Docket No. RP16-___-000
Exhibit No. ANR-018

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

ANR Pipeline Company) Docket No. RP16 -___-000

Summary of the Prepared Direct Testimony of John J. Hampton

Mr. Hampton is the Manager of Business Operations for TransCanada, U.S. Pipelines. Mr. Hampton supports ANR Pipeline Company's ("ANR") substantial capital investments during the test period and explains that those investments will continue in the coming years as part of ANR's effort to modernize its system so it can continue to provide safe, reliable, and efficient service.

Mr. Hampton provides a detailed account of ANR's system improvement and modernization costs it has included in its rate filing. Mr. Hampton explains that this level of costs is considerably higher than in the past, reflecting ANR's long-term effort to modernize and/or rebuild critical and aging portions of its interstate pipeline system, including the upgrade, overhaul, or replacement of numerous compressor units. Mr. Hampton also provides a detailed assessment for the forecasted costs for modernization and maintenance work in the future.

Finally, Mr. Hampton discusses ANR's Southeast Mainline Reliability and Modernization Program ("SE Mainline R&M Program"). As part of this discussion, Mr. Hampton provides an overview of the Southeast Mainline ("SE Mainline") and the historical evolution of the SE Mainline up to the present day, including the impact recent supply and market changes have had on the SE Mainline. He then details the SE Mainline R&M Program and describes the reasons ANR has prioritized the SE Mainline within its system-wide program to modernize its facilities.

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PREPARED DIRECT TESTIMONY OF JOHN J. HAMPTON ON BEHALF OF ANR PIPELINE COMPANY

January 29, 2016

Glossary of Terms

Adjustment Period	The nine-month period ending July 31, 2016
ANR	ANR Pipeline Company
Base Period	The twelve-month period ending October 31, 2015
Bcf/d	Billion cubic feet per day
BOP	Balance of Plant
Commission	Federal Energy Regulatory Commission
El Paso	El Paso Corporation
EPA	Environmental Protection Agency
Facilities	An asset or group of assets on a plot of land that are typically enclosed by a fence, such as a compressor station, meter station, mainline valve site, etc.
GPMC	General Plant and Maintenance Capital
Lebanon Lateral	The jointly-owned lateral extending from Glen Karn, Indiana to Lebanon, Ohio
LDC	Local distribution company
MMCf/d	Million cubic feet per day
NGA	Natural Gas Act
OEM	Original equipment manufacturers
PHMSA	Pipeline and Hazardous Materials Safety Administration
R&M	Reliability and Modernization
REX	Rockies Express Pipeline LLC
SCADA	Supervisory control and data acquisition
SE Area	Southeast Area
SE Mainline	Southeast Mainline

SE Mainline R&M Program	Southeast Mainline Reliability and Modernization Program
SCC	Stress Corrosion Cracking
SW Area	Southwest Area
SW Mainline	Southwest Mainline

UNITED STATES OF AMERICA
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FEDERAL ENERGY REGULATORY COMMISSION

ANR Pipeline Company) Docket No. RP16 -___-000

Prepared Direct Testimony of John J. Hampton

I. INTRODUCTION

Q: What is your name and business address?

A: My name is John J. Hampton. My business address is TransCanada Corporation, 700 Louisiana Street, Houston, Texas 77002.

Q: What is your occupation?

A: I am the Manager of Business Operations for TransCanada, U.S. Pipelines. I am filing testimony on behalf of ANR Pipeline Company ("ANR").

Q: Please describe your educational background and your occupational experience as they are related to your testimony in this proceeding.

A: In 1980, I received a Bachelor of Science degree in Civil Engineering from Michigan State University. I have been a registered Professional Engineer in the State of Michigan since 1984 (renewal pending). Upon graduation from college, I was employed by ANR's predecessor, Michigan-Wisconsin Pipeline Company, in its Facility Planning Department, where I was responsible for capacity modeling of the ANR pipeline system. After various promotions and brief stints in the gas control and operations areas, I transferred to Business Development in 1985. Between 1985 and 2001, I held various management and other positions in the Supply Development, Business Development, and Marketing departments at ANR. In this capacity, I worked on ANR projects such as the Gulfstream and Empire State pipelines. In 2001, ANR's then parent, Coastal

Corporation, merged with El Paso Corporation ("El Paso"). From 2001-2004, I continued in business development, supply development and related management roles for several of the El Paso pipeline subsidiaries, including ANR, Tennessee Gas Pipeline Company, and Southern Natural Gas Company. In April 2004, I transferred to El Paso Field Services where I was responsible for business development for the south Louisiana gas processing facilities. In November 2005, El Paso's south Louisiana gas processing facilities were acquired by Crosstex Energy Services. I transferred with the assets and continued in the business development role. In February 2010, I joined TransCanada – U.S. Pipelines, where I took the position of Manager, System Design. In July of 2012, I was placed in charge of the Business Operations group for ANR and other TransCanada-managed US gas pipelines. In October 2013, I was also given additional responsibilities in Business Development for ANR. From July 2014 until April 2015, I worked on business development for ANR before returning to lead the Business Operations group. Business Operations is responsible for evaluating investment and implementation options for various existing-system capital and maintenance projects.

Q: Have you ever testified before the Federal Energy Regulatory Commission ("Commission") or any other energy regulatory commission?

A: Yes. I filed testimony in ANR Pipeline Company v. Transcontinental Gas Pipe Line Corporation, Docket No. CP98-74-000, and Wisconsin Electric Power Company, et al. v. ANR Pipeline Company, Docket No. RP10-517-000.

Q: What is the purpose of your testimony in this proceeding?

A: I describe ANR's system and provide support for the capital investments ANR has made during the Base Period in this case, and will make during the Adjustment Period. I also explain the need for ANR to make substantial capital investments over the coming years

to modernize its system in order to continue providing safe, reliable, and efficient service in the future, given the age of the ANR facilities and recent market and supply changes on ANR's system. I describe the modernization initiatives and activities that ANR has begun to implement, and will continue to implement across its entire system in the near future. In addition, I describe the specific capital projects and costs associated with ANR's Southeast Mainline Reliability and Modernization Program ("SE Mainline R&M Program"), and provide an overview of the justifications for these projects and costs during the Base and Adjustment Periods in this case and into the future. Although ANR's modernization activities will continue to take place over its entire system, ANR is prioritizing its immediate modernization efforts on the SE Mainline. I explain why ANR has chosen to currently focus on this work.

Q: Are you sponsoring any exhibits in addition to your testimony?

A: Yes. I am sponsoring the following exhibits:

Exhibit No. ANR-019	Test Period GPMC Project Costs
Exhibit No. ANR-020	GPMC Expenditures 2011-2014
Exhibit No. ANR-021	GPMC Expenditures 2015-2018
Exhibit No. ANR-022	SE Mainline Monthly Capacity vs. Nominations
Exhibit No. ANR-023	SE Mainline Contract Profile 2014-2025
Exhibit No. ANR-024	SE Mainline Facilities Study – Unit Recommendations
Exhibit No. ANR-025	SE Mainline R&M Program – Analysis Process
Exhibit No. ANR-026	Cost Comparison, SE Mainline Program vs. Replacements

II. ANR'S SYSTEM IMPROVEMENT AND MODERNIZATION COSTS

Overview of Costs

Q. Please generally describe the capital costs ANR has included in this rate filing for modernization and maintenance of its facilities.

A: As shown in Exhibit No. ANR-019, during the Base Period from November 2014 through October 2015, ANR placed into service General Plant and Maintenance Capital ("GPMC") projects on which it had spent $140.5 million. As also shown in Exhibit No. ANR-019, ANR expects to place into service another $353.6 million of additional GPMC projects during the Adjustment Period. Over the nineteen months of the Base and Adjustment periods, ANR expects to place $494.1 million of GPMC projects into service for an average of $26 million per month or $312 million per twelve months.

Q: Are these costs consistent with the level of costs ANR has incurred in these areas in the past?

A: No, during the period from 2011 through 2013, ANR incurred a much lower average of $96.6 million per year or $8 million per month in GPMC projects, as shown in Exhibit No. ANR-020. As also shown on that exhibit, GPMC project costs increased to $136.7 million in 2014 or $11 million per month.

Q: Why has ANR's overall level of GPMC expenditures increased at this time?

