UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

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

Summary of the Prepared Direct Testimony of Dr. Paul R. Carpenter

Dr. Carpenter is a principal of The Brattle Group ("Brattle"), an economic and management consulting firm. Dr. Carpenter's testimony evaluates considerations of business risk relevant to the determination of an appropriate return on equity ("ROE") for purposes of calculating ANR's FERC-regulated rates. Dr. Carpenter has reviewed and taken into consideration the description of ANR's system and the risks it faces in the testimonies of ANR witnesses Bennett and Hampton. However, Dr. Carpenter evaluates independently – using publicly available data – how ANR's risks are positioned with respect to the eight companies in the proxy group ANR witness Vilbert defines in his cost of capital testimony.

Dr. Carpenter analyzes the eight-member proxy group selected by ANR witness Vilbert, and shows that FERC-regulated gas transmission dominates the business activities of the group (accounting for more than 70 percent of the total). He reviews the 43 pipelines owned by the proxy group companies and selects a sample containing the largest 17 pipelines, which together account for 80 percent of the total FERC-regulated natural gas pipeline net income for the proxy group as a whole, and just under 80 percent of net utility plant. Dr. Carpenter opines that these pipelines are representative of the proxy group because the remaining 26 pipelines are small. Dr. Carpenter goes on to analyze the business risks of the 17 pipelines and compares these business risks with that of ANR.

Dr. Carpenter's analysis indicates that ANR faces appreciably greater business risk than the pipelines in the proxy group. This is so because, although it has approximately equivalent forward contract cover, ANR is much more exposed than the proxy group pipelines to shipper credit risk. Moreover, ANR is more exposed to higher-risk market area storage than the proxy group pipelines and has greater operating risk due to a large capital maintenance and modernization program taking place between 2015 and 2018. ANR, like many of the proxy group pipelines, faces competition from other pipelines which contributes to its business risk.

Dr. Carpenter testifies that because ANR's business risk is higher than that of the proxy group pipelines, he recommends that the authorized return on equity should be set above the median of the proxy group calculated in Dr. Vilbert's testimony. Dr. Carpenter quantifies a "credit risk premium" by examining yields on the debt of an index of independent oil and gas producers, which he compares to yields on an index of utility bonds. Taking into account this credit risk premium and the other elevated business risks facing ANR, Dr. Carpenter recommends that ANR's ROE be set at 100 basis points above the median ROE calculated by ANR witness Vilbert.

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DIRECT TESTIMONY AND SUPPORTING EXHIBITS OF PAUL R. CARPENTER ON BEHALF OF ANR PIPELINE COMPANY

January 29, 2016

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Glossary of Terms

ANR	ANR Pipeline Company
BWP	Boardwalk Pipeline Partners, LP
CPPL	Columbia Pipeline Partners LP
Commission	Federal Energy Regulatory Commission
Dth	Dekatherms
E&P	Exploration and production
EBB	Electronic bulletin board
EBIT	Earnings before interest and tax
EBITDA	Earnings before interest, tax, depreciation and amortization
ENBL	Enable Midstream Partners, LP
EQM	EQT Midstream Partners, LP
FERC	Federal Energy Regulatory Commission
Fitch	Fitch Ratings
KMI	Kinder Morgan, Inc.

Moody's	Moody's Investor Service
Nexus	Spectra Energy Nexus Gas Transmission Project
ROE	Return on equity
Rover	Energy Transfer Partners Rover Pipeline Project
S&P	Standard and Poor's
SE Mainline	Southeast Mainline
SEP	Spectra Energy Partners LP
SW Mainline	Southwest Mainline
TCP	TC Pipelines, LP
TEP	Tallgrass Energy Partners, LP
Tie Line	A line from Defiance, Ohio to Bridgman, Michigan that connects ANR's SE and SW Mainlines

I. INTRODUCTION AND QUALIFICATIONS

Q1. Please state your name, address and position.

A1. My name is Paul R. Carpenter. I am a Principal of The Brattle Group, an economic and management consulting firm with offices in Massachusetts; Washington D.C.; New York; San Francisco, California; London, England; Rome, Madrid; and Toronto, Canada. My office is located at 44 Brattle Street, Cambridge, Massachusetts 02138.

Q2. Could you briefly describe your educational background and professional qualifications?

A2. I am an economist specializing in the fields of industrial organization, finance and energy and regulatory economics. I received a Ph.D. in Applied Economics and an M.S. in Management from the Massachusetts Institute of Technology, and a B.A. in Economics from Stanford University. I have been involved in research and consulting on the economics and regulation of the natural gas, oil and electric utility industries in North America and abroad for over thirty years. I frequently have testified before federal and state regulatory commissions, in federal court and before the U.S. Congress, on issues of pricing, competition and regulatory policy in these industries. Outside of North America, I have advised governments and regulatory bodies on the structure and performance of their natural gas markets and the pricing of gas transmission services. These assignments have included testimony before the U.K. Monopolies and Mergers Commission and the Australian Competition Tribunal, and advice to the governments of and regulators in, Greece, Ireland, the Netherlands, New Zealand and Australia. I have been extensively involved in the evaluation of the economics and regulation of the natural gas pipeline industry in North America. In the U.S., I have testified frequently before the Federal Energy Regulatory Commission ("FERC" or "Commission") and many state regulatory commissions on issues such as gas transmission pricing, rate design and cost of capital, new pipeline certification, and competition policy. In Canada, I have testified before the National Energy Board and several provincial regulatory bodies on the subject of business risk and its relationship to the cost of capital for natural gas pipelines and distributors.

Further details of my educational and professional background, as well as a listing of my publications, are provided in my resume appended to this testimony as Exhibit No. ANR-033.

II. PURPOSE OF TESTIMONY AND SUMMARY

Q3. What is the purpose of your testimony?

A3. ANR Pipeline Company ("ANR") has asked me to review its business risks and evaluate its risk positioning with respect to the proxy group ANR witness Vilbert analyzes in his cost of capital testimony for ANR. I understand that the purpose of this relative business risk analysis will be to determine an authorized rate of return on equity ("ROE") for ANR.

Q4. Could you summarize how you approached this task?

A4. Yes. I started by enumerating a set of business risk factors which are most relevant to an investor's decision to invest in the securities of a natural gas pipeline, and which therefore need to be taken into account in determining the authorized rate of return which adequately compensates the investor for bearing such risks. For each risk factor I considered how ANR's risk compares to the corresponding risk of the pipelines owned by the companies in Dr. Vilbert's proxy group. I have also taken into consideration ANR's own evaluation of the risks that it faces, as described in the testimonies of ANR witnesses Bennett and Hampton, although I have relied upon my own independent analysis in reaching my conclusions.

Q5. Please summarize your conclusions.

A5. I conclude that ANR's business risk is greater than that of the pipelines in the proxy group, principally as a result of ANR's exposure to shipper credit risk and because ANR is more exposed to higher-risk market area storage than the pipelines in the proxy group. I also find that ANR has greater operating risk than the proxy group pipelines, due to its significant maintenance and modernization program. ANR's business risk is towards the top end of the range of the 17 proxy group pipelines I have analyzed. On the basis of its elevated business risk, I recommend an authorized equity return above the median of the

proxy group estimated in ANR witness Vilbert's testimony. Since a major driver of ANR's increased business risk is its exposure to credit risk of shale gas producers, I have benchmarked an appropriate ROE adder by examining credit spreads between an index of low-risk utility shippers and higher-risk independent oil and gas producers. I judge that an ROE adder of 100 basis points would be reasonable. I therefore recommend that ANR's ROE be set at 100 basis points above the median ROE calculated by ANR witness Dr. Vilbert.

Q6. Please describe how your testimony is organized.

A6. In section III, I explain the concept of business risk and how it relates to determining an authorized return for a natural gas pipeline. In section IV, I describe my understanding of ANR's pipeline system and highlight some key business risk factors. In section V, I analyze the business risk of the proxy group, and in section VI, I present my conclusions.

III. BACKGROUND ON THE CONCEPT OF BUSINESS RISK AND ROE

Q7. What is your understanding of the factors and considerations relevant to the FERC's approach to establishing an ROE for an interstate natural gas pipeline?

A7. The determination of a pipeline's allowed ROE represents one component in the FERC's rate-making process. In order to meet the "just and reasonable" standard, rates must be sufficient to allow investors in the common equity of a pipeline the opportunity to earn a return on investment that is similar to the returns available elsewhere from investments of similar risk. FERC has set out its policy and practice for determining an ROE that meets the just and reasonable standard in policy statements and prior decisions.[1] To determine the authorized ROE for a particular pipeline, FERC starts with estimates of the return required by investors in a proxy group of comparable companies. FERC uses the estimates for each company in the proxy group to derive a range of reasonableness for the authorized ROE of the pipeline.

[1] See, for example, *Policy Statement: Composition of Proxy Groups for Determining Gas and Oil Pipeline Return on Equity*, 123 FERC ¶ 61,048 (2008).

When determining the authorized ROE from within the range of reasonableness derived from the proxy group, FERC considers the business risk of the pipeline relative to the business risk of the pipelines in the proxy group. If there are no reasons to distinguish the business risk of the subject pipeline from the business risk of the proxy group, FERC will set the ROE at the median ROE of the proxy group. If, however, there are compelling reasons for believing that the business risk of the subject pipeline is significantly different from the business risk of the proxy group, FERC will consider moving the authorized ROE away from the median.

Q8. What is business risk and how does it relate to a regulator's decision to establish an authorized return for a natural gas pipeline?

A8. One of the bedrock principles for establishing a fair return on capital for a regulated pipeline that has been long recognized by economists, regulators, and the courts in the U.S. is that the authorized return should be comparable with the returns available from investing in other companies with similar risk.[2] When investors provide capital to any business, including a regulated business such as natural gas transmission, they must expect to recover that investment, together with a fair return on it, from future cash flows generated by the business. There are two ways in which investors' expectations of future cash flows could fall short of the level required to meet the fair return standard. First, the expected cash flows might be too small; and, second, the expected variability or uncertainty in the cash flows above or below the expected level might be too great.

The variability or uncertainty in future cash flows is relevant because investors require compensation for bearing risk: other things equal, investors put a lower value on uncertain future returns than they do on certain future returns of the same magnitude. For example, the expected rate of return from investing in equity securities is higher than the expected rate of return from investing in government debt for this reason. However, when analyzing variability or uncertainty in returns, the only variability which is relevant is that which

[2] See *FPC v. Hope Natural Gas Co., 320 U.S. 591 (1944)* and *Bluefield Water Works & Improvement Co. v. Public Service Commission of West Virginia, 262 U.S. 679 (1923).*

cannot be diversified away by holding a broad portfolio of different investments (like a broad-based mutual fund). The undiversified risk that remains is measured by the correlation between the future cash flows and returns from the market as a whole (the most diversified set of investments available). This is commonly termed "systematic risk". The compensation required by investors for bearing systematic risk is incorporated into the market-based ROE estimates of the proxy group companies prepared by ANR witness Vilbert. One way of thinking about the impact of systematic risk on expected returns is to consider a net present value analysis of an investment's expected future cash flows: if there is a greater degree of systematic risk in the cash flows, a higher discount rate will be required and the net present value will be smaller.

The expected level, as distinct from the variability or uncertainty around that level, of future cash flows is also relevant to investors' assessment of whether they expect to recover their investment together with a fair rate of return. For example, the expected yield from investing in low-grade unsecured debt is greater than the expected yield from investing in government debt because of the non-negligible risk that interest and principal may not be repaid in the former case. The risk of non-payment is taken into account by investors in pricing the debt irrespective of whether the risk of non-payment is systematic (correlated with returns from the market as a whole) or not.

In order to meet the fair return standard, and to provide investors in regulated pipelines with a reasonable opportunity to earn a fair rate of return, the level of the authorized ROE determined by FERC needs to take into account both the exposure of the pipeline to systematic risk and the risk that investors may not recover their investment, together with a fair return.

Q9. How do you analyze business risk for a natural gas pipeline?

