VEDO EXHIBIT NO. 7.0

BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Application of Vectren Energy Delivery of Ohio, Inc. for Approval of an Increase in Gas Rates	)))	Case No. 18-0298-GA-AIR
In the Matter of the Application of Vectren Energy Delivery of Ohio, Inc. for Approval of an Alternative Form of Regulation	)))	Case No. 18-0299-GA-ALT

DIRECT TESTIMONY OF
SARAH J. VYVODA
ON BEHALF OF
VECTREN ENERGY DELIVERY OF OHIO, INC.

____	Management policies, practices, and organization
__X__	Operating income
____	Rate base
____	Allocations
____	Rate of return
____	Rates and tariffs
__X__	Other (Alternative Rate Plan: Distribution Replacement Rider)

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Direct Testimony of
Sarah J. Vyvoda

I. BACKGROUND AND QUALIFICATIONS

Q1. Please state your name, business address.

A. My name is Sarah J. Vyvoda and my address is One North Main Street, Evansville, Indiana 47711.

Q2. What position do you hold with Applicant Vectren Energy Delivery of Ohio, Inc. (VEDO or the Company)?

A. I am the Director of Gas System Integrity for Vectren Utility Holdings, Inc. (VUHI), the immediate parent company of VEDO, Indiana Gas Company, Inc. d/b/a Vectren Energy Delivery of Indiana, Inc. (Vectren North), and Southern Indiana Gas and Electric Company d/b/a Vectren Energy Delivery of Indiana, Inc. (Vectren South) (collectively Vectren).

Q3. What are your duties in your present position?

A. I oversee the Company's on-going efforts to reduce risks associated with VUHI's gas assets. In this role, I manage the distribution, transmission and storage field integrity management, and corrosion control programs designed to ensure compliance with federal pipeline safety regulations. Specifically, I am responsible for the execution of integrity assessments in compliance with federal regulations, the quality and storage of asset data and records, the development and implementation of asset-based risk models, and the prioritization of the risk mitigation efforts for VUHI's gas assets. Additionally, I am responsible for the execution of VEDO's asset management programs which include the development and documentation of the overall strategies and processes to achieve the tasks listed previously.

Q4. Please describe your work experience.

A. I have been employed by VUHI since April 6, 2009. My current role is the Director of Gas System Integrity. Prior to this position, I was VUHI's Chief Engineer of Gas Asset Integrity Management for two years. Prior work experience includes eight years of various roles within the gas integrity management programs at Vectren and other engineering positions prior to my time at Vectren.

Q5. What is your educational background?

A. I received a bachelor of science in chemical engineering from Rose-Hulman Institute of Technology in 2004.

Q6. Have you previously testified before this Commission?

A. No. This is the first time I am testifying before the Public Utilities Commission of Ohio (the Commission). However, I have provided updates to the Commission regarding the progress of VEDO's Distribution Accelerated Risk Reduction Program (DARR) in compliance with the Order for Case No. 15-1741-GA-AAM.

Q7. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony is to (1) provide a progress update of VEDO's bare steel and cast iron (BSCI) replacement program (Replacement Program) and costs recovered under the Distribution Replacement Rider (DRR); (2) discuss the pipeline safety and system reliability benefits of VEDO's Replacement Program; (3) describe VEDO's proposal for extending its Replacement Program, general program management, and continued cost recovery through the DRR; (4) discuss historical and future cost savings as a result of the Replacement Program; (5) and provide an update and discuss the effectiveness of VEDO's DARR.

Q8. What exhibits are you sponsoring in this proceeding?

A. I am sponsoring the following exhibits:

- Attachment A: BSCI Retirement Mileage
- Attachment B: Replacement Program Capital Investment 2018-2023
- Attachment C: BSCI Retirement Schedule
- Attachment D: Leak Discovery
- Attachment E: BSCI Leak Elimination
- Attachment F: O&M Cost Savings Comparison
- Attachment G: VEDO Distribution Accelerated Risk Reduction Program
- Attachment H: Distribution Accelerated Risk Reduction Program Management

Q9. How is your testimony organized?

A. My testimony is organized in five sections:

- Bare Steel and Cast Iron Replacement Program Progress;
- Replacement Program Benefits;
- Replacement Program Extension Proposal;
- O&M Savings Adjustment; and
- Distribution Accelerated Risk Reduction Program Update

II. BARE STEEL AND CAST IRON REPLACEMENT PROGRAM PROGRESS

Q10. Please describe the scope of asset replacements included in the Replacement Program.

A. The Replacement Program targets the retirement and replacement of high risk distribution BSCI mains and associated services, and includes other high risk distribution assets such as field coated steel, vintage plastic, and obsolete equipment associated with

the BSCI mains. The Replacement Program also includes moving meters outside of customer premises and the replacement of customer-owned services.

Q11. Please describe the Replacement Program costs and progress-to-date.

A. From 2009 to 2017, the program spend-to-date is $313 million. Since 2009, VEDO has retired approximately 354 miles of BSCI. The annual retirement mileage details are shown in Attachment A to my testimony. Additionally, VEDO has replaced approximately 35,000 services associated with BSCI main replacement, and approximately another 19,000 services independent from those projects, moved approximately 27,000 meters out from customer premises, and retired approximately 20 miles of field coated steel main.

Q12. Please describe the projected work to be completed in the Replacement Program in 2018.

A. In 2018, VEDO projects to increase the rate of BSCI retirement to approximately 53 miles of bare steel and an additional 9 miles of cast iron for a total of 62 miles at a forecasted capital investment of approximately $56 million. Additionally, VEDO projects approximately $9 million of scheduled service replacement capital investment and has planned approximately 10 miles of field coated steel replacement projects for an estimated $4 million of capital investment.

Q13. Does VEDO intend to complete the retirement of BSCI mains and service lines by the end of 2023?

A. Yes.

Q14. Please describe the Replacement Program forecast through 2023.

A. Beginning in 2018 and continuing thereafter, VEDO is increasing the annual average BSCI retirement mileage to 60-65 miles in order to complete the retirement of its BSCI assets by the end of 2023. Additionally, VEDO will continue to replace services and

ineffectively or field coated steel consistent with its current processes. To complete the retirement of BSCI assets and the projected replacement of other assets, VEDO forecasts an additional $414 million as detailed in Attachment B to my testimony. VEDO Witness J. Cas Swiz discusses the continuing recovery of Replacement Program costs in the DRR.

Q15. Will VEDO be able to effectively manage and execute the accelerated Replacement Program?

A. Yes. VEDO has worked over the past few years to research and verify the remaining BSCI segments in the Replacement Program and has included those segments within the scope of replacement projects to be executed by 2023. The Company's internal engineering staff has recently been re-organized to leverage internal resource skill sets and dedicate efforts to designing and executing infrastructure modernization projects, including BSCI retirement. VEDO's current BSCI retirement schedule is provided as Attachment C to my testimony; the schedule is subject to change, but provides the most up to date look at VEDO's current planning. Replacement Program work plans are a priority based on their impact on reducing distribution risk. VEDO is on-track to have the Replacement Program projects designed and available for construction prior to their planned project year. As part of its procurement process to assess contractor availability and workload management, VEDO has proactively communicated a planned increase in BSCI retirement projects to its existing contractor resources. Contractors have communicated that the potential increase in projects is within their available capacity.

Q16. Does VEDO anticipate a change in per mile replacement costs?

A. Yes. The replacement cost per foot has increased from just less than $100 per foot for BSCI main retired in 2009 to $155 per foot for BSCI mains retired in 2017. VEDO projects that the cost per BSCI foot retired will increase to approximately $200 per foot

by 2023. The cost drivers of this increase include changes in the construction process, specifically the Pipeline and Hazardous Materials Safety Administration's (PHMSA) requirement for increased inspections and oversight during field construction; the increase in restoration costs for projects located in more urban and paved areas; and city and county restoration requirements, which have become more onerous.

VEDO has accounted for these and other cost drivers in its forecast which is based on a model that incorporates cost trends, inflation and the specific project characteristics in terms of work location, access, permitting and other execution issues. Actual costs will continue to be a product of our established process where the upcoming year's individual project plans with detailed scope of work and cost estimates will be provided to VEDO's strategic sourcing group. The sourcing group will create bid packages and conduct the annual request for proposals process in order to obtain competitive bids for the work to be performed. As part of that process, the past quality and quantity of each contractor's work will be evaluated and the potential to add additional qualified contractors will be considered.

III. REPLACEMENT PROGRAM BENEFITS

Q17. Does VEDO believe that the Replacement Program is improving system performance, providing benefit to its operations and supporting compliance with applicable pipeline safety regulations?

A. Yes. VEDO's Replacement Program is a major part of its Distribution Integrity Management Program (DIMP) implementation governed by PHMSA regulations. DIMP requires risk assessment to determine the threats to the distribution system and to prioritize the mitigation of those risks. Retirement of BSCI assets has been identified as a high priority risk item and is VEDO's accelerated action (AA) to mitigate the physical

and operational risks that those poorly performing assets pose to the system and help ensure the safety of those that perform work on, and those who live around, those mains. The mitigation of the BSCI distribution system risks are further shown through the safety and risk reduction metrics established through VEDO's DIMP to determine the effectiveness of the Replacement Program. The safety and reliability metrics to measure the effectiveness of the Replacement Program include the leak rate by material type, maintenance work orders, dispatch investigation call frequency and emergency response call frequency.

VEDO's discovery of new leaks is trending downwards from discovery of approximately 1084 new leaks in 2013 to discovering approximately 570 in 2017, as shown in Attachment D to my testimony. The replacement of BSCI and the other high risk distribution assets within the Replacement Program has reduced the number of active leaks in VEDO's system. Specifically, the Replacement Program has allowed VEDO to eliminate almost 1800 leaks associated with BSCI retirements, since 2013, as shown in Attachment E to my testimony. Along with the retired mains themselves, VEDO has been able to eliminate other system components that were required to address issues associated with assets in poor condition. For example, equipment such as "drips" (which are connections to the pipeline that can be connected to a pump) formerly used to remove water from low-pressure mains are eliminated when those mains are eliminated. This means that such system components no longer need to be maintained.

VEDO has also moved approximately 27,000 inside meters to the outside of customer premises. This eliminates the requirement for a more frequent atmospheric-

corrosion check, reduces inconveniences to the customer, and improves employee safety and operational efficiencies.

Through 2017, VEDO has been able to eliminate various inspection and maintenance activities through the retirement of these targeted facilities, including 114 regulator stations, 32 casings, 106 critical valves, 1,069 drips and 1,058 corrosion test stations. Ultimately, these types of improvements provide reliability and safety benefits to VEDO's customers and property owners who live near the replacement project areas and reduce the operating and maintenance costs required to maintain those portions of VEDO's distribution system.

IV. REPLACEMENT PROGRAM EXTENSION

Q18. Is VEDO requesting an extension of its Replacement Program?

A. Yes. VEDO requests an extension of its Replacement Program, and the associated cost recovery in the DRR, in order to complete the retirement of BSCI assets by the end of 2023. In addition to BSCI asset retirement, VEDO will continue to retire and replace services, ineffectively or field coated steel, plastic pipe, and obsolete pipeline components associated with these segments. The capital forecast for BSCI Replacement is shown in the BSCI line item on Attachment B to my testimony. Additionally, VEDO has reviewed its work order records for the installation date of 1955 and prior (when the practice of field coating steel mains was prevalent) and has determined a continued scope of work to replace those assets that are potentially field coated. The cost forecast for this Replacement Program element is shown in the Ineffectively Coated Steel line item on Attachment B. VEDO will also continue to move meters out of customer premises and

replace services, consistent with the current Replacement Program. VEDO provides the details of is DRR cost recovery request in the testimony of Witness Swiz.

While VEDO has made good progress to date, approximately 364 miles of BSCI mains remain active in VEDO's distribution pipeline system. Since 2013, VEDO has continued to perform records reviews and asset assessments and has identified approximately 12 additional miles of BSCI that had not been identified at the outset of the Replacement Program. VEDO must still investigate and remediate leaks on the remaining BSCI assets. The continuation of VEDO's Replacement Program remains essential and necessary to support and maintain the safe and reliable delivery of natural gas throughout the service territory.

Moreover, federal pipeline safety regulations have continued to evolve, increasing the emphasis on pipeline safety through the effective execution of integrity management programs. The DIMP rules require each LDC to implement a risk modeling program that (1) evaluates data related to the nature of its facilities and the potential risks and (2) ranks and prioritizes those risks and the mitigating actions that can be undertaken to address them. Through its DIMP program review and on-going risk assessment, VEDO continues to identify the Replacement Program as the most appropriate risk mitigation activity to address and remediate the highest risk asset classes within VEDO's distribution system, which includes BSCI. The Replacement Program allows VEDO to continue to implement its systematic replacement strategy of targeting and replacing/retiring the highest risk pipe.

The Replacement Program has improved pipeline safety and system reliability and has achieved many benefits as previously discussed; however, the remaining BSCI

assets continue to contribute to distribution system risk by creating leakage and repair rates consistent with the assets retired thus far, and significantly greater than rates associated with protected steel and plastic pipelines. VEDO's Replacement Program is supported by PHMSA as an AA within the gas industry's DIMP implementations and is consistent with risk reduction replacement programs implemented by other LDCs.

V. O&M SAVINGS ADJUSTMENT

Q19. Does VEDO expect cost savings associated with its Replacement Program investments?