A: ANR has increased its overall level of GPMC expenditures as it has begun to undertake a long-term effort to modernize and/or rebuild critical and aging portions of its interstate pipeline system, including the upgrade, overhaul or replacement of numerous compressor units, replacement or upgrade of portions of the ancillary systems at compressor stations (referred to as "Balance of Plant" or "BOP" by ANR) and the implementation of long-term programs to replace aging equipment that is no longer produced or supported by

original equipment manufacturers ("OEM"). ANR is engaged in an effort to evaluate its assets, prioritize modernization needs, and develop a risk-based modernization program, with the primary goal of maintaining pipeline safety and service reliability through the implementation of high priority projects. The implementation of strategic facility and pipeline projects will address potential risks to the reliability of ANR's firm transportation and storage services.

Q: What does ANR forecast for modernization and maintenance work in the future?

A. Modernization and maintenance work is essentially GPMC expenditures. As I already mentioned, quantitatively, ANR has seen a significant increase in GPMC expenditures from 2011 through the rate case Adjustment Period. Qualitatively, the bulk of these increased costs are associated with the SE Mainline R&M Program. Nonetheless, many of the SE Mainline R&M Program costs are associated with modernization programs and initiatives that extend to the rest of the system and well into the future. I discuss these programs and initiatives below. These GPMC expenditures also include significant capital costs associated with system-wide day-to-day operations and maintenance.

In addition to the identified programs and initiatives and the on-going maintenance work, most of ANR's aging BOP and compressor fleet, especially the reciprocating compressor fleet, requires replacement or extensive work to maintain an acceptable level of system reliability. ANR expects to undertake a detailed review of each of the system segments in order to identify the most cost-effective modernization program, just as it has done with the SE Mainline as I describe below.

Finally, the national policy and regulatory landscape continues to evolve towards more stringent standards. The Environmental Protection Agency ("EPA") has issued several regulations in recent years that have increased ANR's compliance costs and will

continue to do so in the future. The Pipeline and Hazardous Materials Safety Administration ("PHMSA") has been directed by Congress to promulgate regulations to establish enhanced safety standards for natural gas pipeline facilities. Although ANR has not budgeted for capital costs associated with pending regulations from the EPA and PHMSA, there is a strong likelihood these regulations will increase ANR's GPMC costs. In addition, while ANR has gone to great lengths to prevent pipeline leaks from occurring, it has experienced incidents which have required pipelines to be temporarily shut down. ANR (as well as PHMSA) now takes a very conservative approach to returning lines to service, and this necessarily entails greater costs.

Q: What are the forecasted costs for modernization and maintenance work in the future?

A: As of November 1, 2015 and as shown on Exhibit No. ANR-021, ANR has expended or plans to expend $1.16 billion on GPMC during the calendar years from 2014 through 2018, for an average of $290 million per year or $24 million per month.

Exhibit No. ANR-021 shows a significant reduction in the total GPMC costs in 2018. This is due to the planned completion of the SE Mainline R&M Program. There is also an increase in the category "Maintenance Capital – Other" which is a result of the modernization programs and initiatives identified and completed on the SE Mainline being implemented on the rest of the ANR system. In addition to these program costs, ANR will have costs associated with the segment-by-segment evaluations and upgrades after the SE Mainline R&M Program is completed. ANR anticipates it will incur costs on the remainder of the system segments for BOP and compressor modernization and maintenance work similar to the work performed on the SE Mainline, but the studies have not been completed and the required work and costs have not yet been identified.

In addition, as I noted previously, there is a strong likelihood ANR will incur costs associated with new EPA and PHMSA regulations, even though ANR has not budgeted for capital costs associated with these anticipated regulations. The Commission itself has acknowledged the need for pipelines to engage in modernization of their facilities in light of new regulatory requirements and provided mechanisms for cost recovery. See Cost Recovery Mechanisms for Modernization of Natural Gas Facilities, 151 FERC ¶ 61,047 (2015), clarification denied, 152 FERC ¶ 61,046 (2015). Although ANR is not proposing to implement a modernization surcharge as part of its current rate filing, ANR's costs associated with capital investments for system modernization activities are consistent with the kinds of costs the Commission has recognized pipelines should be permitted to recover, either via a modernization surcharge or through system rates. ANR plans segment-by-segment evaluations of the required capital investment to modernize its entire system, similar to the SE Mainline evaluation described below, and may seek a modernization tracker in the future, if necessary to ensure ANR's facilities are sufficiently modernized to continue to provide safe, reliable service in an efficient manner, or returning lines to service.

System Overview and History

Q: Please provide an overview of the ANR system.

A: The ANR system consists of approximately 9,400 miles of interstate pipeline located within 17 different states; 58 compressor stations; 308 engine/compressor units; and about 600 active gas metering facilities. The ANR transmission system includes two mainlines, the Southwest Mainline ("SW Mainline") and the SE Mainline, which originally were designed to transport gas from historical production areas primarily to

markets and gas storage fields in ANR's Northern Area (Michigan, Wisconsin, northern Illinois, Indiana, and Ohio). ANR's storage fields are located in the northern and southeastern areas of Michigan's Lower Peninsula. ANR's Northern Area is connected to the SW Mainline just north and east of the Sandwich compressor station in Illinois and the Northern Area connects to the SE Mainline north and west of ANR's Defiance compressor station in Ohio. ANR witness Towne describes ANR's system in greater detail.

Q: Please briefly describe the history of ANR's system.

A: ANR witness Towne provides a description of the history and development of ANR's system, including the construction of what is now the SW Mainline in the late 1940s and the construction of what is now the SE Mainline in the 1950s. As relevant to my testimony, ANR's initial compression facilities were installed beginning in the late 1940s and continuing through the 1950s. There were subsequent major additions of compression in the 1960s and early 1970s, and in the early 1990s ANR added compression to expand the SW Mainline and added compression at Sulphur Springs, Indiana. More recently, ANR has added facilities to its system through various relatively minor system expansion projects.

Need for System Modernization

Q: How does the age of ANR's pipeline system relate to the need to incur costs to modernize ANR's facilities?

A: To a very great extent, ANR is still operating with the same major equipment that was installed with the original pipeline facilities that I have described previously. Although ANR has undertaken a few engine/compressor replacement projects at certain locations (for example, ANR replaced Worthington horizontal compressors at Sandwich, Illinois

and Havensville, Kansas in 1981 and 1982 respectively), this has not been ANR's typical practice. Similarly, at many locations, most of the major components of ANR's infrastructure are many decades old, including transmission pipe, mainline valves, compressor station piping and valves, gas cooling equipment, meter station piping and valves, valve operators, buildings, auxiliary power units (generators), motor control centers, air compressors, engine and piping foundations, and others.

Generally speaking, ANR's practice with respect to major component replacement has been to only replace specific items of equipment that show serious signs of aging and wear, have experienced an unacceptable reduction in reliability, and cannot be reasonably repaired. In limited cases ANR has implemented replacement programs on certain portions of its system to replace a specific type of equipment (e.g., air compressors and motor control systems). While this strategy has proven to be cost-effective over a long period of time, ANR is now at the point where it is necessary to begin to replace many of these aging components and also to consider replacement programs for specific systems. If ANR does not undertake this modernization effort now, service reliability may suffer due to increased numbers of outages and outages of longer duration.

Q: Has ANR experienced any challenges as a result of facilities becoming obsolete?

A: Yes, ANR has been experiencing certain problems due to obsolescence, because many of the major assets and components of the system are very old. ANR generally prefers to repair a facility if possible because it is usually less expensive. However, more and more frequently ANR is finding it is more difficult and/or more expensive to procure replacement parts for the older equipment. Many times, replacement parts must be specially ordered or custom fabricated. This can be an expensive and time-consuming

process, which results in costly repairs and extended outages for failed equipment. For these reasons, repairs of this older equipment are becoming increasingly impractical, and replacement of obsolete equipment is frequently the better choice or necessary due to the lack of available parts. For some systems, such as ANR's automation system, there are many locations that are currently equipped with the identical or similar obsolete equipment. For systems such as these, ANR is developing and implementing an aggressive system-wide replacement program in order to avoid the potential for multiple, simultaneous failures. Such simultaneous failures would contribute to lengthy outages, potential capacity restrictions, and higher costs while replacements are performed as emergent or emergency work.

Q: Has ANR previously undertaken any system-wide efforts to upgrade its facilities?