A9. Business risk refers to the underlying risks inherent in a particular company's market and operations. Although it is a somewhat subjective concept, and there is more than one way of structuring an analysis of business risk, an approach that is commonly taken is to

consider five elements of business risk: supply risk, demand (or market) risk, competitive risk, operating risk and regulatory risk.[3]

Supply risk refers to the ability of shippers on a particular pipeline to obtain reasonably-priced supplies of gas in the supply region served by that pipeline. For example, if a pipeline serves a supply region in which production volumes are declining and in which there is little prospect of obtaining new supplies at reasonable cost, that pipeline would see elevated supply risk. Volumes of gas shipped on the pipeline might be expected to decline over time and, as transportation contracts expired, the pipeline might expect difficulty in re-marketing the capacity at the full recourse rate.

Demand or market risk refers to the ability of shippers to sell gas that they transport. For example, if a pipeline serves a demand region in which natural gas consumption is declining due to reduced industrial activity, that pipeline would see elevated demand (or market) risk. Volumes of gas shipped on the pipeline might be expected to decline over time and, as transportation contracts expired, the pipeline might expect difficulty in re-marketing the capacity at the full recourse rate.

Competitive risk refers to the prospect of competition between pipelines. If there is more than one pipeline available to move gas from a particular producing region to a particular market area, shippers do not have to contract with any one pipeline in order to deliver their gas. Again, where there are competing pipes, any one pipe may experience difficulty in marketing its capacity at the full recourse rate. Supply, demand and competitive risk are related and are often considered together in a business risk analysis. They are aspects of how a pipeline's commercial prospects in the market evolve over time as patterns of gas supply and demand change, and as new pipelines (and competing fuels) enter the market.

Operating risk refers to the risk that a pipeline may experience operating difficulties which either reduces its ability to earn revenue by shipping gas, or which require

[3] For example, this is the approach that the Canadian National Energy Board has adopted for the last two decades.

additional sums to be spent in order to maintain service levels. For example, other things equal, an older pipeline might be expected to face higher operating risk than a newer pipeline. Operating risk is an important component of the business risk analysis to the extent that operating risk may impact the revenues earned by the pipeline or may impact the pipeline's operating costs.

Regulatory risk refers to the risk that regulatory decisions may have an adverse impact on the pipeline's ability to earn its authorized rate of return. For example, in some jurisdictions the ability of a regulated entity to recover a return of and on investment is subject to an ex-post review of prudence, whereas in other jurisdictions the prudence review is dealt with before the investment is committed via a certification process. The former may give rise to increased regulatory risk relative to the latter.

Q10. What is the relevance of long-term transportation contracts to a pipeline's business risk?

A10. Long-term contracts with shippers are important because they have the potential to significantly mitigate a pipeline's risk exposure by increasing the certainty that its investment will be recovered in the future. Subject to shipper credit risk, long-term contracts protect pipelines from risks associated with changing market conditions and fluctuations in the market value of pipeline capacity. The existence of long-term contracts are now the principal metric FERC uses to determine the need for and financial viability of new interstate pipelines.[4] Most new pipelines or pipeline expansion projects justify the need for their projects by providing long-term, binding precedent agreements that have been signed with shippers. FERC frequently conditions actual construction of new pipeline projects that it has approved on the pipeline converting its precedent agreements to firm contracts. Thus, FERC's policy on certificating new pipeline projects implicitly recognizes the importance of long-term contracts as a risk mitigation measure in the development and viability of new natural gas pipeline infrastructure. Long-term contracts

[4] See *Certification of New Interstate Natural Gas Pipeline Facilities, Statement of Policy*, 88 FERC ¶ 61,227 (1999).

provide protection for pipeline developers and the lack of long-term contracts on existing pipelines creates risks for pipeline investors that will influence the return they will require in the market as compensation.

For the duration of a transportation agreement with a particular shipper, many elements of pipeline business risk are borne by the shipper rather than by the pipeline. For example, if market conditions change such that the value of the transportation capacity is reduced, the pipeline is unaffected (subject to shipper credit risk) as the shipper is obliged to pay reservation charges irrespective of the current market value of the capacity.

Long-term contracts do not mitigate all aspects of business risk. I have already mentioned the risk of shipper default due to financial distress. Also, if as a result of operating risk a pipeline's operating costs increase over time, its ability to recover the cost increases from shippers will depend on the nature of the contracts, the uncertain outcome of a future rate case, and its ability to remarket unsubscribed capacity at the higher rates given market and competitive conditions.

IV. ANR'S SYSTEM AND KEY BUSINESS RISK FACTORS

Q11. What is your understanding of the key features of the ANR system?

A11. The ANR pipeline system has two main legs, the Southwest Mainline ("SW Mainline") and the Southeast Mainline ("SE Mainline"), as well as significant market-area storage in ANR's Northern Area. The SW Mainline extends from production areas on the Texas/Oklahoma border to markets in Illinois, Wisconsin and Michigan. The SE Mainline extends from Louisiana up to markets in Ohio and Michigan, where the two legs are joined by ANR's Tie Line. The key features of the ANR system are further detailed in the testimony of ANR witness Towne.

Q12. Please summarize your understanding of the key elements of ANR's business risks.

A12. I have identified four key elements of business risk for ANR. First, a significant proportion of ANR's shippers are shale gas producers, some of which are under financial pressure as a result of an extended period of low gas prices. As a result, ANR is exposed

to credit risk and re-marketing risk. Second, ANR faces competition from other pipes in several of its key supply and market areas. Third, an unusually high proportion of ANR's regulated revenues are associated with market area storage, the value of which has declined over time. Fourth, ANR has a significant capital maintenance and modernization program going forward which contributes to elevated operating risk.

Q13. Are these risks discussed in the testimony of ANR's company witnesses?

A13. Yes. The testimony of ANR witness Bennett describes ANR's business risk from a commercial perspective, and the testimony of ANR witness Hampton describes ANR's capital maintenance and modernization program.

Q14. What risks does the testimony of ANR witness Bennett highlight?

A14. Mr. Bennett's testimony describes the competitive risks facing ANR. On the SW Mainline, his testimony shows that current contractual commitments are relatively short-term, and that depressed basis differentials indicate that the value of this capacity when it is recontracted could be significantly reduced. Ohio and Michigan markets are receiving increased supply volumes from the Marcellus/Utica production region. This reduces the need to transport gas from other supply sources to this consuming area, including long-haul deliveries on ANR's SW mainline. ANR witness Bennett estimates that SW Mainline deliveries into Ohio have already decreased by 70 percent due to the emerging Marcellus/Utica supplies. In addition, new pipeline infrastructure (Rover and Nexus) to supply that area is expected to come online in 2016-17, creating new competition for ANR pipelines. Finally, increased exports to Mexico from the Waha hub are reducing the production available to long-haul shippers on the SW Mainline.

ANR witness Bennett also highlights risks associated with ANR's market-area storage facilities. Existing contracts are relatively short-term, and projections are for declining values when capacity is remarketed.

ANR witness Bennett explains that ANR's SE mainline leg has long-term contractual commitments from shippers that run many years into the future. However, as Mr. Bennett notes, ANR is significantly exposed to credit risk (and hence re-marketing risk) as 50 to

60 percent of its forward haul capacity and almost all of its backhaul capacity is contracted by gas producers, most of which are shale gas producers who are facing financial difficulties as a result of the extended period of low gas prices.

Q15. Where is ANR's capital maintenance and modernization program described?

A15. The testimony of ANR witness Hampton describes ANR's historical, test period and expected future levels of capital maintenance and modernization expenditures. Mr. Hampton explains that ANR needs to make substantial capital investments over the coming years to modernize its system and describes the projects and capital expenditures ANR has undertaken. ANR is projecting increased levels of capital expenditures as it begins a long-term effort to modernize and/or rebuild critical and aging portions of the system.

V. COMPARING ANR'S RISKS WITH THE PROXY GROUP

A. DESCRIPTION OF THE PROXY GROUP

Q16. Which companies are in the proxy group?

A16. ANR witness Vilbert's testimony describes a proxy group containing eight companies which he considers relevant for assessing a FERC-authorized ROE for a natural gas transmission pipeline. The companies in the proxy group are:

- Boardwalk Pipeline (BWP)
- Columbia Pipeline Partners LP (CPPL)
- Enable Midstream Partners LP (ENBL)
- EQT Midstream Partners LP (EQM)
- Tallgrass Energy Partners LP (TEP)
- TC PipeLines LP (TCP)
- Kinder Morgan Inc. (KMI)
- Spectra Energy Partners LP (SEP)

Q17. What are the activities of the proxy group companies?

A17. Each of the proxy group companies owns one or more FERC-regulated interstate natural gas pipelines. In addition, several of the proxy group companies also have other business segments, as described in their Form 10-K and annual reports. The reported business segments include:

Gas Pipelines and Storage: Interstate and intrastate natural gas transportation and storage services. Storage services include underground storage, and pipeline balancing via gas injections and withdrawals. Each one of the companies in the proxy group is involved in interstate natural gas transmission, and all but TCP provide natural gas storage services. Interstate natural gas transmission is regulated by FERC; storage may be FERC-regulated; and intrastate pipelines and gathering pipelines are either not regulated or regulated by state commissions.

Oil and Liquids Pipelines: Interstate and intrastate transportation services for crude oil and other liquids, such as natural gas liquids. TEP and SEP are involved in these activities. Interstate liquids pipelines are FERC-regulated.

Gathering/Midstream/Processing: Midstream services for natural gas, which include gathering (*i.e.*, moving gas through small-diameter pipelines from the wellhead to processing plants or larger mainline pipelines and facilities for compression), treating, and processing to prepare gas for transport via mainline pipelines. ENBL, EQM, TEP and TCP are involved in these activities. ENBL is also involved in gathering services for crude oil. Midstream activities are for the most part unregulated.

Terminals: Liquids and dry-bulk materials terminal facilities which provide services such as short-term product storage, truck and railcar loading, additive injection. KMI is involved in this activity. Terminalling activities are generally not subject to rate regulation.

Q18. What proportion of each of the eight firms does interstate natural gas pipeline transportation represent?

A18. Table 1 shows the breakdown of total assets in 2014 for the firms in the proxy group and Table 2 and Table 3 show a similar breakdown for earnings (EBITDA and EBIT, respectively). As the tables show, gas pipelines and storage represent from 74 to 79 percent of the business activities of the proxy group companies, depending on which measure one selects. The vast majority of gas pipeline and storage activity in the proxy group companies is FERC-regulated. The figures in these tables are based on Form 10-K data and annual reports. I have ordered the firms according to the percentage of total assets which are in the gas pipeline transportation and storage segment of the business.

Table 1 identifies the share of assets for each activity listed above. Where information was available, I used the reported breakdown of assets by "business segment". Where this information was not provided, I used the breakdown of Property, Plant and Equipment to determine the share of assets (ignoring amounts relating to construction work, equipment, vehicles, land and software).

Table 1– Assets by Business Segment

	Company	Gas Pipelines & Storage	Oil & Liquids Pipelines	Midstream Services	Terminals	Other	Total
[1]	TC PipeLines LP	100%	0%	0%	0%	0%	100%
[2]	Boardwalk Pipeline	96%	0%	4%	0%	0%	100%
[3]	Columbia Pipeline Partners LP	96%	0%	4%	0%	0%	100%
[4]	Spectra Energy Partners LP	92%	8%	0%	0%	0%	100%
[5]	EQT Midstream Partners LP	72%	0%	28%	0%	0%	100%
[6]	Kinder Morgan Inc.	70%	12%	0%	12%	7%	100%
[7]	Enable Midstream Partners LP	40%	0%	60%	0%	0%	100%
[8]	Tallgrass Energy Partners LP	29%	57%	14%	0%	0%	100%
	Average Share	74%	10%	14%	1%	1%	100%

Source: The Brattle Group. Data from 2014 company annual reports (10-K SEC Filing). See Workpaper 3.
Notes: Based on the segment analysis reported in each company's 10-K SEC Filing.
[1]-[4]: Based on Property, Plant and Equipment.
[6]: The 'other' category includes the company's CO2 segment, which includes the transportation of CO2 for use in oil recovery projects and oil production and transportation.

