussed below, the estimated growth in residential, commercial, industrial and gas-fired electric generation by 2005 is projected to be about 913,000 Dth per day. This projection is on the conservative side as it does not reflect

## VII.

## PROPOSED SERVICES, RATES, COSTS AND FINANCING

### A. Description of Proposed Services and Rates.

Guardian will offer both firm and interruptible services on an open access, nondiscriminatory basis pursuant to Part 284 of the Commission's regulations, with services available at both recourse and negotiated rates.

#### 1. Firm Services.

Guardian will offer firm transportation service under Rate Schedule FT-1, and proposes to have the authority to negotiate, on a nondiscriminatory basis, with shippers to charge rates for firm service that deviate from its maximum recourse Rate Schedule FT-1 rates. Beyond the GISB-required flexibility inherent in a post-Order No. 636 standard firm transportation service, and as explained in Section VI.A.2 above, each Guardian firm shipper will have, at no premium cost, the added flexibility of nominating at a designated receipt point up to ten percent (10%) of its maximum daily quantity on one-hour notice, with such nomination being accorded Guardian's highest priority.[57] Guardian's Rate Schedule FT-1 recourse rate is a traditional cost-of-service based rate, designed under the straight fixed variable ("SFV") method, based on 100 percent of Guardian's design capacity (750,000 Dth per day), all as fully established in Exhibit P.

Guardian's GT&C provide for the negotiation, on a nondiscriminatory basis, of rates that differ from Guardian's generally applicable recourse rates.[58] Guardian's negotiated

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[57] *See* Exhibit P, Pro Forma Tariff, GT&C §17.2(e).

[58] *See* Exhibit P, Pro Forma Tariff, GT&C § 26.2.

rates may be less than, equal to, or greater than its cost-based maximum rates and may also be designed on a basis other than SFV, all as contemplated by and consistent with Commission policy.[59] During Guardian's open season, as required by the Commission's Alternative Ratemaking Policy Statement,[60] Guardian offered to all interested shippers the option to elect recourse rates based on the traditional cost-of-service and SFV rate design or, on a nondiscriminatory basis, to elect negotiated rates at either (i) a 10-year or 15-year fixed rate, or (ii) an annual declining rate for a minimum term of 10 years up to a maximum term of 15 years. All negotiated rates will be 100 percent reservation charge rates, with transporter's use gas as the only variable or usage charge, plus ACA.

Guardian agrees to comply with the Commission's reporting requirements as to negotiated rates between Guardian and its shippers. Guardian will file with the Commission either its negotiated rate contracts or tariff sheets reflecting the essential elements of its negotiated rate agreements.[61] Guardian will record each volume transported, billing determinant, rate component, surcharge, and revenue associated with its negotiated rates so that these may be filed and separately identified, and in particular separately totaled, as part of and in the form of

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[59] *Alliance Pipeline L.P.*, 80 F.E.R.C. (CCH) ¶61,149, at 61,597 (1997); *Vector*, 85 F.E.R.C. at 61,302; *Noram Gas Transmission Co.*, 75 F.E.R.C. (CCH) ¶ 61,322, at 62,026 (1996).

[60] *Statement of Policy and Request for Comments, Alternatives to Traditional Cost-of-Service Ratemaking for Natural Gas Pipelines, Regulation of Negotiated Transportation Services of Natural Gas Pipelines*, Docket Nos. RM95-6-000, RM96-7-000 (January 31, 1996).

[61] *See, e.g.*, *Vector*, 85 F.E.R.C. at 61,304. *See also* Section 26.2(c) of the GT&C of Guardian's Pro Forma Tariff (Exhibit P).

Statements G, I and J in future rate case filings.[62] Guardian has conducted and will continue to conduct its rate negotiations in accordance with the Commission's policies and regulations as they may be in effect from time to time, including the Commission's Alternative Ratemaking Policy Statement.

Guardian's negotiated rates provide shippers with the opportunity for rate certainty for gas service from the Chicago Hub to markets in Wisconsin and northern Illinois. Guardian's negotiated rate structure provides Guardian's shippers with rate certainty for their contract terms and places all construction cost, operating cost and volume risk on Guardian. By providing such rate certainty, Guardian's negotiated rates yield the benefits that the Commission envisioned would accompany negotiated rate-making.[63]

2. Interruptible and Overrun Services.

In addition to the firm rate schedule described above, Guardian will offer shippers interruptible service under Rate Schedule IT-1. Rate Schedule IT-1 provides for transportation of natural gas on an interruptible basis, when and to the extent Guardian determines that capacity

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[62] Guardian's proposed accounting method is the method approved by the Commission in its Order Issuing Certificate, *Maritimes & Northeast, L.L.C.*, 84 F.E.R.C. (CCH) ¶ 61,130, at 61,681, 61,684 (1998) ("We will clarify that Maritimes' explanation in its application of how it will account for revenues received from negotiated rates . . . complies with the Commission's requirements."). *See also Alliance*, 80 F.E.R.C. at 61,593.

[63] These benefits were noted by the Commission in its *Notice of Inquiry on Regulation of Interstate Natural Gas Transportation Services*, Docket No. RM98-12-000, F.E.R.C. Stats. & Regs. [Proposed Regs.] (CCH) ¶ 35,533, at 35,736 (1998) (stating that "[l]ong-term contracts can provide revenue stability and reduce financial risks to the pipeline") and *Notice of Proposed Rulemaking on Regulation of Short-Term Natural Gas Transportation Services*, Docket No. RM98-10-000, F.E.R.C. Stats. & Regs. [Proposed Regs.] (CCH) ¶ 32,533 at 33,471, 33,472. ("The negotiation of rates and services . . . has the ability to increase the attractiveness of long-

is available, up to the level nominated by an interruptible shipper pursuant to its Rate Schedule IT-1 Service Agreement. All points of receipt and delivery on Guardian will be available to shippers transporting gas under Rate Schedule IT-1.

Guardian's maximum Rate Schedule IT-1 rate is the 100 percent load factor equivalent of the maximum or recourse FT-1 rate. Guardian has allocated $1,000,000 of costs to its interruptible service under Rate Schedule IT-1. Because Guardian has allocated costs to Rate Schedule IT-1, Guardian proposes to retain revenues, if any, for service performed under Rate Schedule IT-1.[64] Also, Guardian proposes to have the authority to contract with shippers, on a nondiscriminatory basis, to charge rates for interruptible services that deviate from its maximum interruptible rate. Guardian will conduct any such transactions in accordance with the Commission's then-effective policy on the negotiation of rates and services.[65]

Rate Schedule FT-1 also includes an overrun provision for daily volumes in excess of contract levels. The rate for authorized overrun service (AOS) is equal to the 100 percent load factor of the maximum or recourse FT-1 rate, unless Guardian, on a non-discriminatory basis, agrees otherwise.

Guardian further proposes an unauthorized overrun rate of the higher of $15 per Dth or 200 percent of the reported price for gas deliveries into the Chicago market for the flow

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term capacity" and the negotiating of service may be a "valuable risk management tool for pipelines and customers with respect to long-term contracts.").

[64] Guardian's proposal is consistent with Commission decisions on this point. *See, e.g., Portland Natural Gas Transmission System*, 80 F.E.R.C. (CCH) ¶ 61,134, at 61,451 (1997) (no revenue crediting required because certain costs were allocated to IT service).

[65] *See* note 58, *supra*.

date on which the gas is transported, multiplied by the quantities in excess of the allowed variance.[66] The unauthorized overrun level proposed by Guardian is necessary to prevent gaming by shippers during periods of extraordinary demand, and it is consistent with Commission policy.[67]

B. Costs and Financing.

Guardian estimates that the total capital cost of constructing its proposed pipeline and appurtenant facilities will be approximately $224.3 million, excluding AFUDC. *See* Exhibit K. Of the total estimated capital construction cost, $196.3 million relates to pipeline and ancillary facilities, and $28.0 million relates to a compressor station. Guardian estimates that AFUDC will total $13.5 million, such that the total capital cost including AFUDC will be approximately $237.8 million.

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[66] *See* Exhibit P. Guardian's Pro Forma Tariff, Rate Schedule FT-1, §7. The "delivered price" to determine the unauthorized overrun rate midpoint will be the "Gas Price Index," which is defined in Guardian's Tariff as for each "reported Day, the midpoint in the range of prices reported for 'Chicago – LDCs, large end-users,' as published in *Gas Daily*, or, if no longer published, an equivalent index or indicator, which substitution shall be posted on Transporter's Website . . . ." *See* Exhibit P, Guardian's Pro Forma Tariff, GT&C, Definitions.

[67] *See, e.g., Northern Natural Gas Co.*, 77 F.E.R.C. (CCH) ¶ 61,282, at 62,232 (1996) ("[W]e favor pipelines' being able to ensure system integrity and to deter gaming or other conduct that would endanger that integrity."); *Panhandle Eastern Pipe Line Co.*, 77 F.E.R.C. (CCH) ¶ 61,202, at 61,876-77 (1997), *reh'g den.*, 82 F.E.R.C. (CCH) ¶ 61,163 (1998). *See also Short-Term NOPR*, Docket No. RM98-10-000, FERC Stats. & Regs. at 33,467-71 (where the Commission set forth its proposal to require pipelines: (1) to provide timely information regarding imbalance and overrun status of each Shipper and the imbalances of their systems as a whole; (2) to have in place only those penalties necessary to protect system operations; (3) to provide services that facilitate Shippers' abilities to manage imbalances, so that penalty situations can be avoided; and (4) to adopt incentives and procedures that will minimize the use and potential negative impact of OFOs).

# EXHIBIT A
# TO
# PRECEDENT AGREEMENT

## SHIPPER'S REQUESTED RECEIPT POINT(S)

| Description[*] | MDQ (in Dth)[**] |
|---|---|
| *Joliet Area* | *650,000* |
| Total Receipt Point MDQ: | *650,000* |

## SHIPPER'S REQUESTED DELIVERY POINT(S)

| Description[*] | MDQ (in Dth) |
|---|---|
| *Watertown, WI* | *500,000* |
| *Eagle, WI* | *150,000* |
| Total Delivery Point MDQ: | *650,000* |

## SHIPPER'S REQUESTED TERM (CHECK ONE)

10 years __X__ 15 years ____ Other ____ (specify number of years greater than 10)

## RATE OPTION (CHECK ONE):

Negotiated: __X__ Recourse: ________

If the Negotiated Rate Option is checked, Shipper and Guardian further agree that the negotiated transportation rate (daily demand charge in $ per Dth), exclusive of fuel and ancillary charges required by FERC, for service on Guardian shall be as follows:

| Year | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rate | $.141 | $.136 | $.131 | $.126 | $.122 | $.107 | $.103 | $.099 | $.096 | $.092 | $.089 | $.086 | $.082 | $.079 | $.076 |

Fuel and lost and unaccounted: Shipper shall tender in-kind at the Receipt Point(s) an amount equal to Guardian's fuel and lost and unaccounted for percentage applied to Shipper's MDQ, as such percentage may be in effect from time to time.

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[*] Specific Points of Receipt and the MDQ at each such point shall be designated on Exhibit "A" to Shipper's Firm Transportation Service Agreement.

[**] The Receipt Point MDQ is to be increased by an amount equal to the applicable fuel and lost and unaccounted for gas percentage, as such percentage may be in effect from time to time.

Resources. The electric power line facilities related to the Sycamore Compressor Station will be subject to the regulations of the Illinois Commerce Commission.

The estimated cost to construct and install the jurisdictional facilities described herein is approximately $261.436 million, as detailed in Exhibit K attached hereto. Attached hereto at Exhibit L is the proposed financing plan for the construction of G-II.