A: Yes, during the late 1970s and early 1980s, ANR implemented a program to enable the pipelines to be pigged and thus allow for in-line inspection. This effort included the replacement of the valves on one of the two SW Mainline loops with full port ball valves; the original valves were reduced port valves.

In the mid-1980s ANR initiated a major program to automate the pipeline system with the installation of state-of-the-art supervisory control and data acquisition ("SCADA") systems and remote monitoring and operation capability. This effort took place over several years and was accomplished in phases based upon the level of complexity and technical difficulty. The automation equipment allowed the pipeline system to be operated remotely from ANR's Gas Control Center, with the facilities only being manned 40 hours per week. It enabled the system to be operated in a more consistent and efficient manner through the application of software driven control schemes. ANR could operate engines more efficiently by consistently operating them at

higher torque levels and lower speed levels. Also, ANR gained significant efficiencies from reduced manpower requirements, since it was no longer necessary to have facilities manned at all times.

Q: Have the automation systems been upgraded since they were installed?

A. For the most part, the automation systems have not been upgraded. Many locations are still equipped with the original automation systems installed approximately 30 years ago and the OEMs no longer provide spare parts or technical assistance. There are a few locations where the original equipment was replaced due to breakage or insufficient functional capabilities to handle expansions or upgrades of operating equipment. Many of these replacements are also obsolete today.

Q: Why is ANR undertaking modernization of its system at this time?

A: As I have explained, most of ANR's facilities were installed decades ago as part of the original installations. Most of the replacements are themselves decades old. Much of this equipment, both original and replacements, are showing their age through significant wear, a deterioration of reliability, and increasing repair costs. ANR has been concerned with deteriorating compressor reliability for several years, and knew it needed to start a modernization program before it experienced system reliability problems. Nonetheless, ANR wanted to make sure the right equipment was targeted and capital was efficiently deployed, which required a new way to analyze the system and prioritize work. The methodology and the analysis are described below, but the result is ANR began its modernization program as soon as the analysis was completed in 2014. ANR is undertaking modernization and replacement of obsolete equipment on an on-going basis before multiple, simultaneous equipment failures have a deleterious effect on system reliability.

ANR has determined that the condition of its older facilities requires sustained capital investment for facility upgrades and replacements to ensure ANR can continue to provide safe, reliable and efficient services to its customers. The magnitude of the costs and the amount of oversight for the work dictates that the work must be completed over an extended period of time. The time required to complete modernization also dictated ANR commence the work as soon as possible so the schedule did not extend too long and lead to sustained reductions in system reliability.

Description of General System Modernization Program

Q: Can you describe the activities ANR plans to engage in with respect to system modernization during the next three years?

A: ANR has identified a number of major areas of work it will undertake as part of its overall system modernization effort at its facility locations or Facilities. ANR generally defines "Facilities" as an asset or group of assets on a plot of land that are typically enclosed by a fence, such as a compressor station, meter station, mainline valve site, etc. The modernization work at Facilities can be grouped into five broad categories: (1) modernization of compressor units via major overhaul or replacement; (2) modernization of compressor station automation equipment; (3) modernization of compressor station BOP facilities, including engine foundations, piping and valves, ancillary power and safety systems, and other equipment which I describe below; (4) modernization of meter station automation equipment; and (5) modernization of SCADA systems. I will discuss each of these categories, and the need for ANR to engage in modernization work, in turn. ANR is engaged in Facilities modernization activities across its entire system; however, at this time ANR has chosen to focus most of its immediate Facilities modernization efforts on the SE Mainline, and thus the SE

Mainline work accounts for the bulk of the capital expenditure during the Base and Adjustment Periods in this rate case. I explain why this is so and discuss the specific modernization work being done on the SE Mainline in greater detail in the ensuing section of my testimony. In addition to the Facilities modernization, ANR also is engaging in upgrade and modernization work associated with its line pipe as part of its pipeline integrity program.

Q: Why does ANR need to modernize its compressor units?

A: As discussed above, most of the compressor units on the ANR system have been in service for decades. ANR's compressor specialists have conducted a review of the compressors across the entire system and found many of them to be at risk for service failure in the next few years. All compressors must be reliable, but not all compressors are required to be at the highest levels of reliability in order for ANR to provide reliable service. In many instances it is not necessary for ANR to incur the higher costs associated with the highest levels of compressor reliability.

Business Operations works with the System Design group to identify the compressor units that are required on each segment of the ANR system to move the aggregate requirements of all firm transportation agreements on their primary paths for the next few seasons. These compressors are designated as "primary" units, a concept which I will discuss in greater detail below. For purposes of the current discussion, the key point is that primary units must have very high reliability. If a primary unit is at significant risk of service failure, the risk must be mitigated either through replacement or repair/overhaul that brings it back to an acceptable level of reliability. Based on a comparison of the designated primary units and the compressors at risk of service failure,

ANR has concluded several units must be addressed in its upgrade/modernization program.

Q: Please describe how ANR is modernizing its compressor units.

A: The majority of compressors on the system that require modernization will be addressed through "zero-hour" overhauls, a concept I describe below. The other compressors that require modernization, a much smaller percentage, will be replaced. Both the zero-hour overhauls and compressor replacements are quite expensive. ANR performs a study to assure the replacement or zero-hour overhaul is justified before undertaking either modernization approach. ANR started its detailed compressor studies on the SE Mainline and is initially focusing its compressor modernization efforts on this segment of the system.

Q: Why does ANR need to modernize its compressor station automation equipment?

A: As described previously, ANR's automation systems were installed in the 1980s and 1990s. When installed, the Bristol systems were "state of the art," but the vendor no longer provides technical support or repair services for these units and replacement components are not available. The Bristol systems are simply obsolete. The automation system is a vital component for ANR's operations, integral to the safe operation of both of the compression and pipeline facilities through both remote and local control. These automation units are vital to system control as well as continuous monitoring, alarm annunciation and safety shutdown functions. ANR needs reliable, serviceable automation at all of its compressor stations.

Q: Please describe how ANR is modernizing its compressor station automation equipment.

A: ANR has begun to implement an automation replacement/upgrade program, replacing the obsolete Bristol systems with state of the art Siemens (and some Allen-Bradley) PLC systems. The automation upgrade consists of two parts: control upgrades for each compressor unit and a station level controller. To date, modernization of unit and compressor station automation equipment has been completed for 44 compressor units at six compressor stations, three of which are on the SE Mainline. During the 2015-2017 time period, ANR plans to modernize automation equipment for 22 units at five more compressor stations associated with the SE Mainline R&M Program. Thereafter, automation upgrades on the remaining units and stations will be performed across the entire system on ten to twenty units per year through 2033. Each project that is completed will not only alleviate the obsolescence and reliability concern at that particular facility, but will also generate spare parts that will help support the remainder of the facilities until the upgrade program is completed.

Q: Why does ANR need to modernize its compressor station balance of plant equipment?

A: In addition to the compressor units themselves, compressor stations house support and ancillary equipment that is necessary to ensure safe and reliable operations of the compressors and the rest of the pipeline. As noted above, ANR refers to this equipment as balance of plant or BOP. BOP would include, for example, engine jacket water cooling systems, exhaust stack systems, gas cooling systems, electrical systems, non-interruptible auxiliary power systems, fire and gas detection systems, yard piping and valves, fuel gas systems and others. Each of these can have a significant effect on the reliability of the compressor station as a whole if they do not operate reliably, as designed. A pipeline system simply cannot be reliable if its vital BOP equipment is not

reliable as well. Most of the BOP equipment at ANR's compressor stations is the originally installed equipment. A substantial portion of these original installations are showing their age through increased wear on components, reduced reliability, and increasing repair costs. Components of the BOP need to be modernized or upgraded to assure safe and reliable system operations.

Q: Please describe how ANR is modernizing its compressor station BOP equipment.