Table 2 and Table 3 show the split of EBIT and EBITDA respectively, by major activity. For Table 2 and Table 3 I rely on the business segment analysis in each company's financial statements. In this analysis I ignored amounts relating to common or shared

activities, such as corporate overheads, headquarters, and inter-segment eliminations. One of the proxy group companies, TEP, does not report a segment breakdown of EBIT.

Table 2 – EBITDA by Business Segment

	Company	Gas Pipelines & Storage	Oil & Liquids Pipelines	Midstream Services	Terminals	Other	Total
[1]	TC PipeLines LP	100%	0%	0%	0%	0%	100%
[2]	Boardwalk Pipeline	100%	0%	0%	0%	0%	100%
[3]	Columbia Pipeline Partners LP	100%	0%	0%	0%	0%	100%
[4]	Spectra Energy Partners LP	85%	15%	0%	0%	0%	100%
[5]	EQT Midstream Partners LP	68%	0%	32%	0%	0%	100%
[6]	Kinder Morgan Inc.	55%	14%	0%	13%	17%	100%
[7]	Enable Midstream Partners LP	41%	0%	59%	0%	0%	100%
[8]	Tallgrass Energy Partners LP	58%	13%	28%	0%	0%	100%
	Average Share	76%	5%	15%	2%	2%	100%

Source: The Brattle Group. Data from 2014 company annual reports (10-K SEC Filing). See Workpaper 3.
Notes: Based on the segment analysis reported in each company's 10-K SEC Filing.
[6]: The 'other' category includes the company's CO2 segment, which includes the transportation of CO2 for use in oil recovery projects and oil production and transportation.
[8]: As reported in the 10-K SEC Filing, Adjusted EBITDA is used in for each segment.

Table 3 – EBIT by Business Segment

	Company	Gas Pipelines & Storage	Oil & Liquids Pipelines	Midstream Services	Terminals	Other	Total
[1]	TC PipeLines LP	100%	0%	0%	0%	0%	100%
[2]	Boardwalk Pipeline	100%	0%	0%	0%	0%	100%
[3]	Columbia Pipeline Partners LP	100%	0%	0%	0%	0%	100%
[4]	Spectra Energy Partners LP	85%	15%	0%	0%	0%	100%
[5]	EQT Midstream Partners LP	67%	0%	33%	0%	0%	100%
[6]	Kinder Morgan Inc.	60%	15%	0%	12%	13%	100%
[7]	Enable Midstream Partners LP	40%	0%	60%	0%	0%	100%
[8]	Tallgrass Energy Partners LP			(N/A)			
	Average Share	79%	4%	13%	2%	2%	100%

Source: The Brattle Group. Data from 2014 company annual reports (10-K SEC Filing). See Workpaper 3.
Notes: Based on the segment analysis reported in each company's 10-K SEC Filing.
[6]: The 'other' category includes the company's CO2 segment, which includes the transportation of CO2 for use in oil recovery projects and oil production and transportation.
[8]: Depreciation and Amortization were not broken out by business segment in the company's annual report.

Q19. What conclusions do you draw from the figures presented above as they relate to the rest of your analysis?

A19. When I compare the business risk of ANR to the business risk of the proxy group, I am considering the proxy group as a whole and I am not comparing ANR with any of the proxy group companies individually. My understanding of FERC's approach is that it

recognizes the uncertainty inherent in estimating ROE for any one of the proxy group companies by using the median ROE of the group as a whole as the primary reference point for determining authorized ROE. While as a matter of arithmetic the median ROE is equal to the average of the ROEs of the two companies ranked four and five out of the eight firms, the median is a property of the proxy group as a whole and the median could change if the ROE estimate of any one of the eight companies were different. Furthermore, I understand that ANR witness Vilbert's testimony explains why each of the eight companies in the proxy group are relevant for the determination of an interstate natural gas pipeline ROE. As a result, I focus on the average figures reported in the last row of each of the three tables above.

Whether analyzed on the basis of assets, EBITDA or EBIT, interstate natural gas pipelines and gas storage account for approximately 70 percent of the proxy group. I consider this to be a high share for this type of analysis. The balance of 30 percent is mostly associated with midstream activities upstream of interstate pipelines, such as gathering and processing (of either natural gas or liquids). A small amount of the proxy group (about 5-10 percent) is associated with FERC-regulated oil or liquids pipelines and about 5 percent is associated with unregulated activities (terminalling, CO_2 pipelines and production, and enhanced oil recovery).

Q20. Do you consider that overall the proxy group has business risks comparable to those of interstate natural gas pipeline operations?

A20. Yes. Interstate natural gas transmission and storage is by far the largest business segment of the proxy group as a whole, accounting for about 70 percent of the results. FERC-regulated oil and liquids pipelines account for a further 5-10 percent. The proxy group has some exposure to unregulated activities which I would expect to have somewhat higher business risks than those of an interstate natural gas pipeline. However, this exposure is small, and I would expect the business risks of interstate natural gas pipelines to dominate the business risks of the proxy group as a whole.

Q21. Which interstate natural gas pipelines contribute to the natural gas pipelines segment of the proxy group?

A21. Together, the eight companies in the proxy group own or have ownership interests in 43 individual FERC-regulated interstate natural gas pipeline systems. However, many of these pipeline systems are relatively small and thus are not likely to have a significant influence on the overall business risk of the proxy group as a whole. I therefore do not include all 43 of these pipelines in my analysis. I have focused on the 17 largest pipeline systems which are listed in Table 4. These 17 pipelines account for about 80 percent of the total as measured by assets or income.

Table 4 – Proxy Group Pipeline Systems: Selected Sample

Pipeline System	Income ($m)	Assets ($m)
Tennessee Gas Pipeline Company, LLC	458	4,381
Southern Natural Gas Company, LLC	215	2,345
El Paso Natural Gas Company, LLC	192	2,074
Florida Gas Transmission Company, LLC	162	2,228
Kinder Morgan Louisiana Pipeline, LLC	132	867
Colorado Interstate Gas Company, LLC	124	1,251
Ruby Pipeline, LLC	78	1,683
Texas Eastern Transmission, LP	379	5,878
Algonquin Gas Transmission, LLC	92	1,436
Gulfstream Natural Gas System, LLC	77	847
Texas Gas Transmission, LLC	137	1,617
Gulf South Pipeline Company, LP	104	2,495
Gulf Crossing Pipeline Company, LLC	58	1,427
Columbia Gas Transmission, LLC	213	3,673
Equitrans, LP	112	1,375
Enable Gas Transmission, LLC	107	1,764
Gas Transmission Northwest, LLC	72	722
Other 26 Pipelines	663	9,726
Sub-Total of Selected Sample	2,713	36,062
Total of Proxy Group Pipelines	3,376	45,788
Sub-Total of Selected Sample (% of Total)	80.3%	78.8%

Sources: 'Net Utility Operating Income' and 'Net Utility Plant' reported in each pipeline's 2014 FERC Form 2 via SNL Energy (accessed 11/20/2015). Parent company ownership from 2014 company annual reports when available, else from company websites (accessed 11/13/2015).
Note: Income and assets are weighted by the company in the proxy group's ownership of each respective pipeline system. See Workpaper 4.

Q22. How did you select the 17 pipeline systems shown in Table 4?

A22. I examined net income and net utility plant reported by each of the 43 pipelines owned by the proxy group companies (weighted by ownership share) and ranked them by net income. I selected the top 17 pipelines, which account for just over 80 percent of the total FERC-regulated natural gas pipeline net income for the proxy group as a whole, and just under 80 percent of net utility plant. I ignore the other 26 pipelines in the rest of my analysis because in aggregate they account for only 20 percent of the total, and each one

individually is less than 2 percent of the total. I consider the 17 pipelines to be representative of the of the proxy group.

B. Business risks of ANR and the pipeline systems owned by Proxy Group companies

Q23. How have you compared the relative business risks of the pipelines owned by the proxy group companies with ANR?

A23. I have compared ANR's business risks with the group of 17 major pipeline systems owned by the proxy group companies by reference to the five elements of business risk I described above: supply risk, market risk, competitive risk, operating risk and regulatory risk.

Supply, market and competitive risk are related, and an important measure of a pipeline's exposure to these risks is the extent to which pipelines have forward contracts with shippers for transportation services. In comparing the degree of forward contract cover of ANR and the proxy group pipelines, it is also important to take into account shipper credit risk. Both forward contract cover and shipper credit risk influence the pipeline's exposure to supply, market and competitive risk because they influence the extent to which a pipeline may need to re-market its capacity and therefore the extent to which the pipeline is exposed to changes in value of its capacity.

I have also analyzed the exposure of ANR and the proxy group pipelines to revenues from market area storage, because the value of market area storage has declined recently and is likely to result in significant discounting from full cost-of-service rates.

Operating risk includes the possibility that future operating costs may be higher than expected, and or may not be recovered in rates. As a proxy for operating risk I have examined the rate of plant additions over time for the proxy group pipelines to the forecast capital expenditure associated with ANR's capital maintenance and modernization program over the 2015-18 timeframe. I do not consider regulatory risk to be an important factor in the business risk analysis in this case because ANR and the proxy group pipelines are similarly situated with regard to regulatory risk.

1. Contract cover

Q24. Why is contract cover relevant to the analysis of business risk?

A24. Pipelines typically enter into long-term contracts with shippers for transportation services. Under these contracts shippers commit to paying capacity reservation fees which cover all or most of the revenue requirement allocated to the capacity reserved by that shipper. As a result, for the duration of the contract and subject to shipper credit risk, the business risks which are reflected in changes in the market value of the capacity are borne by shippers rather than by the pipeline.

Q25. From where do you obtain information on forward contracting?

A25. FERC-regulated interstate natural gas pipelines are required to publish a list of contracts on the pipeline's Electronic Bulletin Board ("EBB") each quarter. This list is commonly known as the "index of customers". I used the index of customers for each pipeline to analyze the degree of forward contracting.[5] The latest index of customers available to me is the one posted on the pipelines' EBBs for Q4 2015, which gives an update of the contracts as at October 1, 2015.

I was informed by ANR that three new contracts with the shipper Ascent started on November 1, 2015 for a significant volume and for a very long term. These contracts do not appear on the Q4 2015 index of customers because they were not effective on October 1, 2015, but do appear on the Q1 2016 index of customers. Although for the proxy group pipelines I am relying on the Q4 2015 index of customers,[6] I have included these additional three contracts in my analysis as they significantly increase ANR's contract cover.

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[5] Unless otherwise noted, throughout my analysis I rely on pipeline data that I obtained from SNL, a commercial information provider. I understand that in turn SNL obtains the data from Form 549B Index of Customers, filed at FERC by interstate pipelines on the first business day after the start of each calendar quarter. I rely on data from SNL because it provides the data in a common format across all of the pipelines I analyze.

[6] At the time I performed my analysis, the Q1 2016 index of customer data was not available via SNL.

Q26. Do pipelines typically hold long-term contracts covering all available transportation capacity?

