

2019

energy API | AOPL® Association of Oil Pipe Lines

PIPELINE SAFETY EXCELLENCE

PERFORMANCE REPORT & 2020-2022 STRATEGIC PLAN

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American Petroleum Institute (API) is the only national trade association that represents all aspects of America's oil and natural gas industry.

Association Of Oil Pipe Lines (AOPL) represents liquids pipeline owners and operators transporting crude oil, petroleum products like gasoline, diesel, jet fuel, home heating oil and industrial products like propane and ethane.



TODD DENTON
PRESIDENT, PHILLIPS 66 PIPELINE LLC
Chair, API-AOPL Pipeline Safety Excellence Steering Committee

2019 was an exciting year for pipeline safety action. Pipeline operators came together and updated an industry-wide recommended practice for inspecting and maintaining liquids pipelines, advocated for legislative proposals to harness technology and innovation, protect public safety and improve federal government programs and regulations, and saw continued decreases in liquids pipeline incidents.

Indeed, pipeline safety data collected by the federal government shows liquids pipeline incidents impacting people or the environment are down 36% over the last 5 years. Total incidents on liquids pipelines are down as well, dropping 17% over 5 years with 77 fewer incidents in 2019 compared to 2015.

Continued reductions in pipeline incidents are not stopping the pipeline industry from improving safety further. In 2019, API and AOPL member companies updated API Recommended Practice 1160, (API RP 1160), *Managing System Integrity for Hazardous Liquid Pipelines*, which provides a process for establishing safe pipeline operations, including robust assessments of potential risks and establishment of systems to safely and sustainably manage them throughout day-to-day operations. Pipeline operators also continued work updating API RP 1162, *Public Awareness Programs for Pipeline Operators*, and developing a new RP for the assessment and management of dents in pipelines, which industry will finalize in 2020. Pipeline safety advocacy begun in 2019 and continuing in 2020 included federal pipeline safety law proposals to authorize a PHMSA pilot program to field test new pipeline safety technologies and approaches, protect the public and surrounding environment from attacks on pipeline infrastructure, encourage joint stakeholder problem solving through a Voluntary Information Sharing program, tailor pipeline management requirements to the operating status of individual lines and incorporate the latest best practices on inspections, repairs and tank maintenance into pipeline safety requirements.

To further enhance safety, the liquids pipeline industry plans a robust set of pipeline safety programs for 2020 to 2022. The following Strategic Plan highlights industry goals to promote organizational safety excellence, improve safety through technology and innovation, increase stakeholder engagement and enhance emergency response preparedness. Industry-wide initiatives include a new RP for public engagement and a program to help operators reduce corrosion failures on their systems.



I invite you to review the details of the 2020-2022 Strategic Plan, as well as the 2019 Pipeline Safety Performance Report also included in these pages. Finally, I am writing this letter in April 2020 as the nation and the energy sector face the COVID-19 outbreak. At the forefront of our minds are the health and safety of the public, our families and our coworkers.

We also recognize the vital role we play delivering the affordable and reliable energy supplies Americans need to lead our daily lives. Pipeline operators are taking precautions to ensure our Nation's energy delivery system continues to operate safely during these trying times. We will do our part to stay safe as we keep energy flowing to homes, employers and the public across the country.

Sincerely,



POSITIVE COMMUNITY IMPACTS

"In 2019, API and AOPL member companies updated API Recommended Practice 1160, (API RP 1160), *Managing System Integrity for Hazardous Liquid Pipelines*, which provides a process for establishing safe pipeline operations, including robust assessments of potential risks and establishment of systems to safely and sustainably manage them throughout day-to-day operations."

Todd Denton
Chair, API-AOPL Pipeline Safety
Excellence Steering Committee

RED WING, MINNESOTA

Energy Delivered by Pipelines Empowers Industry, Agriculture in Southeastern Minnesota



The morning sun rises over the bluffs that frame the town of Red Wing in southeastern Minnesota, hugging the Mississippi River's southern bank about 55 miles from Minneapolis. In the nearby fields and pastures the soil is black and fertile, supporting a cornucopia of planted grains, as well as cattle ranches and chicken farms. A few miles north, an industrial corridor is home to Red Wing's robust manufacturing sector.

Together, industrial manufacturing and farming have driven the Red Wing economy for more than a century. Today, perhaps more than ever, both are thriving in this part of the country because of abundant U.S. natural gas and oil – energy that empowers all sectors, benefits consumers and helps protect the environment. That abundant, affordable energy is delivered to the Red Wing region by pipeline.



Red Wing native and state Sen. Mike Goggin recognizes the vital role affordable energy plays across the regional economy.

"Manufacturing is energy-intensive, and it's our bread and butter," Goggin says. "Low-cost energy helps to keep our facilities operating so that families here can continue to earn a decent living and enjoy all the things that make Red Wing so special."

Statewide, the natural gas and oil industry supported more than 117,000 jobs, or more than 3% of Minnesota's total employment in 2015. The industry provided more than $7 billion in wages and contributed more than $14 billion to the state economy – including $4.5 billion to the second congressional district where Red Wing is located.

But industry's impact is more than it and its suppliers. It's energy that fuels and produces across all sectors – manufacturing, construction, logistics, banking and more. Energy is foundational to growth and the opportunity to prosper. They're seeing it in Red Wing and the surrounding area.

The home of headquarters for global players including Red Wing Shoe Company, 3M, Riedell and BIC Graphic – the parent company of a half-dozen other well-known brands – the town of 16,000 has an oversized impact on the world. Just up the road, Marathon Petroleum's St. Paul Park refinery produces essential fuels for the nation's transportation sector.

Overall, things are good here. The area's unemployment rate of 3.1% in September 2019 was about a point lower than the national rate. There's growth, and energy is playing its part. Pipelines are the lifelines that connect it all together and make sure its benefits are delivered to us.

EAU CLAIRE, WISCONSIN

Energy Renaissance Delivered by Pipelines Helps Set Up Eau Claire, Wisconsin For Bright Future



When James Hanke completed his undergraduate studies at the University of Wisconsin–Eau Claire in 2001, staying around after graduation wasn't the plan. A native of Chippewa Falls, WI, Hanke expected his future would unfold elsewhere. Today, James Hanke leads business development for Market & Johnson, a general building contractor based in nearby Eau Claire, WI. Hanke's glad he stayed in the area – a member of Wisconsin's "sticky population," natives who stay put instead of migrating elsewhere – and to be part of an economic comeback in the northwestern part of the state, closely tied to another comeback: U.S. natural gas and oil.

"America's natural gas and oil renaissance catapulted the region's industrial sand mine industry, and in turn, created a path for economic stability and ultimately, growth for Market & Johnson, our employees and workers across a number of sectors," Hanke says.

The region of western Wisconsin around Eau Claire is home to some of the best industrial sand quarries in the country. Market & Johnson helped build processing facilities in states across the U.S. where hydraulic fracturing has been used to develop natural gas and oil. Eau Claire sand is used in the majority of the shale plays in North Dakota, Oklahoma and Texas. Frac sand mining and other industries associated with natural gas and oil production have helped transform Eau Claire, a relatively quiet, small Wisconsin town of just under 68,000.



Today, the "Indie Capital of the Midwest" is varied and vibrant, attracting indie music lovers, foodies and fans of locally brewed beers. Eau Claire's unemployment rate is under 3%, as of late 2019, and the median family income tops $76,500 (compared to about $76,400 nationally). The cost of living index is 93.9 – compared to the national average and the Twin Cities' index of 105 in 2018. None of this growth and local economic prosperity would be possible without oil and gas development, and that can't happen without pipelines to deliver that energy from where it's produced to where it's used by consumers. Pipelines connect production areas to refineries, and connect those refineries to our local regions supplying gas stations, commuters and travelers around the nation. Pipelines connect consumers and communities like Eau Claire, Wisconsin to good paying jobs and the economic prosperity they are experiencing today.