Construction is scheduled to commence in March, 2008, with an in-service date of November 1, 2008. The construction is not expected to have any significant adverse impact on the quality of human health or the environment. This proposed time-line considers a host of factors requiring substantial lead time and planning, including sufficient time to secure the necessary pipeline rights-of-way and environmental permits and clearances.

## VI.

## DESCRIPTION OF THE MARKET

The demand for clean burning natural gas in Wisconsin has been growing at a rapid pace. Natural gas consumption has increased in the State of Wisconsin by more than 25 percent since 1990 and now totals nearly 400 billion cubic feet annually[2]. More than two-thirds of all Wisconsin households heat with natural gas. Despite relatively mild winters, residential use of natural gas increased 19 percent from 1990 to 2004 as the number of customers increased by approximately 40 percent. During that same period, the number of commercial and industrial gas customers increased by nearly 43 percent. Combined natural gas use in the commercial and industrial sectors, excluding electric generation, also increased by more than 18 percent from

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[2] Wisconsin Division of Energy. 2005. *Wisconsin Energy Statistics 2005*. Wisconsin Department of Administration, Madison, Wisconsin; Wisconsin Division of Energy. 2006. *Wisconsin Energy Statistics 2006 Preliminary Draft*. Wisconsin Department of Administration, Madison, Wisconsin.

1990 to 2004.[3] Each year the Energy Information Administration (EIA) of the U.S. Department of Energy (DOE) assesses key energy issues, including economic growth, energy prices, energy consumption, energy intensity, electricity generation, energy production and imports, and carbon dioxide emissions. The EIA estimates that total energy consumption in the East North Central region, which includes Wisconsin, Illinois, Indiana, Ohio, and Michigan, will rise from 16.268 quadrillion British thermal units (Btu) in 2003 to about 20.238 quadrillion Btu in 2025. Total consumption of natural gas in the East North Central region during this same period is expected to rise from 3.730 quadrillion Btu in 2005 to 5.047 quadrillion Btu in 2025, which represents an average increase in natural gas consumption of 1.4 percent per year over 22 years.[4]

As stated above, G-II was proposed in response to an RFP issued by the Wisconsin LDCs in November 2004. Among the goals in the LDCs' RFP was an expansion of LDC access to competitive supplies and services for the benefit of their utility customers. A 15-month competitive bidding process was used by We Energies and WPSC, the state's two largest natural gas utilities, to select Guardian to meet their needs for transporting additional volumes of natural gas in eastern Wisconsin through the construction of G-II. As will be shown in the Wisconsin LDCs' own filings to the PSCW for construction of the interconnecting pipeline facilities (which Guardian will file as a supplement to this application for informational purposes as Exhibit Z-2), their market studies indicate growth in natural gas demand and the related transportation capacity needed to meet that demand. Not surprisingly given the growing demand for natural gas, the

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[3] Wisconsin Division of Energy. 2005. *Wisconsin Energy Statistics 2005*. Wisconsin Department of Administration, Madison, Wisconsin.

[4] Energy Information Administration. 2006a. *Annual Energy Outlook 2006*. U.S. Department of Energy, Washington, District of Columbia. Energy Information Administration. 2006b. *East North Central Regional Energy Profile*. U.S. Department of Energy, Washington, District of Columbia.

existing pipeline capacity in Wisconsin is constrained (with the existing Guardian facilities presently 98 percent subscribed.) Accordingly, expanding natural gas transmission capacity in Wisconsin is vital to the state's economic development and long-term competitiveness since there is insufficient available incremental natural gas capacity to serve Wisconsin consumers and businesses.

Currently, ANR Pipeline Company is the only pipeline serving the eastern Wisconsin market north of Milwaukee. G-II will establish a second interstate natural gas pipeline serving eastern Wisconsin which will benefit consumers through increased competition and increased reliability in gas transportation services.

Negotiations between Guardian and the LDCs resulted in the execution of separate Precedent Agreements between Guardian and WPSC; and between Guardian and two We Energies entities (Wisconsin Gas LLC and Wisconsin Electric Power Company). (Such Precedent Agreements, as amended, are attached hereto as Exhibit I and collectively referred to as the "Precedent Agreements").

Guardian conducted an open season for G-II from June 29, 2006 through July 21, 2006 to solicit interest for the remaining 40,200 Dth/d of firm transportation capacity on G-II. No parties participated in the open season.

Guardian did not solicit capacity turnback (reverse open season) as part of the open season to allow current shippers to release all or a portion of their current firm entitlements since the 537,200 Dth/day of incremental capacity was not fully subscribed during the time of the open season. Thus, the purpose of the Commission's turnback policy - to minimize the need for new construction to serve unsatisfied demand and to ensure that expansion projects are appropriately sized, *Pricing Policy for New and Existing Facilities Constructed by Interstate Natural Gas*

*Pipelines*, 71 FERC (CCH) ¶ 61,241 (1995) - would not be served if existing shippers were to turnback capacity.

Each of the Precedent Agreements provides for the execution of an FT-2 Service Agreement for an initial term of fifteen years, conditioned upon the satisfaction of certain conditions precedent, including the receipt of the necessary regulatory approvals.

The following table summarizes the G-II Shippers' subscribed capacity and the terms of their commitments.

| Project Shipper | Maximum Daily Quantity (Dth/day) | Length of Contract (Years) |
|---|---|---|
| Wisconsin Gas LLC[5] | 90,105 | 15 |
| Wisconsin Electric Power Company | 201,656 | 15 |
| Wisconsin Public Service Corporation | 205,245 | 15 |

G-II Shippers also were provided a Ramp-Down Provision[6] as part of their Precedent Agreement which allowed the Project Shippers to reduce their Maximum Daily Quantity (MDQ). The non-discriminatory availability of a Ramp-Down Provision is further described in Section VII of this application. Specifically, G-II Shippers were provided two separate Ramp-Down Provision options as more fully detailed in Exhibit B of the Precedent Agreements.[7] All

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[5] As part of the Precedent Agreement, Wisconsin Gas LLC agreed to extend its existing Rate Schedule FT-1 Service Agreement and existing Rate Schedule EAW Service Agreement for a ten-year period commencing December 7, 2012 and ending December 6, 2022 at a rate of $0.120 Dth/day and $0.00 Dth/day, respectively.

[6] "Ramp-Down Provision" in the Precedent Agreements provides that for each year of the last four-year period of the Initial Term (the "Ramp-Down Period"), the MDQ shall be reduced by a certain percentage ("Ramp-Down Percentage") of the MDQ in effect immediately prior to the beginning of the Ramp-Down Period, as further detailed in Exhibit B of the Precedent Agreements.

[7] In addition, in the event a "Partial In-Service Date" occurs as defined in Article 1 of the Precedent Agreements, a G-II Shipper may opt for an MDQ Reduction Right of twenty percent beginning in the twelfth year of service, as more fully detailed in Exhibit B of the Precedent Agreements.

three G-II Shippers elected a ramp-down percentage of ten percent (an "MDQ Reduction Right").[8] Accordingly, beginning in the twelfth year of service, each G-II Shipper's MDQ automatically is reduced by 10% of its originally contracted MDQ. Additionally, each G-II Shipper has the right to reduce its MDQ by an additional 10% each remaining year of the Ramp-Down Period.

Since each of the G-II Shippers requested rate certainty for their respective contractual commitments over the entire term, the executed Precedent Agreements reflect a negotiated fixed rate for each year of the initial term of the Service Agreement (Fixed Rate Option or FRO) as detailed below. Such negotiated fixed rates are inclusive of charges for service under Rate Schedules EAW and MA and are consistent with the Commission's Negotiated Rate Policy.[9]

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[8] Note that Guardian has a more specific definition of "MDQ Reduction Right" in the Precedent Agreements, for purposes of contracting language clarity. Regardless of the specific labels used in Exhibit B to the Precedent Agreements, the Ramp-Down Provisions effectually grant the G-II Shippers the right to reduce their MDQs in the latter years of their initial terms.

[9] Statement of Policy on Alternatives to Traditional Cost-of-Service Ratemaking for Natural Gas Pipelines and Regulation of Negotiated Transportation Services of Natural Gas Pipelines, 74 FERC ¶ 61,076 (1996) ("Policy Statement").

| FRO Reservation Rates | | |
|---|---|---|
| Year | Daily ($/Dth) | Monthly ($/Dth) |
| 1 | 0.1733 | 5.2712 |
| 2 | 0.1750 | 5.3229 |
| 3 | 0.1768 | 5.3777 |
| 4 | 0.1786 | 5.4324 |
| 5 | 0.1803 | 5.4841 |
| 6 | 0.1821 | 5.5389 |
| 7 | 0.1840 | 5.5967 |
| 8 | 0.1858 | 5.6514 |
| 9 | 0.1877 | 5.7092 |
| 10 | 0.1895 | 5.7640 |
| 11 | 0.1914 | 5.8218 |
| 12 | 0.1933 | 5.8795 |
| 13 | 0.1953 | 5.9404 |
| 14 | 0.1972 | 5.9982 |
| 15 | 0.1992 | 6.0590 |

G-II Shippers also must pay Transporter's Use Gas, the Electric Power Cost Recovery Rate, the Annual Charge Adjustment surcharge (ACA), and any other applicable surcharges. Consistent with Rate Schedule FT-1, no commodity rates shall be assessed under Rate Schedule FT-2, unless mandated by a governmental authority. In the event Guardian is required to charge a G-II Shipper a rate higher than the effective FRO due to the imposition of a charge that a G-II Shipper is not required to pay under the FRO, and in the event Guardian and the G-II Shipper do not otherwise agree, then each FRO Rate set forth above shall be reduced by the amount of the difference between the higher rate and the FRO Rate.

As set forth in Section 11.4 of WPSC's Precedent Agreement, as amended, WPSC also will pay an estimated incremental rate of $.0018/Dth, to be added to the above-referenced FRO

Reservation Rate to recover the costs associated with a Shipper Design Request[10] regarding the construction of the Southwest Green Bay Meter Station.

Additionally, Guardian and each of the G-II Shippers agreed to execute Service Agreements for service under Rate Schedule EAW with an MDQ equivalent at all times to the effective MDQ under the corresponding Rate Schedule FT-2 Service Agreement (EAW Service Provision). Guardian and each of the G-II Shippers agreed to a negotiated rate of $0.00/Dth for the term of their respective Rate Schedule EAW Service Agreement.

Guardian also agreed in each Precedent Agreement to file for a market aggregation service[11] which is being proposed herein as a new Rate Schedule MA, as more fully detailed in Section VII of this application. Guardian and each of the G-II Shippers agreed that each shipper's MDQ under Rate Schedule MA would be equal to the effective MDQ in their respective Rate Schedule FT-2 Service Agreement (MA Provision). The negotiated rate for the service under Rate Schedule MA is $0.00/Dth for the term of each G-II Shipper's Rate Schedule MA Service Agreement.

Guardian also agreed in the "Termination Section" of the Precedent Agreements to pay, under certain circumstances, each of the G-II Shippers certain dollars in the event the Full In-Service Date (defined in Article I of the Precedent Agreements of G-II) is delayed.

The Precedent Agreements contain language relating to creditworthiness and financial assurances which is required in order to provide Guardian with the ability to recover the facility costs related to G-II, in the event the Service Agreements are terminated for non-payment or a

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[10] Defined in Section 11.3 of WPSC' Precedent Agreement, as amended.

[11] Referred to as MPN Service in the Precedent Agreements.