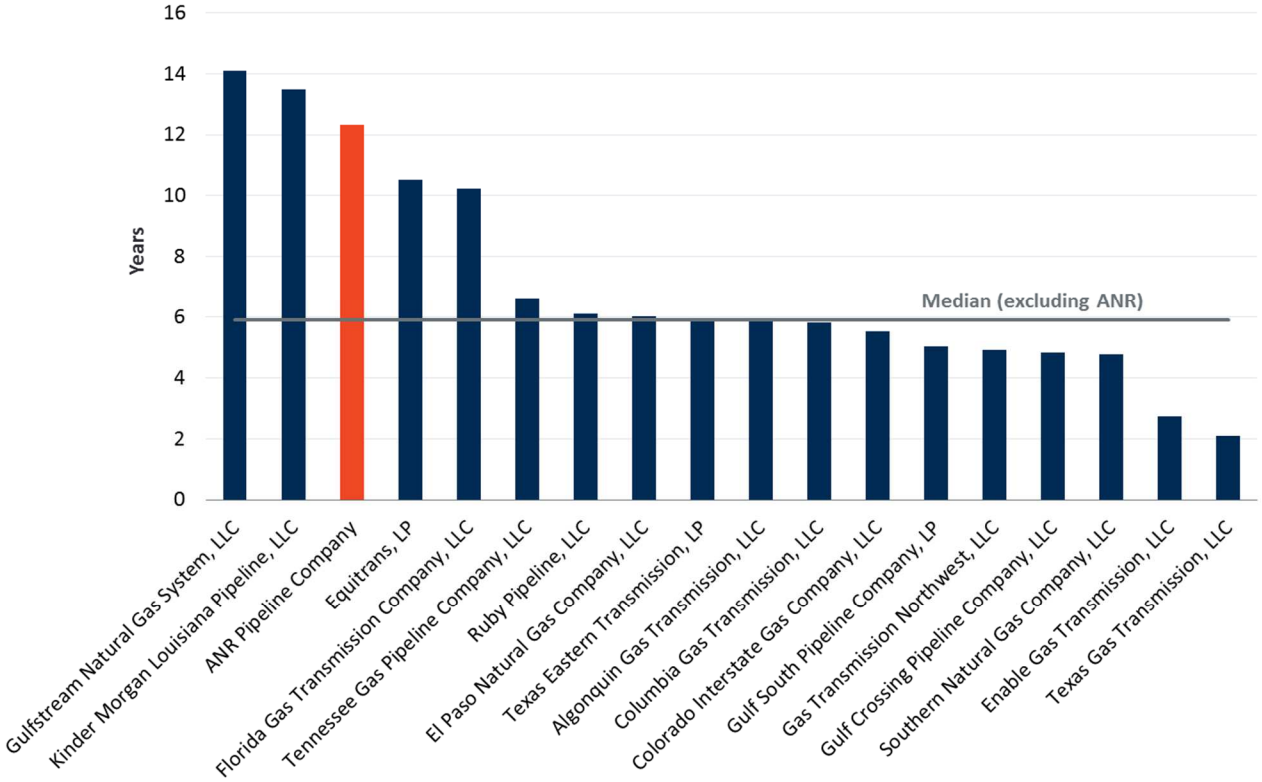
A26. Pipelines are obliged to enter into transportation agreements for currently uncontracted capacity with any shipper willing to pay the full recourse rate (*i.e.*, the rate determined in the most recent rate case, either by FERC or pursuant to a FERC-approved settlement agreement). I would therefore expect pipelines to be fully contracted where the market value of pipeline capacity is greater than the recourse rate. Where demand for pipeline services is lower, as shipper contracts expire the pipeline may not be able to remarket the capacity at the recourse rate. The pipeline may enter into new long-term contracts at a discount to the recourse rate, or it may be left holding unsubscribed capacity.

Many of the pipelines in the proxy group, as well as ANR, report that there is currently unsubscribed capacity on some segments available to shippers willing to sign new long-term agreements.

Q27. How have you measured the degree of protection from business risk that results from long-term contracts?

A27. The greater the quantity of capacity that is covered by long-term contracts, and the greater the length of those contracts, the greater is the degree of risk mitigation afforded by the pipeline. I examined several metrics related to the degree of forward contracting. The first metric is the capacity-weighted average duration of the contracts on each pipeline. This provides a measure of the length of time over which forward contracts provide protection to the pipeline, and the results of this analysis are shown in Figure 1.

Figure 1 – Weighted Average Remaining Life



Source: The Brattle Group. Data from Q4 2015 Index of Customers via SNL Energy (accessed 12/10/2015). Three contracts with American Energy LLC/Ascent beginning after 10/1/2015 (taken from the Q1 2016 Index of Customers on ANR Pipeline Company's Electronic Bulletin Board) were added to the Q4 2015 Index of Customers dataset.
Note: Calculated as the average remaining contract life weighted by volume, starting on January 1, 2016. See Workpaper 10.

Q28. How does ANR compare to the proxy group on this measure?

A28. ANR has a weighted average remaining contract life of 12 years. This is approximately double the median weighted-average contract life for the proxy group, as shown in Figure 1. The results in Figure 1 indicate that the current degree of shipper commitments will last longer for ANR than it will for the proxy group. However, four important additional factors are not reflected in Figure 1.

Q29. What are these other factors and how do you incorporate them into your analysis of contract cover?

A29. First, Figure 1 only shows capacity for which pipelines currently have contracts in place. It does not take into account unsubscribed capacity. ANR, as well as some pipelines in the proxy group, have unsubscribed capacity on some segments. Because the availability of

unsubscribed capacity is very pipeline and segment-specific, and not readily measured by a single reported number, I have not been able to take into account the degree to which different pipelines may differ in the level of capacity currently unsubscribed.

Second, the analysis shown in Figure 1 weights the contracts in each pipeline's index of customers by contracted capacity, measured in dekatherms ("Dth") per day. Long-haul and short-haul capacity is weighted equally, whereas I would expect long-haul capacity to make a greater contribution to the pipeline's overall revenue.

Third, the analysis above effectively places similar weight on capacity contracted for 2016 and capacity contracted for any future year. However, other things equal, in net present value terms protection from business risks in years closer to 2016 is more valuable than protection from business risks in far future years. This is particularly significant for ANR because about 40 percent of ANR's contracts (on a volume-weighted basis) expire within the next five years,[7] but ANR also has some contracts which run through 2045 or later.

Fourth, as I have indicated above, the protection afforded by long-term contracts is subject to shipper credit risk. If a shipper were to default, the protection afforded by the long-term contract would likely be significantly reduced or disappear.

Q30. Why is it difficult to take unsubscribed capacity into account?

A30. Unfortunately, there is no one measure of "unsubscribed capacity" that can be easily combined with information on contracted capacity to create a measure of "total" capacity. Many pipelines report unsubscribed capacity on their EBB, but this information is often provided for pipeline segments, receipt and delivery points. A particular request for transportation capacity could require unsubscribed capacity on several segments, as well as a receipt and a delivery point. The total quantity of unsubscribed capacity by segment and receipt and delivery points would therefore over-estimate the quantity of capacity that could be contracted by new shippers. Pipelines also report peak physical flow capacities.

[7] See Workpaper 1 in Exhibit No. ANR-034.

However, these figures are not necessarily comparable to contracted capacities, for example on pipes with backhaul service.

Q31. How have you analyzed the degree of forward contract cover in net present value terms?

A31. I have calculated an age-discounted net present value measure of contract cover which puts greater weight on contractual commitments for years nearer to 2016 than on equivalent commitments in later years. For each pipeline, I calculated the quantity of contracted capacity in 2016 and each subsequent year. I also calculated the quantity of capacity in each year that would have been contracted if none of the current contracts expired. I calculated a discounted total for both measures, and calculated the ratio of total discounted actually contracted capacity to the total discounted maximum capacity. In Table 5 I show this metric calculated over three different time periods (five, ten and 25 years).

Table 5 – Age-Discounted Contract Cover

Pipeline System	5-Year Contract Cover	10-Year Contract Cover	25-Year Contract Cover
Kinder Morgan Louisiana Pipeline, LLC	100%	100%	80%
Gulfstream Natural Gas System, LLC	100%	95%	79%
Equitrans, LP	97%	89%	66%
Florida Gas Transmission Company, LLC	94%	80%	61%
Ruby Pipeline, LLC	83%	65%	45%
Gulf Crossing Pipeline Company, LLC	80%	52%	37%
Columbia Gas Transmission, LLC	75%	58%	41%
Tennessee Gas Pipeline Company, LLC	71%	58%	43%
Algonquin Gas Transmission, LLC	71%	58%	44%
Texas Eastern Transmission, LP	70%	60%	45%
ANR Pipeline Company	**69%**	**61%**	**54%**
Gulf South Pipeline Company, LP	67%	54%	38%
El Paso Natural Gas Company, LLC	65%	54%	40%
Colorado Interstate Gas Company, LLC	65%	54%	38%
Gas Transmission Northwest, LLC	63%	52%	36%
Enable Gas Transmission, LLC	57%	36%	25%
Southern Natural Gas Company, LLC	52%	42%	31%
Texas Gas Transmission, LLC	50%	31%	21%
Average (excluding ANR)	74%	61%	45%
Median (excluding ANR)	71%	58%	41%

Source: The Brattle Group. Data from Q4 2015 Index of Customers via SNL Energy (accessed 12/10/2015). Three contracts with American Energy LLC/Ascent beginning after 10/1/2015 (taken from the Q1 2016 Index of Customers on ANR Pipeline Company's Electronic Bulletin Board) were added to the Q4 2015 Index of Customers dataset.
Note: Ratios calculated as discounted contracted capacity divided by discounted maximum capacity, calculated as the contracted capacity on the pipeline on October 1, 2015, multiplied by 365.25 days per year. A discount rate of ten percent is used. Pipeline systems are ranked by 5-Year Contract Cover. See Workpaper 5.

Q32. How does ANR compare to the proxy group on this age-discounted measure?

A32. Table 5 shows three measures for each pipeline. The first takes into account only the period 2016 through 2020, ignoring all contracts extending beyond 2020. The second figure similarly takes into account only 2016 through 2025, and the third 2016 through 2040. I would not expect investors to place any significant weight on the existence of contracts further forward than this. Table 5 shows that on all three measures, ANR is close to the average of the proxy group pipelines. Taking into account only the first five years,

ANR has slightly less contract cover than the median (or mean) of the proxy group. Taking into account the first ten years, ANR is between the median and the mean of the proxy group. Taking into account the first 25 years, ANR has slightly more contract cover than the average of the proxy group.

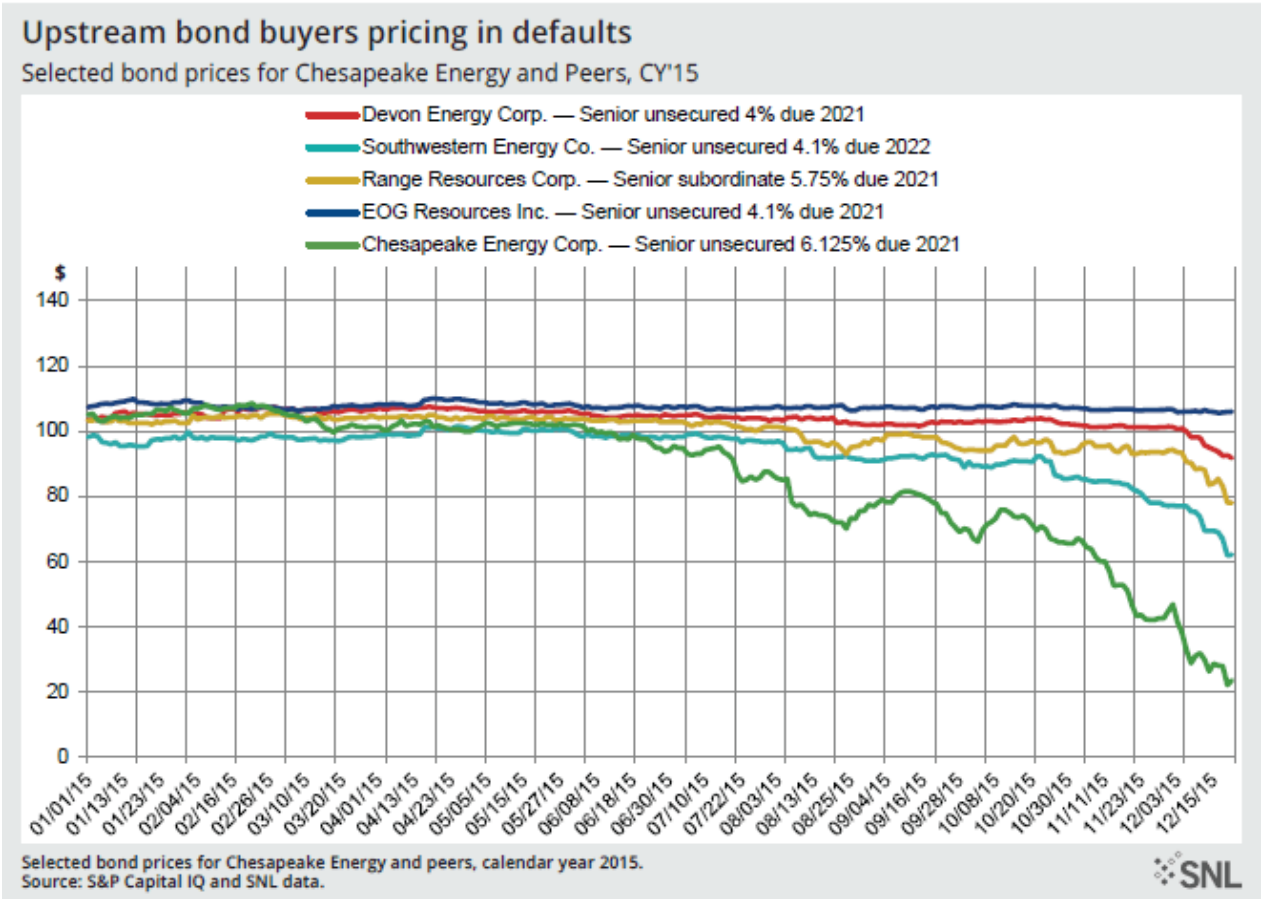
Q33. How have you compared ANR to the proxy group in terms of its exposure to shipper credit risk?