A. Yes. VEDO estimates that it will continue to achieve O&M savings associated with the retirement of targeted assets under of the Replacement Program and the resulting reduction of certain maintenance activities and more efficient operation of portions of VEDO's distribution system.

Q20. Does VEDO propose to continue to include a credit in the DRR reflecting these O&M savings?

A. Yes. VEDO recognizes that the O&M savings actually realized from the retirement of BSCI through 2017 are now embedded in the base rate case test year expenses. VEDO has evaluated the actual O&M cost savings achieved due to the replacement of BSCI. In four of the five most recent Replacement Program years, the savings credit provided to customers has exceeded actual savings, and the "per mile retired" credit exceeds the average actual savings over the duration of the Program. Moreover, the $5,882 per mile exceeds even the average actual savings during the most recent three-year period (approximately $5,750). Based on this review, the existing DRR savings credit of $5,882 per mile for retired BSCI continues to be a reasonable estimate of savings, which will continue to vary from year to year. This provides customers with not only the benefit of

reflecting in the DRR the reduced operating costs driven by the Replacement Program, but also guarantees that level of savings for each mile of BSCI main retired.

Therefore, VEDO proposes to continue to provide this credit in the DRR for the Replacement Program extension period. As before, these cost savings accumulate throughout the duration of the Program. VEDO also proposes to continue to compare the per-mile credit to actual achieved savings, and to the extent actual savings in a given year exceeds the cumulative credit, is willing to provide the larger amount to customers as a credit in the DRR. See Attachment F to my testimony for the detailed O&M savings cost comparison.

VI. DISTRIBUTION ACCELERATED RISK REDUCTION PROGRAM UPDATE

Q21. Please describe how the DARR initiatives were identified.

A. In 2010, VEDO established its DIMP in response to the Department of Transportation (DOT) 49 CFR 192 Subpart P distribution integrity management rule (DIMP rule). VEDO has over 5,000 miles of distribution main and approximately 325,000 services that are covered by DIMP. The DIMP rule requires that operators demonstrate knowledge of their system characteristics and operations in order to identify threats and evaluate the risk to the distribution system. Additionally, DIMP requires that operators develop and implement measures to address the threats to their systems, prioritized by highest risk, and monitor the effectiveness of these measures.

In response to DIMP, VEDO identified risks applicable to its distribution system through an iterative risk analysis process that considered specific system attributes such as material type, install date, coating condition, cathodic protection quality, operations and maintenance experience, system failures and subject-matter-expert knowledge. Once

VEDO identified threat categories of high risk impact or significance applicable to its system it then developed and implemented mitigative measures, or AAs, for those specific threats. Finally, VEDO has conducted on-going evaluations of the effectiveness of those measures, and continues to enhance its program by ongoing risk assessments based on improved data that is gathered through the implementation process.

Key identified areas that either present risk or represent mitigation opportunities include: leak management; excavation damage; training and operator qualification; quality assurance; and risk modeling development. With its Replacement Program already in place, VEDO identified specific initiatives designed to further address system risks on a proactive basis, which resulted in creation of the DARR in Case No. 15-1741-GA-AAM (the DARR case). The process used to determine the risks under VEDO's DIMP and define the DARR initiatives is documented within Attachment G to my testimony.

Q22. Please identify VEDO's six DARR initiatives.

A. VEDO's DARR is comprised of six initiatives. They are:

(1) Expanded Leak Management Program

(2) Enhanced Damage Prevention Program

(3) Public Awareness

(4) Workforce Training and Qualification for New Requirements

(5) Pipeline Safety Management System Implementation

(6) Enhanced Risk Modeling and Threat Analysis

Each initiative is detailed within Case No. 15-1741-GA-AAM (the DARR case). The descriptions below are summarized from that case.

Q23. Please describe VEDO's DARR Expanded Leak Management initiative.

A. VEDO's DARR Expanded Leak Management initiative targets the remediation of open grade 3 leaks within VEDO's distribution system. VEDO has historically carried a significant backlog of grade 3 leaks as they are not required to be immediately repaired as long as they are monitored and checked over time. Grade 3 leaks are less severe than grade 1 and 2 leaks and occur in large volumes in the distribution system not associated with the BSCI and other high risk assets scheduled for replacement in the Replacement Program. The Expanded Leak Management initiative consists of two areas of focus: (1) repair assets with open grade 3 leaks to reduce the open leak backlog, and (2) implement process improvements to repair new grade 3 leaks as they are discovered to avoid to a backlog in the future.

Q24. Please describe VEDO's DARR Enhanced Damage Prevention Program initiative.

A. Excavation damages continue to be a significant threat to VEDO's distribution assets. This initiative focuses on targeting and measuring performance of efforts to reduce third party damages to VEDO facilities by increasing the accuracy of and access to VEDO maps and records used in facility locating, increasing the inspection and interaction of Vectren damage prevention personnel with excavation contractors, conducting root cause analysis of damage incidents, and identifying high risk locate tickets with an for heightened attention in terms of facility marking and monitoring during the excavation process. Measuring the performance of this initiative includes tracking damage trends and causes, and conducting quality audits of locator contractor training and performance.

Q25. Please describe VEDO's DARR Public Awareness initiative.

A. VEDO's Public Awareness initiative focuses on increased public awareness campaigns in areas where VEDO is actively modernizing or performing work on assets and facilities.

The messaging in the campaign targets audiences through different forms of media, such as radio, television and social media mechanisms, to communicate awareness of pipeline activities within residential areas, safe practices around construction zones, and how to communicate concerns. With the increase in infrastructure field activities resulting from the Replacement Program, as well as new construction and system improvement, VEDO identified the need to proactively reach out to the public to provide education regarding safe practices.

Q26. Please describe VEDO's DARR Workforce Training and Qualification for New Requirements initiative.

A. VEDO's Workforce Training and Qualification for New Requirements initiative is in response to increased pipeline safety regulatory requirements impacting the number of activities on or around distribution assets that require worker training and qualification. This also includes conducting root-cause investigations to drive lessons learned type training, and encompasses consideration of the quality of training programs and material and the adequacy of the qualification frequency. These efforts drive improvements to policies and processes to mitigate the existence of asset risks.

Q27. Please describe VEDO's DARR Pipeline Safety Management System Implementation initiative.

A. VEDO's Pipeline Safety Management System Implementation initiative involves the development and implementation of a framework designed to reveal and manage risks and threats to gas assets, promote a learning environment, continuously improve pipeline safety and integrity and ensure the safety of those who work and live around VEDO's gas assets. VEDO's safety management system (SMS) implementation plan is designed based upon the American Petroleum Institute (API) Recommended Practice 1173 "Pipeline Safety Management System Requirements." It is the type of compliance

framework adopted by high risk industries such as airlines to promote safe practices and continuous improvements in compliance with applicable regulations. The implementation plan consists of five years of milestones associated with implementing a safety controls framework with a risk register process for collecting and prioritizing risks, a risk assessment process to continually identify and prioritize risks, and a process to document the mitigation plans and monitor their progress and effectiveness. This is a best practice encouraged by PHMSA guidelines.

Q28. Please describe VEDO's DARR Enhanced Risk Modeling and Threat Analysis initiative.

A. The enhancement of system knowledge and the integration of that knowledge in the determination of threats and assessment of risk to the distribution assets is a requirement of VEDO's DIMP. VEDO spent the first five years of DIMP implementation evaluating and enhancing a baseline set of distribution asset data in order to "know its system" as required by the distribution integrity regulations. During that time, advancements in our geographic information system (GIS) and document management systems enabled more direct access to system information from VEDO's risk assessment modeling platforms. This means that VEDO's facility locator and its field personnel can electronically access all system facilities when out performing their work. VEDO evaluated its initial five years of DIMP implementation, and through that evaluation identified the opportunity to enhance its risk modeling efforts to include this expanded set of physical system data, operational and maintenance data, and system performance information to create risk models associated with the distribution system asset types. These asset-based risk models include models for mains, services, valves and pressure regulation. As part of the development of these assets and VEDO's on-going process to improve the quality of its

system knowledge, data completeness and quality assessments are performed on the required data elements to support the identification and prioritization of VEDO's distribution asset threats and development of these models. Many serious pipeline incidents reported in the past such as the 2010 San Bruno explosion in California stemmed in large part from the operator having poor system data to rely upon. VEDO's Enhanced Risk Modeling and Threat Analysis Initiative includes the evaluation of the data required to determine the threats present with each set of assets, the research and field investigation required to improve the completeness and accuracy of those data sets, the development of the models to determine the risk associated with each set of assets, and the validation and implementation of the asset-based risk model. The implementation of distribution asset-based risk models has and will continue to allow VEDO to identify the assets of highest risk, perform root-cause analysis to determine the drivers of the risks and threats to mitigate, and to appropriately scope and prioritize the mitigation activities.

Q29. Has VEDO developed specific performance measures for each initiative in compliance with the Order in the DARR case that allowed deferral of the costs associated with the DARR initiatives?

A. Yes. VEDO has developed specific performance and risk reduction metrics associated with each initiative of the DARR which included establishing historical baselines for comparison prior to the initiation of the program on January 1, 2016. These performance measures include financial metrics for the overall program and for each initiative, systems operations and maintenance metrics such as leak volumes and facility damages, project milestone metrics such as phase completion for SMS implementation and risk modeling. VEDO maintains the on-going performance metrics in its program management document provided as Attachment H to my testimony. VEDO has provided

this metric reporting to the Commission Staff throughout the implementation of the program.

Q30. Please provide an update on the progress and performance of VEDO's DARR Program.

A. VEDO's DARR was originally defined as a three year program ending in 2018. VEDO has completed two years of the program and has monitored the performance and evaluated the effectiveness of each initiative. VEDO has deferred $2.2 million and $3.9 million of O&M expenses associated with executing the DARR initiatives in 2016 and 2017, respectively. VEDO projects to defer an additional $3.9 million to support DARR initiatives in 2018.

VEDO has achieved the DARR initiative performance and risk reduction targets by:

- mitigating over 3,000 grade 3 leaks;
- reducing the facility damages rate (damages per 1000 locates performed) from 2.53 in 2015 to 1.85 in 2017;
- improving public awareness of where VEDO asset work is taking place as well as appropriate safe work practices in pipeline rights-of-way and in construction zones by conducting quarterly campaigns;
- training and evaluating over 4,300 additional covered tasks required by PHMSA to meet new technical training and workforce qualification requirements;
- identifying a comprehensive set of SMS risks and decreasing them by 3% annually; and
- completing the development and implementation of three distribution asset-based risk models.

These costs and individual DARR initiative performance metrics are provided in Attachment H to my testimony.

Q31. Please describe the benefits of VEDO's "Expanded Leak Management Program" DARR initiative.

A. VEDO's DIMP mitigation activities included additional leak surveys of VEDO's distribution system in order to proactively identify leaks. Over time, the number of leaks discovered across the system increased as a result. VEDO resources were consumed remediating grade 1 and grade 2 leaks as required by federal pipeline safety regulations resulting in a backlog of grade 3 leaks – non-hazardous leaks that are allowed to remain open in the system under PHMSA regulations. Over time, this backlog grew to almost 4,000 leaks with more continuing to be discovered each year. Open leaks within the system create risk and cause duplicate leak or odor calls, reduce sensitivity of the public to detect gas odors and report leaks, and contribute to the methane emissions of the Company. Additionally, resources are consumed on rechecking open grade 3 leaks instead of performing the remediation of the leak itself. Since the onset of the "Expanded Leak Management Program" in 2016, VEDO has remediated 3,313 leaks from the grade 3 leak backlog and has only 505 grade 3 backlog leaks remaining in the system. The remaining 505 are scheduled to be remediated in 2018. Additionally, VEDO reduced the number of overall leaks remaining open in the system by almost 1,000 from 2016 to 2017. VEDO remediated 1,331 grade 1 and 1,216 grade 2 leaks. Attachment H, pages 2-3, show the metrics and performance to-date for the "Expanded Leak Management Program" DARR initiative.

Q32. Please describe the benefits of VEDO's "Enhanced Damage Prevention Program" DARR initiative.

A. The reduction of facility damages continues to be a critical mitigation activity within VEDO's DIMP as the number of one-call tickets and locates performed for VEDO's assets have continued to increase since 2008. VEDO's DIMP requires action to reduce

the facility damages rate, or rate per 1000 locates. VEDO had observed its damage rate increasing from 2.4 in 2012 to 2.5 in 2013 and increased again to 2.7 in 2014. VEDO's "Enhanced Damage Prevention Program" DARR initiative focuses on reducing the number of damages to VEDO's distribution system by: (1) improving the data and information used to locate distribution facilities; (2) staffing the role of damage prevention specialist to assist in targeted contractor relations and additional presence at projects with a higher potential to damage facilities; (3) conducting quality audits and training with our contract locators; and (4) implementing a ticket risk assessment model to identify one-call tickets with a high potential for damage to occur and assign mitigative actions to reduce the likelihood of a damage. Since the implementation of VEDO's "Enhanced Damage Prevention Program", the damage rate has decreased to 2.27 in 2016 and decreased again to 1.85 in 2017. VEDO attributes this reduction to the improvement of locating quality as a result of the efforts described above, as well as increased public awareness efforts. Attachment H, page 4, shows the metrics and performance to-date for the "Enhanced Damage Prevention Program" DARR initiative.