LAS CRUCES, NEW MEXICO

Pipeline Development and Abundant Energy Boost Economic Sectors Across New Mexico

The sun sets on the valley of the Rio Grande River near Hatch, New Mexico, splashing rows of green chilé pepper plants with one last burst of warmth. Today's agriculture is getting a boost from a new benefactor – the natural gas and oil industry.

This is the Southwest desert where, surprisingly, agriculture has long been a pillar of the regional economy. These fertile green fields provide more than 40,000 New Mexicans with a living – including Marshall Wilson, who joined Adams Produce when he was just 18. More than a decade later, he walks through the chilé fields he manages with a deep appreciation for the interwoven relationship between energy and agriculture.

"Energy affects everything we do, whether it's the fertilizer that's produced from natural gas or the diesel fuel for tractors, pumps and transportation. These are all bottom-line considerations for farmers," says Wilson. "Even the power we use on-site to process the crops and support electric well pumps ties back to energy production."

Natural gas and oil are produced in only a handful of New Mexico's 33 counties, and yet state and local government agencies are seeing a funding renaissance from industry's activities — pipeline and other infrastructure builds to maximize the



benefits of energy production. The New Mexico Oil and Gas Association says its members contributed more than $2.2 billion to the state's general fund in 2018. That's money for schools, bridges, water treatment plants and a number of other critical state and local priorities for growing municipalities across New Mexico.

Statewide studies reveal that the industry poured more than $1 billion directly into the state's school systems in 2018. That's an average of $2,472 for every student in New Mexico. Most of this funding was earmarked for K-12 education, but there is also a significant allocation for the state's university system.

Going further, Gov. Michelle Lujan Grisham has proposed free college tuition for all state residents – largely funded by natural gas and oil revenues. "I could spend well longer than 30 minutes telling you about the benefits of what's going on in the state of New Mexico because of what's going on in the oil and gas industry — opportunities that we haven't seen, ever," Grisham said last fall.

That's prosperity and progress – delivered safely and efficiently by pipelines all while generating benefits for communities across the country.

LANSING, MICHIGAN

In Lansing, Michigan, Energy Infrastructure Promotes New Growth Narrative



It's 8 a.m. at Blue Owl Coffee in East Lansing, Michigan, the twin city to Lansing, the state capital. Blue Owl sits just a few blocks from Michigan State University and prides itself on serving "community driven coffee." Locals, college students and faculty alike know Blue Owl's baristas by name. Like many other locally owned businesses throughout the area, Blue Owl is hiring. That's a small clue to a big story. People here can remember when things were much different: double-digit unemployment and folks talking about the entire state approaching an economic abyss. Rich Studley, president and CEO of the Michigan Chamber of Commerce, recalls that "The city was at risk of losing General Motors, which at the time, was one of our last major manufacturers."

Those unhappy days are a memory. The unemployment rate in the Lansing-East Lansing area is about 3.6%, as of late 2019. Jobs have increased over the past year and local officials are optimistic the area is positioned for growth in the years to come. GM stayed; Lansing is home to the automaker's two newest manufacturing plants.

Studley says the area's energy infrastructure was a significant factor in GM's decision to stay and has supported growth. "Manufacturers need access to safe, reliable and abundant energy," he says, "and we're proud that Lansing has the energy infrastructure that enables plants and skilled workers to build some of America's best cars."

For companies like Blue Owl Coffee, access to abundant natural gas and oil are powering their success and that of Lansing as a whole. Reliable transportation of oil and natural gas by pipeline is attracting numerous businesses, big and small, back to the state through lower energy costs and access to abundant raw materials.



Across Michigan, the natural gas and oil industry contributed $14.6 billion to the state's economy while supporting more than 159,000 jobs, or nearly 3% of the state's total employment in 2015. Yet, natural gas and oil's part is larger than the jobs they create or the vendors who support their operations. For growth all across the economic spectrum, it takes energy delivered by pipelines.



A STRATEGIC PLAN TO IMPROVE PIPELINE SAFETY

The pipeline industry's commitment to long-term safety includes the following shared principles:

ZERO INCIDENTS– Only with a goal of zero safety incidents can accidents be minimized.

ORGANIZATION-WIDE COMMITMENT– Safety is emphasized at every level of the organization from employees who accept personal responsibility for safety to managers who are vital to reinforcing a safety culture.

A CULTURE OF SAFETY– A workplace culture where safety is an enduring value that all employees share.

CONTINUOUS IMPROVEMENT– Pipeline operators believe that no matter how safe they already are, they can always improve safety.

LEARN FROM EXPERIENCE– Pipeline operators learn how they can improve safety from their own experiences and from other pipeline operators.

SYSTEMS FOR SUCCESS– Safety management systems bring a consistent, holistic structure to safety management, helping to improve safety performance.

EMPLOY TECHNOLOGY– From "smart pigs" to innovative ways to interpret integrity data, operators constantly develop new ways to advance pipeline safety.

COMMUNICATE WITH STAKEHOLDERS– Operators know communicating and establishing a positive relationship with the public and stakeholders who value safety is vital to improving safety.

2020-2022 - PIPELINE STRATEGIC PLAN GOALS

PROMOTE ORGANIZATIONAL EXCELLENCE– Develop and promote an industry-wide safety culture through continuous implementation and improvement of Pipeline Safety Management Systems. Transform industry-wide sharing and learning into a robust, sustainable program, and emphasize the benefits and power of data integration.

1

IMPROVE SAFETY THROUGH TECHNOLOGY AND INNOVATION– Drive industry-wide engagement in advancing in-line inspection (ILI) capabilities to achieve the pipeline industry's goal of zero incidents. Create sustainable, workable frameworks for operator leak detection management. Improve corrosion identification and mitigation techniques to reduce corrosion-caused incidents.

2

INCREASE STAKEHOLDER AWARENESS & INVOLVEMENT– Improve pipeline operator and landowner relations through the development of a public stakeholder engagement recommended practice. Promote awareness through the update of the third edition to API RP 1162 and revisions to the **Pipeline101.org** website. Strive to reduce excavation damage.

3

ENHANCE EMERGENCY RESPONSE PREPAREDNESS– Increase effective and rapid emergency response efforts through the development and adoption of industry guidance on emergency planning and response processes. Promote peer to peer opportunities for conducting drills, exercising emergency response plans, and sharing of lessons learned from incidents.

4

GOAL 1

PROMOTE ORGANIZATIONAL EXCELLENCE

Objective 1.1
Expand Safety Management Practices

STRATEGIC INITIATIVE: PIPELINE SMS

1. **INCREASE COMPANIES ASSESSING THEIR CURRENT SAFETY MANAGEMENT PRACTICES:** 5% increase in companies conducting Pipeline SMS gap assessment.
2. **INCREASE COMPANIES TAKING ACTION TO IMPROVE THEIR SAFETY MANAGEMENT SYSTEMS:** 5% increase in companies taking action on plans to address recommendations from Pipeline SMS gap assessment.
3. **INCREASE COMPANIES EVALUATING THEIR SAFETY MANAGEMENT SYSTEMS AND PERFORMANCE IMPROVEMENT:** Four companies complete third-party assessments per year.

The liquids pipeline industry will promote organizational excellence by expanding use of safety management practices. Comprehensive safety management systems (SMS) facilitate greater awareness of current safety performance, opportunities for safety improvement and tracking of safety progress and improvement. Pipeline operators developed API Recommended Practice (RP) 1173, *Pipeline Safety Management Systems (Pipeline SMS)*, in collaboration with federal and state pipeline regulators, industry experts and public stakeholders in 2015. The RP is designed to be scalable, to accommodate companies of any size and scope, and flexible, to integrate with existing corporate management systems.