A33. I have conducted a qualitative analysis by classifying shippers into groups which I would expect to have different credit quality. I would expect that in general the best credit quality (the least likely to default) would be gas LDCs and electric utilities. LDCs and utilities have a regulated franchise and in most cases are able to pass on the costs of their gas supplies, including transportation costs, to end users in regulated rates. In contrast, I would expect some gas producers to represent elevated credit risk, particularly as low natural gas prices continue to put pressure on the financial condition of the smaller producers. In particular, I would expect that smaller producers with significant activities in shale gas production would present elevated credit risks. I classify natural gas marketers and power generators as intermediate in terms of credit risk.

Q34. How significant is the credit risk associated with shippers that are shale gas producers?

A34. A number of producers with interests in shale resources are under financial pressure. For example, a recent article in the trade press showed how the bonds of four independent gas producers have lost value during 2015, with the bonds of Chesapeake Energy Corporation in particular pricing in a significant probability of default (see Figure 2).

Figure 2[8] – Bond Prices for Chesapeake Energy and Peers in 2015



Another trade press article recently commented on the Rating Agency Fitch's outlook for the exploration and production ("E&P") sector in 2016: "Many of these credits are in survival mode – covering cash costs but not full replacement costs – which is in effect a slow-motion liquidation of the business".[9]

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[8] Taken from *Gas world faces reckoning of drillers' 'growth at the expense of profit'*, December 28th 2015, SNL Financial LC. Graph is copyrighted and distributed under a license from SNL. No further reproduction is permitted.

[9] *High-yield E&Ps in 'survival mode,' with gloomy 2016 ahead, Fitch says*, SNL, November 24, 2015.

Several gas producers in the Marcellus and Utica region have recently been downgraded,[10] including at least two that are shippers on ANR. S&P was already assigning speculative or junk ratings to 45 of the 62 drilling companies in the Bloomberg Intelligence North America Independent Exploration and Production Index in June 2015.[11]

Q35. How did you determine the exposure of each pipeline to shippers in the credit risk groupings you identified above?

A35. The 18 pipelines I am analyzing have in total approximately 1,500 shippers listed in the corresponding indexes of customers. However, if I rank each pipeline's shippers according to the total forward contractual commitment each has made (discounted as I described above), and include only the top 80 percent term-weighted capacity bookings for each pipeline, I obtain a list of 128 shippers. I classified each shipper as either lower risk (utility), higher risk (producer), or intermediate (generator, marketer or other) on the basis of the shipper's identity reported in the index of customers, and my general knowledge of the industry. Within producers, I also identified the sub-set of producers that are heavily focused on shale gas production, since these producers tend to be under greater financial pressure than those active in more conventional production areas, as I explained above.

Q36. What are the results of this analysis for ANR?

A36. Approximately one quarter of ANR's commitments are from shippers I classify as lower risk (utilities). Over half of ANR's commitments are from shippers I classify as higher risk (shale gas producers), and the balance of less than one quarter are intermediate. Among

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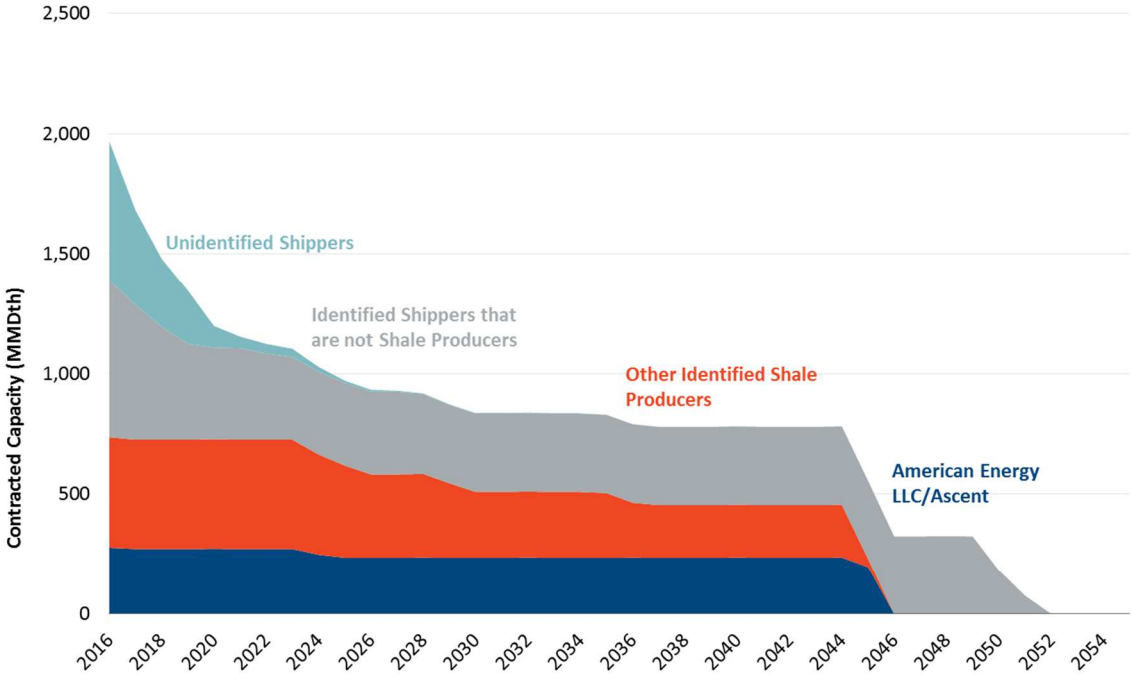
[10] In the past six months, Ascent Resources – Marcellus, LLC, Penn Virginia Corporation, CONSOL Energy Inc., Range Resources Corporation, EXCO Resources, Inc., Magnum Hunter Resources Corporation, REX Energy Corporation, Chesapeake Energy Corporation, Ultra Resources Inc. and Atlas Energy Holdings Operating Company, LLC have been downgraded by at least one of the three main Rating Agencies (Moody's, S&P, Fitch).

[11] *The Shale Industry Could Be Swallowed By Its Own Debt*, BloombergBusiness, June 18, 2015. http://www.bloomberg.com/news/articles/2015-06-18/next-threat-to-u-s-shale-rising-interest-payments, accessed on January 13, 2016. Note that this article describes the index as having 62 member companies. In the analysis I describe below using data for this index, I found that Bloomberg reports data for 61 companies in the index.

the higher-risk shippers, a significant fraction of the total commitment is from a single shipper (Ascent/American Energy Partners), which is reported to have been experiencing financial distress.[12] Figure 3 illustrates the contractual commitments of ANR's shale gas producer shippers.

Figure 3 – ANR Pipeline Company's Contract Portfolio



Source: The Brattle Group. Data from Q4 2015 Index of Customers via SNL Energy (accessed 12/10/2015). Three contracts with American Energy LLC/Ascent beginning after 10/1/2015 (taken from the Q1 2016 Index of Customers on ANR Pipeline Company's Electronic Bulletin Board) were added to the Q4 2015 Index of Customers dataset.
Note: "Unidentified Shippers" include any shipper that is not in the top 80% of one of the 18 pipelines analyzed. "Identified Shippers that are not Shale Producers" include shippers identified as utilities, conventional gas producers, power generators, marketers, and other. See Workpaper 11.

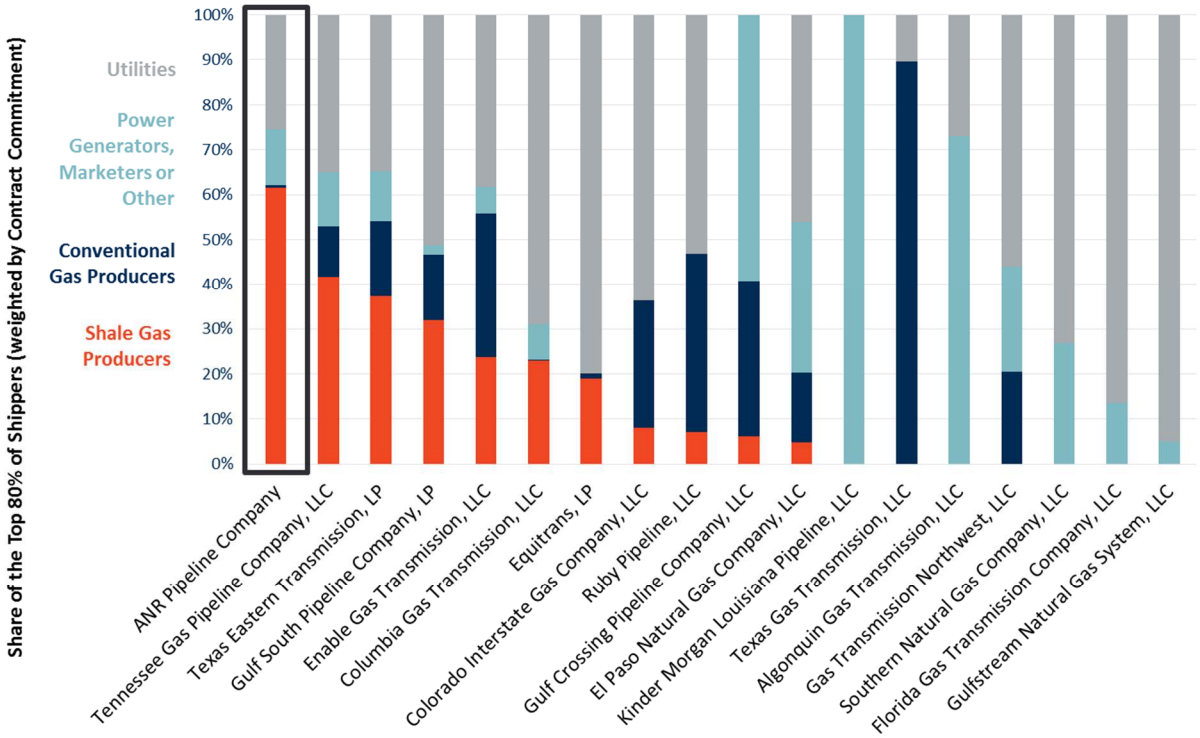
Q37. How does ANR compare with the pipelines in the proxy group?

A37. ANR has amongst the highest exposure to shale gas producer shippers, and amongst the lowest exposure to utility shippers, relative to the pipelines in the proxy group, as illustrated in Figure 4. I understand from the testimony of ANR witness Bennett that contracts with gas producers are particularly significant on ANR's SE Mainline, with

[12] "Exclusive: McClendon's American Energy hires banks to help raise cash", Reuters, October 15th 2015.

producers accounting for 50 to 60 percent of forward haul contracts and all backhaul contracts.