Shipper fails to maintain creditworthiness (Creditworthiness Provision). These provisions are consistent with the requirements of the Commission's policy statement addressing creditworthiness issues, which provide that the shippers for whom an expansion is built can be expected to provide collateral up to that shipper's proportionate share of the project's cost.[12]

Guardian seeks a preliminary determination that although the EAW Service Provision, MA Provision, and Creditworthiness Provision may constitute a material deviation from the form of service agreement, such provisions are not unduly discriminatory. Each of these special contract provisions should be permitted for inclusion in the respective negotiated rate service agreements. Consistent with current Commission policy, Guardian intends to file tariff sheets reflecting the negotiated rate service agreements, identifying any material deviations or non-conforming provisions, at the time specified in the regulations or in a Commission Order issued in this proceeding. As part of this application, Guardian is identifying these specific provisions so that the Commission can address them in its certificate order and not reconsider them later once the provisions have been incorporated in executed service agreements.

## VII.

## PROPOSED RATES AND TARIFF

Guardian proposes to establish a recourse rate for the firm transportation to be provided on G-II pursuant to a new firm transportation rate schedule referred to as Rate Schedule FT-2[13] and contained in Exhibit P attached hereto. The proposed Rate Schedule FT-2 is designed to provide enhanced hourly flow rights so that a shipper may transport up to ninety percent of its

---

[12] *Creditworthiness Standards for Interstate Natural Gas Pipelines*, Policy Statement, 111 FERC (CCH) ¶ 61,412 at PP 17-19 (2005).

[13] Upon approval, such rate schedule also will be made available to any shippers desiring to utilize available capacity on Guardian's existing mainline system.

**From:** Findley, Kelly
**To:** Jeff Lafond
**Subject:** [EXTERNAL] RE: contract #118249
**Date:** Tuesday, August 11, 2020 4:23:03 PM
**Attachments:** image001.png
image002.png

---

No other changes.

**From:** Jeff Lafond <jeff_lafond@tcenergy.com>
**Sent:** Tuesday, August 11, 2020 4:02 PM
**To:** Findley, Kelly <KellyFindley@alliantenergy.com>
**Subject:** [EXTERNAL] contract #118249

---

Hi Kelly,
I am working on your request for a shorter path (ML7-ML7) for this contract. Would there be any other changes to the contract such as MDQs or ROFR?

Thanks,
Jeff

**Jeff Lafond**
**Senior Marketing Rep**
U.S. Natural Gas Pipelines
jeff_lafond@tcenergy.com
**mobile:** 281.753.5266
700 Louisiana Street, Suite 700
Houston, TX 77002
**TCEnergy.com**

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**From:** Findley, Kelly
**To:** Jeff Lafond
**Subject:** [EXTERNAL] RE: IPL portfolio
**Date:** Wednesday, September 2, 2020 10:06:26 AM

---

Would you consider discounting the summer 118249 from ML3-ML6. There is no value in that path.
Kelly

**From:** Jeff Lafond <jeff_lafond@tcenergy.com>
**Sent:** Wednesday, September 2, 2020 9:19 AM
**To:** Findley, Kelly <KellyFindley@alliantenergy.com>
**Subject:** [EXTERNAL] RE: IPL portfolio

---

Hi Kelly,

I hope all is well.

After our last conversation, you were going to check into changing the receipt point on contract 118249 from Fayetteville to Rex/Shelbyville, which would shorten the path on that contract and provide future gas purchase optionality. If that is an option for IPL, I can re-send the proposal spreadsheet which I previous sent.

Please let me know, happy to discuss anytime.

Thanks,

Jeff.

**Jeff Lafond**
**Senior Marketing Rep**
U.S. Natural Gas Pipelines
jeff_lafond@tcenergy.com
**mobile:** 281.753.5266
**TCEnergy.com**

**From:** Findley, Kelly <KellyFindley@alliantenergy.com>
**Sent:** September 2, 2020 8:36 AM
**To:** Jeff Lafond <jeff_lafond@tcenergy.com>
**Subject:** [EXTERNAL] IPL portfolio

HI Jeff

Can you let me know where we are at with the IPL renewals? I need to get management approval to be able to sign these – and at this point I am unsure what I am asking for.

Can you also let me know if the ROFR letters are all complete? The on-line format was a bit confusing and we received some emails that said something to the fact that not all the boxes were checked appropriately.

Thanks,

Kelly

---

**From:** Findley, Kelly
**To:** Jeff Lafond
**Subject:** [EXTERNAL] RE: IPL Contract Renewal Proposal
**Date:** Thursday, September 10, 2020 6:44:08 AM
**Attachments:** image001.png

---

Hi Jeff

We would like the straight discounted rate (not the blend of max and discount).

Two further questions and then hopefully we are good to go:

- You mention that secondary receipts are allowed, are secondary deliveries allowed also?
- Is the discounted rate "fixed" at $10.11 – ie – if there is a rate case will our rate still at the $10.11?

Thanks,
Kelly

---

**From:** Jeff Lafond <jeff_lafond@tcenergy.com>
**Sent:** Tuesday, September 8, 2020 10:41 AM
**To:** Findley, Kelly <KellyFindley@alliantenergy.com>
**Subject:** [EXTERNAL] IPL Contract Renewal Proposal

---

Hi Kelly,

Please see the spreadsheet attached with ANR's proposal for IPL renewal contracts (IPL Tab) as per our conversation this morning.

To answer your question regarding ability to nominate secondary transport on the contract 118249 under the revised rate for summer capacity: The rate provided in the spreadsheet **will** include secondary receipt points.

Let me know if you have any questions.

Thanks,
Jeff.

**Jeff Lafond**
**Senior Marketing Rep**
U.S. Natural Gas Pipelines
jeff_lafond@tcenergy.com
**mobile:** 281.753.5266
700 Louisiana Street, Suite 700
Houston, TX 77002
**TCEnergy.com**

**From:** Joseph Pollard
**To:** Amy Sowa
**Cc:** Bruce Hopper*
**Subject:** Re: George B Franklin & Sons Extension Request
**Date:** Friday, March 13, 2015 5:25:02 PM

---

okay

Thanks, Joe

On Mar 13, 2015, at 3:32 PM, Amy Sowa <amy_sowa@transcanada.com> wrote:

> Thanks, Joe: I just realized I left a loose end. Are you ok with extending contractual ROFR on this? He has that in his current contract.
>
> **From:** Joseph Pollard
> **Sent:** Friday, March 13, 2015 2:03 PM
> **To:** Amy Sowa
> **Cc:** Bruce Hopper
> **Subject:** RE: George B Franklin & Sons Extension Request
>
> Following our discussion I would agree to move forward with the extension.
>
> **From:** Amy Sowa
> **Sent:** Friday, March 13, 2015 1:15 PM
> **To:** Joseph Pollard
> **Cc:** Bruce Hopper
> **Subject:** George B Franklin & Sons Extension Request
>
> Hi Joe: I have received a request for contract extension from George B. Franklin & Sons. This is a very small end user in ML2 who uses natural gas only for its rice drying facility in northern Louisiana. Here is some history on their business with ANR:
>
> <!--[if !supportLists]-->- <!--[endif]-->ANR's first involvement with GBF&S was a right-of-way/landowner relationship. According to my contact, Fred Franklin, the facility's original transportation contract came from that relationship.
>
> <!--[if !supportLists]-->- <!--[endif]-->Fred tells me their original transportation agreement started in 1987, but I don't see anything prior to 1994 in GEMS. That 1994 FTS-2 contract (K#43900) was a 400 Dth/d max rate <u>volumetric</u> agreement from SEHS to NORAM/DELHI (delivery changed from Delhi to George B Franklin Int in 1995) that was supposed to run from 10/1/94 to 9/30/14.
>
> <!--[if !supportLists]-->- <!--[endif]-->The original K#43900 contract had a host of issues in the Further Agreement section (including GBF&S waiving its capacity release rights and ANR agreeing to reimburse GBF&S for any imbalance penalties) and was renegotiated in 2003.
>
> <!--[if !supportLists]-->- <!--[endif]-->The 2003 FTS-2 contract (K#108766) was <u>filed as a negotiated rate</u> and contains the following terms:
>
> <!--[if !supportLists]-->• <!--[endif]-->Term: 10/1/03 – 9/30/18
>
> <!--[if !supportLists]-->• <!--[endif]-->MDQ: 400 Dth/d
>
> <!--[if !supportLists]-->• <!--[endif]-->Primary Path: SEHS to George B Franklin Int
>
> <!--[if !supportLists]-->• <!--[endif]-->Associated Gathering agreement (GF-

1 K#109660).

<!--[if !supportLists]-->•<!--[endif]-->Secondary Points: None

<!--[if !supportLists]-->•<!--[endif]-->Demand Rate: $0.00 (max FTS-2 demand is $4.2740/dth/mo or $0.1405/dth)

<!--[if !supportLists]-->•<!--[endif]-->Commodity Rate: $0.2598/Dth. This exceeds both the maximum FTS-2 commodity of rate of $0.0837/dth and the 100% load factor rate of $0.2364/dth, but does not exceed the 100% load factor rate plus the $0.0413/dth gathering fee ($0.2777/dth).

<!--[if !supportLists]-->•<!--[endif]-->Rates are inclusive of surcharges

<!--[if !supportLists]-->•<!--[endif]-->GF-1 includes Authorized Overrun Service language

<!--[if !supportLists]-->•<!--[endif]-->Contract has ROFR

<!--[if !supportLists]-->-<!--[endif]-->While this is an annual contract, the customer only uses gas during the rice drying season in the fall. Usage is determined by crop size and rainfall levels. I took a look at past invoices and found that in the past 24 months the customer only used its contract for 15 days in September 2014. Total volume was 1,100 dth and total revenue was $289.71.

Which brings me to today. Fred is asking to extend his contract as is for an additional six years to 9/30/24 to match up with his OBA agreement termination date. Some points to consider:

<!--[if !supportLists]-->•<!--[endif]-->Given its diminutive usage, this contract is more an act of landowner goodwill than a revenue generator.

<!--[if !supportLists]-->•<!--[endif]-->The primary path is located in an area where we have ample capacity and limited market potential (though this FTS-2 contract does take the same capacity reservation as an FTS-1).

<!--[if !supportLists]-->•<!--[endif]-->I’ve chatted with Bruce Reed in the Rates group and he has no concerns with FTS-2 cost allocation in any potential rate case (this is the only active FTS-2 contract).

<!--[if !supportLists]-->•<!--[endif]-->The optics of a higher-than-max rate volumetric contract are arguably better than a deeply discounted standard demand rate.

<!--[if !supportLists]-->•<!--[endif]-->This negotiated rate extension would need to be filed with FERC.

I’ve worked this request through with Bruce and the team and we’re all in agreement that we should honor GBF&S’s request for a six-year extension. If you are also in agreement, please let me know how I should proceed. I understand there’s a new Marketing Committee we’re putting in place, but I don’t yet know the what deals qualify for that treatment or the best way to put this deal forth (Email? Meeting?). Please advise. If you have any questions or need any additional information, just give a shout.

Thank you,

**Amy Sowa**

Account Manager, Marketing
TransCanada U. S. Pipelines Central
(p) 832.320.5374 (c) 832.239.2276
AIM: amysowaTC

# Michigan Natural Gas Active Storage Field Summary

Data on underground natural gas storage fields in Michigan, summarized by gas company that operates each field.