Under the 2017 - 2019 Strategic Plan, the liquids pipeline industry developed tools and provided resources to pipeline companies to help them improve their current safety management practices or adopt new safety management systems based on the industry-wide recommended practice. Following the publication of RP 1173, in 2016 and 2017, the liquids pipeline industry provided commitments to implement the RP and resources to assess gaps between current operations and RP 1173 program elements. The Industry Team developed gap assessment, planning, implementation and evaluation tools to help pipeline operators measure the effectiveness of their program elements and identify safety performance improvements. The team had a significant step forward in 2018 by joining forces with gas transmission and distribution operators through AGA, INGAA and APGA, presenting a unified pipeline industry approach to implementing Pipeline SMS and improving safety performance. This year, the third party assessment program made important strides, finalizing the assessment tool, assessor trainings and an initial assessor pool before piloting with two major liquids pipeline operators and a large gas distribution operator. API is collecting feedback and lessons learned from these assessments to provide additional value to members during future evaluations.

Through the 2020 - 2022 Strategic Plan, the liquids pipeline industry will support pipeline operators assessing, improving and evaluating their safety management systems. The full third-party assessment program will be rolled out in early 2020, with strong consideration into resource and assessor allocations, data security and benchmarking among peers as part of the Plan-Do-Check-Act process of continuous improvement. Assessments will be available for both members and non-members of API, spanning the entire pipeline industry. After a number of these assessments are completed, operators will be able to benchmark with industry peers and compare the effectiveness of program elements with similar companies. The Industry Team will maintain its four main strategic areas going forward, namely increasing industry participation, ensuring proactive external engagement, providing ongoing operator support, and providing governance and oversight. API in conjunction with AOPL will conduct a safety culture survey in 2020, with findings informing SMS Program initiatives and allowing for benchmarking with 2019 INGAA/CEPA survey results.

2020

- Roll out third-party assessment program for liquid and gas transmission and distribution operators in a sustainable way.
- Publish the 2019 Pipeline SMS Annual Report summarizing the results of the SMS Annual Survey
- Provide training opportunities to facilitate best practice information exchanges among peers and increase implementation effectiveness
- Regularly engage with key stakeholders on voluntary SMS implementation, including regulatory, legislative and public pipeline safety advocates, including PHMSA, NTSB and the Pipeline Safety Trust
- Increase commitment to and implementation of Pipeline SMS among smaller pipeline operators who may be in the early stages of their journey
- Conduct initial off cycle safety culture survey for liquid pipeline operators and aggregate learnings with INGAA/CEPA results to reinforce internal culture
- Establish Ad-Hoc RP 1173 workgroup of industry, regulators and general users to begin reviewing and developing recommendations to support RP 1173 Task Group for RP revisions in 2021-2022

2021

- Refine the third-party assessment program, assessor pool and assessor trainings following feedback and lessons learned from previously assessed companies
- Publish the 2020 Pipeline SMS Annual Report summarizing the results of the SMS Annual Survey
- Conduct training workshops and webinars to facilitate best practice information exchanges among peers and increase implementation effectiveness
- Engagement with and outreach to key stakeholders on industry progress on voluntary implementation, e.g. PHMSA, NTSB, Pipeline Safety Trust through advisory committee and direct meetings
- Monitor activity of the RP 1173 Task Group and provide technical and policy support as appropriate through the course of their revision work

2022

- Continuously improve the third-party program to provide the best value to pipeline operators through enhanced benchmarking capabilities, streamlined assessment processes and data security
- Publish the 2021 Pipeline SMS Annual Report summarizing the results of the SMS Annual Survey
- Conduct training workshops and webinars to facilitate best practice information exchanges among peers and increase implementation effectiveness
- Conduct Triennial safety culture survey for liquid pipeline operators and distribution operators in conjunction with INGAA and CEPA and disseminate aggregated learnings to reinforce internal culture
- Engagement with and outreach to key stakeholders on voluntary industry progress, e.g. PHMSA, NTSB, Pipeline Safety Trust through advisory committee and direct meetings
- Monitor activity of the RP 1173 Task Group and provide technical and policy support as appropriate through the course of their revision work

GOAL 1

PROMOTE ORGANIZATIONAL EXCELLENCE

Objective 1.2
Promote Leading Safety Practices Sharing

STRATEGIC INITIATIVE: SHARING AND LEARNING

1. **INCREASE COMPANY SHARING OF SAFETY LESSONS:** 10 companies annually use systematic process, such as industry-developed Guide to Sharing, to review whether to share own safety lesson with other companies.

2. **FACILITATE INDUSTRY-WIDE SHARING OF SAFETY LESSONS:** Liquids pipeline operators share safety lessons through four industry-wide safety tailgates and one safety exchange forum.

3. **PROMOTE COMPANY LEARNING FROM SAFETY LESSONS:** Industry-developed Guide to Learning completed and 10 companies use guide or other systematic process to review, incorporate and measure benefits of safety lessons from external sources.

The liquids pipeline industry will promote organizational excellence by facilitating and increasing the sharing of and learning from pipeline safety lessons. Over 50 companies operate 200,000 miles of liquids pipelines across the nation. Operating these systems provides lessons on what to avoid and how to improve that can benefit all pipeline companies. Recommendations from safety investigators and government regulators also provides valuable safety improvement information. Many companies have programs to document incidents or near misses and share those lessons within their own company. Industry-wide safety performance will increase if more companies share their safety lessons outside of their companies across the industry. Companies would benefit from having a systematic process to consider whether to share internal company learnings across the industry. Similarly, companies would benefit from a systematic set of procedures to review safety lessons, determine whether a change to their procedures is appropriate and ensure needed changes are made.

Under the 2017 - 2019 Strategic Plan, a new industry-wide objective to promote sharing practices led to the creation of a standing Sharing & Learning Subteam and the development of tools to help operators consider when and how to share safety-related information. The Subteam is now coordinating the annual industry forum for liquids pipeline operators to share lessons from safety incidents and near misses. The Subteam is now also coordinating quarterly safety-sharing Virtual Tailgates to distribute safety lessons on a more regular basis. In 2019, the Subteam created a Guide to Sharing. The Guide helps operators formalize a process to share externally and assists users in deciding whether to share across the industry. Further, using templates and worksheets, the Guide can help resolve organizational disagreements on external shares. The Subteam will use pre-defined metrics to determine whether the Guide is increasing the number of companies sharing externally.

Through the 2020-2022 Strategic Plan, the Subteam will complete a companion Guide to Learning. This Guide will provide a systematic process for operators to take what they learned at a sharing event, determine whether the issue reflects a gap in their own operations, and incorporate those recommendations or lessons learned within their organizations. The Subteam will promote the Guide with implementation resources shared at industry events. The Subteam will also continue to coordinate the annual Pipeline Information eXchange (PIX), quarterly Virtual Tailgate webinars, periodic roundtable discussions, and alerts on industry and regulator-based safety improvement recommendations.