A: ANR has begun the program of modernization of compressor station BOP initially on the SE Mainline as part of its SE Mainline R&M Program. The experience on the SE Mainline is instructive as to how ANR will address modernization of BOP across its entire system. There are fourteen compressor stations included in the system evaluation that led to the SE Mainline R&M Program. ANR's field staff evaluated the BOP to identify poorly performing and/or unreliable equipment at these stations. Next, the stations were prioritized based on criticality of the station to overall system performance. Starting with the most critical station, the field staff began more detailed evaluations. BOP equipment that was expected to erode the reliability of the station, particularly after the compressors were modernized or upgraded, were further evaluated to determine whether it was more cost-effective to repair, replace, or otherwise address problems with the BOP equipment. Station by station, these BOP projects were included in the first year of the SE Mainline R&M Program until the list included as many locations as could be overseen by the project management and field staff in the first year. Five compressor stations (and one key meter station) were included in the SE Mainline R&M Program in 2015. BOP equipment that was evaluated included:

a. Jacket water preheaters

b. Emergency Shut Down (ESD) System Piping

c. Fuel gas pre-heaters

d. Lube oil pre-heaters

e. Fuel gas and compressed air filter systems

f. Fuel gas pressure regulators

g. Suction/discharge unit block valves and actuators

h. Station yard piping, valves, actuators

i. Auxiliary power units (APU)

j. Main station circuit breaker

k. Utility transformers

l. Automatic transfer switch (ATS)

m. Power factor correction capacitor (PFCC)

n. Heat Recovery Generators (HRG), and other associated power systems

o. Station yard light poles, light fixtures and new LED lighting

p. Aerial Gas Cooler Fan drives

q. Auxiliary and Cooling Water Temperature Control Valve (TCV)

r. Motor Control Center (MCC)

s. Compressed air mist eliminator

t. Condensate return piping

Costs to modernize BOP at the initial five compressor stations on the SE Mainline range from a low of approximately $4 million to a high of $10 million, with an average estimated cost of approximately $7 million per station. ANR has nine more stations on the SE Mainline and roughly 40 additional compressor stations that will require varying

degrees of modernization over the coming years to assure continued safe and reliable operations in the future.

Q: Why does ANR need to modernize its meter station automation equipment?

A: Like the compressor station automation equipment, ANR's meter station automation equipment was installed in the 1980s and 1990s and has also become obsolete, with no vendor support and no new replacement parts available. These systems provide the electronic measurement of the gas (e.g., calculation of gas flow based on meter measurement parameters and gas properties), the control of which meter runs are utilized based on flow, continuous monitoring and alarm generation for operating conditions such as low pressure and no flow, and in some cases the control of gas flow via control valves. The systems thus are critical for the accurate measurement and delivery of gas to customers as well as the safety of the pipeline system. Due to the high number of meter facilities with obsolete systems, it is imperative that ANR begin replacing these systems before multiple, simultaneous failures are experienced.

Q: Please describe how ANR is modernizing its meter station automation equipment.

A: Until recently, modernization of meter station automation has been performed on an ad hoc basis. As units failed, they were repaired with spare parts, if available, but replaced with modern equipment when spare parts were not available. To date, approximately 25 units have been replaced. The pace of unit failures has increased to the point where the availability of spare parts is insufficient to satisfy internal demand. To address this critical issue, ANR has initiated a meter station automation upgrade program starting in 2016 to replace all of the remaining, obsolete units with new equipment. Bristol 3330's will be upgraded to the Bristol Control Wave systems and facilities currently equipped with Thermo Automate systems will be upgraded to ABB systems. ANR anticipates it

will replace meter station automation equipment at approximately 520 locations from 2016 through 2021 at an estimated cost of $57 million. Similar to the station automation program, each completed project will alleviate the obsolescence and reliability concern at that particular facility and generate spare parts that will help support the remaining meter facilities until the program is completed. Unlike the station automation program, the meter station automation program isn't initially focused on the SE Mainline.

Q: Please explain why ANR will be modernizing its SCADA system.

A: As part of a full TransCanada U.S. pipeline SCADA system upgrade, ANR's SCADA system is scheduled to be upgraded in 2018-2020, with the bulk of the ANR project to be completed in 2018. TransCanada has acquired several U.S. gas pipeline systems throughout its history. Through these acquisitions, TransCanada inherited four distinct SCADA systems, all of which are at or near end of life. Failure of a SCADA system could result in the potential loss of pipeline functionality, which could interrupt business, threaten regulatory non-compliance, or worse yet, could degrade pipeline safety. All of TransCanada's gas pipeline SCADA systems are being standardized on the same "platform." The replacement of ANR's SCADA system will be the last of three phases and will cost approximately $7.6 million (ANR's portion of the total cost).

Q: Please describe ANR's modernization and upgrading efforts associated with its line pipe.

A: ANR has a substantial pipeline integrity program in place. For example, roughly $40 million of GPMC is budgeted in 2016 to address pipeline integrity issues. Everything the Pipeline Integrity department does is safety or compliance related. Pipeline Integrity works closely with ANR's Compliance department and PHMSA to assure risks are minimized and the pipeline operates safely.

The Pipeline Integrity department groups its projects as follows:

- The **Geotechnical** program primarily monitors, analyzes and mitigates issues such as depth of pipeline cover and slope failures to ensure pipeline integrity is maintained. The program also ensures pipe exposure issues are addressed.
- The **Cathodic Protection** program addresses the risk of external corrosion on the pipeline. The program consists of a mix of new and replacement facilities such as rectifiers, test stations, and grounding beds.
- The **Damage Prevention** program monitors and addresses external threats and pipeline class changes.
- The **Facilities** program addresses pipe integrity issues that may arise within the yards of compressor stations, meter stations, storage fields and similar installations.
- The **Manufacturing Constructions** program addresses pipe manufacturing and installation defects to ensure pipeline integrity.
- The **Stress Corrosion Cracking ("SCC")** program addresses the threat of SCC issues primarily through the use of hydrostatic testing, investigative digs, and appropriate pipe reinforcements or replacements.
- The **Valve Management** program is focused on ensuring pipeline isolation is possible in case of pipeline failure as well as during the course of pipeline integrity-related work.

Q: Please resummarize ANR's System Modernization Program.

A: There are six primary, "sub-programs" included in ANR's system modernization program. Five are associated with Facilities (compressor units, compressor station automation, compressor station BOP, meter station automation, and SCADA) and one is associated with line pipe, as part of ANR's pipeline integrity program. Setting

appropriate priorities for the three sub-programs associated with compressor stations requires a detailed study of compressor units and stations. These three programs are initially focused on the SE Mainline as part of the SE Mainline R&M Program. The other three sub-programs (meter station automation, SCADA, and line pipe) are independent of compressor stations and are being prioritized and implemented across the entire system.