Q33. Please describe the benefits of VEDO's "Public Awareness" DARR initiative.

A. Public Awareness activities is another initiative developed in response to system risk identification consistent with our DIMP program. As construction activity increases on and around VEDO's distribution assets, DIMP has identified the necessity to continually educate the public on safe practices around gas assets. Such education includes responses to these common questions:

- what actions to take when you smell gas;
- why should you call before you dig; and
- how can you be safe around our work zones?

VEDO runs campaigns throughout the entire calendar year and evaluates performance metrics for the campaign messaging on a quarterly basis. As part of VEDO's DARR performance management requirement, the public awareness performance metrics are monitored from a historical baseline starting Q1 2015 through the end of 2017. This is shown in Attachment H, page 5. Metrics show that approximately 90 percent of residential customers are aware of the "Call before you dig" phone number; that 80 percent feel that VEDO effectively communicates how to be safe around natural gas and that the information provided is clear and understood. Based on the historical public awareness campaign trends, VEDO has concluded that the on-going messaging is necessary to maintain the current level of awareness; this initiative also supports the improved facility damage rate discussed above.

Q34. Please describe the benefits of VEDO's "Workforce Training and Qualifications for New Requirements" DARR initiative.

A. Ensuring that VEDO's workforce performing tasks on gas assets is qualified is necessary to maintain the integrity of VEDO's gas system. As regulations have become more prescriptive on what tasks must be qualified, as well as the content and frequency of the training, it has been necessary for VEDO to enhance its workforce training and operator qualification (known as OQ) programs. The OQ program is subject to audit by the Commission's pipeline safety division. In addition to developing the training content and materials and establishing the training schedules, these enhancements include more hands-on performance evaluations ensuring personnel can adequately perform the task

prior to being assigned the field activity. It also includes training and maintaining a qualified set of hands-on evaluators for those critical construction, operations and maintenance tasks that require hands-on evaluation. As a result of the enhanced efforts in this area, VEDO has greatly increased worker performance evaluations which translates to better performance and safety in executing covered tasks. Attachment H, page 6 shows the initiative metrics and next milestones to continue the enhancement of VEDO's workforce training and qualification activities.

Q35. Please describe the benefits of VEDO's "Pipeline Safety Management System Implementation" DARR initiative.

A. VEDO's "Pipeline Safety Management System Implementation" satisfies the requirement within VEDO's DIMP and other integrity programs to annually collect and determine risks to gas assets, identify threats to the system, develop mitigation activities, and evaluate the effectiveness of mitigation actions on risk reduction. This is the foundation of VEDO's safety compliance program and drives the actions planned to improve system safety. The implementation of VEDO's SMS has improved the risk assessment process, which was heavily focused on asset performance and failures, and now equally identifies risks associated with human factors, environmental factors, and process and procedural factors. SMS has identified an expanded set of risks, in addition to those identified from VEDO's integrity management risk models, and has prioritized them on a common scale and established a threshold for mitigation.

VEDO's SMS supports the requirements of integrity management and pipeline safety compliance by ensuring processes necessary for compliance with those plans have change management processes and controls that are reviewed at least annually and that any defects are mitigated. The SMS risk register contains almost 1000 line items of risk

with a threshold of anything above two standard deviations being evaluated and tracked for mitigation. Examples of risks above this threshold include potential damage to critical feeds within VEDO's distribution system, the quality of and access to information on VEDO's services, workforce turnover for key construction, operations and maintenance functions, the potential and preparedness for natural disasters, and the potential for system pressure exceedances. The SMS process is inherently continuous in nature and so will produce ongoing mitigation activities designed to improve safety and system performance.

Q36. Please describe the benefits of VEDO's "Enhanced Risk Modeling and Threat Analysis" DARR initiative.

A. VEDO's DIMP requires the on-going identification of risks to VEDO's distribution system and the prioritization and mitigation of the highest risks. Also part of the risk assessment process is the requirement to continually improve the information used to identify those risks to the system and to incorporate new and improved information into the threat assessment process. VEDO's initial distribution risk model relied upon the most prevalent and reliable sources of information on the performance and operation of VEDO's system, specifically asset type, material type, leak rate and leak cause. As VEDO's DIMP was implemented over time, advancements in data quality and technology have allowed VEDO to enhance its models and risk assessment process to identify opportunities in data quality enhancements; evaluate a broader set of threats specific to certain asset types like pipeline, services, pressure regulation and valves; and predict the impact that system risk mitigation activities may have in order. This, in turn, permits VEDO not only to prioritize effort and resources to the actions that expected to reduce the most risk but also to validate the effectiveness of those actions as they are

executed in a more real-time fashion, as well as over time by monitoring failure trends and root causes. VEDO's enhanced model validation process includes evaluating risk results against historical system performance and failures as well as the performance of mitigation activities and the results of this validation phase for the pipeline model has been vetted through this process. The model identifies additional areas of risk, such as opportunities to improve gaps in asset data, which in turn reduces gaps in data elements critical in identifying risks or scoping mitigation activities, as well as the need to replace asset types that are demonstrating an increasing trend in leak rate and maintenance actions. These models will enable VEDO to identify and remediate areas of distribution system risk, which helps enhance safety and improve reliability. Attachment H, pages 9-10 discuss the progress and timing for VEDO's enhanced asset-based risk model implementation.

Q37. Have the results to date from VEDO's enhanced distribution asset risk modeling identified additional high risk assets for replacement consideration?

A. Yes. The enhanced pipeline risk model has been substantially completed, and the process of utilizing the model and refining its output continues. Review of the model results in conjunction with other improvements to records and data collection has identified other categories of pipeline assets that may pose similar risks, such as vintage "Aldyl-A" plastic and coated unprotected steel discussed in the testimony of VEDO Witness Ellis S. Redd. Additional assets under investigation also include obsolete regulators and equipment, and non-standard pipeline and appurtenances. VEDO believes that feedback gained from the risk model should be considered in the context of designing and carrying out the Replacement Program prospectively.

Q38. Does VEDO propose to continue the DARR and distribution risk reduction activities and include those on-going costs in base rates?

A. Yes. Distribution asset risk reduction is a required component of an operator's DIMP. VEDO accomplishes distribution asset risk reduction through many efforts to ensure the mitigation of threats of legacy assets and improve the construction and maintenance of newly constructed assets as to minimize the presence of threats and ensure the on-going reliability of VEDO's distribution system. The DARR initiatives are included in these on-going efforts that are required as part of VEDO's DIMP and to meet other PHMSA pipeline safety regulations. Therefore, VEDO proposes to reflect the costs of these DIMP initiatives as a necessary adjustment to its test year given these initiatives are driven by pipeline safety regulations, and they serve to reduce system risk and improve reliability. The nature of a compliance program is to continuously improve performance, and failing to continue funding for programs that have proven to be beneficial in reducing risk is not an appropriate option.

Q39. Please discuss VEDO's on-going DARR and other distribution risk reduction activities.

A. As a result of its DIMP and SMS, VEDO recognizes that on-going activities to reduce distribution system risk are necessary to comply with existing pipeline safety regulations. While DARR began as a three year program, the success of the initiatives and the remaining and on-going work to be done support continuance of these operational activities. For example, it is necessary to continue to repair grade 3 leaks within VEDO's system in order to avoid recreating an open leak backlog, focus on efforts to continue to reduce continuing risks of damages to VEDO's distribution system so that the third party damage rate continues to decline, perform and monitor operator qualification of tasks necessary to safely construct, maintain and inspect VEDO's distribution system, enhance

the quality and availability of physical and operational and maintenance data, and identify and prioritize risks for mitigation through advancements in distribution asset risk modeling and the execution of VEDO's SMS. Furthermore, VEDO understands that pipeline safety requirements are evolving and increasing the scope and prescriptiveness of integrity management requirements for transmission, distribution and storage assets. It is necessary for VEDO to continue to enhance its knowledge of the system, proactively identify threats and prioritize mitigation activities to ensure compliance with the regulations as they exist today and be prepared for the increased stringency and enforcement of pipeline safety regulations to come.

Q40. What are the on-going O&M expenses associated with the DARR and other related distribution risk reduction activities?

A. VEDO reviewed the program-to-date DARR Program costs, the 2018 estimated costs, and the five-year forecast of continued DARR-related expenses. VEDO believes that a five-year average of these projected expenses is reasonable and has included that amount in the test year, resulting in additional expense of approximately $3.6 million. The projected five-year average expenses for each DARR initiative are as follows, and slightly less than what VEDO expects to occur in the twelve months following the test year:

DARR Initiative	Five Year Average Cost
Expanded Leak Management Program	$1,600,000
Enhanced Damage Prevention Program	$625,500
Public Awareness	$225,050
Workforce Training and Qualification	$250,050
Pipeline Safety Management System Implementation	$200,026
Enhanced Risk Modeling and Threat Analysis	$650,000
Total	$3,550,626

As explained by Witness Swiz, these expenses are not included in VEDO's test year, and this adjustment is necessary to reflect an ongoing level of expense to be able to support the continuation of these programs. In addition, the DARR Program costs deferred, estimated through 2018, are approximately $10.1 million, which will be amortized in rates over three years as explained by Witness Swiz. These expenses are shown on Schedule C3.17 and supported by work paper WPC 3.17.

Q41. Has VEDO included TIMP and DIMP expenses within the test year operating expense budget?

A. Yes. VEDO will continue to incur costs associated with TIMP and DIMP; $6.0 million of expense associated with TIMP compliance and $0.5 million of expense associated with DIMP compliance is included in the unadjusted test year. Consistent with the approach used for the ongoing DARR-related expenses, VEDO has again used a five-year average of projected TIMP and DIMP expenses to support an adjustment to the test year of $(1.3) million (a reduction of $(1.4) million for TIMP and an increase of $0.1 million for DIMP). These adjustments, discussed in greater detail by Witness Swiz and included on

Schedule C-3.17, result in a $4.6 million for ongoing TIMP compliance expense and $0.6 million for ongoing DIMP compliance expense for a total of $5.2 million.

Q42. Why is a five-year average of expenses for DARR, DIMP, and TIMP reasonable and appropriate in determining the ongoing level of expense in base rates?

A. The unadjusted test year contains three-months of actual expenses and nine-months of budgeted expenses. Specific to DIMP and TIMP compliance activities, VEDO has recognized that it plans to conduct an increased level of in-line inspection integrity assessments, field investigations and distribution records collection and mining in this period. Moving forward, VEDO expects the activities, which will still vary somewhat from year to year, to level out at the adjusted projection. VEDO's comprehensive budget and forecast process, as discussed in detail by Witness David M. Bowler, reflects the operational plan set forth by me and my team for these compliance activities. Because of the fluctuations in each annual year of the plan for these programs, use of a five-year average based on these detailed budget and forecast periods provides a better representation of VEDO's ongoing compliance plan expenditures for DARR, DIMP, and TIMP.

VII. CONCLUSION

Q43. Does that conclude your prepared direct testimony?

A. Yes, it does.

BSCI Retirement Mileage

	Retirement Miles									
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**Total**
Miles BSCI Retired	24.47	16.91	34.7	36.41	43.8	44.8	57.28	48.53	46.72	**353.62**

Replacement Program Capital Investment 2018-2023

	Capital Investment ($000's)						
Replacement Program Element	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**Total**
Bare Steel/Cast Iron	$ 56,500	$ 58,000	$ 60,000	$ 60,000	$ 50,000	$ 45,000	$ 329,500
Service Replacements	$ 9,000	$ 9,000	$ 9,000	$ 9,000	$ 8,500	$ 8,500	$ 53,000
Ineffectively Coated Steel	$ 4,500	$ 4,500	$ 7,500	$ 5,000	$ 5,000	$ 5,000	$ 31,500
Total	**$ 70,000**	**$ 71,500**	**$ 76,500**	**$ 74,000**	**$ 63,500**	**$ 58,500**	**$ 414,000**

BSCI Retirement Schedule

	Retirement Miles						
Material Type	2018	2019	2020	2021	2022	2023	Total
Bare Steel	53	56	56	56	46	43	**310**
Cast Iron	9	9	9	9	9	9	**54**
Total	**62**	**65**	**65**	**65**	**55**	**52**	**364**

Leak Discovery

Year	2013	2014	2015	2016	2017
Leaks Discovered -Mains	149	160	136	155	90
Leaks Discovered - Services	935	921	659	774	480
Total Leaks Discovered	**1084**	**1081**	**795**	**929**	**570**

BSCI Leak Elimination

Year	2013	2014	2015	2016	2017	Total
BSCI Leaks Closed	285	347	359	365	441	**1797**

Operating & Maintenance Savings Comparison

		A	B	C	D
		Miles Retired		Baseline Savings	
1	Baseline Miles BSCI and Savings :	112.49		$ 294,116	

		Miles Retired	Calculated Savings per Mile	2015 Calculated Annual Savings	Actual Annual Savings
2	Savings from 2013 Retired BS/CI Mileage	43.80	$ 5,882	$ 257,632	$ 206,138
3	Savings from 2014 Retired BS/CI Mileage	44.80	$ 5,882	$ 263,514	$ 224,589
4	Savings from 2015 Retired BS/CI Mileage	57.28	$ 5,882	$ 336,921	$ 284,133
5	Savings from 2016 Retired BS/CI Mileage	48.53	$ 5,882	$ 285,453	$ 260,988
6	Savings from 2017 Retired BS/CI Mileage	46.72	$ 5,882	$ 274,807	$ 331,513
7	Annual Savings Subtotal			$ 1,418,327	$ 1,307,361

			Total Calculated Savings	Total Actual Savings
8	Total Miles BSCI Retired (2013-2017)	241.13		
9	Savings Per Mile Comparison (2013-2017)		$ 5,882.00	$ 5,421.81

			Total Calculated Savings	Total Actual Savings
10	BSCI Program-To-Date Savings Comparison		$ 1,712,443	$ 1,601,477
11	Total Miles BSCI Retired (Program-to-Date)	353.62		

		Calculated Total Savings per Mile	Actual Total Savings per Mile
12	Savings Per Mile Comparison (Program-to-Date)	$ 4,842.61	$ 3,697.08

VECTREN ENERGY DELIVERY OF OHIO
DISTRIBUTION ACCELERATED RISK REDUCTION PROGRAM (DARR)

I. INTRODUCTION

In 2010, Vectren Energy Delivery of Ohio (Vectren) created the Distribution Integrity Management Department in response to the development of the Department of Transportation (DOT) 49 CFR 192 Subpart P distribution integrity management rule. The department is responsible for developing, maintaining and implementing a plan, performing the daily activities, and managing the programs required to meet the Distribution Integrity Management regulations. Vectren has over 5,000 miles of distribution main and approximately 325,000 services that are covered by the Distribution Integrity Management Program (DIMP).