2020

- **Continue to promote and support the use of established industry learning opportunities such as Virtual Tailgate webinars and the Pipeline Information eXchange**
- **Implement the Guide to Sharing**
- **Publish and Implement the Guide to Learning**
- **Evaluate Process and Solicit Feedback on the Use of the PIPES Learning Portal**

2021

- **Continue to promote and support the use of established industry learning opportunities such as Virtual Tailgate webinars and the Pipeline Information eXchange**
- **Track the following sharing metrics**
  - » Number of Shares
  - » Number of Sharing Companies
- **Track learning metrics**
  - » Number of Companies that have a process for learning from external events
  - » Number of Companies that took an action as a result of learning from external events

2022

- **Track the following sharing metrics**
  - » Number and percent increase of Shares
  - » Number and percent increase of Sharing companies
- **Track learning metrics**
  - » Number and percent increase of companies that have a process for learning from external events
  - » Number and percent increase of companies that took an action as a result of learning from external events
- **Support established industry learning opportunities such as Virtual Tailgate webinars and the Pipeline Information eXchange**

PIPELINE SAFETY EXCELLENCE PERFORMANCE REPORT

GOAL 2

IMPROVE SAFETY THROUGH TECHNOLOGY & INNOVATION

Objective 2.1

Improve Pipeline Integrity Inspection Technology

STRATEGIC INITIATIVE: CONTINUOUS IMPROVEMENT OF ILI TECHNOLOGIES

1. **Decrease the Number of Incidents from onshore pipe Impacting the Public or Environment**
2. **Evaluate the Current Industry ILI Specifications**
3. **Improve ILI Crack Tool Capabilities**
4. **Create Further Transparency Between Operators and ILI Service Providers**

Pipeline operators inspect their pipelines on regular schedules looking for signs the pipe needs maintenance. By inspecting proactively, pipeline operators catch and fix issues long before they become a problem for the pipe. In-line inspection (ILI) tools are a key tool for analyzing the health of pipelines and assessing threats to pipeline systems. ILI or "smart pigs" travel inside the pipe scanning the pipe wall for signs of dents, corrosion or possible cracking. Smart pigs use technology similar to an ultrasound or an MRI found at a doctor's office. The information obtained from these tools can then be used to target issues, prioritize maintenance activities, and prevent releases. Improving smart pig capabilities will help pipeline operators find smaller potential defects in the pipe, catch them earlier, and provide a greater margin of safety for pipeline operations.

Under the 2017 - 2019 Strategic Plan, industry ILI technology research and development (R&D) funding focused on testing and analysis of capabilities for detecting metal loss (both through corrosion and gouging) and cracking within pipe dents. ILI R&D also focused on detecting and sizing cracking in longitudinal seams of pipe, with an emphasis on low frequency electric resistance weld (LF-ERW) and flash weld pipe. The API and AOPL Research and Development Work Group (RDWG), working in conjunction with the Pipeline Research Council International (PRCI), developed protocols and equipment to validate and test the performance specifications published for ultrasonic crack detection (UTCD), electromagnetic acoustic transducer (EMAT), and spiral and circumferential magnetic flux leakage (MFL) ILI tools. This project is divided into three phases: Phase I develops the project's plans and procedures; Phase II inspects pipe samples and designs defect test strings; and Phase III tests the ILI tools. In 2019, the RDWG completed Phase I of this project by soliciting and receiving pipe samples, evaluating man-made cracks for future testing applications, growing a stress corrosion cracking proof-of-concept and developing further testing plans.

Through the 2020 - 2022 Strategic Plan, RDWG under Phase II of its ILI tools project will quantitatively inspect existing pipe samples with PRCI and design the defect sets to be used in Phase III. The industry's goal is to improve ILI crack tool capabilities by furthering ILI systems' capabilities through increased testing and analysis that will be part of comprehensive performance studies on existing ILI systems.

PIPELINE SAFETY EXCELLENCE PERFORMANCE REPORT

2020

- Complete Project Phase II
- Solicit ILI Vendor Participation

2021

- Formalize and Share Results of the Project
- Complete Project Phase III
- Compare Results with the Specifications of the ILI Crack Tools

2022

- Formalize and Share Results of the Project
- Develop calibration and reference standards for use in evaluating inspection systems
- Continue testing to advance confidence in ILI systems' performance – improving on all levels, including Probability of Detection (POD) and Probability of Identification (POI), and sizing accuracy
- Review results and determine need for update to API RP 1163, *In-line Inspection System Qualification*.

GOAL 2

IMPROVE SAFETY THROUGH TECHNOLOGY & INNOVATION

Objective 2.2
Enhance Incident Identification & Response

STRATEGIC INITIATIVE: IMPROVE LEAK DETECTION CAPABILITIES

1. **Update Industry Standards for Managing Leak Detection Programs and Systems**
2. **Support Improvement of Technologies That Detect Product Released From Liquids Pipeline**
3. **Support Improvement of Analytic Capabilities That Indicate A Potential Pipeline Leak**
4. **Conduct Yearly RP 1175 Survey (Cybernetics Group) -** Target to Increase Response Rate Yearly

Improved leak detection capabilities will enhance the safety of pipeline systems by reducing the size and impact of any incident. Pipeline operators use multiple technologies and activities to detect pipeline leaks, including sensors monitoring pressure, flow and volume, aerial overflights, ground-based inspections, and public awareness campaigns. Where applicable, analytical computer programs help operators discern between system readings reflecting normal operational variances and a potential release. Integrating multiple leak detection technologies and activities into a comprehensive program can help pipeline operators improve leak detection capabilities. Leak detection technology advances can help pipeline operators find smaller leaks, find leaks faster and find leaks more reliably with higher confidence and lower false alarms than is possible today with conventional monitoring systems.

Under the 2017 – 2019 Strategic Plan, the liquids pipeline industry promoted comprehensive leak detection program management through API RP 1175, *Leak Detection Program (LDP) Management.* Published in late 2015, API RP 1175 builds upon the industry's holistic approach to safety management with guidance on how to develop a leak detection culture and strategy, select a leak detection system (LDS), and monitor overall LDPs. Liquid pipeline operators also funded industry-wide research conducted through PRCI to simulate subsurface fluid migration from small pipeline leaks, evaluate changes in meter and calibration processes that would improve minimum leak detection thresholds, and field test commercially available Distribute Acoustic Sensing leak detection technologies on an operational pipeline.

Through the 2020 - 2022 Strategic Plan, the liquids pipeline industry will update RP 1175 in 2020 to better align with the needs of industry and Pipeline SMS. Additionally, industry will update RP 1130, *Computational Pipeline Monitoring*, to better align with RP 1175 and to ensure that both work together to amplify industry's capabilities in this space. Liquids pipeline operators will support leak detection technology research and development through PRCI to test methods for retrofitting existing pipelines with cable-based leak detection systems, use machine learning to adjust algorithms that detect variations from normal operating conditions indicating a potential leak, and evaluate technologies for detecting hydrocarbon leaks on waterbodies.

PIPELINE SAFETY EXCELLENCE PERFORMANCE REPORT

2020

- **Complete RP 1175, *Leak Detection Program (LDP) Management* update**
- **Support field testing of cable-based leak detection system on existing pipeline**
- **Support initiation of leak detection algorithm machine learning project**
- **Create new RP 1175 yearly survey**

2021

- **Complete RP 1130 – *Computational Pipeline Monitoring* update**
- **Update, distribute and facilitate communications as necessary, outlining updated Implementation Guidance for RP 1175**
- **Conduct RP 1175 yearly survey (1Q 2021)**

2022

- **Update, distribute and facilitate communications as necessary, outlining updated Implementation Guidance for RP 1130**
- **Conduct RP 1175 yearly survey** (1Q 2022)

GOAL 2

IMPROVE SAFETY THROUGH TECHNOLOGY & INNOVATION

Objective 2.3
Improve Corrosion Detection and Identify Mitigations

STRATEGIC INITIATIVE: IMPROVE CORROSION RISK ASSESSMENT

1. **Decrease the Number of Corrosion-Related Incidents Impacting the Public or Environment**
2. **Cultivate Awareness of the Increasing Number of Corrosion-Related Releases through Sharing Corrosion-Related topics at Industry-Wide Events**
3. **Increase the Number of Operators Who Have Completed a Gap Analysis Against PHMSA Data**
4. **Collaborate with Outside Organizations to Formalize an Industry-Wide Corrosion Management Document**

Improved corrosion risk assessment will enhance pipeline safety through fewer pipeline releases. Corrosion to a pipeline can occur both from the inside or outside walls of the pipe. Many factors can contribute to corrosion on a pipe including water or sediment inside the pipe, stagnant low spots in a pipeline system, moisture or heat on the outside of a pipe, or stray electrical current from an outside source. Pipeline operators use multiple overlapping strategies to prevent pipeline corrosion related releases, including epoxy coatings applied to the pipe during manufacturing, quality standards required of petroleum products shipped by pipeline, electrical systems on and near the pipe that ward away corrosion, and proactive inspection and maintenance of pipelines to detect corrosion early and repair it before it becomes a safety issue. However, industry review of operator incident data submitted to PHMSA finds corrosion remains a major cause of pipeline incidents. Corrosion is the second most frequent cause of pipeline incidents overall and the most frequent cause of incidents impacting the public or environment.