III. SOUTHEAST MAINLINE MODERNIZATION

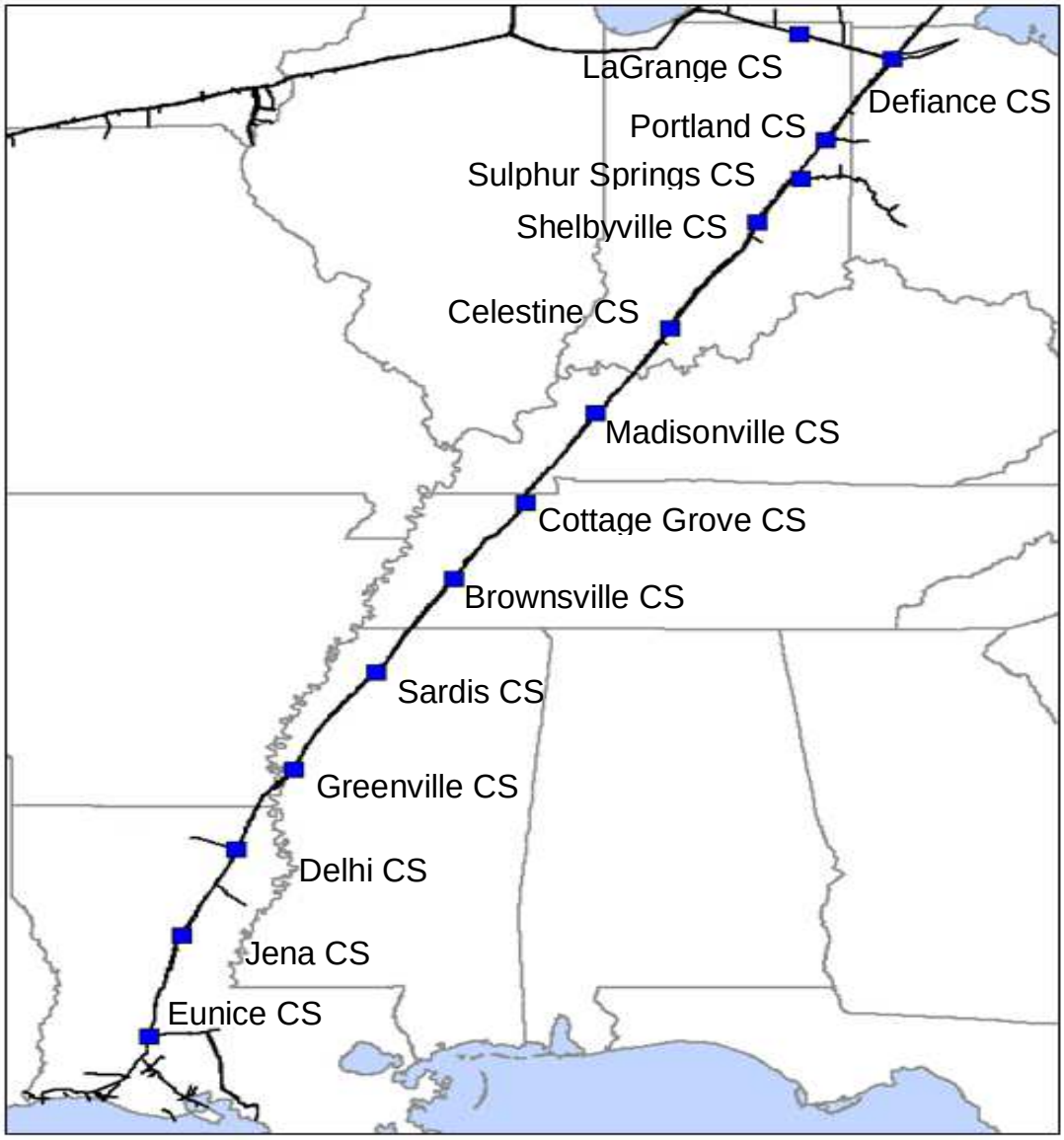
Segment and Program Overview

Q: Please describe ANR's SE Mainline.

A: ANR's SE Mainline starts at the Eunice Compressor Station in Acadia Parish, Louisiana and runs roughly 895 miles north-northeast to the Defiance Compressor Station in Defiance, Ohio. The SE Mainline is essentially comprised of dual 30-inch lines running the entire length and a 36-inch loop line covering about 40 percent of the length in several segments. There are eleven mainline compressor stations located along the SE Mainline, excluding the Eunice Compressor Station and including the Defiance Compressor Station. These stations are generally configured with two to three large or intermediate sized compressor units with about 5,000 to 11,000 horsepower each and five to seven small units with about 2,000 horsepower each. Below is a map depicting the SE Mainline.

1

SOUTHEAST MAINLINE AND RELATED COMPRESSOR STATIONS



Note that although there are only eleven compressor stations on the SE Mainline itself, due to recent contract additions and the introduction of bidirectional flow on the SE Mainline, additional stations are important to the segment analysis. The Eunice Compressor Station, which historically has not been considered part of the SE Mainline, is critical for southbound contracts. The Sulphur Springs Compressor Station is located on the Lebanon Lateral, but is critical to moving gas through the sold-out, west-bound Lebanon Lateral capacity onto the SE Mainline. The LaGrange Compressor Station is technically on ANR's Tie Line, but is critical to moving gas away from Defiance and the SE Mainline through the sold-out, west-bound Tie Line capacity. The eleven mainline stations plus Eunice, Sulphur Springs, and LaGrange comprise the fourteen stations included in the SE Mainline R&M Program.

Q: Please describe the SE Mainline R&M Program.

A: The SE Mainline R&M Program is an initiative ANR is undertaking to modernize the SE Mainline to sustain high reliability on this system segment. Although ANR is undertaking a system-wide program to modernize its facilities, as I have described above, the SE Mainline R&M Program is being implemented as a priority because, as discussed in detail below, there has been a significant change in contracting and operations on the SE Mainline. In response to these changes, there has been a very large increase in capital costs on the SE Mainline that have been incurred during the Base Period and will continue during the Adjustment Period and in the coming years.

Q: Why is the SE Mainline R&M Program needed at this time?

A: As I will discuss in greater detail below, there have been significant amounts of unsubscribed capacity on the SE Mainline in 2013 and for many prior years. The existing infrastructure was capable of providing highly reliable transportation service with limited

compression, given the relatively low quantities that were actually flowing on the SE Mainline. The dramatic market changes that have occurred in the natural gas industry and the consequential changes in ANR's contracts and SE Mainline flows, puts more demands on the SE Mainline compression. As a result, ANR will need higher reliability from key compressor units than what has been required of these units in roughly the last two decades. Therefore, ANR has undertaken the SE Mainline R&M Program to conduct the necessary repairs, overhauls, and facility replacements to modernize these units and ensure a continuing high level of service reliability on the SE Mainline.

Historical Review

Q: Please discuss how ANR historically operated the SE Mainline.

A: As discussed in greater detail by ANR witness Towne, the historical role performed by the SE Mainline was to move gas supply from traditional supply regions in the United States Gulf Coast, upstream of the SE Mainline, to market and storage areas in the Midwest, including Wisconsin, Illinois, and Michigan markets and ANR's storage fields in Michigan, all downstream of the SE Mainline. The system was designed to move gas supply essentially the entire length of the segment and the installed horsepower was nearly equal at all stations. As a result, all of the compressor units on the SE Mainline were originally designed to operate at all of the stations when the system was at full capacity. At lower flows, the design called for smaller units to be idled in order to trim to the appropriate amount of horsepower at each station. At even lower flow levels, entire stations could be taken offline with the compression adjusted at the operating stations.

As shown on Exhibit No. ANR-022, nominations on the SE Mainline have consistently been well below the capacity of the SE Mainline for more than a decade. As

a consequence of the low flow quantities on the SE Mainline in recent years, ANR was able to move full nomination quantities with many compressor units offline. The idled units essentially became spare horsepower or redundant units that helped assure system reliability. For example, if a station had six small units and only two were necessary for the typical flow, the system would have had 200 percent redundancy on small units for typical flows.

Q: What is the impact of compressor redundancy on system reliability?

A: With redundant compressor units, no individual unit needs to be as reliable on its own as compared to a system without redundancy. When there are many redundant units, a system can operate with a high degree of system and throughput reliability even though individual units may have lower reliability on their own.

Present Day Situation

Q: Have any supply changes occurred that affect the SE Mainline?

A: Yes, as discussed in greater detail by ANR witness Towne, various supply changes have occurred over the last several years that have had a significant impact on SE Mainline operations. For example, traditional gas receipts offshore have declined precipitously and been replaced by gas receipts further north. Specifically, gas produced in the Haynesville and Fayetteville shale formations is being received at interconnections near the southern end of the SE Mainline. Similarly, gas production from the Utica and Marcellus shale formations is entering ANR at interconnections near the northern end of the SE Mainline.

Q: Are there market changes that affect the SE Mainline?

A: Yes, again, as explained in greater detail by ANR witness Towne, ANR has built delivery points along the SE Mainline changing it from essentially a bullet line moving gas from Eunice, the southern terminus, to Defiance, the northern terminus, to one that delivers gas along the mainline as well.

Q: How have these supply and market changes affected contracting practices on the SE Mainline?

A: As shown on Exhibit No. ANR-023, there was a major shift in contracting on the SE Mainline in the 2013/2014 timeframe. ANR's contract profile on the SE Mainline now includes a wide variety of northbound and southbound contracts, and requires much higher usage of the SE Mainline. There are still "traditional" contracts with gas receipts south of Eunice, the SE Mainline's southern terminus, flowing to points beyond Defiance, the SE Mainline's northern terminus. In addition, there are northbound contracts for essentially all of the other available flow permutations: from Eunice to points partway up the SE Mainline; from Haynesville or Fayetteville shale formations to points partway up the mainline or beyond Defiance; and from Utica/Marcellus shale formations to points beyond Defiance. There are also large quantities contracted for southbound flow, again with essentially all of the southbound flow permutations.