## ANR EATON

| Field Name | Capacity Volumes[Note 1] (BCF) | | | Year Converted | Formation | Location | Area | Reference |
|---|---|---|---|---|---|---|---|---|
| | Working | Base | Total | | | | | |
| Eaton Rapids 36 | 13.5 | 2.7 | 16.2 | 1990 | Niagaran | T2N R3W | 2,484 | **Ref A** |
| | | | | | | | | MPSC rates |

## ANR PIPELINE

| Field Name | Capacity Volumes[Note 1] (BCF) | | | Year Converted | Formation | Location | Area | Reference |
|---|---|---|---|---|---|---|---|---|
| | Working | Base | Total | | | | | |
| Austin | 7 | 16 | 23.1 | 1941 | Michigan Stray | T14N R9W | 9,000 | **Ref B** |
| Reed City | 13.2 | 15.7 | 28.9 | 1947 | Michigan Stray | T17N R10W | 15,000 | **Ref B1** |
| Goodwell | 19.3 | 12.4 | 31.7 | 1948 | Michigan Stray | T14N R11W | 8,500 | |

| **Field Name** | **Capacity Volumes[Note 1] (BCF)** | | | **Year Converted** | **Formation** | **Location** | **Area** | **Reference** |
|---|---|---|---|---|---|---|---|---|
| | **Working** | **Base** | **Total** | | | | | |
| **Lincoln**<br>**Freeman** [Note 2] | 17 | 18.7 | 35.7 | 1950 | Michigan Stray | T18N R5W<br>T18N R5W | 10,000<br>10,500 | **Ref B1** |
| **Winfield** | 6.8 | 9.1 | 15.9 | 1950 | Michigan Stray | T12N R9W | 3,850 | **Ref B1** |
| **Loreed** | 22 | 23.7 | 45.7 | 1963 | Reed City | T17N R10W | 17,500 | |
| **Muttonville** | 8.2 | 5.2 | 13.4 | 1975 | Niagaran | T4N R14E | 300 | **U-4485** |
| **S. Chester** | 13.4 | 6.1 | 19.5 | 1980 | Niagaran | T29N R2W | 460 | |
| **Central Charlton 1** | 12.9 | 6.1 | 19 | 1981 | Niagaran | T30N R1W | 640 | |
| Cold Springs 1 | 14 | 6 | 20 | 2008 | Niagaran | T28N R6W | 155 | **Ref C** |
| **Total ANR Pipeline** | **133.8** | | | | | | | **FERC rates** |

## ANR STORAGE

| **Field Name** | **Capacity Volumes[Note 1] (BCF)** | | | **Year Converted** | **Formation** | **Location** | **Area** | **Reference** |
|---|---|---|---|---|---|---|---|---|
| | **Working** | **Base** | **Total** | | | | | |
| **Cold Springs 12** | 25.3 | 3.6 | 28.9 | 1980 | Niagaran | T27N R6W | 800 | CP94-29 |
| **Rapid River 35** | 15.1 | 2.2 | 17.3 | 1980 | Niagaran | T28N R7W | 480 | CP94-291 |
| **Cold Springs 31** | 4.6 | 0.7 | 5.3 | 1981 | Niagaran | T27N R6W | 900 | CP94-291 |
| Excelsior 6 / E. Kalkaska [Note 3] | 10.8 | 1.5 | 12.3 | 1981 | Niagaran | T27N R7W | 1,300 | CP94-291 |

| **Field Name** | **Capacity Volumes[Note 1] (BCF)** | | | **Year Converted** | **Formation** | **Location** | **Area** | **Reference** |
|---|---|---|---|---|---|---|---|---|
| | **Working** | **Base** | **Total** | | | | | |
| **Total ANR Storage** | **55.8** | | | | | | | FERC rates |

## BLUE LAKE STORAGE

| **Field Name** | **Capacity Volumes[Note 1] (BCF)** | | | **Year Converted** | **Formation** | **Location** | **Area** | **Reference** |
|---|---|---|---|---|---|---|---|---|
| | **Working** | **Base** | **Total** | | | | | |
| Blue Lake 18 | 47.1 | 7 | 54.1 | 1992 | Niagaran | T28N R5W | 1,500 | **CP95-656** |
| | | | | | | | | FERC rates |

## BLUEWATER GAS STORAGE

| **Field Name** | **Capacity Volumes[Note 1] (BCF)** | | | **Year Converted** | **Formation** | **Location** | **Area** | **Reference** |
|---|---|---|---|---|---|---|---|---|
| | **Working** | **Base** | **Total** | | | | | |
| **Columbus 3** | 26.2 | 4.8 | 31 | 2004 | Niagaran | T5N R15E | 549 | **Ref D** |
| **Kimball 27** | 3 | 0.5 | 3.5 | 2001 | Niagaran | T6N R16E | 230 | **Ref E** |
| **Total Bluewater Gas Storage** | **29.2** | | | | | | | FERC rates, MPSC rates |

## CONSUMERS ENERGY

| **Field Name** | **Capacity Volumes[Note 1] (BCF)** | | | **Year Converted** | **Formation** | **Location** | **Area** | **Reference** |
|---|---|---|---|---|---|---|---|---|

| **Field Name** | **Capacity Volumes**[Note 1] **(BCF)** | | | **Year Converted** | **Formation** | **Location** | **Area** | **Reference** |
|---|---|---|---|---|---|---|---|---|
| | **Working** | **Base** | **Total** | | | | | |
| **Cranberry Lake** | 11 | 17.2 | 28.2 | 1947 | Michigan Stray | T20N R5W | 24,000 | **Ref F** |
| **Winterfield** | 25.3 | 47 | 72.3 | 1947 | Michigan Stray | T20N R6W | 24,500 | **Ref F** |
| **Overisel** | 23 | 30 | 53 | 1960 | A-1 Carbonate | T4N R14W | 11,000 | |
| **Ira** | 2 | 4.3 | 6.3 | 1961 | Niagaran | T3N R15E | 800 | |
| **Riverside** | 1.5 | 7.5 | 9 | 1962 | Michigan Stray | T21N R7W | 11,000 | **Ref F** |
| **Salem** | 11.6 | 18.9 | 30.5 | 1963 | A-1 Carbonate | T4N R13W | 11,000 | |
| **Lenox** | 1.2 | 2 | 3.2 | 1965 | Niagaran | T3N R14E | 500 | |
| **Lyon 29** | 1.2 | 1 | 2.2 | 2004 | Niagaran | T1N R7E | 237 | **U-13322** |
| Lyon 34[Note 4] | 0.7 | 0.7 | 1.4 | 1997 | Niagaran | T1N R7E | 237 | **U-11315** |
| **Ray** | 48.1 | 17.3 | 65.4 | 1966 | Niagaran | T5N R13E | 2,000 | |
| **Northville**[Note 4] | 0.5 | 0.7 | 1.2 | 1968 | Niagaran | T1S R8E | 40 | |
| **Puttygut** | 9.5 | 5.1 | 14.6 | 1971 | Niagaran | T4N R15E | 1,150 | |
| Four Corners | 2.4 | 1.4 | 3.8 | 1972 | Niagaran | T4N R15E | 400 | |
| **Swan Creek** | 0.4 | 0.3 | 0.7 | 1972 | Niagaran | T4N R15E | 300 | |
| **Hessen** | 12.5 | 4.5 | 17 | 1976 | Niagaran | T4N R15E | 1,000 | |
| **Total Consumers Energy** | **150.9** | | | | | | | MPSC rates |

## DTE GAS COMPANY

| Field Name | Capacity Volumes[Note 1] (BCF) | | | Year Converted | Formation | Location | Area | Reference |
|---|---|---|---|---|---|---|---|---|
| | Working | Base | Total | | | | | |
| Belle River Mills | 46.9 | 29.2 | 76.1 | 1965 | Niagaran | T4N R16E | 1,760 | |
| Columbus | 15 | 4.6 | 19.6 | 1972 | Niagaran | T4N R15E | 1,760 | |
| West Columbus | 22.5 | 4.4 | 26.9 | 1973 | Niagaran | T4N R15E | 1,280 | |
| Six Lakes | 40 | 28.6 | 68.6 | 1953 | Michigan Stray | T12N R7W,T13N R7W | 50,000 | |
| **Total DTE Gas Company** | **124.4** | | | | | | | MPSC rates |

## LEE 8

| Field Name | Capacity Volumes[Note 1] (BCF) | | | Year Converted | Formation | Location | Area | Reference |
|---|---|---|---|---|---|---|---|---|
| | Working | Base | Total | | | | | |
| Lee 8 | 2.4 | 0.6 | 3 | 1995 | Niagaran | T1S R5W | 160 | **Ref G** |
| | | | | | | | | MPSC rates |

## MICHIGAN GAS UTILITIES CORPORATION

| Field Name | Capacity Volumes[Note 1] (BCF) | | | Year Converted | Formation | Location | Area | Reference |
|---|---|---|---|---|---|---|---|---|
| | Working | Base | Total | | | | | |
| Partello-Andersen[Note 5] | 0.8 | 2.6 | 3.3 | 1971 | Niagaran | T1S R5W | 160 | |

| Field Name | Capacity Volumes[Note 1] (BCF) | | | Year Converted | Formation | Location | Area | Reference |
|---|---|---|---|---|---|---|---|---|
| | Working | Base | Total | | | | | |
| Cortwright | 0.7 | 0.5 | 1.2 | 1979 | Niagaran | T1S R5W | 80 | **U-4872** |
| Lee 3 / Lee 3A | 1.5 | 1.2 | 2.7 | 1993 | Niagaran | T1S R5W | 160 | **U-10106** |
| **Total MGU[Note 6]** | **5.1** | | | | | | | MPSC rates |

## SEMCO ENERGY

| Field Name | Capacity Volumes[Note 1] (BCF) | | | Year Converted | Formation | Location | Area | Reference |
|---|---|---|---|---|---|---|---|---|
| | Working | Base | Total | | | | | |
| **Lacey Station** | 0.17 | 0.08 | 0.25 | 1973 | B-Salt | T1N R8W | 40 | |
| **Morton** | 2 | 1.6 | 3.6 | 1974 | B-Salt | T4N R14E | 60 | |
| **Collin** | 1.7 | 1 | 2.7 | 1979 | Niagaran | T3N R16E | 400 | |
| **Lee 2** | 0.66 | 0.27 | 0.93 | 1981 | Niagaran | T1S R5W | 40 | |
| **Lee 11** | 0.64 | 0.36 | 1 | 1988 | Niagaran | T1S R5W | 160 | **U-9076** |
| **Total SEMCO Energy** | **5.17** | | | | | | | MPSC rates |

## SOUTH ROMEO GAS STORAGE

| Field Name | Capacity Volumes[Note 1] (BCF) | | | Year Converted | Formation | Location | Area | Reference |
|---|---|---|---|---|---|---|---|---|
| | Working | Base | Total | | | | | |
| **Washington 28** | 9.7 | 1.9 | 11.6 | 1990 | Niagaran | T4N R12E | 1,020 | **Ref H** |

| Field Name | Capacity Volumes[Note 1] (BCF) | | | Year Converted | Formation | Location | Area | Reference |
|---|---|---|---|---|---|---|---|---|
| | Working | Base | Total | | | | | |
| | | | | | | | | MPSC rates |

## SOUTHWEST GAS STORAGE

| Field Name | Capacity Volumes[Note 1] (BCF) | | | Year Converted | Formation | Location | Area | Reference |
|---|---|---|---|---|---|---|---|---|
| | Working | Base | Total | | | | | |
| Howell | 17.3 | 13.4 | 30.7 | 1962 | Niagaran | T3N R4E | 12,000 | **CP01-67**, Ref I |
| | | | | | | | | FERC rates |

## WASHINGTON 10 STORAGE

| Field Name | Capacity Volumes[Note 1] (BCF) | | | Year Converted | Formation | Location | Area | Reference |
|---|---|---|---|---|---|---|---|---|
| | Working | Base | Total | | | | | |
| **Shelby 2** | 8.1 | 2.3 | 10.4 | 2008 | Niagaran | T3N R12E | 560 | **Ref J** |
| **Washington 10** | 68.5 | 8.5 | 77 | 1999 | Niagaran | T4N R12E | 2,630 | **Ref K** |
| **Total Washington 10 Storage** | **76.6** | | | | | | | MPSC rates |