Under the 2017 - 2019 Strategic Plan, industry focused primarily on reducing pipeline cracking in pipe walls and welds. Several significant incidents occurred earlier in the 2010s related to cracking in or near a pipeline weld seam. While crack-based incidents are relatively fewer in number, they result in larger than average incident release sizes. Current PHMSA regulations contain no quantitative requirements for when and how to repair pipeline cracking. Based on recommendations from safety investigators and regulators, industry developed best practices for assessing and managing cracking in pipelines, including API RP 1176, and produced a technical bulletin for integrating pipeline safety data, API Bulletin 1178. In 2019, the pipeline industry updated its core recommended practice for managing the integrity of pipelines to include recommendations from API RP 1176. After developing these industry-wide best practices for cracking, industry is now developing new approaches to tackling corrosion.

Through the 2020 - 2022 Strategic Plan, the liquids pipeline industry is adding a strategic objective to improve corrosion detection and identify mitigations. Industry will begin this industry-wide challenge by improving the capability to assess corrosion risks. As described above, corrosion can have many different contributing causes depending on the materials, operation or operating conditions of the pipeline.

PIPELINE SAFETY EXCELLENCE PERFORMANCE REPORT

Over the course of the next three years, industry will evaluate in-depth corrosion release data to better understand root causes of failures, identify gaps in current industry guidance, develop technologies to better support corrosion management practices, and produce updated corrosion management recommended practices.

2020

- **Evaluate corrosion release data to better understand root causes of failure**
  - » Expand evaluation of release events to categorize by causal factors
  - » Conduct thorough review with operators to understand specific causal factors of largest releases by volume
- **Complete review of existing API and NACE standards and recommended practices to identify gaps in industry guidance**
  - » Develop roadmap of corrosion management practices and current industry guidance
  - » Strengthen references to NACE standards that support API standards / recommended practices
  - » Identify gaps in existing guidance and work through appropriate NACE/API channels to address through expansion of existing or development of new standards/RPs

2021

- **Develop technology supporting corrosion management practices**
  - » Benchmark corrosion technology use across API operators (remote monitoring, probes, etc.)
  - » Identify opportunities for new technology development and validation, through PRCI or joint industry projects
  - » Improve ILI capabilities to detect and size metal loss anomalies. Incorporate advancements into corrosion growth rate analysis
- **Develop a white paper, highlighting corrosion management**
- **Improve industry guidance for internal corrosion management within facilities**
  - » Incorporate guidance for facility internal corrosion management into API RP 2611 revisions

2022

- **Host a workshop to discuss leading and lagging indicators that organizations may use to assess the effectiveness of a corrosion management system**
- **Incorporate Plan-Do-Check-Act cycle into a corrosion management system**

GOAL 3

INCREASE STAKEHOLDER AWARENESS & INVOLVEMENT

Objective 3.1

Improve Communications to and from Stakeholders on Pipeline Safety

STRATEGIC INITIATIVE: IMPROVE STAKEHOLDER ENGAGEMENT

1. **Increase traffic to the updated www.Pipeline101.org website by 10% as compared to 2019 and maintain with evergreen content to engage targeted audiences**
2. **Increase PAPERS participation to 26 companies in 2021**
3. **Develop a Recommended Practice for Public Engagement**

Pipeline operators are part of the communities in which they operate, delivering much needed transportation and heating fuels and ensuring raw materials are provided to make the consumer goods we all need and enjoy. Operating a pipeline in communities obligates pipeline companies to engage with their surrounding stakeholders on how they are keeping the pipeline safe, any inconveniences that may result from building and operating a pipeline and the public's role in ensuring safe pipeline operations. Pipeline public awareness programs require pipeline operators to communicate the hazards and benefits of pipeline operations and development to key public stakeholders including affected public, elected officials, excavators and first responders. Awareness communications largely focus on pipeline locations, risks and hazards, damage prevention, emergency response protocols and how to identify and respond to a pipeline emergency.

Under the 2017—2019 Strategic Plan, pipeline operators have spent nearly two years updating the third edition of API RP 1162, *Public Awareness Programs for Pipeline Operators,* to replace the outdated first edition that is incorporated by reference into PHMSA regulations. The RP's third edition will introduce new technologies and enhanced methods that are key for communicating with target audiences to improve transparency and message effectiveness. Additionally, numerous companies participated in the Public Awareness Programs for Pipeline Operators (PAPERS) study to measure the effectiveness of public awareness messaging to key audience groups and will look for program improvements based on the findings and lessons learned. The industry also completely revamped its informative website, www.Pipeline101.org, to showcase pipeline operator's commitment to better educate public audiences on pipeline safety, operations, locations and benefit.

Through the 2020—2022 Strategic Plan, the pipeline industry will complete API RP 1162 and encourage PHMSA to incorporate and replace the outdated first edition. API and AOPL will also seek to increase industry awareness on the updated RP through trainings, webinars and an implementation guidance site. The industry is also embracing the transition from public awareness to public engagement, particularly in the development of new pipeline infrastructure. The update to RP 1162 and publication of community engagement guidelines that highlight best practices for community feedback, input and conflict resolution will meet some of these growing needs; however, the industry will also look to develop a recommended practice on community engagement during the next three years. The public engagement RP will fall under the umbrella of Pipeline SMS, stakeholder engagement, and the process of continuous improvement, and it will be governed by a balanced group of industry, the public and pipeline regulators. The industry is prioritizing these new public expectations and is learning from proven and successful strategies that communicate important pipeline safety messages through collaborative, multi-stakeholder efforts, such as the national Call811 initiative.

2020

- **Finalize and publish the third edition of API RP 1162, *Public Awareness Programs for Pipeline Operators* and encourage incorporation by reference by PHMSA**
- **Develop revised approach and promotions for the 2021 PAPERS Program to encourage at least 26 operators to participate**
- **Rollout updated www.Pipeline101.org website and identify methods to engage stakeholders**
- **Begin development of industry-wide recommended practice for public engagement with pipeline operators, members of the public and federal and state regulators**

2021

- **Develop an implementation guidance site for API RP 1162 and conduct in-person training and webinars to train operators on API RP 1162 program elements**
- **Conduct PAPERS cycle with target audiences**
- **Maintain updated content on www.Pipeline101.org website to continually engage target audiences**
- **Complete development of new industry-wide recommended practice for public engagement**

2022

- **Continue holding training and awareness sessions for operators implementing RP 1162**
- **Share high-level findings from 2021 PAPERS program**
- **Educate and assist liquids pipeline operators on implementation of new public engagement recommended practice**

GOAL 3

INCREASE STAKEHOLDER AWARENESS & INVOLVEMENT

Objective 3.2

Promote Innovative Approaches to Enhancing Damage Prevention

STRATEGIC INITIATIVE:
REDUCE EXCAVATION DAMAGE

1. **Decrease the Number Of First - and Second-Party Damages by Sharing Information for Safe Digging Along the Pipeline Right-Of-Way**
2. **Decrease the Number of Third-Party Damages During Excavation**

Excavation damage to underground pipelines continues to be a source of incidents and a threat to critical infrastructure integrity. Continued infrastructure protection improvements are a shared responsibility between the pipeline industry, federal and state regulators, and the public.