This document describes the process through which Vectren has identified both the key areas of risk to be addressed by the DIMP and the initiatives developed by Vectren to continue satisfying state and federal pipeline-safety regulations. The DIMP initiatives Vectren has identified as a result of its risk analysis form the Distribution Accelerated Risk Reduction (DARR) Program. Cost estimates for the DARR Program from 2015-2018, incremental to costs already recovered in base rates, are included below.

II. BACKGROUND

Pipeline safety regulations 49 CFR 192 Subpart P require an operator with gas distribution assets to implement a DIMP meeting minimum requirements outlined in the subpart including:

- developing a written distribution integrity management plan;
- demonstrating knowledge of the system and its characteristics;
- identifying threats;
- evaluating risk;
- identifying and implementing measures to address risk;
- monitoring results and measuring performance;
- performing periodic reviews; and
- reporting on measures annually.

In 2010, Vectren created a group whose role was to create and implement a DIMP to meet regulatory requirements. During the following five years, Vectren developed and implemented a distribution integrity management plan; created data collection processes; developed a risk model; documented existing additional/accelerated actions (AAs); developed tools for analysis; established a baseline against which to measure program performance; and developed and executed projects to mitigate risk as part of the pipeline modernization program.

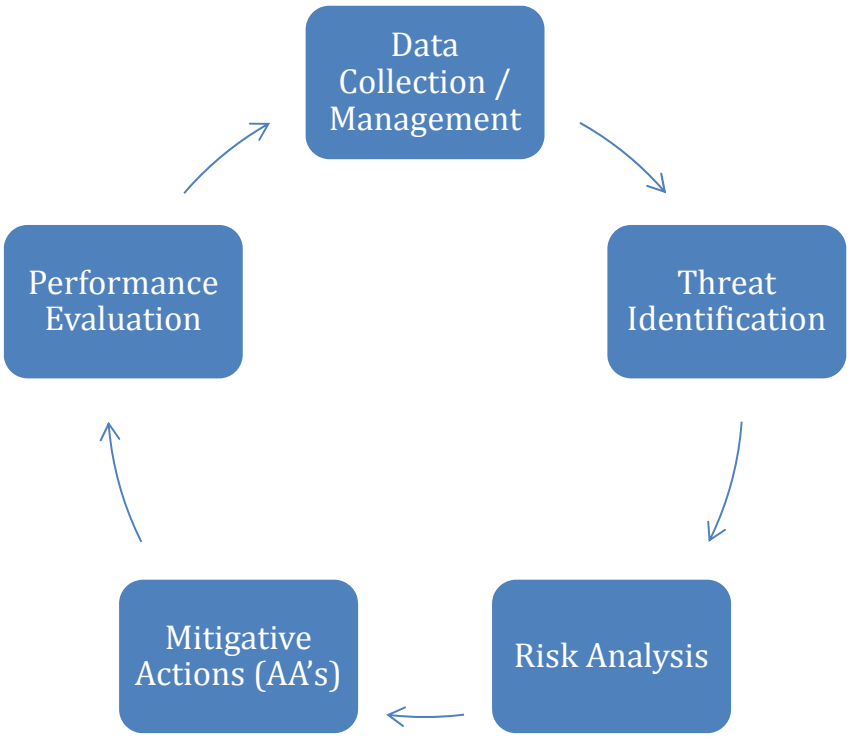
III. RISK ANALYSIS PROCESS

Vectren identified risks applicable to the distribution system through risk modeling and subject-matter-expert (SME) threat analysis. Vectren then created processes to collect and

manage data to support risk evaluation of the following threats, as defined by Federal DOT regulations: corrosion; natural force damage; excavation damage; sewer transection; other outside force damage; material, joint, or weld failure; equipment malfunction; inappropriate operations; and encroachments.

Vectren manages distribution risk through a process of on-going data collection and management of change; risk modeling and evaluation of results; and developing and implementing risk-mitigating activities through asset strategies and AAs. Vectren then evaluates the effectiveness of mitigation activities and the program performance annually, including assessing trends of identified threats.

Figure 1: Distribution Risk Management Cycle



Vectren updates the distribution risk model at least annually to evaluate the risks across the system. The risk model uses the most up-to-date information available regarding the system based on data collection and management processes, such as asset data, leak history, and population data. Each area of risk or change in risk identified is reviewed by distribution integrity engineers and SMEs, including field operations personnel, and additional information is added to support the analysis. Mitigating actions are developed based on the analysis and can include the creation or revision of AAs or development and scheduling of modernization projects, such as replacement of bare steel and cast iron assets.

Vectren considers certain threats (such as corrosion and excavation damage) as ever present and on-going and thus requiring mitigation, even if those threats are not identified as top threats by the risk-analysis process. This treatment reflects the potential impact of the threat on the system and the prevalence of these threats industry-wide. For example, excavation damage creates serious issues on Vectren's system and is the leading cause of serious incidents industry-wide.

The risk analysis process has identified areas of focus for risk reduction activities: leak management; excavation damage; training and operator qualifications; quality assurance; and enhancement of risk modeling.

A. Leaks, Corrosion and Material, Joint and Weld Failure Threats

From risk analysis, Vectren identified that the leading areas of risk and cause of leaks are related to corrosion and material, joint, and weld failure threats. Vectren has identified a large volume of open leaks related to these threats and an increasing trend in leak discovery. A focused program to eliminate open leaks and mitigate leaks at discovery will reduce the risk related to these threats.

B. Excavation Damage Threat

Excavation damage has been identified as a significant contributor to the distribution system risk and continues to be an area identified by SMEs. Excavation damage is an on-going threat that requires continual mitigation and monitoring. Recently, Ohio updated its excavation damage laws, heightening the focus on damage prevention by contractors and operators. Third-party construction work has increased and shows an increasing trend as evidenced by the increased number of one-call tickets and locate requests around the distribution assets. First-party construction activity has increased due to risk-mitigating actions, such as main and service replacement programs expanding into more neighborhoods through pipeline modernization, requiring an increased need for public awareness to promote public safety. Enhancements in the quality and availability of data used to locate mains and services will aid in the mitigation of the excavation damage threat.

C. Training and Operator Qualification

Vectren risk analysis determined that increased training and operator qualification requirements and controls would tend to mitigate joint and weld failure threats. Accordingly, Vectren intends to enhance the training and qualification of operating and construction personnel to ensure that pipeline tasks continue to be performed consistently by well-trained and competent operators, even as the demand on resources increases and pipeline-safety regulations evolve.

D. Quality Assurance

Vectren identified the need for a centralized quality-assurance program to ensure that risk-mitigation activities and processes are well documented and performed to the applicable standard. This effort will require the development of new processes designed to ensure

compliance and safety. It will provide an on-going and proactive measurement process to allow for early detection of threats and risks and assessment of risk-mitigating activities promoting continuous improvement as required by the DIMP rules.

E. Risk Modeling and All Threats

Through many cycles of risk analysis and measuring the effectiveness of risk-mitigating activities, Vectren identified the need to enhance the risk model to provide a greater level of detail on each threat and include a broader amount of asset data to ensure all risks may be identified and mitigated effectively.

Together, all of the foregoing efforts will position Vectren to continue the growth of the DIMP by:

- reducing risk by eliminating open leaks and collecting additional root-cause information for use in threat analysis;
- increasing data mining of historical records and improving data collection efforts to maintain distribution data required through everyday work processes to accelerate risk management efforts;
- improving risk assessment by enhancing information systems and risk model algorithm to assign risk at an asset level;
- implementing AAs to address threats to the distribution system to reduce excavation damage and increase public awareness;
- enhancing the training and qualification program to ensure best work practices; and
- implementing a pipeline safety management system to ensure the quality and effectiveness of its pipeline safety programs.

IV. PROGRAM DESCRIPTION

The DARR Program comprises six initiatives to support pipeline safety, continue the execution of DIMP, and address the identified threats to mitigate risk. These activities are in line with industry actions and regulatory recommendations to manage an effective pipeline safety program. This program includes the following initiatives: Expanded Leak Management Program; Enhanced Damage Prevention Program; Public Awareness; Workforce Training and Qualification for New Requirements; Pipeline Safety Management System Implementation; and Enhanced Risk Modeling and Threat Analysis.

Table 1: Distribution Accelerated Risk Reduction Initiatives and Threats of Focus

Initiative	Threats of Focus
Expanded Leak Management Program	Corrosion; Material, Joint and Weld Failure
Enhanced Damage Prevention Program	Excavation Damage
Public Awareness	Excavation Damage
Workforce Training and Qualification for New Requirements	Material, Weld and Joint Failure; Inappropriate Operations
Pipeline Safety Management System Implementation	Inappropriate Operations, and all other threats
Enhanced Risk Modeling and Threat Analysis	Corrosion, Material, Joint and Weld Failure, and all other threats

Vectren evaluated internal and contract resource needs and timelines for each initiative to produce program estimates from 2015-2018. Vectren currently performs and has historically performed activities to manage and repair leaks, execute DIMP, manage training and operator qualification, and prevent damages. DARR Program costs are incremental both to the costs reflected in base rates and to the level of costs incurred during calendar year 2014. Vectren is proposing deferral treatment only for these incremental costs.

Table 2: Distribution Accelerated Risk Reduction Program (2016 – 2018)

Program Element	2016	2017	2018
Expanded Leak Management Program	$1,250,000	$1,250,000	$1,250,000
Enhanced Damage Prevention Program	$725,000	$770,000	$775,000
Public Awareness	$200,000	$200,000	$200,000
Workforce Training and Qualification for New Requirements	$247,219	$255,840	$263,515
Pipeline Safety Management System Implementation	$107,909	$110,441	$138,754
Enhanced Risk Modeling and Threat Analysis	$362,572	$362,408	$445,000
Grand Total	**$2,892,700**	**$2,948,689**	**$3,072,269**

A. Expanded Leak Management Program

Vectren monitors open leak count, grade, and cause as part of the risk analysis process and has identified an increasing trend in open grade 3 leaks and leak discovery. Among other issues, open leaks consume company resources (such as routine rechecking and responses to odor calls) without eliminating the leak. New regulations and emission-reduction programs also require minimizing methane emissions.

Vectren's current leak management program allows for grade 3 leaks to remain open; however, grade 3 leaks are required to be reevaluated at least every 15 months while open, which results in increased diversion of field response personnel time spent on open leak monitoring. The volume of open leaks is over 4,400 and has been increasing on average by over 900 leaks each year. The DARR Program includes an expanded leak management strategy to eliminate open grade 3 leaks and remediate new ones as they are detected to avoid a backlog in the future. The Expanded Leak Management Strategy will be centrally managed with dedicated resources to complete repairs efficiently. It will reduce distribution system risk, and allow field personnel to focus efforts on higher priority pipeline safety tasks increasingly spent on open leak rechecks and duplicate leak calls.

The Expanded Leak Management Strategy will address safety concerns and remediate system threats of corrosion, excavation damage, and material, joint and weld failure. The Strategy consists of two basic parts: (1) repair assets with open grade 3 leaks and (2) implement a strategy for grade 3 leak repair and replacement at discovery. Vectren has evaluated the open leaks for repair using an asset-based risk score and leak characteristics, such as above-ground, below-ground hard surface, or below-ground soft surface, and created a repair priority that has been optimized for geographical efficiencies. The repair plan takes into account asset replacement projects that would eliminate the leak and deprioritizes those leaks. This Strategy also entails improvements and efficiency gains regarding existing leak management programs.

The Expanded Leak Management Strategy will also help Vectren reduce methane emission, which is becoming increasingly important for operators due to heightened Environmental Protection Agency (EPA) focus. As part of its Gas Asset Management and Environmental Department Initiatives, Vectren reviews methane emissions, which it is required by 40 CFR 98 Subpart W to report, and has started initiatives to reduce those emissions. Those initiatives include joining the Natural Gas Star Program, which encourages oil and natural gas companies to adopt operational practices and technologies to reduce methane emissions.