## TOTAL

| | |
|---|---|
| **Statewide Working Volume** | **671** |

# NOTES

| | |
|---|---|
| Note 1 | BCF = Billion cubic feet at 14.73 psia pressure base. Working gas means the maximum gas that can be cycled in and out of storage. Base Gas means gas that is not cycled in and provides pressure support. |
| Note 2 | ANR Pipeline Lincoln and Freeman share common reservoir and are considered one storage field. Combined volumes shown. |
| Note 3 | ANR Storage Excelsior 6 and E. Kalkaska share common reservoir and are considered one storage field. Combined volumes shown. |
| Note 4 | Consumers reports the summed storage field capacity for Lyons 34 and Northville to EIA as Northville. |
| Note 5 | MGU operates Partello and Andersen fields as one storage field. |
| Note 6 | MGU reports the summed storage field capacity for all fields to EIA as Partello. |

# REFERENCE (MPSC AND FERC REGULATORY ACTIONS)

| | |
|---|---|
| Ref A | ANR Eaton, also known as Eaton Rapids Gas Storage, was certificated by the MPSC in docket number U-9355 by **order dated November 9, 1999** and **order dated September 25, 1991**. The FERC granted a blanket certificate in docket number CP90-769-000 by order dated June 8, 1990 (51 FERC 62,233). |
| Ref B | ANR Pipeline, with FERC permission, will replace 2 BCF of Austin's 16 BCF of base gas with nitrogen. See FERC **June 30, 1999 order** in docket number CP99-138-000. |
| Ref B1 | ANR Pipeline filed a Storage Enhancement Project with FERC on May 30, 2006, in docket number CP06-358-000, which shifted base gas to working gas in Winfield, Lincoln-Freeman, and Reed City, and shifted 10 BCF of gas reserved for operations to working gas. |
| Ref C | Coldsprings 1 was certificated by FERC in docket number CP06-464 by **order dated May 31, 2007**, with an in service date of April 2008. The connecting pipeline was certificated by MPSC in docket number U-15291 by **order dated September 25, 2007**. |
| Ref D | Columbus 3 was certificated by MPSC in docket number U-13776 by **order dated July 8, 2003**, and went into service during the 2004 injection season. The connecting pipelines were certificated by MPSC in docket numbers U-13896 by **order dated January 22, 2004**, U-13926 by **order dated May 18, 2004**, and U-14023 by **order dated May 18, 2004.** The FERC granted Bluewater Gas Storage a Presidential Permit (to begin sending and receiving natural gas over the Canadian border) in docket no CP04-105-000 by **order dated November 24, 2004**. |
| Ref E | Kimball 27 was certificated by MPSC in docket number U-12209 by **order dated February 22, 2000**, and went into service in September 2001. The connecting pipeline was certificated by MPSC in docket number U-12357 by **order dated September 18, 2000**. The FERC last approved rates were in docket number CP04-80-000 by **order dated July 13, 2004**. |

| | |
|---|---|
| Ref F | Fields were certificated by FERC in docket numbers G-131 and G-1600, amended in docket number CP97-2-000 by FERC **order dated December 19, 1996** as part of Michigan Gas Storage Company, which was merged into Consumers Energy on November 8, 2002. |
| Ref G | Lee 8 was certificated by MPSC in docket number U-10602 by **order dated September 27, 1994** and **order dated April 13, 1995**. The FERC last approved rates were in docket number PR00-2-000 by order dated June 28, 2000. |
| Ref H | South Romeo Gas Storage does not sell any storage service and has no rates on file. Washington 10 Storage Corporation has contracted for all of the storage from Washington 28. |
| Ref I | Southwest Gas Storage Company is a wholly owned subsidiary of Panhandle Eastern Pipe Line Company. On April 1, 1999, Panhandle transferred Howell field to Southwest Gas Storage Company, as approved by FERC **order dated December 2, 1998** in docket number CP97-237-000 approving abandonment. |
| Ref J | Shelby 2 pipeline and storage field was certificated by MPSC in docket number U-15149 by **order dated June 12, 2007**, with a projected in-service date of April 2008. |
| Ref K | Washington 10 was certificated by MPSC in docket number U-10424 by **order dated December 16, 1994** and **order dated April 24, 1997**, and went into service in April 1999. The FERC last approved rates were in docket number SA99-30-000 by **order dated October 25, 1999**. The maximum stabilized wellhead pressure was increased by MPSC in docket number U-14020 by **order dated June 29, 2004**. |
| Ref L | Kalkaska 13/35 was certificated by MPSC in docket number U-15254 by order dated August 21, 2007, with an expected in service date of April 2008. The connecting pipeline was certificated by MPSC in docket number U-15291 by order dated September 25, 2007. {MOVE TO INACTIVE}} |
| Rates | For rate information, see **MPSC rate books** and **FERC tariff books**. |

## CONTACT

For more information, please contact the Gas Operations Section at 517-284-8220.

## RELATED CONTENT

Michigan Natural Gas Inactive Storage Field Summary

**FOIA**
**Información en Español**
**المعلومات باللغة العربية**

**MICHIGAN.GOV HOME**
**ADA**
**MICHIGAN NEWS**
**POLICIES**

Docket No. RP22-__-000
Exhibit No. ANR-0062

**UNITED STATES OF AMERICA**
**BEFORE THE**
**FEDERAL ENERGY REGULATORY COMMISSION**

ANR Pipeline Company ) Docket No. RP22 -___-000

## Summary of the Prepared Direct Testimony of Nara Houy

Mr. Houy is a Rate Analyst for TransCanada USA Services Inc. His testimony assesses whether two system expansion projects, which were not previously rolled in, now qualify for rolled-in rate treatment under the Commission's 1999 Certificate Policy Statement. Mr. Houy used a two-step roll-in evaluation to determine whether roll-in of the two expansions is appropriate. In the first step, he calculated a per-unit rate for each of the expansions and then compared each expansion's per unit-rate to the otherwise applicable ANR system zone base tariff recourse rate for non-incremental facilities, as filed in this proceeding. If the calculated expansion rate is lower than the applicable system rate, the project satisfied this step of the roll in test. In the second step, Mr. Houy compared the cost-of-service of the expansion project to its revenues. If the expansion project cost-of-service was lower than the calculated expansion project revenues, the project satisfied the second part of his roll in test. As Mr. Houy demonstrates, both expansion projects satisfied the two-step test and thus should be permitted to be rolled in to ANR's cost-of-service.

Docket No. RP22-___-000
Exhibit No. ANR-0062

**UNITED STATES OF AMERICA**
**BEFORE THE**
**FEDERAL ENERGY REGULATORY COMMISSION**

ANR Pipeline Company ) Docket No. RP22-___-000

# PREPARED DIRECT TESTIMONY OF NARA HOUY ON BEHALF OF ANR PIPELINE COMPANY

January 28, 2022

Docket No. RP22-___-000
Exhibit No. ANR-0062

# Glossary of Terms

| | |
|---|---|
| ANR | ANR Pipeline Company |
| Commission | Federal Energy Regulatory Commission |
| Dth | Dekatherms |
| Dth/d | Dekatherms per day |
| TC Energy | TC Energy Corporation |

# UNITED STATES OF AMERICA
# BEFORE THE
# FEDERAL ENERGY REGULATORY COMMISSION

ANR Pipeline Company ) Docket No. RP22-___-000

## Prepared Direct Testimony of Nara Houy

**Q: What is your name and business address?**

A: My name is Nara Houy. My business address is TC Energy Corporation ("TC Energy"), 700 Louisiana Street, Houston, Texas 77002.

**Q: What is your occupation?**

A: I am presently employed by TransCanada USA Services Inc., an indirect subsidiary of TC Energy, as a Rate Analyst. TransCanada USA Services Inc. employs all personnel in the United States who are involved in the operation and maintenance of TC Energy's U.S. energy systems and facilities, including ANR Pipeline Company ("ANR"). I am filing testimony on behalf of ANR.

**Q: Please describe your educational background and your occupational experience as they are related to your testimony in this proceeding?**

A: I graduated with a Bachelor of Science in Economics from the Wharton School of Business at the University of Pennsylvania. I later received a Master's in Business Administration from the University of Memphis. In 2013, I joined Kinder Morgan's Corporate Financial Planning department as a financial analyst, and in 2017 I transferred to the Tennessee Gas Pipeline business segment as a Rates Analyst. I transitioned to TC Energy as a Rates Analyst in March 2021.

**Q: Have you ever testified before the Federal Energy Regulatory Commission ("FERC" or "Commission") or any other energy regulatory commission?**

A: No.

**Q: What is the purpose of your testimony in this proceeding?**

**A:** The purpose of my testimony is to assess whether two expansion projects ("Expansion Projects"), the Collierville Expansion Project and the Grand Chenier Xpress Project, which were not previously rolled in, now qualify for rolled-in rate treatment under the Commission's 1999 Certificate Policy Statement ("1999 Policy Statement").

**Q: Are you sponsoring any exhibits in addition to your testimony?**

A: Yes. I am sponsoring the following exhibits:

| | |
|---|---|
| Exhibit No. ANR-0063: | Collierville Expansion Project Roll-In Analysis |
| Exhibit No. ANR-0064: | Grand Chenier Xpress Project Roll-In Analysis |

## I. <u>Expansion Projects Roll-In Analysis</u>

**Q: Based on your analyses of the Expansion Projects you evaluated for roll in, what conclusions did you arrive at with respect to each?**

A: I conclude that the Expansion Projects satisfy the Commission's roll-in standard under the 1999 Policy Statement, and as such, the costs should be included as part of the system-wide cost-of-service.

**Q: Are any other expansion projects remaining incrementally priced?**

A: Yes. The Cold Springs 1 Project, approved by the Commission May 31, 2007 under Docket No. CP06-464-000, will remain incrementally priced. I am not providing testimony in support of rolled-in treatment for this project.

**Q: Can you please give a brief overview of the Expansion Projects?**

A: Yes. The Commission certificated the Collierville Expansion Project (Docket No. CP16-64-000) on September 22, 2016. The project involved upgrades to ANR's existing Collierville Meter Station and the construction of a new compressor station near Memphis, Tennessee. This expansion increased capacity by 200,000 dekatherms ("Dth") per day ("Dth/d").

The Commission certificated the Grand Chenier XPress Project (Docket No. CP20-8-000) on June 18, 2020. The project involved modifying two existing compressor stations and constructing a new one in Louisiana, increasing incremental capacity by 400,000 Dth/d. This project also involved replacing an old compressor unit at the Eunice Compressor Station to provide additional standby compression to increase reliability for existing services. Exhibit K of Grand Chenier's certificate application estimated the expansion cost at $107.0 million and the replacement cost at $65.9 million.

**Q: What rate determinations were previously made regarding the Expansion Projects?**

A: ANR requested a predetermination for rolled-in rate treatment for the Collierville Expansion Project, but the Commission denied the request. With respect to the Grand Chenier Xpress Project, ANR sought and the Commission approved incremental reservation rates with no predetermination for rolled in rate treatment.

**Q: Can you provide your understanding of the Commission's roll-in policy that is relevant to the Expansion Projects?**

A: My understanding is that the Commission's current approach to determining the appropriateness of rolled-in rate treatment for expansion facilities is set forth in its 1999 Policy Statement regarding the certification of new interstate pipeline facilities. As stated in the 1999 Policy Statement, the threshold requirement in establishing the public convenience and necessity for existing pipelines proposing an expansion project is that the pipeline must be prepared to financially support the project without relying on subsidization from its existing customers. This means that if the pipeline seeks to roll in the costs of new facilities, then the rate impact of doing so must not result in a subsidization of the expansion shippers by existing shippers.

**Q: Does the Commission's 1999 Policy Statement govern the roll-in determination for the Expansion Projects?**

A: Yes, my understanding is that the 1999 Policy Statement governs the appropriate roll-in treatment for the Expansion Projects.