Finally, ANR's customer profile has changed considerably on the SE Mainline. Historically, customers were primarily market side customers, such as local distribution companies. Much of the demand was weather-driven, resulting in weather-induced reductions in both seasonal flows and day-to-day flows. Historically, less compression was used on days of lower demand, decreasing the run hours on units and therefore decreasing their wear and tear. Today, most of the new contract quantities are with producers. In contrast to ANR's historical consumer-driven customer profile, producers

generally attempt to keep their production flowing every day. As a result, contract nominations are expected to be at a higher load factor than historical averages. This will likely increase the compression load factors at critical stations and therefore will necessitate higher compression reliability. ANR needs to be prepared to provide service if 100 percent of the northbound firm contracts are nominated and zero percent of the southbound firm contracts are nominated, and vice-versa.

Q: How have these supply and market changes affected the SE Mainline facilities and capacity sales?

A: The new supply from the Utica and Marcellus shale formations triggered changes to existing facilities. ANR converted the Lebanon Lateral to bidirectional flow, and then expanded capacity in the western direction by adding additional compression on the lateral at the Sulphur Springs Compressor Station. ANR also expanded the interconnection with Rockies Express Pipeline LLC ("REX") at Shelbyville, Indiana to roughly 1.2 billion cubic feet per day ("Bcf/d") of receipt capacity. Most significantly, the SE Mainline has been converted to operate compression for both northbound and southbound services. The compressor stations from Eunice to Shelbyville have been modified to compress gas in either direction. Northbound capacity remains as certificated at roughly 1.35 Bcf/d and southbound capacity is restricted to roughly 1.15 Bcf/d due to system constraints unique to southbound flow. In addition to these changes, ANR witness Towne details an additional, proposed supply connection into the SE Mainline at Defiance associated with the proposed Rover Pipeline.

Supply from the Utica and Marcellus shale formations also drove a tremendous demand for ANR's SE Mainline capacity. Producers were anxious to contract for SE Mainline capacity to liquid points on the ANR system in order to avoid having their

production constrained by downstream bottlenecks. As a result, ANR is now fully subscribed on the SE Mainline in both directions. For northbound contracts, the SE Mainline constraint is on the northern end of the system from the Portland Compressor Station through the Defiance Compressor Station. For southbound service, the constraint is on the southern part of the system through the Jena and Eunice compressor stations. All available capacity through these two constraint points has been sold. As a consequence, ANR must be prepared to reliably serve these contracts, regardless of the flow direction and quantity resulting from the ultimate nominations.

Q: How have the supply and market changes impacted system flows and compressor station operations?

A: Compressor station throughput and compressor utilization has change dramatically. As I discussed previously, historically the SE Mainline was almost exclusively supplied with gas from Southern Louisiana and the Gulf of Mexico flowing north through Eunice to markets in the Midwest. Compressors along the length of the SE Mainline were used to move this gas north.

Five to ten years ago, ANR began receiving significant quantities of gas from interconnections north of Eunice, supplied by the Haynesville and Fayetteville shale formations, with nominations both north and south. Soon thereafter gas was physically flowing both north and south from one of these interconnections, creating a point of zero flow through the SE Mainline or a "null point." The null point is the receipt point from which gas physically flows both north and south at any given point in time. The northbound flow was still a large quantity that continued to be compressed at various stations from the Delhi Compressor Station north through the Defiance Compressor

Station. By contrast, the southbound flow was primarily free flowing (without compression) into ANR's SE Area.

The recent modifications to the Lebanon Lateral and the REX interconnection and the flow changes associated with those modifications have had a significant impact on gas flow and horsepower needs. Although the null point is still associated with Haynesville and Fayetteville receipts, the northbound flow is much lower through the middle of the mainline. For example, in October 2015 the highest gas flows were on the north end of the SE Mainline. The Portland and Defiance compressor stations were compressing roughly 1 Bcf/d of gas but the rest of the SE Mainline compressor stations were offline except for intermittent use of the Shelbyville Compressor Station.

Q: What are the expectations for future flows and compressor operations?

A: ANR expects additional, dramatic changes in gas receipts. Both the Lebanon Lateral and REX interconnections are expected to see large increases in gas receipts, such that the null point will shift to one of these more northern supply points. Ultimately, the proposed Rover Pipeline interconnection at Defiance could become the null point, with the SE Mainline turned into a predominately southbound pipeline. Assuming the Rover Pipeline interconnection goes into service, the expectation is that the Jena and Eunice compressor stations on the south end of the SE Mainline will operate at a high load factor and many of the northern compressor stations will be idle or operating at a low load factor.

To restate it, ANR is currently experiencing high utilization of the compression on the north end of the SE Mainline and free flowing gas on the south end of the mainline. In just two or three years, ANR expects the south end of the mainline to be

operating at or near capacity, with south end compression being highly utilized and north end compression frequently idle.

More importantly, ANR also believes the nominations could be highly variable. During cold spells, northern demand is likely to pull gas north, up to the capacity of the ANR system. At other times, large quantities of gas could very well be nominated for southern delivery. Depending upon the quantity of gas available and nominated at the various receipt points, the SE Mainline flow could flip from northbound to southbound service at many or possible all of the compressor stations.

Q: How will the shifting null point and flow variations on the SE Mainline impact compression station operations and resulting costs?

A: The drastic change in forecasted compressor station operations presents a challenge for ANR to keep compression costs reasonable while assuring high reliability. ANR must be able to reliably serve all of the northbound contracts alone, or all of the southbound contracts alone, or a mix of these two sets of contracts that will have variable, offsetting nominations. While ANR must stand ready to meet all of these scenarios, it made sense for ANR to analyze probable flow patterns on the SE Mainline to determine the most effective way of sequencing the necessary overhauls of its compressor units. This was the reason ANR undertook a lengthy evaluation process before embarking upon its SE Mainline R&M Program, as described below.

SE Mainline R&M Program

Q: How will ANR modernize the SE Mainline to achieve a higher level of compressor reliability and maintain a high level of service reliability?

A: ANR is undertaking extensive overhauls on several compressor packages on the SE Mainline. These units will be modernized by essentially returning them to a condition as

close to new as can be reasonably achieved. ANR is also replacing, as opposed to overhauling, several compressor units on the SE Mainline.

Furthermore, ANR is changing its maintenance program from condition-based to time-based. Under the time-based approach, compressor run hours determine when basic maintenance steps are performed, as opposed to performing maintenance only when potential problem is detected. As a result, ANR expects many units will undergo more frequent maintenance procedures, thereby fostering greater reliability. In addition to this change, ANR undertook an extensive study to determine the units that will have the highest load factors and therefore will be critical to the operation and reliability of the SE Mainline. This study provides the foundation for ANR's SE Mainline R&M Program. Both the study and the results are described in much greater detail below. A copy of the study results is included as Exhibit No. ANR-024.

Q: How does the SE Mainline R&M Program fit into ANR's larger modernization program?

A: The SE Mainline R&M Program was a natural starting point for ANR's effort to modernize its system precisely because of the impacts the recent market changes have had on SE Mainline operations. It was imperative ANR modernize its system to ensure continued reliability on the SE Mainline in light of the additional contract quantities and shipper profiles. ANR has undertaken a comprehensive study of the condition of the various facilities along the SE Mainline and its future needs.

Q: What were the goals of the SE Mainline study?

A: First and foremost, the study needed to determine which facilities are necessary to assure ANR can reliably meet its firm service obligations today and in the future. The second and more difficult goal was to determine from a capital standpoint how to most

efficiently meet all of the various daily flow permutations. In order to meet this second goal, ANR developed a method of assessing the theoretical utilization of individual compressor units that takes into account daily flow variations. These unit and station "load factors" helped determine the required amount of capital by unit and station and to prioritize the overhauls and BOP work as well.

Q: How was the SE Mainline study conducted?

A: Exhibit No. ANR-025 is a slide presentation explaining the six basic steps used in the identification of key compressors on the SE Mainline. The first step was to develop what I call a Compressor Build-Up Schedule. A series of SE Mainline flow studies were run to identify which units would be needed at each station under a wide variety of flow conditions. All units were assumed to be in "top health" and highly reliable. Compressor units were identified in increments of 100 million standard cubic feet per day ("MMcf/d") starting with the lowest flow that required compression. These studies optimized fuel but also attempted to keep unit switching to a minimum as flow quantities were increased. In other words, as the quantities increased and a new unit was brought on line, an attempt was made to keep that unit on line for subsequent flow increments. The operating units and station flows for each increment were recorded in a framework to be used in conjunction with flow estimates.