B. Enhanced Damage Prevention Program

Vectren's DIMP team has evaluated damage prevention metrics and root causes to create an AA to address the threat of excavation damage and reduce the number of facility damages, leading to the Enhanced Damage Prevention Program. This program is designed to (1) execute historical research efforts, (2) improve electronic data submission, tracking and maintenance, (3) add Damage Prevention Specialists to increase monitoring of construction contractor communication and activity, and (4) prioritize locate responses and perform increased analysis to identify root causes and mitigate risks through a risk assessment model.

In recent years, Vectren distribution assets have experienced an upward trend in facility damages. In 2008, in compliance with a federal mandate, Vectren developed a facility damages metric to measure both the number of incidents of damage per 1000 locate tickets and the success of Vectren's damage prevention efforts. Since that time, Vectren has developed a damage prevention scorecard that includes damage prevention targets and monitors the at-fault versus third-party damage rate. The current year's projection is 2.7 damages per 1000 locate tickets, increasing on the damage rates of 2.38 damages per 1000 locate tickets in 2013 and 2.50 damages per 1000 locates in 2014. Over 50% of all damages incurred are on service lines. Historically, approximately 70% of all damages incurred have been determined to be excavator at-fault. Additional actions would help to reduce the number of incidents of damage and achieve the damage prevention targets for pipeline safety.

Vectren's locating process includes reporting root causes when assets are difficult to locate. Errors in the geographical information system (GIS) mapping system are among the most frequent root causes reported. Targeted records research, distribution work order data mining, and GIS mapping system updates performed will improve the accuracy and availability of system information used when locating assets. These activities will also tend to increase employee and public safety and decrease outages.

Vectren also identified the need to increase the presence of Vectren personnel while activities are performed near its assets to bring increased awareness of pipeline safety practices to workers and to provide support, when necessary, to determine the root cause of damage incidents. The Enhanced Damage Prevention Program includes a Damage Prevention Specialist to actively engage with construction contractors performing work in Vectren pipeline right-of-ways. The Specialist monitors excavations in Vectren right-of-ways, investigates incidents of damage in the field, meets with contractors performing work, determines root causes of damage, and develops actions to prevent future damage.

In an effort to focus resources and damage prevention efforts at the most relevant areas, Vectren is working with its contract locating company, USIC, to implement a locate-ticket risk assessment model. The model uses information from locate tickets and previous incidents of damage, such as work type and excavators with a history of damages, to assign a relative-risk ranking to the locate tickets. This allows Vectren to use the results to focus damage prevention efforts through increased communication and resourcing. Model results will be used to increase priority and attention to high-risk locate tickets through notification to specialists and field personnel. Results will be evaluated along with facility damages and used by the public awareness program to focus communications and emphasize the importance of the 811 "Call Before You Dig" process and excavation safety with excavators, counties and the public in areas of high-risk tickets and high damages.

Historically, services lines were owned and maintained by the customer, so service line locations and attribution (such as active or retired status, size, material and installation date) were not included in the GIS mapping system. Service lines are difficult to locate and have made up 63% and 59% of total incidents of damage in 2013 and 2014. Sampling of service card completeness has been performed to develop an AA to address the incomplete data on service

lines in the GIS mapping system. The Enhanced Damage Prevention Program includes data mining service cards and collecting data on stubs to improve available GIS data.

C. Public Awareness

Vectren has experienced increased activity around the pipeline system due to pipeline safety projects through its modernization program and additional third-party activity, impacting more of the public living around pipeline assets. This is evidenced by the increase in locate tickets. Vectren has evaluated the increased activity and identified the need to increase its communications with these communities to make them aware of continued efforts in pipeline safety and how they may be impacted.

Vectren is expanding communication efforts with the general public, contractors, community officials and emergency responders to provide improved awareness of pipeline safety efforts and education of safe practices around its construction and crews. The Public Awareness Initiative will provide increased funding for additional communication campaigns around damage prevention and pipeline safety efforts and focus on public safety around Vectren assets and crews.

D. Improved Workforce Training and Qualification

Operator qualification and training is required to ensure safe construction, maintenance, repair, and inspection practices. Well-trained and qualified personnel are necessary to protect the integrity of the assets, address threats, and reduce overall risk, particularly in light of Vectren's ongoing infrastructure modernization efforts. Recent developments have made meeting these critical requirements more difficult.

State and federal pipeline-safety regulations continue to evolve. PHMSA has recently completed a number of rulemakings and a number of planned rulemakings are on the horizon. For example, PHMSA published the final rule "Pipeline Safety: Miscellaneous Changes to Pipeline Safety Regulations" in March 2015, which requires plastic pipe joiners to be re-qualified both annually and prior to performing any more joins should any production joint fail due to human error. As a result, Vectren required staff to determine the root-cause of joint failures, and the company also improved the electronic detail and tracking of operator qualifications regarding pipe joining. As data and programmatic needs increase, Vectren has implemented technology to assist in performing pipeline activities and capturing the work and records performed. As part of that same rule, PHMSA is also increasing requirements on construction inspection, which will increase training and qualification for personnel performing those activities as well as those inspecting construction activities. Additionally, PHMSA recently issued a notice of proposed rulemaking on Operator Qualification, which would require increased training and qualification of personnel performing emergency response activities and control room activities. Other planned rulemakings will also impose new obligations on Vectren and its personnel, with similar cascading effects on policies and procedures and further increasing the need for new and refresher training.

Compounding this challenge, Vectren is also experiencing a turnover of qualified personnel due to an aging workforce and has increased hiring and recruitment. With that and the increase in hiring skilled resources in the gas industry due to shale gas and pipeline expansions, Vectren has found it necessary to increase the robustness of its operator qualification and training program to address personnel of varied levels of pipeline experience, education and work history.

In response to these new challenges, and based on its review of risk and threat analysis, the DIMP team has identified incremental training and improvements to policy, procedures, and methods. Incremental training will be provided to existing operations personnel, and training for new personnel will also be expanded.

Vectren has also enhanced its operator qualification program and has required, starting June 30, 2015, more hands-on performance evaluations in order to qualify an employee for a covered task. In total, the number of covered tasks requiring a performance evaluation increased from 48 to 145. In addition to program enhancements, Vectren will also add one or more full-time training consultants and contracted training personnel to the technical training department, to manage the increase in training requirements, performance evaluations, and related documentation. Incremental training will include:

- Increase in hands-on performance evaluations to improve safety and compliance.
- Development of training content and simulations for additional performance evaluation forms (PEFs) to qualify to perform tasks.
- Improvement of simulations for existing PEFs.
- Establishment of evaluator training on a reoccurring interval.
- Qualifying of evaluators to perform hands-on evaluation.
- Enhancement of documentation and tracking of training materials and qualifications.
- Contractor compliance meetings to review qualification status and tasks allowed to be performed by contract service providers.

In addition to further reducing operator error in areas of construction, maintenance, leak repair, emergency response, and inspection, these training efforts will help ensure that Vectren continues to field a skilled and qualified workforce in an environment of changing and increasing pipeline regulations. These efforts will also emphasize record completion and documentation of activities to enable Vectren to continuously increase knowledge of the system through normal activities conducted on the pipeline.

E. Pipeline Safety Management System Implementation

The term “pipeline safety management system” (PSMS) refers to an industry-recommended practice that, when applied, provides a framework to reveal and manage risk, promote a learning environment, and continuously improve pipeline safety and integrity. A

PSMS involves a comprehensive change to the management lifecycle framework that drives a safety culture including pipeline safety, employee safety and public safety.

In 2014, the American Petroleum Institute (API) Recommended Practice 1173 "Pipeline Safety Management System Requirements" was developed to create a structure for pipeline safety operators to implement governance, communication, and quality assurance processes around existing pipeline safety programs. Additionally in 2014, PHMSA issued "Guidance for Strengthening Pipeline Safety through Rigorous Program Evaluation and Meaningful Metrics," to assist in setting safety goals, selecting metrics in addition to those already prescribed through regulations, and evaluating program effectiveness. The goals of PSMS are zero incidents, enhancement of the effectiveness of risk management, enabling continuous improvement of pipeline safety performance, and learning and resilience when incidents occur. Through risk analysis and process evaluation, Vectren identified the need for greater controls to ensure that its adopted risk-mitigation processes address the appropriate threats, are followed as documented, and effectively mitigate the intended risks.

Vectren engaged a consultant to assess the current state of its pipeline safety programs and help create a Pipeline Safety System Implementation Plan. The plan executes a PSMS as a risk reduction measure to ensure the evaluation of effectiveness of pipeline safety programs and allows for a process to improve programs to mitigate risk. This impacts all aspects of Vectren's DARR Program, as it relies on the execution and results of the many safety measures implemented by an operator, such as the damage prevention program, leak management program, risk assessment, pipeline modernization, standard policies and procedures, regulatory reporting, compliance evaluations and audits.

The plan includes an organizational restructuring focused on safety and a safety control framework, including measures to understand the effectiveness of Vectren pipeline safety process and derive improvements. The plan also calls for increased staff dedicated to managing, planning, developing and implementing the safety management system. This includes documenting work processes associated with pipeline safety to add to the current policies and procedures, enhancing the operator qualification plan and compliance plan, as well as a change to the management process and the integrity management risk models. The addition of personnel including quality control specialists, quality assurance staff, management and oversight staff, and consultant support will support the quality of completion of those processes.

F. Enhanced Risk Modeling and Threat Analysis

Vectren's current risk model focuses on leak count, leak status, and consequence factors to produce a risk score identifying highest threats at an operating center level, and requires additional analysis to determine root causes and risk reduction measures.

Figure 2: Current Leak-Cause Based Distribution Risk Model Output

COMMODITYGROUP	Description	GASLCAUSE	Leak Based Probability	SME Consequence per Threat	Percent of Service By OC	Pipe in Area Factor	Risk
OHIO	DaytonWest	MATLWELD	1.270417089	3.072807018	1.091551666	1	4.261141044
OHIO	DaytonWest	CORR	1.358333892	2.742735043	1.091551666	1	4.066630272
OHIO	Centerville	EQUIP	1.083110919	3.418055556	1.08089063	1	4.001601191
OHIO	DaytonWest	EQUIP	1.050208412	3.418055556	1.091551666	1	3.918311028
OHIO	Centerville	MATLWELD	1.167584312	3.072807018	1.08089063	1	3.87797754
OHIO	Centerville	CORR	1.292250691	2.742735043	1.08089063	1	3.831002017
OHIO	Bellefontain	MATLWELD	1.231491116	3.072807018	1.009454608	1	3.819912053
OHIO	DaytonWest	EXCAV	1.118541852	3.106047454	1.091551666	1	3.792316902
OHIO	Centerville	NATFOR	1.173261288	2.989237929	1.08089063	1	3.790853294
OHIO	Bellefontain	EXCAV	1.200043266	3.106047454	1.009454608	1	3.762632356
OHIO	Fairborn	EQUIP	1.035608111	3.418055556	1.061841681	1	3.75867114
OHIO	Troy	EQUIP	1.044762857	3.418055556	1.048015005	1	3.742521828
OHIO	Troy	MATLWELD	1.152097448	3.072807018	1.048015005	1	3.710154553
OHIO	Troy	EXCAV	1.136213854	3.106047454	1.048015005	1	3.698585541
OHIO	Centerville	OUTSIDE	1.127618406	3.026726727	1.08089063	1	3.689071903
OHIO	DaytonWest	NATFOR	1.125000195	2.989237929	1.091551666	1	3.670771732
OHIO	Centerville	EXCAV	1.089696211	3.106047454	1.08089063	1	3.658434462
OHIO	WashingtonCH	EQUIP	1.036080221	3.418055556	1.014149439	1	3.591488292
OHIO	Fairborn	MATLWELD	1.097136833	3.072807018	1.061841681	1	3.579775984

The DIMP team has identified the need for a more detailed, asset-based relative risk-ranking model to support threat identification and risk-mitigating activities. Developing an asset-based risk model allows DIMP staff and local operating personnel to assess risk at multiple levels such as asset, asset class, and activity.

Vectren has developed a baseline set of data for the distribution system, relying heavily on SME input to improve data quality. Vectren has identified areas of improvement to mitigate the risk of not identifying a threat or change in risk due to the current high-level risk model output and SME investigation process. These improvements include developing an asset-based risk model, expanding data collection and records, data mining to support more robust threat identification and threat analysis, collecting data through field investigation of critical high pressure assets, and evaluating their condition for the main threats of the system. The Enhanced Risk Modeling and Threat Analysis Initiative will allow Vectren to more effectively drive risk and threat mitigation efforts for corrosion, material, joint and weld failure, and all other threats from system data and performance. It will also determine the effectiveness of risk reduction efforts using system performance and characteristic data and measure the effectiveness of those measures across different asset types. Vectren will gain data and eliminate information gaps on the system necessary to determine threats and evaluate risk per the DIMP rules. Completing these efforts will help reduce risk, improve the effectiveness of the pipeline safety programs, and allow a predictive rather than reactive approach to pipeline-safety threats.

Under the risk model enhancement project, Vectren intends over the next two to three years to develop a proof-of-concept asset-based relative risk-ranking model and analysis tools for mains and services, and to develop additional factors based on system data, leak history, environmental factors, construction activity, and population to support a more granular risk profile. The asset-based risk model allows the operator to specifically derive root-cause and risk-

reduction measures from the model, measure their effectiveness, and provide for better planning of capital investments and real-time decision-making by operations personnel.