**Q: What methodology did you use to determine whether roll in of the Expansion Projects is appropriate?**

A: I performed a two-step process for evaluating whether each Expansion Project qualifies for roll-in. If an Expansion Project satisfies both tests in the two-step process, it qualifies for roll-in.

In the first step of the roll-in evaluation, I initially calculated a per-unit rate for each of the Expansion Projects. I then compared each Expansion Project's per-unit rate to the otherwise applicable ANR system zone base tariff recourse rate for non-incremental facilities ("System Rate"), as filed by ANR in this proceeding, stated on a 100 percent load factor equivalent unit basis. The System Rates reflect roll-in of the Expansion Projects. In each instance, I compared the Expansion Project per-unit rate to the otherwise applicable System Rate as calculated by ANR witness Barry. If the Expansion Project rate was lower than the applicable System Rate, the Expansion Project satisfied the first step in the roll-in test.

This methodology of evaluating whether roll in is appropriate for each of the projects avoids having to compare the per-unit rate of each successive incremental project to the applicable per-unit System Rate after each successive project's costs and volumes have been rolled in, *i.e.*, an iterative process. This is because, as I demonstrate below, the per-unit rate for each of the Expansion Projects is below the otherwise applicable System Rate that includes roll-in of all the costs and volumes of each qualifying incremental project. As a result, because each of the Expansion Projects' per-unit rate is lower than the applicable System Rate with both Expansion Projects rolled in, the first test for roll-in demonstrates that roll-in would also be appropriate at any higher System Rate, *i.e.*, a System Rate that did not include any of the costs and volumes associated with the Expansion Projects.

In the second step, I compared each Expansion Project's cost-of-service to its revenues. Both of ANR's Expansion Projects are supported by negotiated rate contracts. Therefore, in order to calculate project revenues, I applied the lesser of the revenues at contract negotiated rates or at ANR's maximum recourse rates. If the Expansion Project cost-of-service was lower than the calculated Expansion Project revenue, then the second test is satisfied, and the Expansion Project qualifies for roll-in. I discuss in greater detail below the specifics of the roll-in calculations for each Expansion Project.

**Q: How did you calculate a per unit rate for each of the Expansion Projects?**

A: As noted above, for each of the Expansion Projects, I designed a unit rate to compare to the otherwise applicable unit System Rate. I accomplished this by designing firm reservation and commodity rates for each Expansion Project and then converting the firm rate components to 100 percent load factor equivalent unit rates for comparative purposes. The rate for each Expansion Project was calculated using its fixed and variable costs divided by the respective reservation and commodity billing determinants.

**Q: How were billing determinants identified for each of the Expansion Projects?**

A: For each Expansion Project, the adjusted base period firm contracts are used as the basis for the associated reservation billing determinants. To determine commodity billing determinants for the Collierville Expansion Project, I utilized the last 12 months of usage volume as the Collierville Expansion Project has been in service since November 14, 2017. To determine commodity billing determinants for the Grand Chenier XPress Project, I imputed the commodity billing determinants by first calculating the FTS-1 system load factor as there are no actual project volumes yet to date because the project's expected in service date is January 1, 2022. I calculated the FTS-1 system load factor by taking the last 12 months of FTS-1 system usage (12 months ending October 31, 2021) and dividing it by the total FTS-1 reservation Maximum Daily Quantity ("MDQ"). I then multiplied this load factor by Grand Chenier XPress Project's total capacity of 400,000 Dth/d MDQ times 365 days to determine the commodity billing determinants.

## Collierville Expansion Project

**Q: Please discuss the roll-in analysis for the Collierville Expansion Project.**

A: For the Collierville Expansion Project, the threshold rate for roll-in is the otherwise applicable FTS-3 SE to ML-2 capacity, deliverability, two hour notice, and enhancement service System Rate as filed in this proceeding, as the project is fully subscribed with a single FTS-3 contract that spans the SE to ML-2 zones. The applicable total FTS-3 daily System Rate for SE to ML-2 is $0.8960 per Dth, as shown on line 20 of Exhibit ANR-0063 in ANR's tariff sheets in Appendix A-1. The $0.2537 deliverability charge is based on a 24-hour service.

Exhibit No. ANR-0063 details the Collierville Expansion Project costs along with associated billing determinants used to determine a per-unit rate for the project. As shown on line number 7, the Collierville Expansion Project calculated cost-of-service is approximately $4,948,510.

**Q: How did you identify billing determinants associated with the Collierville Expansion Project?**

A: The Collierville Expansion Project is fully subscribed with a single FTS-3 negotiated rate agreement for the total capacity of 200,000 Dth/day. The total capacity of 200,000 Dth/day was included in the reservation billing determinants. The commodity billing determinant is based on the last 12 months of actual volumes.

**Q: Please describe the calculation of the Collierville Expansion Project unit rate.**

A: To determine the project unit rate, I utilized the project reservation cost-of-service of approximately $4.8 million and total reservation billing determinants of 200,000 Dth to derive a project reservation unit rate of $0.0664 per Dth. I then added the commodity project rate of $0.0170 to obtain a $0.0833 total project unit rate, as detailed on line number 11 of Exhibit No. ANR-0063.

**Q: Does the Collierville Expansion Project satisfy the first step of the roll-in test?**

A: Yes, because the resulting per-unit rate of the Collierville Expansion Project is lower than the otherwise applicable FTS-3 SE to ML-2 System Rate, the Collierville Expansion Project satisfies the first test for rolled-in treatment under the 1999 Policy Statement.

**Q: Did you also apply the second step of the roll-in test comparing Collierville Expansion Project's revenues and costs?**

A: Yes, because the contract associated with the project is a negotiated rate contract, I additionally evaluated the project for roll in by comparing Collierville Expansion Project revenues with Collierville Expansion Project costs.

**Q: Please describe the calculation of the Collierville Expansion Projects revenues for the comparison to the associated cost-of-service.**

A: Exhibit No. ANR-0063 details the Collierville Expansion Project costs. As shown on line number 7, the calculated project stand-alone total cost-of-service is approximately $4.9 million. To determine the project revenues, I utilized the lesser of the negotiated rate or the otherwise applicable FTS-3 SE to ML-2 System Rate. As shown on line number 39, the calculated negotiated revenue is lower and totals $8.6 million.

**Q: Does the Collierville Expansion Project satisfy the second step in the roll-in test?**

A: Yes, because the resulting cost-of-service is lower than the Expansion Project's negotiated rate revenue, the Collierville Expansion Project also satisfies this second step and therefore the project qualifies for rolled-in rate treatment under the 1999 Policy Statement. With roll-in, existing shippers will not subsidize the Expansion Project.

## Grand Chenier XPress Project

**Q: Please discuss the roll-in analysis for the Grand Chenier XPress Project.**

A: For the Grand Chenier XPress Project, the threshold rate for roll in is the otherwise applicable FTS-1 SE to SE zone System Rate as filed in this proceeding, as the project is fully subscribed with a single FTS-1 contract that spans the SE zone. The FTS-1 System Rate for SE-SE is $0.1499 per Dth, as shown in ANR's tariff sheets in Appendix A-1, a combination of daily reservation rate plus commodity rate.

Exhibit No. ANR-0064 details the Grand Chenier XPress Project costs along with associated billing determinants used to determine a per-unit rate for the project. As shown on line number 6, the Grand Chenier XPress Project calculated total cost-of-service is approximately $14.1 million.

**Q: How did you identify billing determinants associated with the Grand Chenier XPress Project?**

A: The Grand Chenier XPress Project is fully subscribed with a single FTS-1 negotiated rate agreement for the total capacity of 400,000 Dth/day. The total capacity of 400,000 Dth/day was included in the reservation billing determinants. As previously stated, I imputed the Grand Chenier XPress Project volumes based on the FTS-1 load factor multiplied by the 400,000 Dth/day MDQ multiplied by 365 days.

**Q: Please describe the calculation of the Grand Chenier XPress Project unit rate.**

A: To determine the project unit rate, I utilized the project reservation cost-of-service of approximately $12.9 million and total reservation billing determinants of 400,000 Dth to derive a project reservation unit rate of $0.0887 per Dth. I then added the Project's commodity unit rate of $0.0092 to obtain a total Project unit rate of $0.0980, as detailed on line number 10 of Exhibit No. ANR-0064.

**Q: Does the Grand Chenier XPress Project satisfy the first step of the roll-in test?**

A: Yes, because the resulting per-unit rate of Grand Chenier XPress is lower than the otherwise applicable FTS-1 SE-SE System Rate of $0.1499, the Grand Chenier XPress Project satisfies the first test for rolled-in treatment under the 1999 Policy Statement.

**Q: Did you also apply the second step of the roll-in test comparing Grand Chenier XPress Project revenues and costs?**

A: Yes, because the contract associated with the project is a negotiated rate contract, I additionally evaluated the project for roll-in by comparing Grand Chenier XPress Project revenues with Grand Chenier XPress Project costs.

**Q: Please describe the calculation of the Grand Chenier XPress revenues for the comparison to the associated cost-of-service.**

A: Exhibit No. ANR-0064 details the Grand Chenier XPress Project costs. As shown on line number 6, the calculated project stand-alone total cost-of-service is approximately $14.1

million. To determine the project revenues, I utilized the lesser of the negotiated rate or the otherwise applicable FTS-1 SE-SE System Rate. As shown on line number 23, the calculated negotiated revenue is lower and totals $14.8 million.

**Q: Does the Grand Chenier XPress Project satisfy the second step in the roll-in test?**

A: Yes, because the resulting cost-of-service is lower than the Expansion Project's negotiated rate revenue, the Grand Chenier XPress Project also satisfies this second step and therefore the project qualifies for rolled-in rate treatment under the 1999 Policy Statement. With roll-in, existing shippers will not subsidize the Expansion Project.

**Q: Does this conclude your testimony?**

A: Yes, it does.

# UNITED STATES OF AMERICA
# BEFORE THE
# FEDERAL ENERGY REGULATORY COMMISSION

ANR Pipeline Company ) Docket No. RP22-____-000

State of Texas )
) ss.
County of Harris )

## AFFIDAVIT OF NARA HOUY

Nara Houy, being first duly sworn, on oath states that he is the witness whose testimony appears on the preceding pages entitled “Prepared Direct Testimony of Nara Houy”; that, if asked the questions which appear in the text of said testimony, he would give the answers that are therein set forth; and that affiant adopts the aforesaid testimony as Nara Houy’s sworn testimony in this proceeding.

DocuSigned by:
Nara Houy
D90C1E4ED9B540F...

Nara Houy

SWORN TO AND SUBSCRIBED BEFORE ME THIS 19th DAY OF January, 2022. This notarial act was an online notarization.

**Notary Seal**

**SHELIA O. COPUS**
Notary ID
976876
My Commission Expires
2/22/2023

**Digital Certificate**

DocuSigned by:
Shelia Copus
6B60C3597ADE4AD...