The second step was to vet the units selected in the theoretical flow studies against real world issues, such as the condition of specific units. The unit priorities were adjusted based on these real world issues. The result was a listing of which units to run at each station under a full range of flow conditions. Slides 3, 4 and 5 of Exhibit No. ANR-025 show examples of portions of the Compressor Build-Up Schedule. In labeling the flow "case", Brownsville was selected as the base station. The 1000 MMcf/d case shows

1000 MMcf/d flowing through Brownsville but all other station flows are based on markets and fuel use between Brownsville and that station. These station-by-station Compressor Build-Up Schedules provide a proxy for determining the necessary units for any flow pattern on the system.

Next, contract flows were entered into a traffic study to determine the contract flows station by station. All of the northbound contracts were entered into the framework to determine which units were necessary on a station-by-station basis to serve those contracts. An identical process was utilized with all southbound contracts. From these simulations, the units that were identified as necessary to serve those contracts were identified and tagged as possible "primary" units. Slide 6 shows the contracted flows for the winter of 2017/2018.

Q: After the traffic studies were performed, how did the analysis proceed?

A: Following these initial traffic studies, marketing, business development, and other subject matter experts were brought together to derive an estimate of the most likely average system receipts and deliveries for key locations, by seasons. These assumptions are shown on Slide 7. These flows were then set up with trafficking studies to identify the most likely flow through each station. These results are shown on Slide 8. Next, a standard deviation was chosen for each station to estimate the percentage of time each station's throughput would be operating in each of the 100 MMcf/d flow increments. The standard deviation was generally 100 MMcf/d for the next season. Later seasons incorporated a standard deviation of 150 MMcf/d. An example flow distribution is shown on Slide 9 for winter 2015/2016 for the Portland Compressor Station. The base station flow is 1130 MMcf/d and the standard deviation is 100 MMcf/d. With a normal statistical distribution, the maximum flow is unbounded and some percentage of the

implied flow distribution, 6.8 percent in this case, is above the maximum station capacity. The flow steps at and below capacity are normalized to account for 100 percent of the flows, as shown on the top of Slide 9. With this allocation of the percentage of time in each flow step and the horsepower configuration in each flow step, a load factor can be estimated for each unit on the SE Mainline. Slide 10 shows the resulting load factor for the Portland Compressor Station units.

Q: What is meant by primary compressor unit?

A: Primary units are the most critical units for moving firm contract quantities on the primary contract path and estimated station throughput, as determined by the base estimated flows and the standard deviation, for the next three to four years. Primary compressor units have all been targeted for zero-hour overhauls as part of the SE Mainline R&M Program. A zero-hour overhaul is a multi-step process designed to restore the compressor to as close to new as can reasonably be achieved, or in other words, the same condition as when it had zero operating hours. This process entails stripping the unit down to the frame. The frame is straightened or otherwise repaired, if necessary. If the foundation is cracked or has other problems, it is replaced or repaired, as appropriate. Crank shafts are also straightened and re-chromed, when appropriate. Then all of the engine parts are cleaned, remachined and/or replaced, as may be appropriate, and reassembled. Conceptually, ANR is targeting 95 percent reliability for the primary compressor units and expects to achieve this reliability by performing zero-hour overhauls. The primary units are the units that need to be most reliable.

Q: How was the SE Mainline study data used?

A: As mentioned earlier, the contract-based studies identified compressor units that were needed to serve primary firm agreements and were tentatively tagged as primary units. Whether or not a unit is needed to fulfill primary firm transportation agreements is the most important criteria in selecting primary units, but many other factors were considered before settling on the list of primary units. Redundancy of units at the station was a consideration in determining primary units. For example, if two small units at a station are needed to fulfill contracts and there are five small units in reasonably good condition, there is more than 100 percent redundancy and none of the units would have been considered primary. All five small units would be listed as "standby" units, as explained below. Other questions that were considered include:

- What is the unit's load factor in the estimated future flow scenarios?
- What is the unit's condition? Can it wait to be overhauled?
- How much will a zero-hour overhaul cost? Are there less expensive options?
- When is the unit needed? Now? Soon? Much later?
- How long will it take to complete the overhaul?
- Can the system operate without a particular unit long enough to repair the unit or should another one be overhauled first?
- Is the unit needed to create enough pressure differential across the station to load the compressors and keep the station on line?
- Is it less expensive to replace the unit(s) instead of overhauling it (them)?
- Is the unit/station used as a back-up when the preferred unit/station is off line?

There was no simple formula and few set conditions that determined which units were primary. Each of the factors was carefully considered and the pros and cons weighed before selecting the primary units.

One criterion that was adopted is to have at least one intermediate or large primary compressor at every station so the station could be brought online across a wide range of flow conditions. There was a preference to have the intermediate sized KVR units serve this function, because they have proven to be reliable, are able to create a pressure differential across the station, and are the right size to stay online for a wide range of flows. They have been the "workhorse" units for much of the recent past.

Q: What is meant by a standby unit?

A: A standby unit is one that must be operable but may not be required to be as reliable as a primary unit. ANR has assumed 85 percent reliability for standby units in its modeling. As a consequence, standby units are not targeted for zero-hour overhauls – they are not likely to be dismantled down to the frame. However, over time all of the standby units will receive a more typical, time-based overhaul. I understand that during a basic "time-based" overhaul the major components of the compressor and power cylinders are typically re-machined or replaced based on operating hours. Any other items that need adjusting or replacing would also be addressed, including repairing or replacing the foundation.

Q: What were the results of ANR's study?

A: Based on the methodology described above, 29 units were selected to be "primary" units and 54 units were designated as standby. It was also determined that it was more cost-effective to replace eight units. Finally, there were five units that were targeted for

abandonment. A detailed list of the compressor unit designations is provided in Exhibit No. ANR-024.

Q: Does the SE Mainline R&M Program include BOP ancillary equipment?

A: Yes, the description of ANR's general system modernization program I have provided above identifies some of the equipment that has been evaluated on the SE Mainline. Faulty or unreliable BOP will either be repaired or replaced to assure highly reliable BOP. There are significant expenditures associated with BOP as part of the SE Mainline R&M Program.

Q: How were the eight units chosen to be replaced?

A: I have previously identified the types of information that were considered in evaluating the units, including whether to perform replacements. Replacements received additional scrutiny. ANR only considered replacement for targeted primary units. The expected future reliability of the unit and the cost to overhaul the unit(s) were also important considerations for replacements.

Q: Please describe the replacement evaluations.

A: ANR has six Cooper Bessemer Z330 units on its system, all of which are quite old. There are only 28 or so of these units operating in the world and the manufacturer no longer supports them. The Z330's have a reputation for being difficult to operate and not very reliable. This has generally been true for ANR. In particular, the Z330's at LaGrange (1973 installation) and Brownsville (1970 installation) have performed poorly. ANR's Field Operations and Engineering and Asset Reliability teams have had significant difficulty with these units for many years and have spent tremendous time and resources repairing and maintaining them. The zero-hour overhauls for these two units were estimated to cost in excess of $10 million each. Based on worldwide experience

and ANR's own experience with these two units, neither was expected to come close to 95 percent reliability – even with a zero-hour overhaul. The decision to replace these two units was made early in the evaluation process. As a consequence, the replacements of these units were funded and started before the SE Mainline R&M Program was fully defined and approved.

The LaGrange Z330 is certificated at 12,000 horsepower. A Mars 100 unit, nominally site rated at 13,500 horsepower, is a reasonably good horsepower fit and was selected to replace the LaGrange Z330. As indicated in ANR's certificate application in Docket No. CP15-21 for the LaGrange Horsepower Replacement Project, the Mars 100 unit is being modified to operate at an ISO rating of 13,220 horsepower and a site rating of 12,000 horsepower. ANR has a preference for using the same type of compressor unit at multiple locations when it is able to do so. There are both cost and knowledge benefits associated with such a practice, as parts stock can be reduced and experience from one unit can be applied to the other. At Brownsville, ANR is replacing the Z330 unit certificated at 11,000 horsepower as well as a 6V-250 unit certificated at 2000 horsepower with a Mars 100 unit. As clarified in ANR's section 2.55(b) 30-day advance notice and supplement in Docket No. CP15-526-000, ANR will have controls in place to govern the horsepower such that operations will at no time exceed the certificated station horsepower.