Figure 3: Sample Output of Proof-of-Concept Asset-Based Risk Model – All Factors

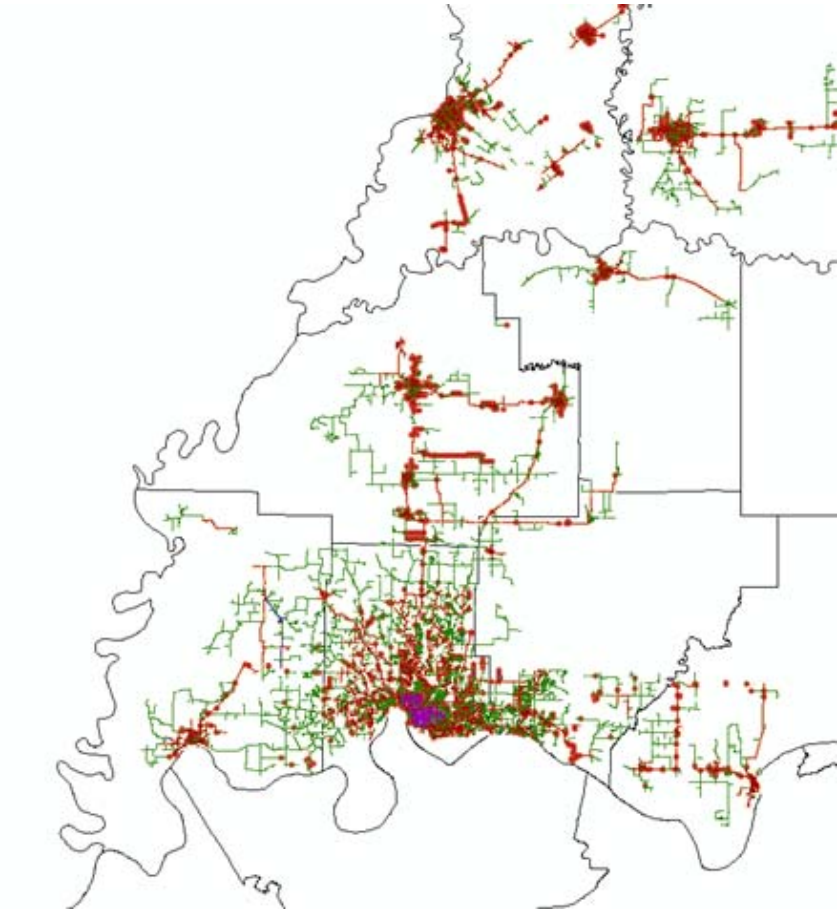
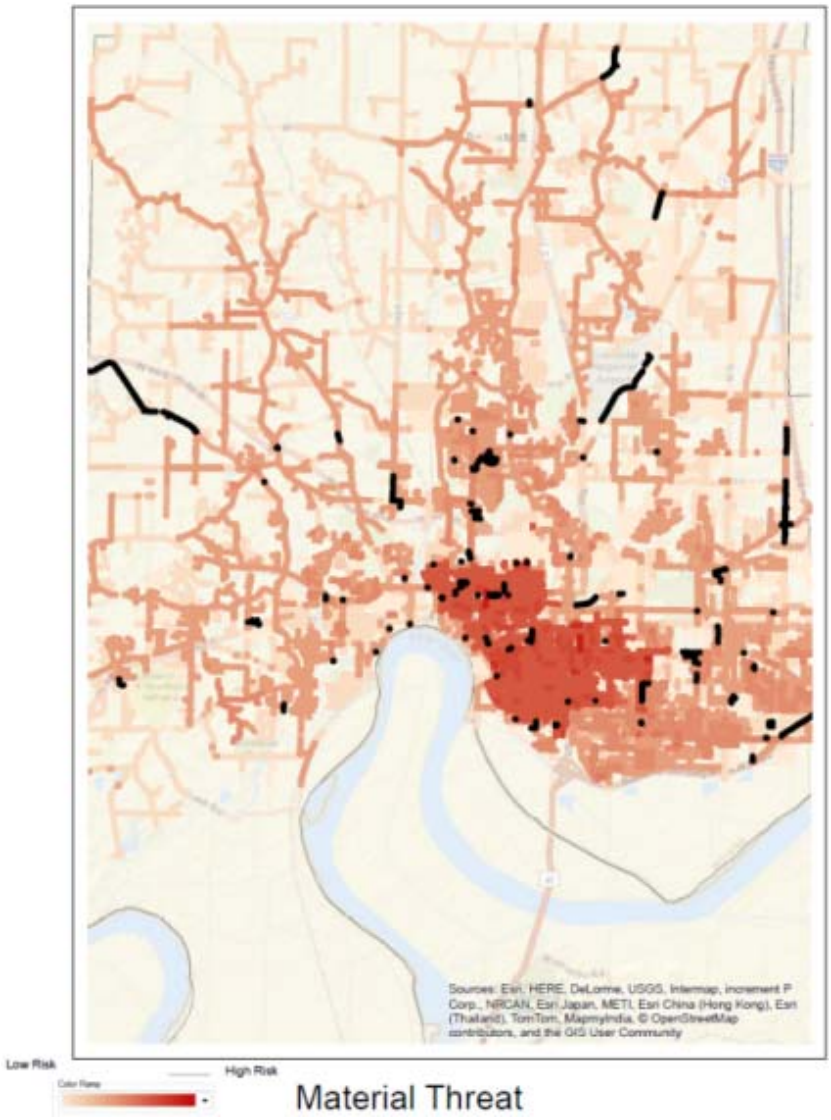


Figure 4: Sample Output of Proof-of-Concept Asset-Based Risk Model - Material Threat Factor



GIS enhancements are required to hold the data necessary to support the DIMP. The primary data repository and data integration tool for distribution integrity management is GIS. As Vectren improves data quality, expands data types, becomes more granular with data attribution, and implements asset-based relative risk modeling and maximum allowable operating pressure (MAOP) verification, GIS must be expanded and improved to hold the required data and host the toolsets for data analysis. GIS improvements focus on the following.

- identification and ability to define and store pressure systems for MAOP verification.
- expansion of the data model to hold required assets, events, and projects.

- improvement of data quality including data reconciliation amongst sources, geometry and location improvements, system connectivity, and the elimination of data gaps.

The GIS improvement project works in complement with data mining and improved data collection efforts to ensure the quality and completeness of the data to support distribution integrity management threat identification, risk assessment, reporting, and metrics.

Since the inception of DIMP, Vectren has converted all paper maps to GIS; upgraded GIS to a new platform, ESRI, which supports increased data capture and analysis abilities; and imaged all service cards and valve cards. In 2016, all as-built work order packets will be imaged along with other asset records. In order to fully utilize these records and continuously improve the DARR Program, these records will be data mined so that GIS can be updated with the most complete information available. This will allow Vectren to advance its risk modeling to be more asset-specific, which will enhance risk assessment and mitigation planning, and ultimately provide more precision with its remediation activity and reduce system risk. Additionally, by data mining records, Vectren will be able to support other efforts to mitigate risk, such as providing detailed information to developers, cities, and locators to improve facility design and locating practices, which will reduce damages. The significant data mining activity is a short-term activity with some additional on-going work expected. As part of this effort, Vectren will broadly data mine all service cards and as-built work orders, but will do a deeper dive into high-pressure distribution MAOP records. While Vectren has implemented new systems, such as On Base document management system and ESRI GIS, data reconciliation is necessary to ensure historical information systems align with new document and data storage systems.

To continue to maintain data and capture information through normal pipeline activities, the field data collection process, forms, and tools must be reviewed to ensure on-going data quality. This data is necessary to continue support of threat identification, risk analysis, regulatory reporting and collection and review of performance metrics. Improvements will include enhancing existing forms, developing field data capture methods, creating standard work, and training.

Vectren has 500 miles of high-pressure distribution main recognized as higher-risk assets where a focused level of data collection and threat analysis is needed to support risk modeling and risk mitigation efforts. Performing field investigation and testing to gather information on its high-pressure distribution assets where gaps in the records exist will supply necessary information to the asset-based risk model and support MAOP. The information to be gathered includes wall thickness, coating type, pipe material, pipe diameter, and yield strength. The Enhanced Risk Modeling and Threat Analysis Initiative includes coordinating investigational digs on high-pressure distribution assets with direct examinations of indications from pipeline surveys to evaluate coating condition or potential excavation damage. This analysis will assist Vectren in determining a baseline threat analysis and risk profile for those critical assets. Vectren will perform indirect surveys over high-pressure distribution main located in highly populated areas and/or with a high risk score to evaluate coating condition and cathodic protection and detect and remediate any corrosion anomalies or areas of potential excavation damage. This will reduce the risk of failure for those assets and provide data to be used in the asset-based risk

model to determine weightings and rankings of those threats based on the Vectren system condition and performance.

V. HISTORICAL DIMP RELATED EXPENSES

Historical expenses prior to DIMP regulations were incurred mostly for main and services leak repair. Vectren incurs costs to support the DIMP risk analysis. This analysis has identified the benefits of the accelerated activities, and such efforts are expected to comply with Subpart P. On average, Vectren has spent $1,918,234 on leak repair for mains and services. Test year expenses for the current rate case extended from June 1, 2007 through May 31, 2008, for leak repairs and were $1,310,622. Vectren is not proposing to seek cost recovery of these baseline expenses through this deferral request. Rather, it is the additional incremental activity above the 2014 baseline cost level that will be deferred.

Table 3: 5-Year History of Leak Repair and Maintenance Spend

Category/Year	2010	2011	2012	2013	2014
Mains and Services Leak Repair	$1,234,784	$1,781,225	$2,139,001	$1,885,849	$2,550,310

Table 4: 5-Year History of DIMP Programmatic Spend

Category/Year	2010	2011	2012	2013	2014	2015*
Vectren DIMP Expense	$400,264	$405,474	$555,099	$744,611	$351,475	$453,081

*2015 represents projected level of spend.

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Distribution Accelerated Risk Reduction Program Management

Distribution Accelerated Risk Reduction 3-Year Plan Update

Program Element	2016 – Actuals	2017 – Plan	2017 – Actuals	2018 – Plan
Expanded Leak Management Program	$1,399,326	$1,500,000	$2,121,337	$2,000,000
Enhanced Damage Prevention Program	$274,412	$770,000	$468,670	$625,000
Public Awareness	$183,324	$200,000	$280,285	$230,000
Workforce Training and Qualification for New Requirements	$197,774	$255,840	$208,886	$295,000
Pipeline Safety Management System Implementation	$61,119	$110,441	$230,347	$112,000
Enhanced Risk Modeling and Threat Analysis	$133,228	$250,000	$633,110	$665,000
Grand Total	**$2,249,183**	**$3,086,281**	**$3,942,635**	**$3,927,000**

Plan Variance Commentary

- Vectren reduced the number of leaks left open in the system from 2016 and completed approximately 1,000 more in 2017. Resource availability and favorable weather allowed leak mitigation efforts to continue through fall and winter months, accounting for the variance of approximately $620,000.
- Enhanced damage prevention efforts focused on mapping accuracy improvements, records availability, and data enhancements in systems used to support locating. Since this information is used for the asset-based risk modeling, these projects were executed by distribution integrity management data resources, and the actual spend is reflected in the Enhanced Risk Modeling and Threat Analysis program.
- Vectren conducted an increased number of partnered root-cause analysis exercises based on the threats identified by the risk register and current events throughout 2017 to determine root-cause and developed and implemented mitigation plans including process enhancements, additional training and qualifications, and data and system enhancements.
- Vectren adjusted the 2018 planned spend for the Expanded Leak Management to $2.0M to continue to leverage the existing level of resources dedicated to eliminate the grade 3 leak backlog and the additional grade 3 leaks that have been discovered since January 2016 and ensure a backlog of leaks is not created.
- The average annual spend program-to-date is $3.1M and is projected to increase to $3.4M at the end of 2018.

Distribution Accelerated Risk Reduction 2017 Monthly Actual Spend

Program Element	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2017
Expanded Leak Management Program	-	-	-	-	-	-	$120,467	$394,473	$318,299	$368,002	$366,668	$553,427	$2,121,337
Enhanced Damage Prevention Program	$20,573	$46,406	$34,386	$41,450	$38,963	$50,515	$37,454	$42,877	$8,199	$60,953	$40,918	$45,975	$468,670
Public Awareness	-	-	$10,150	$58,650	$49,657	$(2,028)	-	-	$64,008	$30,012	$77,504	$(7,668)	$280,285
Workforce Training and Qualification for New Requirements	$14,017	$16,412	$16,987	$12,814	$16,773	$16,908	$14,953	$13,144	$18,562	$18,556	$13,549	$36,210	$208,886
Pipeline Safety Management System Implementation	$8,777	$9,410	$17,905	$12,125	$11,095	$20,099	$37,075	$52,021	$26,865	$11,024	$10,001	$13,949	$230,347
Enhanced Risk Modeling and Threat Analysis	$4,473	$3,233	$941	$450	$8,392	$9,647	$8,867	$30,016	$133,745	$176,885	$187,530	$68,929	$633,110
Grand Total	**$47,841**	**$75,462**	**$80,369**	**$125,490**	**$124,880**	**$95,142**	**$218,817**	**$532,532**	**$569,678**	**$665,432**	**$696,171**	**$710,822**	**$3,942,635**

- The Expanded Leak Management Program costs met the baseline of $1,918,234 in July 2017. Costs incurred for leak repairs above the baseline from July through December are reflected in the actual costs of the Expanded Leak Management Program for grade 3 leak remediation.