Figure 4 – Split of Discounted Contractual Commitment by Type of Shipper

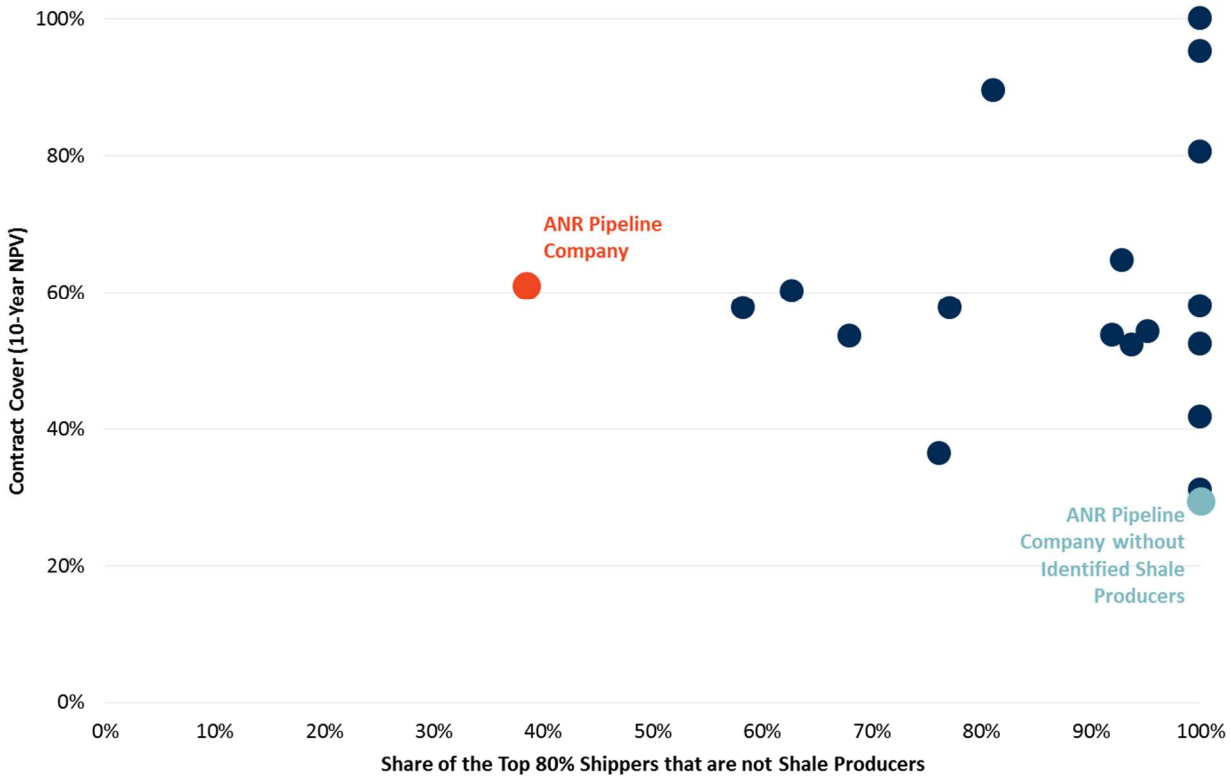


Source: The Brattle Group. Data taken from Q4 2015 Index of Customers via SNL Energy (accessed 12/10/2015). Three contracts with American Energy LLC/Ascent beginning after 10/1/2015 (taken from the Q1 2016 Index of Customers on ANR Pipeline Company's Electronic Bulletin Board) were added to the Q4 2015 Index of Customers dataset.
Note: Calculated using forward contract commitments, discounted on a ten-year basis with a discount rate of 10 percent. See Workpaper 13.

Q38. How have you combined the analysis of contract cover and the analysis of shipper credit risk?

A38. Both the degree of forward contracting and the degree of exposure to shipper credit risk are relevant to analyzing the business risk of ANR and the pipelines in the proxy group. In Figure 5 the degree of forward contract cover is plotted on the y-axis and the proportion of lower-risk shippers (all shippers that are not shale gas producers) is plotted on the x-axis.

Figure 5 – Customer Portfolios versus Contract Cover



Source: The Brattle Group. Data taken from Q4 2015 Index of Customers via SNL Energy (accessed 12/10/2015). Three contracts with American Energy LLC/Ascent beginning after 10/1/2015 (taken from the Q1 2016 Index of Customers on ANR Pipeline Company's Electronic Bulletin Board) were added to the Q4 2015 Index of Customers dataset.
Note: See Workpaper 15.

Figure 5 shows that there are no proxy-group pipelines with similar shipper credit risk exposure and similar forward contract cover to ANR. ANR is in the middle of the range of the proxy group pipelines in terms of contract cover, but all seventeen have less exposure to higher-risk shale gas producer-shippers than ANR does.

If I were to exclude all shale gas producer commitments, ANR would have less contract cover than any of the 17 proxy group pipelines when looking at five-year cover, and be the least (along with Enable Gas Transmission) on a ten-year basis. On a 25-year basis only two of the 17 pipelines would be less contracted than ANR, as shown in Table 6.

Table 6 – Age-Discounted Contract Cover, Excluding Contracts with Shale Producers

Pipeline System	5-Year Contract Cover	10-Year Contract Cover	25-Year Contract Cover
Kinder Morgan Louisiana Pipeline, LLC	100%	100%	80%
Gulfstream Natural Gas System, LLC	100%	95%	79%
Florida Gas Transmission Company, LLC	94%	80%	61%
Equitrans, LP	80%	74%	56%
Ruby Pipeline, LLC	77%	61%	42%
Gulf Crossing Pipeline Company, LLC	75%	49%	35%
Algonquin Gas Transmission, LLC	71%	58%	44%
Columbia Gas Transmission, LLC	63%	47%	34%
Gas Transmission Northwest, LLC	63%	52%	36%
El Paso Natural Gas Company, LLC	63%	52%	39%
Colorado Interstate Gas Company, LLC	60%	50%	36%
Southern Natural Gas Company, LLC	52%	42%	31%
Texas Eastern Transmission, LP	51%	41%	30%
Texas Gas Transmission, LLC	50%	31%	21%
Gulf South Pipeline Company, LP	50%	38%	27%
Tennessee Gas Pipeline Company, LLC	49%	37%	27%
Enable Gas Transmission, LLC	45%	29%	20%
ANR Pipeline Company	**37%**	**29%**	**25%**
Average of Proxy Group Pipelines	67%	55%	41%
Median of Proxy Group Pipelines	63%	50%	36%

Source: The Brattle Group. Data from Q4 2015 Index of Customers via SNL Energy (accessed 12/10/2015). Three contracts with American Energy LLC/Ascent beginning after 10/1/2015 (taken from the Q1 2016 Index of Customers on ANR Pipeline Company's Electronic Bulletin Board) were added to the Q4 2015 Index of Customers dataset.
Note: Calculations identical to those in Table 5, excluding shippers that have been classified as shale producers. See Workpaper 6.

Q39. What do you conclude about the impact of forward contracting on ANR's business risk?

A39. Before considering shipper credit risk, on a discounted basis ANR has a similar degree of forward contract cover as the average of the proxy group pipelines. Only if contracts over ten years in length are taken into account is the contract cover for ANR above the average of the proxy group.

The proxy group pipelines have up to 50 percent of their contracts with shale gas producers, but seven of the 17 pipelines have no significant exposure to shale gas producer shippers. ANR is at the top of the range, with about 60 percent exposure.

On this basis, and given that shale gas producers are under significant financial pressure from an extended period of low gas prices, I judge ANR to have less protection from long-term contracts than the typical proxy group pipeline. When removing all shale gas producer shippers, ANR becomes one of the three least contracted pipelines of the sample. I also note that, in common with many pipelines, about 40 percent of ANR's current contract cover will expire within five years. ANR is thus significantly exposed to changes in the market value of its services and thus its ability to remarket its capacity in the future at full recourse rates.

2. Competitive risk

Q40. How have you analyzed ANR's competitive risk relative to the proxy group?

A40. I have conducted a qualitative analysis of the degree to which each pipeline is exposed to competition by considering the main upstream supply areas in which shippers on each pipeline might obtain supplies, and the main downstream market area in which shippers on each pipeline may face competition to sell their gas.

There have been significant changes in North American gas markets in recent years, primarily driven by the development of low-cost shale gas resources and the construction of new pipelines and interconnects to serve the new shale gas producing areas. As a result, many of the pipelines in the proxy group face a significant degree of competition. Most pipelines in the proxy group face competition from several pipelines in both upstream supply areas and downstream markets. ANR is similarly situated: the supply areas to which it is connected are also served by other pipelines, and other pipelines also deliver to the market areas that ANR supplies. For example, ANR's downstream markets are also served by pipelines including Great Lakes, Panhandle Eastern, Trunkline, Vector, Viking, Guardian, and Rockies Express, and would be served in the future by Nexus and Rover,

which have certificate applications pending before FERC. Many of the pipelines in the proxy group face similar competition from other interstate pipelines.

Q41. What competitive risks are ANR facing on its pipeline system?

A41. The testimony of ANR witness Bennett describes the competitive risks facing ANR in detail. For example, deliveries from ANR's SW Mainline into eastern markets have declined as those markets are now increasingly served by new production from the Marcellus and Utica shale areas. New pipelines currently undergoing FERC certification (*e.g.*, Rover and Nexus) are expected to present further competitive threats to ANR. As Mr. Bennett notes, these pipelines can compete with both long-haul deliveries on ANR's SW Mainline into ANR's Northern Area and with services on ANR's SE Mainline delivering shale gas from the Marcellus and Utica regions.

Q42. Do all of the pipelines in the proxy group face the same degree of competition?

A42. As I mentioned above, many of the proxy group pipelines, like ANR, face competition from multiple pipelines in both supply and market areas. There are a few pipelines in the proxy group which are somewhat less exposed. For example, Colorado Interstate faces relatively little competition in its downstream markets in Colorado. Similarly, Florida Gas Transmission, Enable Gas Transmission and Southern Natural have relatively little competition in downstream markets (but have significant competition upstream). Other pipelines in the proxy group are predominantly "upstream" and connect into other interstate pipelines rather than directly to downstream markets. Gulf South and Texas Gas are in this position. Kinder Morgan Louisiana faces an unusually high degree of competition risk (albeit moderated by long-term contractual commitments) because it is dedicated to servicing the Sabine Pass LNG terminal. The future value of capacity on this pipeline is therefore determined by the relative prices of natural gas in U.S. and international markets and is more exposed to swings in basis differential than the typical U.S. pipeline serving U.S. supply and demand centers.

However, most of the pipelines in the proxy group face a similar – and high – degree of competition risk as does ANR.

Q43. If most of the pipelines in the proxy group face a similar degree of competition risk, is this level of competition risk likely to be reflected in the return on equity estimates prepared by ANR witness Vilbert?

A43. No, not necessarily. Return on equity estimates based on market evidence as to investors' required rates of return (like those in Dr. Vilbert's testimony) reflect the compensation investors require for bearing systematic risk. Systematic risk is a measure of the degree to which volatility in returns from one investment is likely to be correlated with returns from the market as a whole. The return on equity estimates do not reflect the degree to which investors may expect a level of return below that authorized for the pipeline, for example due to the realization of risks that prevent a pipeline from earning the authorized rate of return.

Q44. What are the implications for investors of elevated competitive risks?

A44. Elevated competitive risks are not necessarily problematic for pipeline investors. Provided that there is a supportive regulatory environment which permits the pipeline to set maximum regulated rates that reflect prudently-incurred costs, and provided that there is a market environment which permits the pipeline actually to charge the maximum rate, competitive risk may not have a significant impact on investors. However, if the regulatory environment does not permit rates that reflect all prudently incurred costs, or if the market environment is such that the pipeline cannot charge the maximum regulated rate, investors may require higher returns due to the elevated competitive risk.

Q45. Does FERC provide a supportive regulatory environment for pipeline investment?

A45. In general, yes. However, FERC's policy is to permit entry by new pipelines where there is a demonstrated market demand without any substantive or analytical consideration of the impact on existing pipelines. As such, the risks facing investors are directionally higher than they would be in a jurisdiction that is less open to competitive entry.

3. Operating risks

Q46. How have you analyzed ANR's operating risk relative to the proxy group?

A46. As a proxy for operating risk, I have measured the size of ANR's future capital maintenance and modernization program relative to the average amount of capital maintenance and modernization incurred historically by the proxy group pipelines.

Q47. How did you quantify this comparison?