The decision to replace units at the Jena Compressor Station was based on the unique circumstances and the compelling economic review. Four of the five small units at Jena (2,700 horsepower each) were designated as primary units. All five units were evaluated for a zero-hour overhaul at a cost of roughly $5.5 million each (Unit 101 was

estimated to cost $6.0 million and units 102-105 were estimated to cost $5.5 million each). These five units would also need time-based overhauls in the future, which would add significant cost over time, particularly due to the age of the units. Additionally, the five small units are also located in one building, making replacement more efficient. By replacing all five units, ANR will not need to perform any of the BOP work associated with these five units or the building, saving another $5 million. As a result, ANR determined it would be more expensive to overhaul and maintain the five small units than to replace them with one new unit. The Mars 100 at 13,500 horsepower is a matching horsepower fit for the replaced horsepower.

Q: Why were other units not replaced?

A: ANR determined it was more cost-effective to repair and modernize the other compressors, except for the eight units I previously identified as targeted replacements. The cost of zero-hour overhauls for primary units plus future time-based overhauls for primary and standby units was less expensive than the replacement costs. The prospect of many new units is appealing, but it would not have been in the best financial interest of our customers. The resulting rates would have been higher for the same level of reliability.

Q: How were the five units chosen to be abandoned?

A: Similar to the Z330's, the five units targeted for abandonment are in poor condition. These particular units have had a history of expensive, unreliable service on the SE Mainline. Three of the units are GE Frame 3F's, rated at 9464 horsepower each and located at Delhi, Sardis and Brownsville. Like the Z330's, these units were estimated to be very expensive to overhaul, including BOP costs, and were not expected to be very reliable after the overhaul. The other two units are a KVT-410 (2440 horsepower)

located at Sardis and a KVS-412 (2000 horsepower) located at Shelbyville. These two units are in very poor condition and would be expensive to overhaul.

Most importantly, all five of these units are located towards the middle of the SE Mainline and away from the constrained segments. As I mentioned earlier, northbound service is constrained through the Portland and Defiance compressor stations. Southbound service is constrained through the Jena and Eunice compressor stations. Abandoning these five units would have no effect on either northbound or southbound long-haul capacity through the constrained segments.

Q: Did ANR develop the SE Mainline R&M Program because of the new contracts for service on the SE Mainline?

A: No, the new contracts were certainly part of the evaluation and a prime reason for starting ANR's modernization efforts on the SE Mainline at this time. Nonetheless, the SE Mainline would have needed extensive modernization work even without the new contracts.

Q: Please explain.

A: ANR has been concerned about the deteriorating compressor reliability on the SE Mainline for some time. ANR initially discussed the SE Mainline evaluation in 2012. It took time to determine how to best evaluate the system and develop the necessary analytical tools. By mid-2013, the basics had been worked out. For the next several months, the participants, key inputs, and the evaluation evolved. By the end of 2013, an initial recommendation had been assembled, based strictly on the contracts that existed at that time. The study identified 27 units that were required to meet the highest standard of reliability. At the time they were called "core" units but they were essentially what are being called primary units today. However, in late 2013 and early 2014 ANR began

signing up new firm transportation customers, essentially selling out both northbound and southbound capacity. The group conducting the evaluation revised the analysis and issued an updated recommendation in mid-2014. The key point is that with or without the customers and contracts added in late 2013 and 2014, ANR was going to need to undertake extensive modernization of its SE Mainline.

Q: What is the total cost of ANR's SE Mainline R&M Program and associated SE Mainline modernization?

A: As shown in Exhibit No. ANR-021, the total cost of the SE Mainline R&M Program is estimated to be $456.9 million (November 2015 estimate), which includes the replacement compressor at Jena. The compressor replacements at LaGrange and Brownsville, which are budgeted outside of the SE Mainline R&M Program, are estimated to cost $87.5 million for a total cost of $544.4 million (November 2015 estimates) for all projects related to the SE Mainline R&M Program and SE Mainline modernization. Roughly half of this cost is for projects that are expected to be completed by the end of July 2016 and therefore included in the Base and Adjustment Period asset additions. This constitutes the major portion of ANR's asset additions during the Base and Adjustment Periods.

Q: How does the total cost of the SE Mainline modernization compare with the cost of simply replacing all of the SE Mainline compressor units?

A: Reiterating, the total cost for modernizing and updating the SE Mainline through the end of the SE Mainline R&M Program, which ends in 2017, is approximately $544 million. The cost of replacing all units instead of the overhauls is significantly more expensive. The Jena, LaGrange, and Brownsville replacements would still be required plus an additional 28 units of various sizes at a total of fourteen stations. The total cost to replace

all units is estimated to be $1,254 million, more than twice as expensive as ANR's plan. A comparison is provided in Exhibit No. ANR-026.

Moreover, the cost of replacing all units does not take into account the timing issues. A zero-hour overhaul on a large unit can be completed in about twelve months. Installation of a new, replacement unit takes up to 24 months. With the number of replacements needed to replace the entire SE Mainline fleet, it would be impossible to get all of the equipment suppliers and contractors aligned to complete all work at all locations in two years. ANR estimates it would take up to four years to implement such a project. In the meantime, the current units would need to be maintained and many would still require repairs and overhauls to continue to operate until the replacements are done. This added cost has not been included in the replacement estimate described above.

ANR's goal is to provide safe, reliable, and efficient service to its customers on the SE Mainline before, during, and after its modernization program. ANR believes the approach it is taking is not only necessary at this time, but it is also the most cost-effective modernization plan and provides the best reliability during implementation.

Q: Do you expect modernization and upgrade costs to continue in the future?

A: Yes. First, the SE Mainline R&M Program continues beyond the end of the rate case Adjustment Period, through the end of 2017. Second, a portion of the costs in each calendar year shown on Exhibit No. ANR-021 and labeled as "Maintenance Capital – Other" is for modernization and upgrades.

Costs for "Maintenance Capital – Other" increase in 2018. Some of this increase is due to General Plant, which is not broken out separately for 2018. Another portion reflects that the SE Mainline R&M Program will be completed by then. The SE Mainline R&M Program included costs for some of the general modernization programs I

described above, such as automation obsolescence. In 2018, these program costs have been included in the "Other" line.

More importantly, I expect there will be additional modernization costs across the rest of the system associated with zero-hour overhauls and BOP. The segment-by-segment evaluation of safety, equipment reliability, and contract needs across the entire system is bound to generate additional modernization needs. I understand the "Other" line in 2018 includes a modest increase in compressor costs for a few zero-hour overhauls, but I believe this amount will not be sufficient on a yearly basis to cover all of the necessary compressor modernization costs. In addition, the "Other" line does not include any costs for BOP modernization, which is also likely to be required on the rest of the system.

As the segment evaluations are completed, I expect there will be a Reliability and Modernization ("R&M") program implemented on each segment. I am confident the total GPMC costs in 2018 and beyond will be more than the amount currently estimated for 2018 once the results of the segment evaluation is factored in to the work plans. I also believe these future R&M program costs will be much, much less than the SE Mainline R&M Program.

Q: Are there other more cost-effective alternatives ANR could pursue to meet its firm obligations?

A: No, I do not believe there are any. ANR is incurring these capital costs because the facilities it is seeking to upgrade or replace have aged to the point of obsolescence, and cannot be maintained as they have been in the past. ANR is committed to providing service in a safe, reliable, and efficient manner, and to do so it must take proactive steps to ensure the condition of its facilities does not reach the point where they are subject to

long term outages or catastrophic failures. Moreover, ANR must position itself to comply with safety and environmental regulations that will impose stricter requirements than those that are currently in place. It will be more cost-effective to address these significant facility problems and issues now than to address them later.

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. RP16-____-000

State of Texas)
) ss.
County of Harris)

AFFIDAVIT OF JOHN J. HAMPTON

John J. Hampton, being first duly sworn, on oath states that he is the witness whose testimony appears on the preceding pages entitled "Prepared Direct Testimony of John J. Hampton"; 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 John J. Hampton's sworn testimony in this proceeding.

John J. Hampton

SWORN TO AND SUBSCRIBED BEFORE ME THIS 22nd DAY OF January, 2016

Notary Public
My Commission Expires:

SARA TATE
Notary Public, State of Texas
Comm. Expires 11-24-2019
Notary ID 130450901