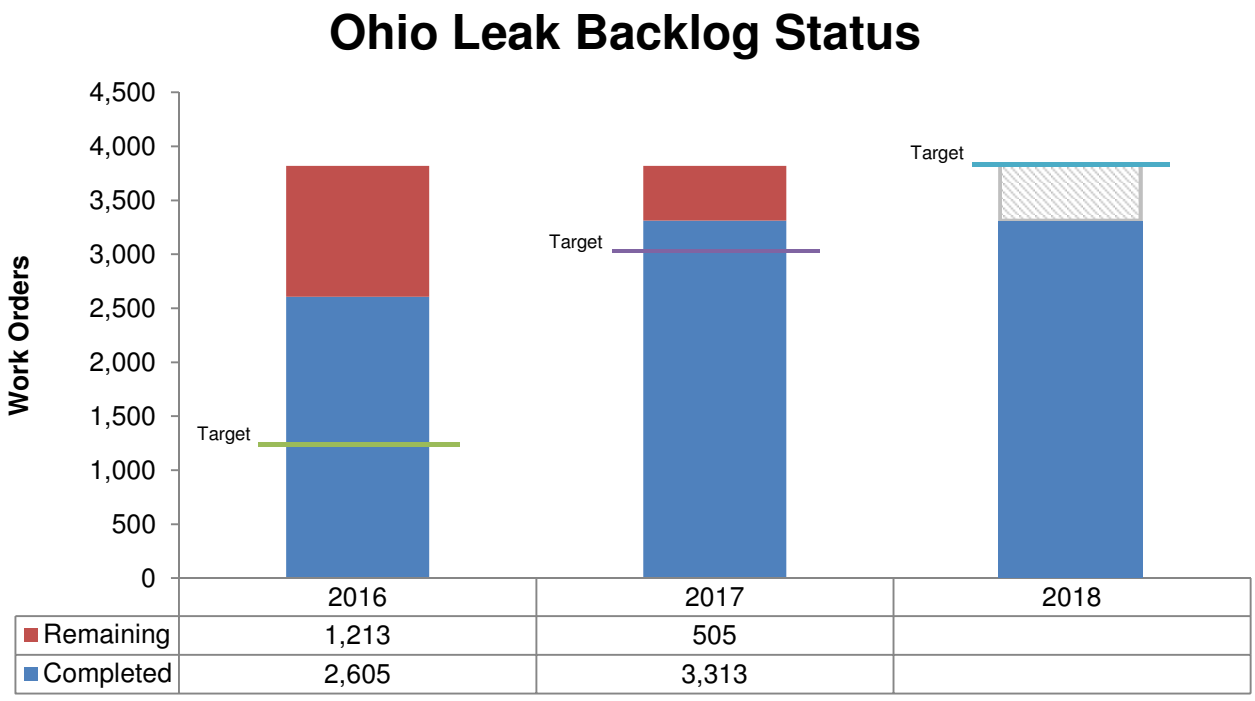
Expanded Leak Management Program

This section focuses on the performance of the grade 3 leak reduction program and demonstrates progress toward eliminating the grade 3 leak backlog and repairing grade 3 leaks as they occur in the system. The grade 3 leak backlog was assessed as of January 3, 2016, and identified 3,818 grade 3 leaks to be evaluated and resolved. The leaks were prioritized for evaluation using a base set of criteria including above ground or below ground, asset type, vintage, and historical remediation information.

Expanded Leak Management Program Measure	Data
Number of Grade 3 Backlog Leaks Resolved (12/31/2017)	3,313
Percent of Backlog Leaks Completed	87%

2017 Status

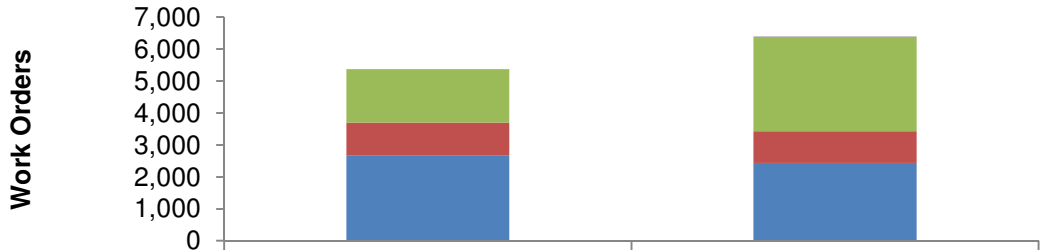
- In 2017, Vectren focused on remediating grade 3 leaks from the backlog as well as remediating newly discovered leaks to reduce the total amount of open leaks in the system.
- Additionally, 1,331 grade 1 and 1,216 grade 2 leaks have been remediated.
- Vectren completed approximately 1,000 more leaks in 2017 than in 2016 and almost doubled the number of above ground leaks completed.
- Vectren reduced the number of leaks left open in the system by almost 1,000 from 2016 to 2017.



	2016	2017	2018
Remaining	1,213	505	
Completed	2,605	3,313	

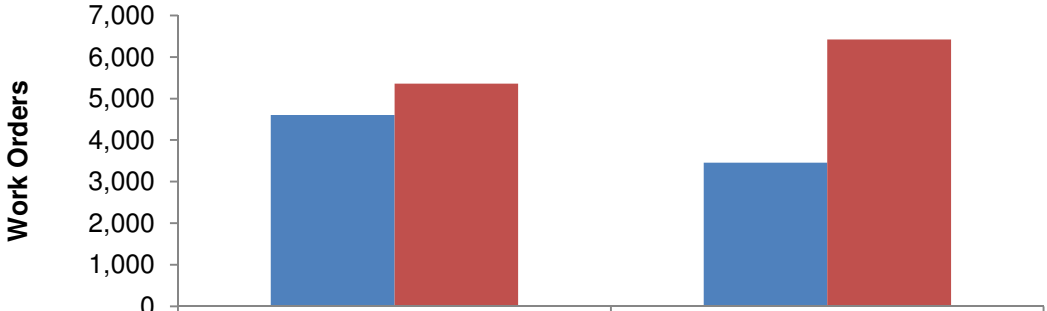
Expanded Leak Management Program

Total Completed Leaks



	2016	2017
Unknown	9	2
Above Ground	1,655	2,954
Below Ground Soft Surface	1,022	991
Below Ground Hard Surface	2,680	2,436

Leak Status at Year-end



	2016	2017
Open	4,601	3,459
Completed	5,361	6,421

2018 Focus

- In 2018, the focus of grade 3 leak repair will be to continue to remediate grade 3 leaks as they are discovered as well as work on the backlog, resulting in a lower percentage of the backlog being mitigated as compared to 2017, but still remaining on target to eliminate the original backlog (from January 1, 2016) by the end of 2018.
- In 2017, an additional 2,890 grade 3 leaks were discovered that are being addressed.
- Any new grade 3 leaks discovered during 2018 leak surveys will be remediated to avoid rebuilding a backlog of leaks for repair.
- Vectren has discovered that some leak reports are duplicates, as the leaks had been reported from a previous survey. We are working towards process enhancements to resolve duplicate reporting, which will remediate a number of grade 3 backlog leaks.

Enhanced Damage Prevention Program

This section focuses on the reduction of damages to distribution assets. The initiative includes:

- projects to improve the data and information used to locate distribution facilities;
- the addition of a damage prevention specialist to assist in targeted contractor relations and additional presence at projects with a higher potential to damage facilities;
- conduct quality audits and training with our contract locators; and
- the development and implementation of a ticket risk assessment model to predict one-call tickets with a high potential for damage to occur and assign mitigative actions to reduce the likelihood of a damage.

Measures	2016 Data	2017 Data
Number of Locate Tickets	89,303	84,540
Damage Rate (2017 Target 2.10)	2.27	1.85

2017 Status

- The Ohio damage prevention specialist (DPS) engages with excavators both on job sites and in structured educational meetings held throughout the year. The DPS evaluates excavator damage history to work with both their field crews and leadership to create safe excavation practices around pipeline assets.
- Excavators were at-fault for 51% of all 2017 excavation damages. In 2017, there were 29 excavation damages due to the person excavating not using the 811 system and 37 excavations related to the failure to hand dig in the tolerance zone. We have enhanced our 811 awareness messaging to target specific industry groups. We have also increased education around hand tools usage.

Enhanced Damage Prevention Program Measures	2015	2016	2017
Damage Rate	2.53	2.27	1.85
Target	N/A	2.25	2.10

Ticket Risk Assessment

Measure	2016 Data	2017 Data
Number of Ticket Risk Assessment (TRA) Tickets Worked	5,350	7,716

2017 Status

- The TRA team consists of 4 highly trained and experienced contract locator technicians. This program was a key factor in exceeding the 2017 targets and getting Ohio below 2.0 damage rate for the first time.
- 2017 Percent of Total Damages due to Incorrect/Unavailable Records includes Stubs which are 80% of the total.

Damage Reduction Data Improvements

Measure	2016 Data	2017 Data
Percent of Total Damages due to Incorrect/Unavailable Records	7%	16%

2018 Focus

- In 2018, Vectren will continue to educate excavators on safe digging practices and using ticket risk assessment to provide more attention to locate tickets with a higher likelihood of damage.
- Vectren will conduct a pilot main cameraing program to locate and map stubbed off mains/services.
- An additional focus for 2018 is enhancing our public awareness messaging to target stakeholders that are less aware of the state laws and best practices around safe digging.
- The metrics will continue to be evaluated annually to determine program performance and identify enhancements.

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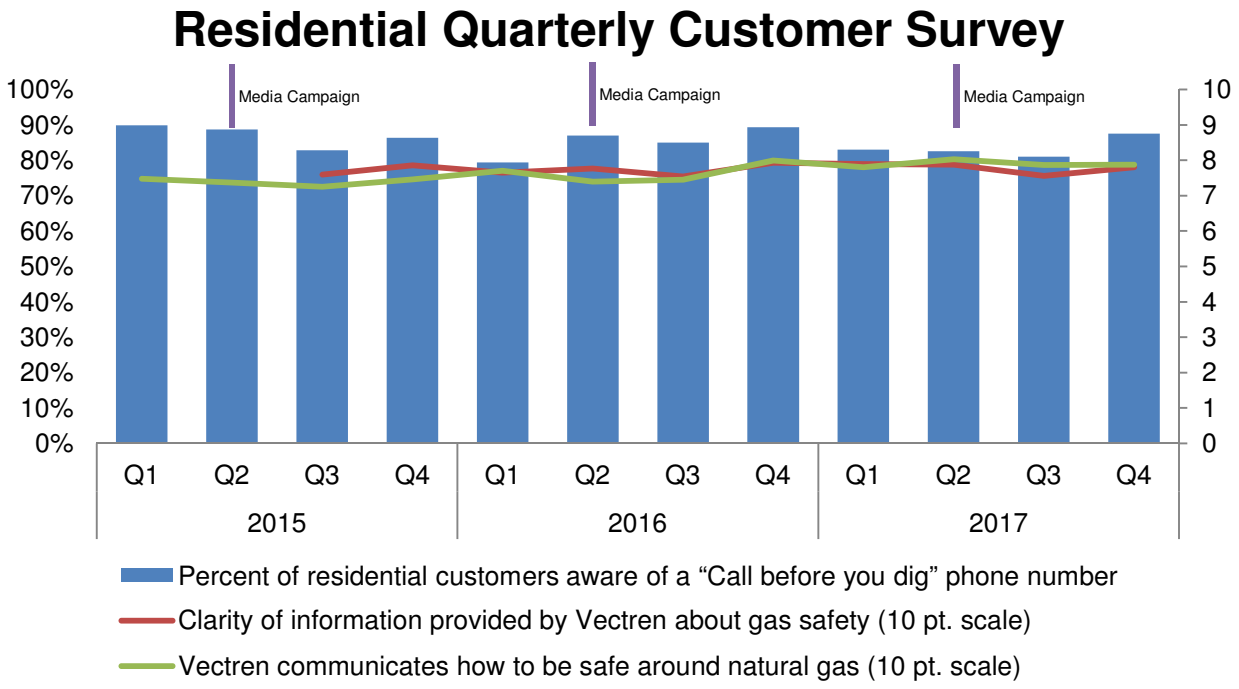
Public Awareness

The focus of this section is to describe the increased communications to support pipeline safety in regard to our increased work within pipeline right-of-way in communities. These communications efforts are directly connected to our pipeline modernization programs and also continue to sustain public awareness of the importance in calling 811 before digging to locate facilities and decrease the chance of a facility damage.

Media	Total Impressions	Click-Throughs	# of Spots
Digital (YouTube, Facebook, Twitter, Pandora, Weather.com, Hulu, Display Ads)	1,957,663	3,629	N/A
Network & Cable TV	2,720,009	N/A	569
Radio	957,000	N/A	186

Data included above is from April–June 2017.



Source: Quarterly Online Customer Satisfaction Survey and Quarterly Online Customer Satisfaction Survey

2017 Status

Awareness campaigns have successfully maintained gas safety and “Call before you dig” phone number awareness within our gas service and pipeline safety working areas.