Under the 2017 – 2019 Strategic Plan, the pipeline industry worked with like-minded partners to respond to the threat of excavation damage and improve critical infrastructure protections. Pipeline operators and industry associations routinely partner with the Common Ground Alliance to increase public awareness around safe digging techniques and promote "Call Before You Dig" activities. Pipeline operators also conduct public awareness programs to ensure landowners and affected public are aware of the underground pipelines in proximity to them. One such program that operators utilize is the Public Awareness Program Effectiveness Research Survey (PAPERS) to measure and increase the effectiveness of messaging to target audience groups of affected public, other pipeline operators, elected officials, first responders and excavators.

PAPERS participants conduct this important survey every two years, with the last cycle completed in 2019.

Through the 2020 – 2022 Strategic Plan, the Damage Prevention Work Group (DPWG) will look to reduce excavation incidents most directly under its control, namely first-, second- and third-party excavation incidents during pipeline operator excavation projects. To accomplish this goal, the DPWG will first review current practices for preventing first- and second-party damage and develop summary pages by topic on the Excavation Damage Prevention Toolbox, which serves as a document repository for operators. After reviewing current practices, the group will look to identify underlying root causes and develop an action plan to reduce first- and second-party damages. The DPWG will also examine industry practices on third-party damages from insufficient line locating/marking or marking in a timely fashion and identify recommendations. Throughout the next three years, the Work Group will also continue regular PAPERS surveys, routinely engage federal and state regulators and legislators and public safety advocates and coordinate with like-minded associations on the shared goal of excavation damage prevention and critical infrastructure protection.

PIPELINE SAFETY EXCELLENCE PERFORMANCE REPORT

2020

- **Review current practices on first- and second-party damages and third-party damages for pipeline operator excavation projects**
  - » Develop a summary page on the Excavation Damage Toolbox websiteby topic
- **Create a standardized list of root cause analysis for first- and second-party damages, potentially using an existing list of causes, to streamline reporting and data analysis**
- **Determine root cause analyses of first- and second-party damages to identify underlying causes**
- **Review existing industry practices on third-party damages from insufficient line locating/marking or marking in a timely fashion for updated recommendations**

2021

- **Develop and implement action plan based on gaps identified in 2020 for first-, second- and third-party damages**
- **Promote and disseminate learnings identified in action plan**
- **Review and potentially update Excavation Damage Toolbox website for all third-party damages**
  - » Develop summary page by topic

2022

- **Measure success of initiatives from previous two years and identify challenges through Strengths, Weaknesses, Opportunities and Threats analysis**
- **Continue to engage federal and state regulators and legislators on the importance of critical infrastructure protections and excavation damage enforcement**
- **Coordinate with excavation damage prevention associations and state One-Call systems on damage prevention initiatives**
- **Identify opportunities for improvement in damage prevention for 2023-2025 Strategic Plan**

GOAL 4

ENHANCE EMERGENCY RESPONSE PREPAREDNESS

Objective 4.1

Boost Operator & First Responder Planning, Preparedness & Response Capabilities

STRATEGIC INITIATIVE: PIPELINE EMERGENCY PLANNING, PREPAREDNESS & RESPONSE

1. **Conduct Yearly RP 1174 Survey (ER Group) –** Increase Survey Participation Rate Year-over-Year
2. **First Responder Training Portal (PAG) -** Increase Portal Course Completions by 10% Yearly
3. **Cross – Company Learnings (ER Group) -** Publish Yearly Summary and Achieve 25% Cross-Company Participation for All Opportunities Provided

Protecting human life and the environment is industry's first priority when responding to a pipeline incident. A rapid and effective response can reduce spill size and potential impact. Emergency response stakeholders expect all parties, including operators, to have a plan for response and to be prepared for and have the capability to respond to pipeline emergencies. First responders can improve their response times with increased operator communications, outreach and training programs. Operators improve their procedures by adopting industry-wide recommended practices, publishing necessary good-practice guides and engaging in peer to peer opportunities for drilling/exercising emergency response plans and sharing lessons learned from incidents.

Under the 2017—2019 Strategic Plan, the liquids pipeline industry worked to increase the capabilities of both pipeline operators and emergency response personnel to prepare for and respond to pipeline emergencies. In 2019, the API/AOPL Emergency Response Group (ERG) developed tactical guidance for the special needs of swift water response, such as a river with a high flow rate. API RP 1174, *Onshore Hazardous Liquid Pipeline Emergency Preparedness and Response*, was developed with input from pipeline operators, federal regulators, and first responders. API RP 1174 provides a framework for hazardous liquid pipeline operators to create adaptive emergency planning and response processes, which include the identification and mitigation of risks. Industry recognizes that educating first responders on incidents that involve our products greatly reduces their risk and enables for a better initial response. The liquids pipeline industry expanded the online training course on responding to pipeline emergencies developed jointly with the National Association of State Fire Marshals and provided free of charge to local emergency responders. Over the last 3 years, the training program resulted in over 4,870 course completions on how to respond safely to a pipeline emergency, managing a pipeline emergency response, and tactical response guidelines for hazardous materials response.

Through the 2020—2022 Strategic Plan, the ERG will publish three tactical response guidance documents, including the swift water response guidance developed in 2019 and two new guidance on highly volatile liquids response and cold weather response. The ERG will continue to assess the implementation of RP 1174 across the industry, through targeted yearly surveys. Over the next three years, API and AOPL will increase promotion of the free online training portal for first responders. Peer-to-peer sharing of learnings is an invaluable way for our industry to continue to drive performance in oil spill response planning and response. The ERG will formalize a program in the coming years to give member companies an avenue by which they can open their training and exercises to other member companies for participation. At the end of each year, we will produce an annual report highlighting this effort, as well as any best practices that are identified and discussed within the API/AOPL Emergency Response Group.

2020

- **Circulate 2019 RP 1174 Survey and evaluate responses for need for more guidance materials**
- **Promote First Responder Training Portal (nasfm-training.org) to relevant stakeholder groups**
- **Internally publish cross-company training and exercise opportunities**
- **Publish Swift Water Response Good Practice Guide** (API Technical Report)

2021

- **Circulate 2020 RP 1174 Survey and evaluate responses for need for more guidance materials**
- **Publish survey results communicating industry's progress toward RP 1174 implementation**
- **Promote First Responder Training Portal (nasfm-training.org) to relevant stakeholder groups**
- **Internally publish cross-company training and exercise opportunities**
- **Develop and publish Highly Volatile Liquids Response Good Practice Guide** (API Technical Report)

2022

- **Circulate 2021 RP 1174 Survey and evaluate responses for need for more guidance materials**
- **Publish survey results communicating industry's progress toward RP 1174 implementation**
- **Promote First Responder Training Portal (nasfm-training.org) to relevant stakeholder groups**
- **Internally publish cross-company training and exercise opportunities**
- **Develop and publish Cold Weather Response Good Practice Guide** (API Technical Report)

PIPELINE SAFETY EXCELLENCE PERFORMANCE REPORT



2019 PERFORMANCE REPORT

Measuring Pipeline Safety Performance





KEY PERFORMANCE INDICATORS

Measuring the performance of pipelines is a key way to determine how safe they are and whether their safety is improving. Pipeline operators and PHMSA collect hundreds of different data points measuring how safely pipelines are operating and the reasons behind pipeline incidents when they occur.