Docket No. RP22-___-000
Exhibit No. ANR-0063

## Roll-In Analysis - Transmission

Collierville Expansion Project Roll-In Analysis

| Line No. | *Cost of Service Calculation /1* | | Reservation | Commodity | Total |
|---|---|---|---|---|---|
| 1 | O & M | | $ 116,438 | $ 104,195 | $ 220,633 |
| 2 | Depreciation /2 | | $ 1,095,302 | | $ 1,095,302 |
| 3 | Other Taxes | | $ 151,663 | | $ 151,663 |
| 4 | Income Taxes /3 | | $ 769,414 | | $ 769,414 |
| 5 | Return /4 | | $ 2,722,761 | | $ 2,722,761 |
| 6 | Less EDIT | | $ (11,263) | | $ (11,263) |
| 7 | **Cost of Service** | **Sum Lines 1 - 6** | **$ 4,844,315** | **$ 104,195** | **$ 4,948,510** |
| 8 | | | | | |
| 9 | ***Project Rate*** | | | | |
| 10 | Billing Determinants (Dth) /5 | | 2,400,000 | 6,143,324 | |
| 11 | **Project Rate** | **Line 7 / Line 10 / 365 * 12** | **$ 0.0664** | **$ 0.0170** | **$ 0.0833** |
| 12 | | | | | |
| 13 | ***Roll-In Comparison*** | | | | |
| 14 | Applicable ANRP FTS-3 System Rate (Capacity) | FTS-3 SE to M2 | $ 0.2537 | $ - | $ 0.2537 |
| 15 | Applicable ANRP FTS-3 System Rate (Deliverability) | FTS-3 SE to M2 | $ 0.2537 | $ 0.0206 | $ 0.2743 |
| 16 | Enhancement Service (Capacity) | | $ 0.0951 | $ - | $ 0.0951 |
| 17 | Enhancement Service (Deliverability) | | $ 0.0951 | $ 0.0078 | $ 0.1029 |
| 18 | Two hour Notice (Capacity) | | $ 0.0788 | $ - | $ 0.0788 |
| 19 | Two hour Notice (Deliverability) | | $ 0.0788 | $ 0.0124 | $ 0.0912 |
| 20 | **Total Applicable ANRP General System Rate** | | **$ 0.8552** | **$ 0.0408** | **$ 0.8960** |
| 21 | | | | | |
| 22 | **Difference in Rates** | **Line 11 - Line 20** | | | **$ (0.8126)** |
| 23 | | | | | |
| 24 | ***Revenue/Cost Analysis*** | | | | |
| 25 | Revenues (Capacity) at System Rate | | $ 18,520,100 | $ - | $ 18,520,100 |
| 26 | Revenues (Deliverability) at System Rate | | $ 18,516,480 | $ 126,552 | $ 18,643,032 |
| 27 | Enhancement Service (Capacity) at System Rate | | $ 6,942,300 | $ - | $ 6,942,300 |
| 28 | Enhancement Service (Deliverability) at System Rate | | $ 6,942,720 | $ 47,918 | $ 6,990,638 |
| 29 | Two hour Notice (Capacity) at System Rate | | $ 5,752,400 | $ - | $ 5,752,400 |
| 30 | Two hour Notice (Deliverability) at System Rate | | $ 5,752,800 | $ 76,177 | $ 5,828,977 |
| 31 | **Total Applicable ANRP General System Revenue** | | **$ 62,426,800** | **$ 250,648** | **$ 62,677,448** |
| 32 | | | | | |
| 33 | Base Reservation Revenue (Capacity) | | $ - | $ - | $ - |
| 34 | Base Reservation Revenue (Deliverability) | = $0.1150 * 365 * 200,000 | $ 8,395,000 | $ 126,552 | $ 8,521,552 |
| 35 | Enhancement Service (Capacity) | | $ - | $ - | $ - |
| 36 | Enhancement Service (Deliverability) | | $ - | $ 47,918 | $ 47,918 |
| 37 | Two hour Notice (Capacity) | | $ - | $ - | $ - |
| 38 | Two hour Notice (Deliverability) | | $ - | $ 76,177 | $ 76,177 |
| 39 | **Total Negotiated Reservation Revenue plus Commodity Revenue at Maximum Rate** | | **$ 8,395,000** | **$ 250,648** | **$ 8,645,648** |
| 40 | | | | | |
| 41 | Cost of Service | | | | $ 4,948,510 |
| 42 | **Revenue Excess/(Shortfall)** | **Line 39 - Line 41** | | | **$ 3,697,138** |

/1 Derived using expansion gross plant balances from schedule C-1.
/2 Derived using ANR's proposed depreciation and negative salvage rates from schedule D-1.
/3 Derived using ANR's state and federal tax rates from schedule H-3.
/4 Derived using ANR's proposed WACC from schedule F-2.
/5 Reservation Billing determinants: 200,000 x12, commodity billing determinants based on 12 months of actuals ending October 31, 2021.

Docket No. RP22-___-000
Exhibit No. ANR-0064
Page 1 of 1

## Roll-In Analysis - Transmission

### Grand Chenier Xpress Project Roll-In Analysis

| Line No. | *Cost of Service Calculation /1* | | | Reservation | Commodity | Total |
|---|---|---|---|---|---|---|
| 1 | | O & M | | $ 313,916 | $ 1,106,728 | $ 1,420,644 |
| 2 | | Depreciation /2 | | $ 2,543,611 | | $ 2,543,611 |
| 3 | | Other Taxes | | $ 630,445 | | $ 630,445 |
| 4 | | Income Taxes /3 | | $ 2,109,165 | | $ 2,109,165 |
| 5 | | Return /4 | | $ 7,356,116 | | $ 7,356,116 |
| 6 | | **Cost of Service** | **Sum Lines 1 - 5** | **$ 12,953,254** | **$ 1,106,728** | **$ 14,059,982** |
| 7 | | | | | | |
| 8 | ***Project Rate*** | | | | | |
| 9 | | Billing Determinants (Dth) /5 | | 4,800,000 | 119,807,600 | |
| 10 | | **Project Rate** | **Line 6 / Line 9 / 365 * 12** | **$ 0.0887** | **$ 0.0092** | **$ 0.0980** |
| 11 | | | | | | |
| 12 | ***Roll-In Comparison*** | | | | | |
| 13 | | **Applicable ANRP General System Rate** | **FTS-1 SE (ML-1) to SE (ML-1)** | **$ 0.1483** | **$ 0.0016** | **$ 0.1499** |
| 14 | | **Difference in Rates** | **Line 10 - Line 13** | | | **$ (0.0520)** |
| 15 | | | | | | |
| 16 | ***Revenue/Cost Analysis*** | | | | | |
| 17 | | Reservation Revenue at System Rate | = 400,000 * 365 * $0.1483 | | | $ 21,654,720 |
| 18 | | Commodity Revenue at System Rate | = 119,807,600 * 0.0016 | | | $ 191,692 |
| 19 | | **Total Revenue at System Rate** | | | | **$ 21,846,412** |
| 20 | | | | | | |
| 21 | | Reservation Revenue at Negotiated Rate | = 400,000 * 365 * $0.1000 | | | $ 14,600,000 |
| 22 | | Commodity Revenue at System Rate | = 119,807,600 * 0.0016 | | | $ 191,692 |
| 23 | | **Total Negotiated Reservation Revenue plus Commodity Revenue at Maximum Rate** | | | | **$ 14,791,692** |
| 24 | | | | | | |
| 25 | | Cost of Service | | | | $ 14,059,982 |
| 26 | | **Revenue Excess/(Shortfall)** | **Line 23 - Line 25** | | | **$ 731,711** |

/1 Derived using expansion gross plant balances from schedule C-1.
/2 Derived using ANR's proposed depreciation and negative salvage rates from schedule D-1.
/3 Derived using ANR's state and federal tax rates from schedule H-3.
/4 Derived using ANR's proposed WACC from schedule F-2.
/5 Reservation Billing determinants: 400,000 x12, Commodity billing determinants based on : 400,000 x 365 x 82.06% load factor.

# ANR PIPELINE COMPANY

Docket No. RP22-___-000

# Statement O

January 28, 2022

## System Overview

The exact legal name of ANR is ANR Pipeline Company. ANR is a corporation organized and existing under the laws of the State of Delaware with its principal place of business located at 700 Louisiana Street, Houston, Texas 77002-2700. ANR is a wholly owned indirect subsidiary of TC Energy Corporation ("TC Energy"). ANR is authorized to do business in the states of Alabama, Arkansas, Delaware, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Michigan, Mississippi, Missouri, Nebraska, Ohio, Oklahoma, South Dakota, Tennessee, Texas, and Wisconsin.

ANR is a "natural gas company," as defined under the Natural Gas Act, engaged in the business of transporting natural gas in interstate commerce under authorizations granted by and subject to the jurisdiction of the Federal Energy Regulatory Commission ("Commission"). ANR operates approximately 9,000 miles of interstate pipeline extending from Texas north through Oklahoma, Kansas, Missouri, Iowa, Illinois, and into Wisconsin, with a segment extending through Indiana and into Michigan, and additional pipeline extending from Louisiana north through Arkansas, Mississippi, Tennessee, Kentucky, Indiana, Ohio, and into Michigan. ANR provides storage, transportation, and various capacity-related services on an open access basis to qualifying shippers. ANR provides both firm and interruptible transportation services on the mainline portion of its system under multiple rate schedules approved by the Commission and incorporated into ANR's FERC Gas Tariff, Third Revised Volume No. 1 ("Tariff"). These services are provided on an open access basis pursuant to the blanket certificate authority under Subpart G of Part 284 of the Commission's regulations.

## System Map [18 C.F.R. § 154.312(u)(1)]

No significant changes have occurred on ANR's system, shown below, since the filing of ANR’s last FERC Form No. 2. A system map is provided for convenience.

## ANR Pipeline Company
## Gas Quality Daily Gas Chromatograph Locations

G:\12-Data Request\MattSpencer\ANR Pipeline Chromatographs\ANR Gas Quality Daily Chromatographs.mxd

This map shows the general geographic locations of certain gas chromatographs on ANR Pipeline Company and is provided for informational purposes only. These general locations are based on the best information available at the time of posting and are subject to revision at any time. For questions regarding the gas chromatograph locations shown herein, please contact a gas quality representative at 832-320-5832 or gasqualityus@tcenergy.com. For the daily gas quality results associated with these gas chromatograph locations, please refer to the "Gas Quality" information available on our Informational Postings website.

# Major Expansions and Abandonments[1] [18 C.F.R. § 154.312(u)(2)]

Major expansions and abandonments since ANR's last general rate case

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[1] Excludes addition of interconnect receipt/delivery points, as well as activities performed under ANR’s blanket certificate.

## CP16-64

Collierville Expansion Project

Section 7(c) of the NGA

Date Application Filed: January 20, 2016

Date In-Service: November 2017

Final Cost: $28.6 million

Description: ANR modified the existing Collierville Meter Station and installed one new compressor station consisting of one new 4,700 HP turbine compressor unit and appurtenant facilities along ANR's existing 501 mainlines in Shelby County, Tennessee. This enables ANR to provide the firm transportation service requested by Tennessee Valley Authority to supply its Allen Combined Cycle Power Plant, located in Memphis, Tennessee.

## CP16-80

ANR SEML Abandonments

Section 7(b) of the NGA

Date Application Filed: February 29, 2016

Date Abandoned: October 2017 – December 2017

Account 101 Gas Plant In-service: ($2.5 million)

Description: ANR abandoned in place 5 compressor units and related appurtenant facilities (See table). Additionally, ANR is requested the authority to abandon 36 MMcf/d of short-haul capacity on the segment northbound from Eunice to the Celestine compressor station.

| Station | State | County/Parish | Unit | Description |
|---|---|---|---|---|
| Delhi | LA | Richland | 207 | 9,100 HP Frame 3F |
| Sardis | MS | Panola | 402 | 2,500 HP KVT 410 |
| Sardis | MS | Panola | 406 | 9,100 HP Frame 3F |
| Brownsville | TN | Haywood | 507 | 9,100 HP Frame 3F |
| Shelbyville | IN | Shelby | 906 | 2,000 HP KVS 412 |

## CP16-467

ANR Grand Chenier Abandonment

Section 7(b) of the NGA

Date Application Filed: June 3, 2016

Date Abandoned: August 2017

Account 101 Gas Plant In-service: ($13.9 million)

Description: ANR abandoned in place its Grand Chenier CS, located in Cameron Parish, Louisiana, and associated southeast area segment capacity. This abandonment includes one Allison KC-570 unit rated at 8,100 hp and one Solar Taurus 70 unit rated at 8,100 hp (aggregating 16,200 hp) and ancillary facilities. the existing Solar Taurus unit was repaired and refurbish, restore certificated 9,700 hp and associated 192 MMcf/d design capacity. ANR had no firm transportation contracts associated with the facilities abandoned.