A47. I have compared ANR's planned maintenance capital expenditures for 2015-18 to a measure of historical maintenance capital expenditures for the pipelines of the proxy group for the past four years. I divided average annual maintenance capital expenditures by net utility plant in order to have comparable numbers from one pipeline to the other.

Q48. How do you quantify ANR's planned maintenance capital expenditures?

A48. I base my analysis on Exhibit No. ANR-021 from ANR witness Hampton's testimony, which gives the expected capital expenditures for General Plant and Maintenance Capital from 2015 to 2018.

Q49. How do you identify maintenance capital expenditures for the proxy group pipelines?

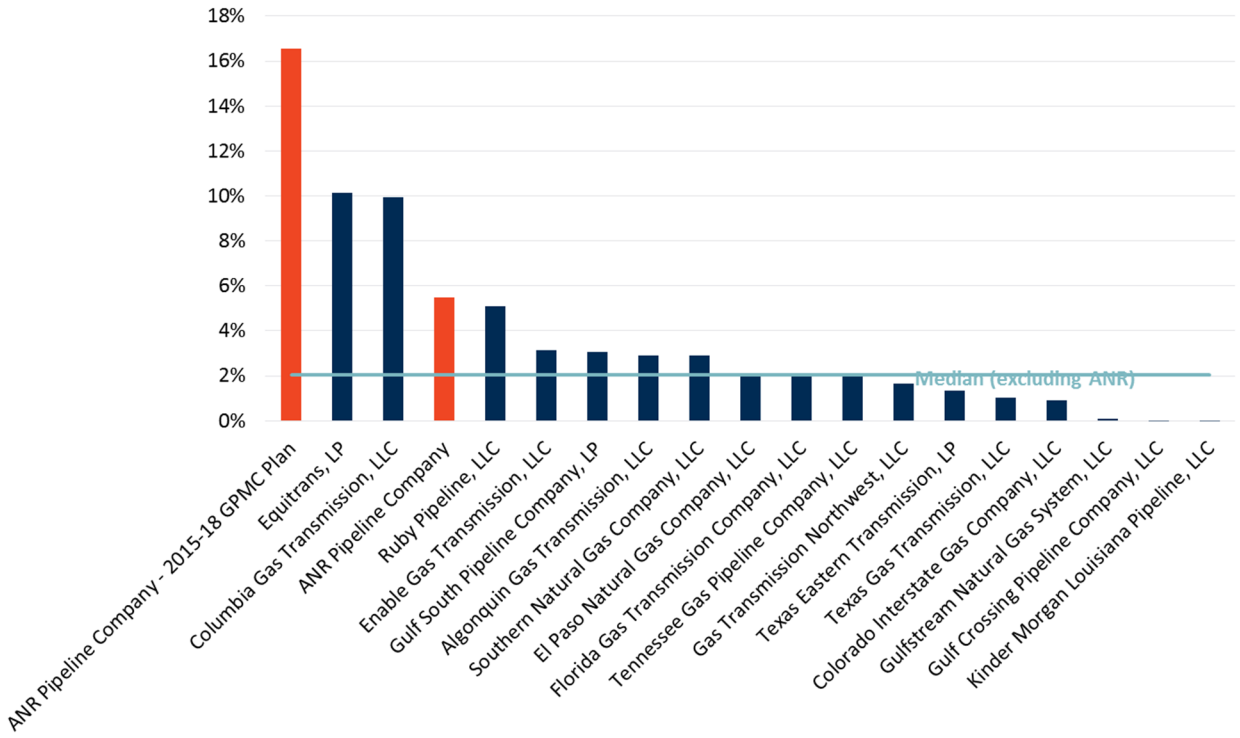
A49. I do not have access to data on maintenance capital expenditures for the proxy group pipelines. However, overall plant additions data is reported on FERC Form 2. Form 2 does not provide a split between maintenance and expansion capital expenditures, but EIA publishes a list of major pipeline expansion projects, including in-service dates and costs.[13] As a proxy for maintenance capital expenditures I use total plant additions less expansion capital expenditures.

[13] "Natural Gas Pipeline Projects," EIA-NaturalGasPipelineProjects.xls, released 12/31/2015, http://www.eia.gov/naturalgas/data.cfm.

Q50. What are the results of this analysis?

A50. Figure 6 shows the ratio of average 2011-14 plant additions (after excluding expansion related expenditures) to net utility plant of 2010 for each pipeline of the proxy group. Figure 6 also shows two bars for ANR: one for the historical additions vs. net plant ratio for 2011-14, and one for the expected average annual 2015-18 capital expenditure for the GPMC plan as a percentage of 2014 net plant.

Figure 6 – Average Annual Transmission Plant Additions less Expansion Capital Expenditures as Percentage of Net Utility Plant



Source: The Brattle Group. 2010-14 transmission plant additions and utility plant data from annual FERC Form 2 filings via SNL Energy (accessed 01/08/16). Pipeline expansion data from the EIA. ANR 2015-18 forecast data from ANR Witness Hampton's testimony.
Note: Calculated as the average of additions less expansion costs between 2011 and 2014, divided by 2010 net utility plant. ANR forecast value calculated as the average of GPMC expenditures between 2015 and 2018 divided by 2014 net utility plant. See Workpaper 16.

Figure 6 shows that ANR's planned capital maintenance and modernization expenditures are significantly greater than the historical maintenance capital expenditures of the proxy group.

4. Storage-related business risks

Q51. Why have you investigated business risks associated with storage?

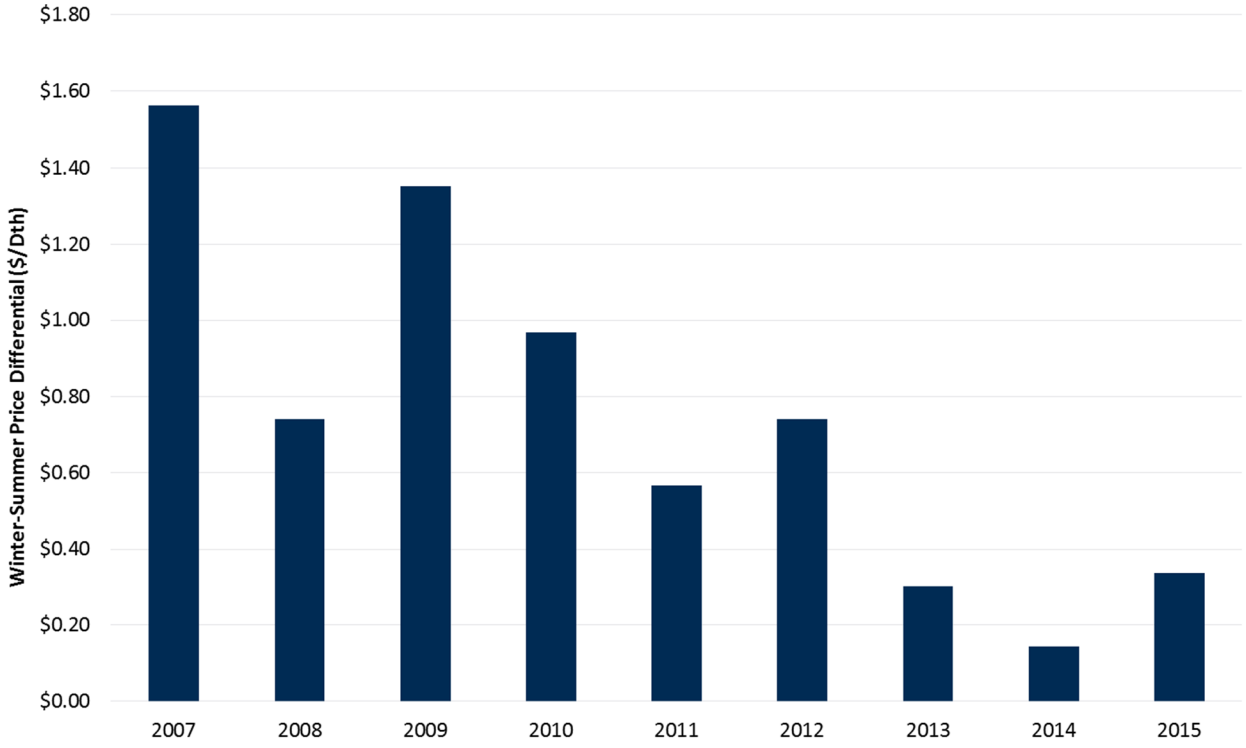
A51. ANR's FERC-regulated pipeline system includes significant storage assets. In 2014, approximately 25 percent of operating revenues and 12 percent of total utility plant were associated with storage.[14] Storage in or close to demand centers, like ANR's, is currently less valuable than it has been historically because seasonal price spreads have collapsed in upper Midwest and northeast markets. Storage assets therefore tend to increase business risk because the revenues earned from storage customers may be insufficient to recover the revenue requirements associated with the storage assets. The testimony of ANR witness Bennett describes how current storage contracts are relatively short-term, and explains that projected future storage values are below historical levels.

Q52. Why is market area storage less valuable currently than it has been in the past?

A52. A significant source of value for market area storage is seasonal price differentials. Shippers are willing to pay for storage space because they can realize value by injecting gas into storage in the summer when gas is cheaper, and withdrawing it in winter when gas is more expensive. If the difference in price between summer and winter is reduced, shippers' willingness to pay for storage is similarly reduced. Winter-summer price differentials in many market centers have been much lower in recent years than historically, in part because new sources of gas production have been developed in locations much closer to demand centers than the traditional supplies from the Gulf, the Rockies, or Western Canada. As a result, market area storage is less valuable now than it has been historically. Figure 7 shows the Winter-Summer price differential for the Henry Hub. The differential decreases over the years, showing that market area storage is less valuable than historically.

[14] Based on ANR's 2014 FERC Form 2.

Figure 7 – Winter-Summer Price Differential for Henry Hub



Source: The Brattle Group. Data from NYMEX via Bloomberg (accessed 11/10/15).
Note: Calculated as the difference between winter contracts (November to March) and summer contracts (April to October) using forward prices as of March in each year. For example, the 2007 value is calculated as the difference between winter 2007-08 and summer 2007 using the average of March 2007 forward prices. Seasonal contracts data used when available, else an average over winter and summer months was used. See Workpaper 17.

Q53. How did you calculate the results shown in Figure 7?

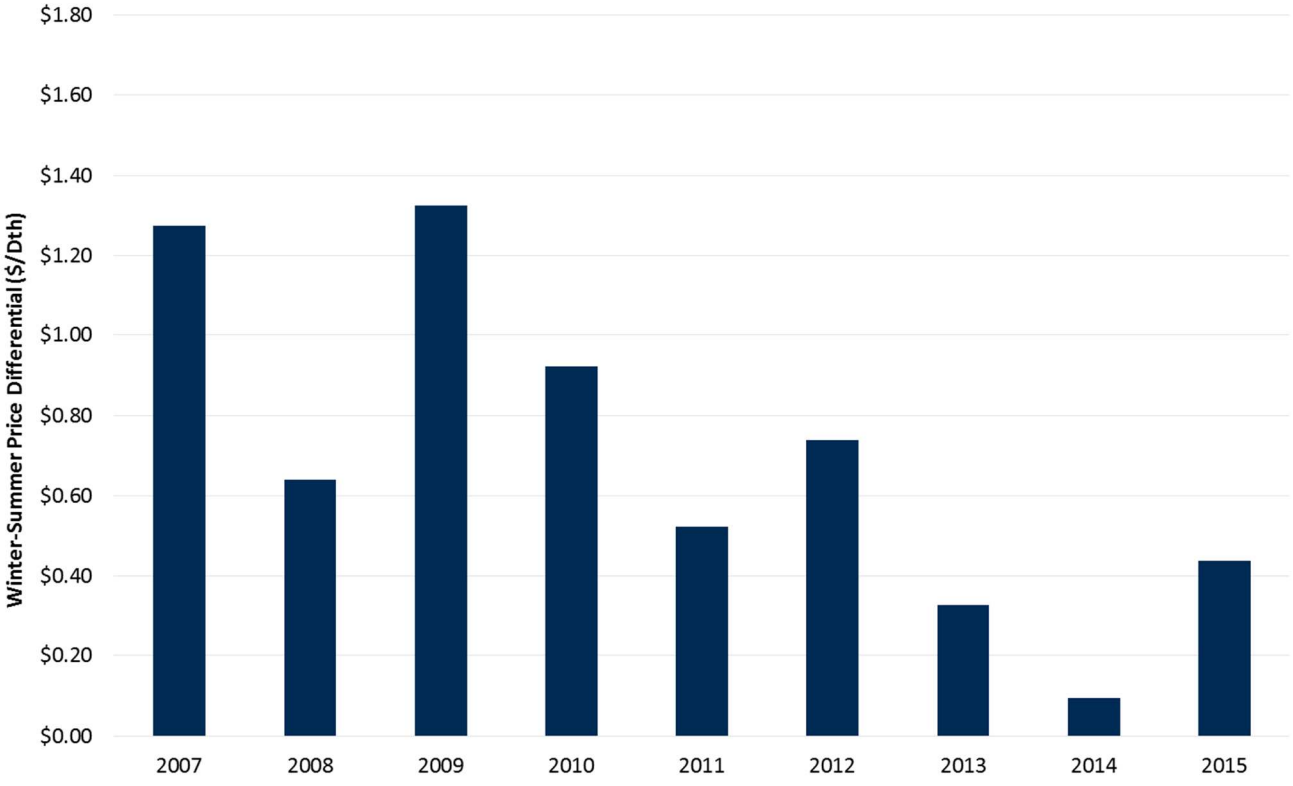
A53. To calculate the results shown in Figure 7 (and the equivalent analysis below in Figure 8) I took forward prices in March of each year for the following summer and winter seasons.[15] The differentials shown in the charts are the average of the price differences for each business day in March of each year.