Particularly useful measures of pipeline safety examine incident size, location, commodity and cause. The liquids pipeline industry uses each one of the following measures to better understand pipeline incident trends and develop strategies for improving pipeline safety. As a sign of overall pipeline safety performance, the liquids pipeline industry tracks a core set of Key Performance Indicators (KPIs). These KPIs are based primarily on incidents impacting people or the environment. They were created through a recommendation of the U.S. National Transportation Safety Board in a collaborative effort between PHMSA, pipeline operators and public pipeline safety advocates represented by the Pipeline Safety Trust. They reflect the highest priority we place on protecting people and the environment. This year, the pipeline industry continued to demonstrate its commitment to safety, with incidents impacting people or the environment down 36% over the last five years, all while pipeline mileage has increased nearly 10% in that time. For a full definition of the criteria for incidents impacting people or the environment, please see page 54.

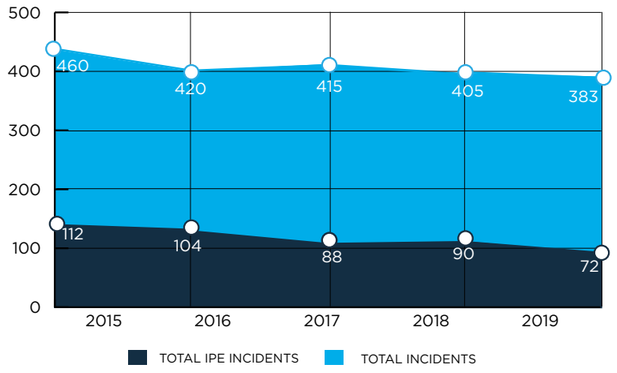
The four industry-wide KPIs are:

1) **Total Incidents Impacting People or the Environment**
2) **Integrity Management Incidents Impacting People or the Environment**
3) **Operations & Maintenance (O&M) Incidents Impacting People or the Environment**
4) **Participation in Pipeline Safety Management System (PSMS) Programs**

Integrity management incidents are those of the pipeline itself, such as corrosion, cracking or weld failure. Operations and maintenance causes include equipment failure or incorrect operations.

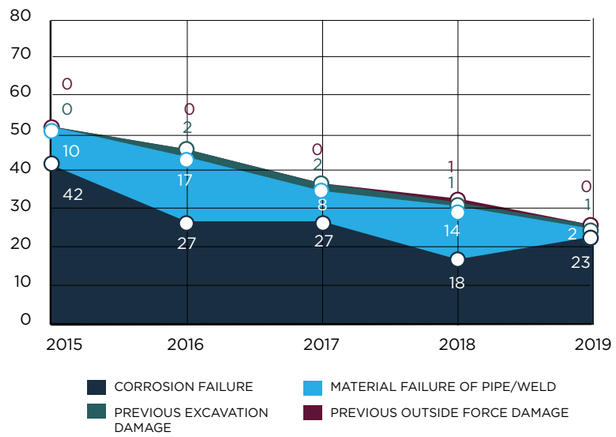


KEY PERFORMANCE INDICATORS



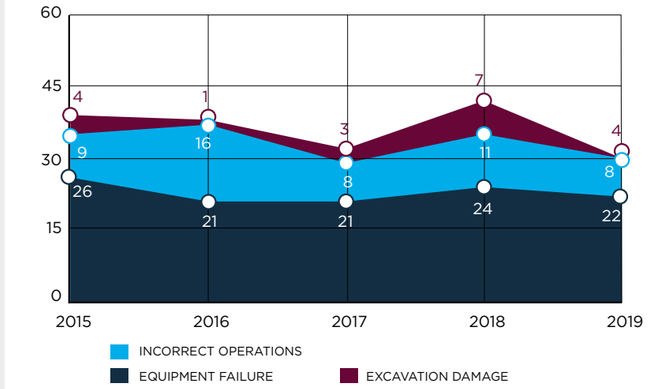
#1: TOTAL INCIDENTS & INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT (2015-2019)

Pipeline incidents impacting people or the environment decreased 36% over the last 5 years. Total pipeline incidents were down as well, dropping 17% over 5 years with 77 fewer incidents in 2019 compared to 2015. A full description of the specific types of incidents impacting people or the environment can be found on page 54.



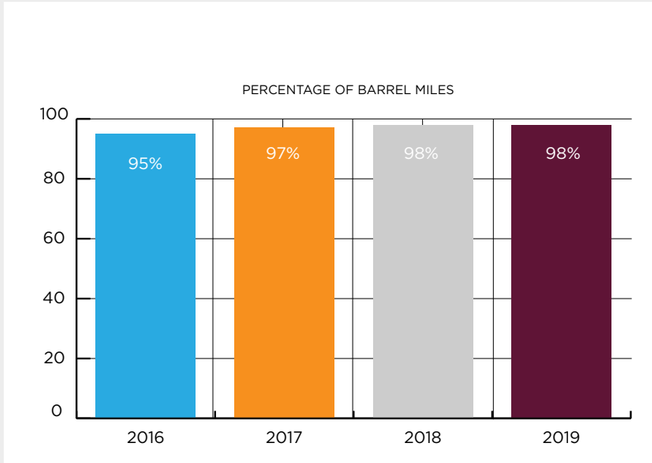
#2: INTEGRITY MANAGEMENT INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT (2015-2019)

Incidents related to the pipeline itself, such as corrosion, cracking or weld failure, were down 50% over the last 5 years in areas impacting people or the environment. In these areas, corrosion failures are down 45% from 2015 to 2019.



#3: OPERATIONS & MAINTENANCE (O&M) INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT (2015-2019)

Incidents related to installing and maintaining pipeline equipment or operating the pipeline and its valves or pumps were down 13% over the last 5 years in areas impacting people or the environment. In these areas, incidents caused by incorrect operations decreased by 11% while equipment failure decreased 15% from 2015 to 2019.

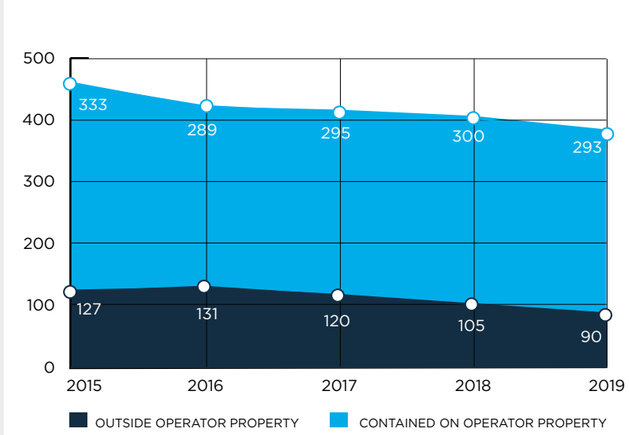


#4: PIPELINE SAFETY MANAGEMENT SYSTEMS OPERATOR COMMITMENT

In 2019, the pipeline industry maintained liquids pipeline operator commitment to Pipeline Safety Management Systems at 98% of industry barrel miles.

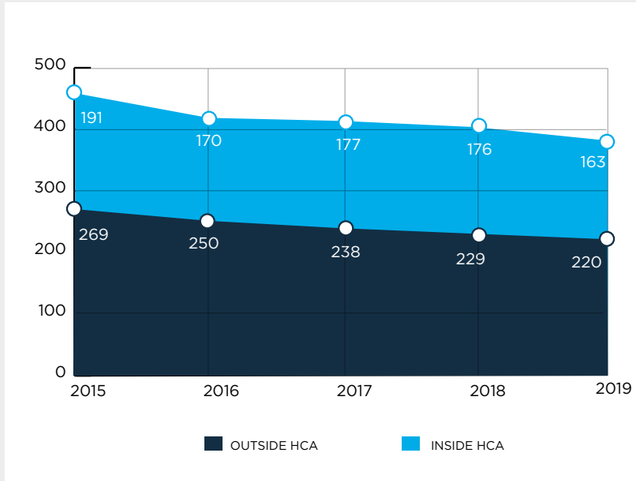
INCIDENTS BY LOCATION

The location of a pipeline incident matters both when gauging the impact of an incident and developing strategies to prevent incidents in the future. Pipeline operators place the greatest emphasis on preventing and minimizing impacts to people or the environment. Tracking these incidents helps operators focus on this priority. Additional measures of incident impacts are whether they are contained on operator property or outside the operator's facilities, specifically in high consequence areas (HCAs), a regulatory term used by PHMSA.