## CP17-9

ANR WISE Project

Section 7(b) and 7(c) of the NGA

| | |
|---|---|
| Date Application Filed: | November 3, 2016 |
| Date In-Service: | November 2018 |
| Date Abandoned: | September through December 2017 |
| Final Cost: | $45.8 million |

Description: ANR installed one (1) new compressor building containing one (1) new 6,130 horsepower ("HP") Solar Centaur 50 compressor unit with SoLoNOx and appurtenant facilities. ANR increased the capacity of the existing Hampshire Meter Station in Kane County, Illinois and ANR's downstream lateral (Line 332) from the current 300 million cubic feet per day ("MMCFD") to 500 MMCFD by installing a tap on ANR's 24-inch, 1-301 Loop Line. ANR replaced, in the same right of way, ANR's existing, NPS 16-inch, 0.54 mile Line 332 delivery lateral with a NPS 24-inch pipeline lateral to increase flow capacity from the Hampshire Meter Station to Nicor Gas in Kane County, Illinois. ANR increased the delivery capacity of ANR's existing Tiffany East Meter Station, in Rock County, Wisconsin. Lastly, ANR restaged an existing Solar Saturn 10 turbine compressor unit at ANR's Kewaskum Compressor Station in Sheboygan County, Wisconsin. ANR abandoned an approximate 0.54 mile 16-inch pipeline lateral and replaced it with a new approximate 0.54 mile 24-inch pipeline lateral that will increase the lateral's capacity in concert with the increased Hampshire Meter Station capability, and enhance the efficiency of ANR's operations by increasing the measurement capacity and reducing the pressure loss prior to delivery, while maintaining the same level of service existing shippers. The subscribed project capacity of 230,950 Dth/d is served through a combination of new capacity expansion and existing capacity reserved for the project.

## CP20-1

ANR Mid Michigan Storage

Section 7(b) and 7(c) of the NGA

| | |
|---|---|
| Date Application Filed: | October 1, 2019 |
| Date Abandoned/Acquired: | April 2020 |

Description: ANR filed an abbreviated application for the authority necessary to implement the acquisition and transition of ownership to ANR of certain natural gas storage assets currently leased by ANR from its affiliate, Mid Michigan Gas Storage Company ("Mid Michigan" or "MM") at the Austin, Goodwell, Lincoln Freeman, Loreed, and Reed City storage fields ("Leased Fields"), all located in central Michigan. ANR requested authority pursuant to section 7(b) and section 7(c) of the NGA as applicable to 1) amend the applicable certificates of public convenience and necessity to a) abandon the existing lease arrangements with Mid Michigan to remove Mid Michigan as owner and lessor, and b) change ANR from lessee to owner of the subject assets acquired from Mid Michigan, and 2) establish a new interim lease arrangement with Mid Michigan, specific to the Mid Michigan-owned base gas in the Leased Fields. The Leased Fields are currently operated by ANR in providing its jurisdictional natural gas storage and transportation service. Additionally, ANR has installed and owns related certificated storage facilities at the Leased Fields and owns quantities of base gas in the Leased Fields. Mid Michigan's depreciable facilities have a net book value of zero, and the book value of the non-depreciable land assets is approximately $1.6 million.

ANR abandoned by removal and/or in place twenty-one (21) Storage Line Sections, totaling 11,192 feet of 4.5-inch diameter pipe, associated with nineteen (19) abandoned Storage Wells within the Winfield Storage Field in Mecosta and Montcalm counties, Michigan.

## CP20-8

Grand Chenier XPress

Section 7(c) of the NGA

| | |
|---|---|
| Date Application Filed: | October 28, 2019 |
| Date In-Service: | April 2021 to current |
| Application Cost: | $173 million |

Description: ANR filed an abbreviated application for the authority necessary to implement its Grand Chenier XPress Project ("Project") consisting of: (i) modifications to the existing Eunice and Grand Chenier Compressor Stations, (ii) construction and operation of the new Mermentau Compressor Station, (iii) modifications to ANR's Mermentau River GCX Meter Station, and (iv) installation of various appurtenant and auxiliary facilities. In-service of Project facilities began in April 2021. The Mermentau Compressor Station and modifications to ANR's Mermentau River GCX Meter Station were placed into service on November 6, 2021. The Project provides 400,000 dekatherms per day of incremental capacity that commenced January 1, 2022.

# System Design and Operation [18 C.F.R. § 154.312(u)(3)]

The ANR pipeline system is hydraulically modeled with Gregg Engineering's WinFlow software utilizing the AGA general flow equations. Broadly speaking, the ANR system is divided into five major areas: Southwest Area ("SW Area"), Southwest Mainline ("SW Mainline"), Southeast Area ("SE Area"), Southeast Mainline ("SE Mainline"), and Northern Area. The ANR system also includes storage facilities located in the state of Michigan.

The **SW Area** is a ring-shaped pipeline segment traversing portions of western Oklahoma, both the Texas and Oklahoma panhandles, and a portion of southern Kansas. Operationally, there is typically a null point of gas receipts near the border between Wheeler County, Texas and Roger Mills County, Oklahoma. Gas flows both east and west from this null point around the ring, flowing back together at the compressor station at Greensburg, Kansas. The pipeline segment ranges from 4-inch to 24-inch pipe. The maximum allowable operating pressure ("MAOP") along the pipeline is predominately 1050 psig and 975 psig but also contains smaller segments with MAOP's of 1000 psig and 936 psig. There is approximately 89,000 HP installed at eight compressor stations. For modeling purposes, the capacity is based on a gas specific gravity of 0.60, a heat content of 1,020 Btu/cf, and an assumed ambient temperature of 60˚F.

The **SW Mainline** extends from Greensburg, Kansas through the states of Nebraska, Missouri and Iowa, terminating at a compressor station near Sandwich, Illinois. The pipeline segment consists of a complete mainline of 24-inch pipe and a complete loop line of 24-inch pipe. The remaining pipeline segment consists of laterals ranging from 4-inch to 16-inch pipe. There is a common MAOP of 975 psig with approximately 94,000 HP installed at seven compressor stations. For modeling purposes, the capacity is based on a gas specific gravity of 0.60, a heat content of 1,020 Btu/cf, and an assumed ambient temperature of 60˚F.

The **SE Area** is comprised of two legs, one originating at the Patterson Compressor Station near Patterson, Louisiana and the other originating at the Grand Chenier Compressor Station near Grand Chenier, Louisiana. The two legs come together at the Eunice, Louisiana compressor station, which is the demarcation point between the SE Area and the SE Mainline. The mainline segment ranges from 20-inch to 30-inch pipe with other segments comprised of 16-inch, 12-inch, 10-inch, 8-inch and 6-inch pipe that is mostly laterals. The MAOP along the pipeline is predominately 1050 psig and 975 psig but there are sections with MAOP's of 1200 psig, 1100 psig, 1090 psig, and 991 psig. There is approximately 66,000 HP installed at four stations. For modeling purposes, the capacity is based on a gas specific gravity of 0.60, a heat content of 1,020 Btu/cf, and an assumed ambient temperature of 70˚F.

The **SE Mainline** extends from Eunice, Louisiana through the states of Mississippi, Tennessee, Kentucky and Indiana, terminating at Defiance, Ohio. The pipeline segment consists of complete mainline of 30-inch pipe, a complete loop line of 30-inch pipe, and a partial loop line of 36-inch pipe. Additionally, there are laterals ranging from 4-inch to 30-inch pipe. The MAOP of the segment is 858 psig, except for one lateral with an MAOP of 944 psig. There is approximately 330,000 HP installed at eleven compressor stations. For modeling purposes, the capacity is based on a gas specific gravity of 0.60, a heat content of 1,020 Btu/cf, and an assumed ambient temperature of 70˚ F.

The **Northern Area** is sectioned for modeling purposes into the following five segments:

- The **Wisconsin System** extends north from Sandwich, Illinois through the state of Wisconsin to Crystal Falls, Michigan. This pipeline segment consists of parallel and non-parallel nested loop lines serving most of the eastern half of the state. There are large interconnections at Crystal Falls (Great Lakes Gas Transmission), Marshfield (Viking Gas Transmission), and Janesville (Northern Natural Gas Company). The pipeline ranges in size from 4-inch to 30-inches. The MAOP along the pipeline from the Sandwich Compressor Station north to the Kewaskum Compressor Station is 850 psig. The remainder of the segment is 975 psig. There is approximately 144,000 HP installed at nine compressor stations. For modeling purposes, the capacity is based on a gas specific gravity of 0.59, a heat content of 1,010 Btu/cf, and an assumed ambient temperature of 60˚F.

- The **Michigan Leg South** extends from Sandwich, Illinois through the state of Indiana, terminating at Bridgman, Michigan. The pipeline segment consists of a complete mainline of 22-inch pipe, a complete loop line of 30-inch pipe and a partial loop of 42-inch pipe. There is a common MAOP of 850 psig with approximately 37,000 HP installed at two compressor stations. For modeling purposes, the capacity is based on a gas specific gravity of 0.60, a heat content of 1,020 Btu/cf, and an assumed ambient temperature of 60˚F.
- The **Michigan Leg North** extends from Bridgman, Michigan through the state of Michigan, terminating at Woolfolk, Michigan. The pipeline segment consists of a complete mainline of 22-inch pipe, a complete loop of both 24 and 43-inch pipe, and two complete loops of 30-inch pipe. The remaining segment consists of laterals ranging in size from 4-inch to 12-inch pipe. There is a common MAOP of 850 psig with approximately 62,000 HP installed at two compressor stations. For modeling purposes, the capacity is based on a gas specific gravity of 0.63, a heat content of 1,020 Btu/cf, and an assumed ambient temperature of 60˚F.
- The **Tie Line** extends from Bridgman, Michigan through the state of Indiana, terminating at Defiance, Ohio. The pipeline segment consists of a complete mainline of 22-inch pipe and a complete loop of 24-inch pipe. The remaining segment consists of laterals ranging in size from 4-inch to 12-inch pipe. There is a common MAOP of 858 psig with approximately 23,000 HP installed at one compressor station. For modeling purposes, the capacity is based on a gas specific gravity of 0.60, a heat content of 1,020 Btu/cf, and an assumed ambient temperature of 60˚F.
- The **Willow Run Lateral** extends from Defiance, Ohio into the state of Michigan, terminating at Ypsilanti, Michigan. The pipeline segment consists of a complete mainline of 30-inch pipe and a complete loop line of 30-inch pipe. The remaining segment consists of laterals of both 12-inch and 20-inch pipe. The MAOP along the pipeline is predominately 858 psig, but with smaller segments of MAOP's at 679 psig and 720 psig. There is approximately 37,000 HP installed at one compressor station. For modeling purposes, the capacity is based on a gas specific gravity of 0.60, a heat content of 1,020 Btu/cf, and an assumed ambient temperature of 60˚F.

The **Storage Area** consists of fifteen storage fields and connecting pipeline ranging from 8-inch to 36-inch pipe. The major directly connected facilities are connected to the Michigan Leg North located in central Michigan. The discontiguous facilities, which are connected to the Great Lakes Gas Transmission system and the MichCon system, are located in northern and eastern Michigan. A minor directly connected facility connected to the Tie Line is located in southern Michigan and Indiana; its mileage is reflected in the Tie Line segment referenced in the Northern Area above. The MAOP varies from 650 psig to 1200 psig with approximately 140,000 HP installed at ten compressor stations.