[15] When seasonal strips were not quoted I used monthly strips for April through October for summer and November through March for winter.

Q54. Does Henry Hub data provide a good indication of the value of ANR's market area storage?

A54. Henry Hub prices are one good indicator of the gas commodity value in the overall North American natural gas market, and Figure 7 can be used as an illustration of the situation of an average market area storage facility. In order to look at the situation in the Midwest region where most of ANR's storage capacity is located, I repeat this price differential analysis using MichCon Citygate price differentials. Figure 8 shows the price differential also decreases significantly over time for MichCon Citygate.

Figure 8 – Winter-Summer Price Differential for MichCon Citygate



Source: The Brattle Group. Data from NYMEX via Bloomberg (accessed 11/10/15).
Note: Calculated as the difference between winter contracts (November to March) and summer contracts (April to October) using forward prices as of March in each year. For example, the 2007 value is calculated as the difference between winter 2007-08 and summer 2007 using the average of March 2007 forward prices. Seasonal contracts data used when available, else an average over winter and summer months was used. See Workpaper 17.

Q55. Do all pipelines systems have storage activities similar to that of ANR's?

A55. No. ANR owns storage facilities that help supply seasonal needs and they are located close to market area demand. Some pipeline systems have similar "market area" storage

facilities and others have "production area" storage facilities serving the balancing needs of producing fields. Other pipelines have no significant storage assets. Table 7 characterizes the storage activity of the 17 pipeline systems in the proxy group, and shows that four of the 17 pipelines have market area storage only, four have production area storage only and two have both types of storage facilities.

Table 7 – Type of Storage Facilities

Table 7: Type of Storage Facilities Owned by Proxy Group Pipeline Systems

Pipeline System	Production-Area Storage [1]	Market-Area Storage [2]
Algonquin Gas Transmission, LLC		
Colorado Interstate Gas Company, LLC	X	X
Columbia Gas Transmission, LLC		X
El Paso Natural Gas Company, LLC	X	
Enable Gas Transmission, LLC	X	
Equitrans, LP		X
Florida Gas Transmission Company, LLC		
Gas Transmission Northwest, LLC		
Gulf Crossing Pipeline Company, LLC		
Gulf South Pipeline Company, LP	X	
Gulfstream Natural Gas System, LLC		
Kinder Morgan Louisiana Pipeline, LLC		
Ruby Pipeline, LLC		
Southern Natural Gas Company, LLC	X	
Tennessee Gas Pipeline Company, LLC		X
Texas Eastern Transmission, LP	X	X
Texas Gas Transmission, LLC		X
ANR Pipeline Company		**X**

Source: EIA 191 Field level Storage data in 2014, Energy Information Admnistration ('EIA'). Release date Sept. 201
Notes:
[1]: Production-area storage facilities serve the balancing needs of producing fields. An 'X' is displayed in this column if the pipeline system owns storage facilities located in producing regions of the United States, e.g., southern states close to Mexico and the Gulf of Mexico, as defined by the EIA.
[2]: Market-area storage facilities serve seasonal needs of demand centers. An 'X' is displayed in this column if the pipeline system owns storage facilities located in consuming regions of the United States, as defined by the EIA.

See Workpaper 7.

Q56. How do ANR's storage assets compare to the storage assets of the pipelines shown in Table 7?

A56. The share of operating revenues and utility assets associated with storage for the ten pipelines in the proxy group that have storage is shown in Table 8. ANR obtains a greater fraction of operating revenue from storage than any of the proxy group pipelines, and only two proxy group pipelines have a greater fraction of utility plant associated with storage. These two pipelines own market area storage facilities, as ANR does.

Table 8 – Contribution of Storage to Total Regulated Revenues and Assets

Storage Type	Pipeline System	Storage Share of Operating Revenues	Storage Share of Assets
	[1]	[2]	[3]
Market-Area Storage	**ANR Pipeline Company**	24.6%	11.8%
	Columbia Gas Transmission, LLC	23.0%	24.4%
	Equitrans, LP	11.1%	21.7%
	Texas Gas Transmission, LLC	4.4%	9.4%
	Tennessee Gas Pipeline Company, LLC	3.7%	1.8%
	Colorado Interstate Gas Company, LLC	0.3%	10.9%
Producer-Area Storage	Texas Eastern Transmission, LP	6.5%	3.8%
	Southern Natural Gas Company, LLC	5.9%	2.9%
	Enable Gas Transmission, LLC	3.5%	6.3%
	Gulf South Pipeline Company, LP	1.5%	3.3%
	El Paso Natural Gas Company, LLC	0.0%	1.5%

Sources and Notes:
[1]: Pipelines are classified according to the category of storage most prominent in their storage assets based on the working gas capacity, then ranked by storage share of operating revenues.
[2]: Revenues from Storing Gas ÷ (Revenues from Storing Gas + Revenues from Transportation of Gas). Source - 2014 FERC Form 2. See Workpaper 8.
[3]: Underground and Other Storage Plant ÷ (Underground and Other Storage Plant + Total Transmission Plant). Source - 2014 FERC Form 2, via SNL Energy. See Workpaper 9.

Q57. Does ANR have forward contracts for its storage capacity?

A57. Yes. The testimony of ANR witness Bennett states that ANR currently has 170 Bcf/d contracted on a long-term basis, with an average term of approximately 3.5 years. Mr. Bennett's testimony also indicates that storage contracts expiring in 2016 and 2017 have a much higher price than current forecasts of storage value. The current estimate is 30

percent below the contracted price for contracts expiring in 2016, and 45 percent below the contracted price for contracts expiring in 2017.[16]

Q58. What do you conclude about ANR and storage?

A58. ANR has significantly more exposure to storage risks and in particular market-area storage than does the typical proxy group pipeline. ANR has the largest overall storage activity as well as the largest market-area storage activity of all 18 pipeline systems when measured by share of operating revenues. It is the third largest when measured on the share of assets. Since the business risk associated with market area storage has increased in recent years, this factor directionally increases ANR's business risk relative to the proxy group.

VI. CONCLUSIONS

Q59. What is your overall conclusion as to ANR's business risk relative to the business risk of the proxy group?

A59. ANR faces some significant competitive risks with respect to its pipeline transportation services generally, due primarily to new sources of gas supply that have altered traditional patterns of pipeline flows, and due to competition with other pipelines. Many of the pipelines in the proxy group face similar risks. However, relative to the proxy group pipelines, ANR is of above average risk with respect to its exposure to higher-risk market area storage. ANR is more exposed to this source of risk than almost all the pipelines in the proxy group. Furthermore, relative to the pipelines in the proxy group, a significant proportion of ANR's long-term contracts for transportation services are with shippers that are also gas producers. These producers present elevated credit risk because several companies in this sector, including one which is currently the largest shipper on the ANR system, are in financial distress as a result of the low price of gas. Taking into account

[16] In Mr. Bennett's testimony, the current estimate of storage value for the next two years is $0.38/Dth and the price in expiring contracts is $0.54/Dth and $0.69/Dth for contracts expiring in 2016 and 2017 respectively.

exposure to producer shippers, ANR is in the bottom half of the range defined by the proxy group pipelines in terms of forward contract cover. ANR also has above average operating risk, due to the size of its capital maintenance and modernization program.

On the measures discussed above, ANR's business risk is elevated relative to that of the pipelines in the proxy group as a whole.

Q60. How should ANR's elevated business risk be reflected in the ROE used to determine revenue requirement and rates?

A60. Since ANR is of above-average business risk, ANR's ROE should be set above the median ROE of the proxy group. Choosing the magnitude of the required ROE adder is a matter of judgment. One of the more significant risks facing ANR is its exposure to credit risk associated with its contracts with producer shippers, and in some ways ANR is similarly situated to a lender: both expect periodic payments from the producers, and both are exposed to the risk that the financial conditions of the producers deteriorate to the point where the payments cannot be made. If one of ANR's shippers was to seek bankruptcy protection and repudiated its transportation contract with ANR, the transportation capacity would revert to ANR, but it is possible that the market value of the capacity might be less than what the original shipper had agreed to pay. Similarly, in a bankruptcy, lenders might recover some amount less than the total owed to them.

Making use of the parallel between ANR and a lender, I have estimated a "credit risk premium" by comparing the yield on debt of oil and gas producers with the yield on utility bonds.

Q61. How did you estimate the credit risk premium?

A61. Bloomberg Intelligence publishes an "independent exploration and production" index. I estimated a yield on the debt of the companies in this index by dividing the 61 companies in the index into groups according to the companies' credit rating, adding up the market capitalization for each group, and multiplying the resulting index weights by the yields[17]

[17] I used the average of the daily yields published in November 2015.

on a set of corporate bond indexes of the appropriate credit ratings.[18] The resulting yield was about 6.3 percent, whereas the yield on Bloomberg's index of utility bonds[19] was about 3.8 percent, implying a credit risk premium of about 2.5 percent.[20]

Q62. What ROE adder do you recommend?

A62. About 60 percent of ANR's capacity is held by shale gas producers, whereas the average across the proxy group pipelines is about 10 percent. On a weighted-average basis, therefore, the credit risk premium for ANR is about 1.5 percent whereas for the average of the proxy-group pipelines it is about 0.25 percent.

Recognizing that the credit risk premium I calculated is a parallel for, rather than an exact measure of, ANR's increased business risk, and that ANR also has other above-average risk factors, I judge that an ROE adder of 100 basis points would be reasonable. I therefore recommend that ANR's ROE be set at 100 basis points above the median ROE calculated by ANR witness Vilbert.

Q63. Does this conclude your direct testimony?

A63. Yes.

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[18] For A and BBB ratings I used yields on an index of US energy firms, and for BB and B ratings I used yields on an index of US corporations. I grouped B, CCC and SD ratings together. I used a ten year term.

[19] I take the average of yields on an index of A and BBB-rated utilities bonds with a ten year term.

[20] See Workpaper 2 in Exhibit No. ANR-034.

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

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

State of Oregon)
) ss.
Wallowa County)

AFFIDAVIT OF PAUL R. CARPENTER

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

Paul R. Carpenter

SWORN TO AND SUBSCRIBED BEFORE ME THIS 26th DAY OF January, 2016

OFFICIAL STAMP
KATE SHELTON
NOTARY PUBLIC-OREGON
COMMISSION NO. 927085
MY COMMISSION EXPIRES APRIL 03, 2018

Notary Public
My Commission Expires: April 3, 2018