Awareness communications focused on public notification of pipeline modernization project work in their areas. Messaging was designed to alert customers of the increase in work crews in order to safely navigate around the work zones. Messaging also reiterated that the pipeline replacement program is to maintain a reliable, safe gas delivery system. Continued messaging was used to communicate recognizing a gas leak and calling 811 before digging. Messaging media included network and cable television, radio, digital, social media, newspaper, and bill inserts/messaging.

Workforce Training & Qualifications Performance

This section focuses on the increased activities in workforce training and qualifications required by new and increasingly stringent regulations. Vectren evaluated the current operator qualification program, identified activities critical to maintaining and operating the pipeline system, and is increasing hands-on performance evaluation forms (PEFs) to ensure personnel have appropriate training and skills to perform those tasks to ensure pipeline safety, reduce risk, and meet increased regulatory requirements for operator qualification.

Vectren added internal resources dedicated to support the increased training and performance evaluations as well as tracking, reporting, and maintenance of the workforce training and qualification information systems. Vectren utilizes contract and internal resources to develop the content for the training materials, performance evaluations, and simulations.

Covered tasks increased from 48 to 153. Vectren continues to identify additional necessary covered tasks as a result of developing policies and procedures required by new pipeline safety regulations.

Measure	2016 Data	2017 Data
Number of Evaluations Completed and Processed	2,498	1,838
Number of Employees Evaluated	103	132

2017 Status

- Assigned and/or completed 923 new evaluations and other reoccurring tasks from first and second phase PEF deployments, continuing through 2018.
- Continued to review and complete evaluations from the 32 remaining covered tasks identified in the PEF project's third phase (target date of completion of third phase items is June 30, 2018).
- Maintained current qualifications by requalifying employees on items coming due through the end of 2017. In 2016, 97 employees had completed the new training standard and PEFs and in 2017, the number of personnel fully completing the additional PEFs rose to 121.
- Continued to monitor PEF completion rates and audit to ensure any deviation from evaluation protocols is investigated.
- Reviewed covered task list for additional evaluations that may need to be developed, consolidated, or removed based on Vectren's evolving operational requirements/procedures.

2018 Focus

Vectren will continue to develop content for additional tasks for our training programs and conduct performance evaluations to enhance the qualifications of staff for activities impacting gas assets with a target to train all staff performing the additional covered tasks. Vectren expects the number of required covered tasks to fluctuate as it implements new plans, policies, and procedures to comply with new pipeline safety regulations and as updates to Vectren's infrastructure continues.

Pipeline Safety Management System Implementation

This section focuses on the development and implementation of a pipeline safety management system (PSMS) supported by Pipeline Hazardous Materials and Safety Administration's (PHMSA's) "Guidance for Strengthening Pipeline Safety through Rigorous Program Evaluation and Meaningful Metrics" and the American Petroleum Institute (API) issued recommended practice 1173 "Pipeline Safety Management System Requirements." A PSMS is a comprehensive change management lifecycle framework, which drives a safety culture including pipeline safety, employee safety, and public safety.

The PSMS implementation plan includes:

- Organizational restructuring focused on safety
- Implementing a safety control framework
- Increased staff dedicated to managing, planning, developing, and implementing the safety management system including:
  - Documenting processes and developing control points
  - Enhancing the operator qualification plan, the compliance plan, change management process, and the integrity management risk models
  - Performing quality assurance of pipeline safety processes

Measure	2016	2017	2018 (Targets)
Percent Complete of Implementation Plan Milestones	55%	80%	N/A*
Percent Complete of Planned Mitigation Activities	15%	70%	75%
Percent Complete of 2 Year Project Plan Milestones*	N/A	N/A	50%

2017 Status

- 80% of the milestones to develop and implement the foundational elements of the PSMS have been completed.
- Milestone achievements include the development and population of a risk register, evaluation and prioritization of register items to address, and the identification and assignment of mitigating actions.
- 45 risk register items were identified exceeding the initial threshold for evaluation. 70% of the mitigative actions developed to address those items are complete.
- 45 of the 45 risk register items above the threshold for evaluation have been addressed.
- Completed 87 PSMS risk mitigation activities aimed to reduce risk or strengthen controls to determine root cause, establish mitigation plans and process enhancements, and communicate lessons learned.
- Initiated 8 testing plans.
- Conducted a mock drill to test emergency response to a pipeline event detected through Gas Control.
- Vectren volunteered to complete PHMSA's inaugural review of PSMS.
- *Completed PricewaterhouseCoopers (PwC) reassessment and established new 2 year project plan.

2018 Focus

- Vectren will continue to:
  - execute improvement opportunities for implementation of the PSMS;
  - implement operational control testing processes;
  - conduct activities to maintain the risk register, develop mitigating actions to reduce risk of the reported items, and measure the effectiveness of those activities; and
  - hold communication meetings to report progress on implementation of the PSMS and associated activities to reduce pipeline risk.

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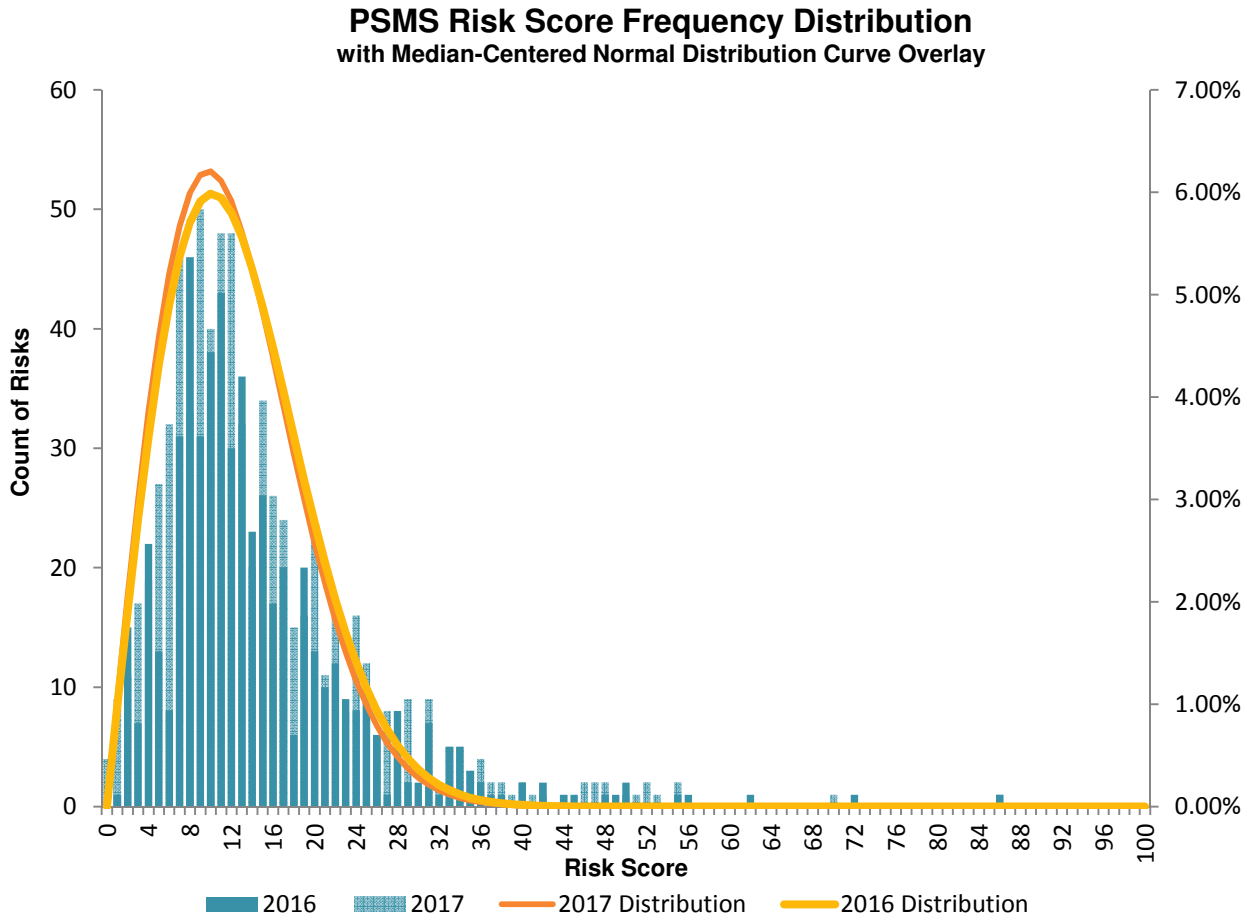
Pipeline Safety Management System Implementation



2017 Status

- The PSMS risk register profile shows that the items reported range in risk score from 0 to 87 with the majority falling within the 7–15 range. This initial population provided the baseline, established in 2016, of the PSMS risk register items to compare year-over-year.
- The risk score takes into account the likelihood of the event occurring and the consequence of the event.
- Register items may be added at any time. The entire register listing will be reviewed annually, and risk may be adjusted considering status of mitigative actions, industry events, operational activities, etc.
- Mitigative actions are focused around higher risk register items first.

2018 Focus

- The 2018 focus includes executing the mitigation plans and measuring their impact to the PSMS risk score. The target is an additional 3% reduction.

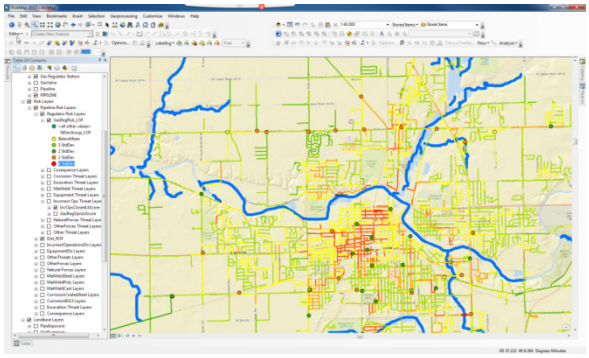
Enhanced Risk Modeling And Threat Analysis

This section focuses on the progress of developing asset-based risk models, improving the quality and completeness of data on distribution assets, and enhancements to the threat identification and analysis processes by developing additional or more robust reporting, data integration, data mapping, and data viewing tools. This initiative contains many specific projects to enhance the risk modeling and threat analysis processes.

Measure	Year	Status
Develop 2016 Targeted Distribution Risk Models	2016	100%
Implement 2017 Targeted Distribution Risk Models	2017	100%

2017 Status

- In 2017, Vectren has focused on the development of three specific asset-based risk models for distribution assets. Asset types were evaluated and prioritized for 2017 model building for completion of models covering the asset categories below:
  - Pipeline
  - Valves
  - Regulator
- Accomplishments include:
  - Enhanced data extract, transfer, and load process
  - Validated Pipeline model with subject-matter experts (SMEs)
  - Tested outputs for all three models
  - Created maps for easy review for all models
  - Created procedure for running/update models
  - Identified and prioritized data quality enhancements related to risk
  - Dashboard developed for Pipeline
  - Completed Indirect Survey on high pressure distribution (HPD) line

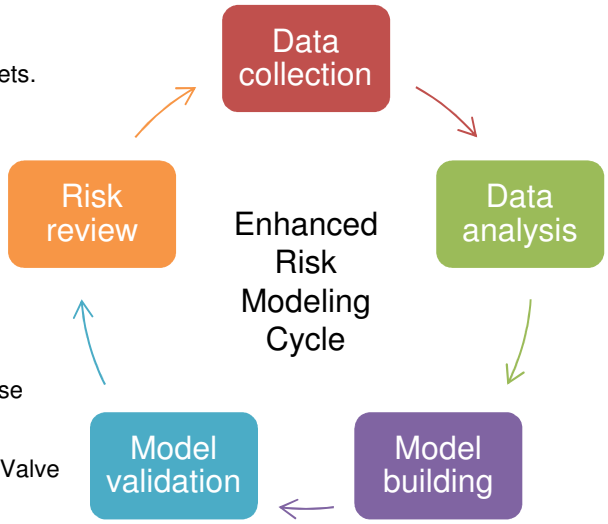


- PSMS Risk Register
  - We have completed a total of 11 bowties in 2017.
  - There is a total of 15 bowties with completed mitigation plans.
  - There is a total of 138 action items assigned. 20 were assigned in 2017.
  - 80% of 2017 assigned action items are complete.

Enhanced Risk Modeling And Threat Analysis

2018 Focus

- In 2018, Vectren will focus on the development of three specific asset-based risk models for distribution assets. Asset types were evaluated and prioritized for 2018 model building for completion of models covering the asset categories below:
  - Service Line
  - Meter Setting
  - Fitting
- Other risk model initiatives will include:
  - Interface to the modernization project database
  - Cycle of check and adjust on the previously developed models—Pipeline, Regulator, and Valve



- In 2018, there will be a high focus on data to support risk modeling and identify threats. Initiatives include:
  - Develop a data health report for data being used in the distribution risk models
  - Create data governance to direct and approve data projects
  - Complete Indirect Survey for HPD lines

- PSMS Risk Register
  - Continue analyzing asset related risks and threats to develop bowtie analysis and mitigation plans for high risk items.

Summary: Exhibit 7.0 - Direct Testimony of Sarah J. Vyvoda electronically filed by Ms. Rebekah J. Glover on behalf of Vectren Energy Delivery of Ohio, Inc.