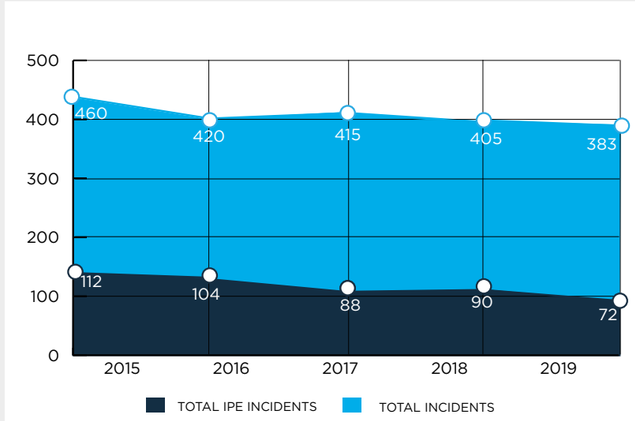
#5: PIPELINE INCIDENTS INSIDE & OUTSIDE OF OPERATOR PROPERTY (2015-2019)

In 2019, 77% of incidents from liquids pipelines were contained within an operator's property. Examples of pipeline operator properties include pump stations, tank farms and terminals. Incidents in public spaces outside of operator facilities decreased 17% from 2015 to 2019.



#6: PIPELINE INCIDENTS INSIDE & OUTSIDE OF HCAs (2015-2019)

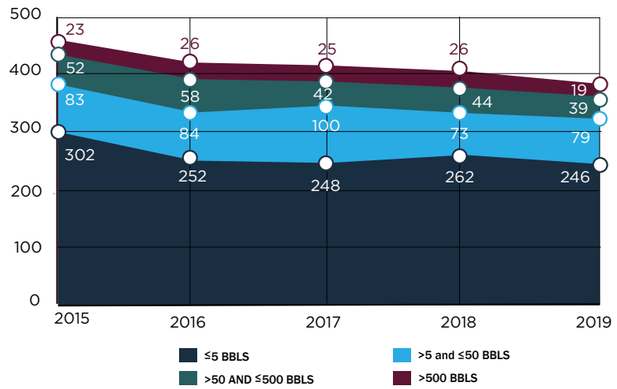
Liquids pipeline incidents occurring in high consequence areas (HCAs) declined 15% over the last 5 years. Through federal regulation, PHMSA defines HCAs as areas of population concentration, commercially navigable waterways, or sensitive environmental locations. Fewer than half (43%) of pipeline incidents occurred in HCAs in 2019. HCA data differs from incidents impacting people or the environment, because under PHMSA regulation an incident can have no impact on people or the environment, remain wholly within an operator's facility, and still count as an HCA if that facility is surrounded by an HCA.



#7: TOTAL INCIDENTS AND INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT (2015-2019)

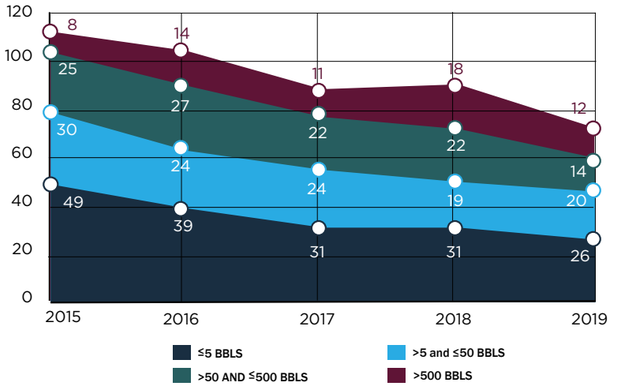
In 2019, 73 liquids pipeline incidents impacted people or the environment, a 36% decrease over the last 5 years. Total pipeline incidents were down as well, dropping 17% over 5 years with 77 fewer incidents in 2019 compared to 2015. A full description of the specific types of incidents impacting people or the environment can be found on page 54.

INCIDENTS BY SIZE



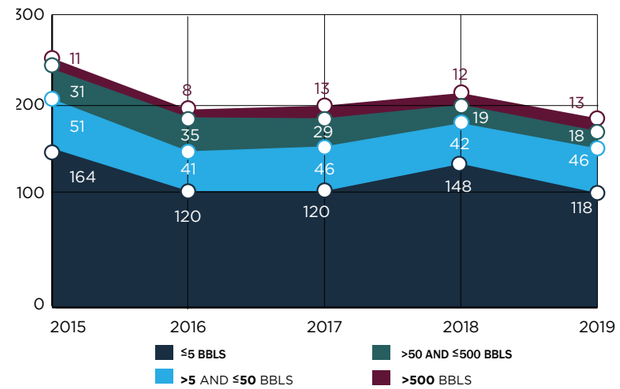
#8: LIQUID PIPELINE INCIDENTS BY SIZE (2015-2019)

Most pipeline incidents are small in size. In 2019, 64% of incidents were less than 5 barrels and 85% were less than 50 barrels. Large pipeline incidents are also the rarest. In 2019, only 5% of incidents were 500 barrels or larger.



#9: INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT BY SIZE (2015-2019)

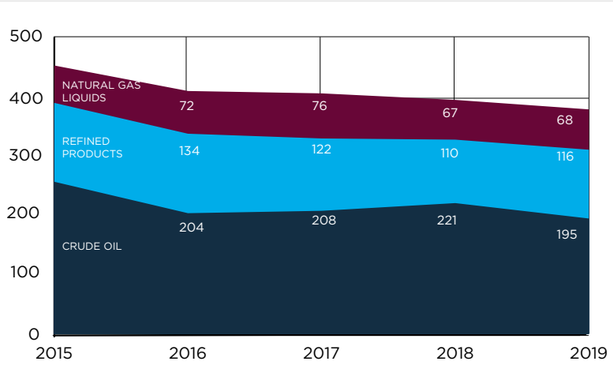
Most incidents impacting people or the environment are small in size. In 2019, approximately 66% of such incidents were less than 50 barrels, with only 16% of incidents 500 barrels or larger.



#10: CRUDE OIL INCIDENTS BY SIZE (2015-2019)

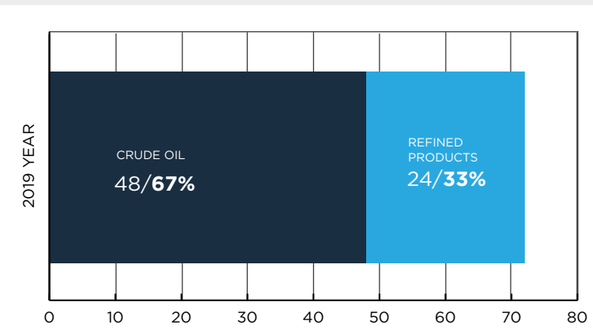
Similar to total incident trends, the majority of crude oil pipeline incidents are small in size. In 2019, 61% of crude oil incidents were 5 barrels or smaller and 84% of crude oil incidents were smaller than 50 barrels. Over the last 5 years, only 7% of crude oil incidents were over 500 barrels. Crude oil incidents greater than 50 barrels have decreased 26%, from 42 to 31 incidents.

INCIDENTS BY COMMODITY



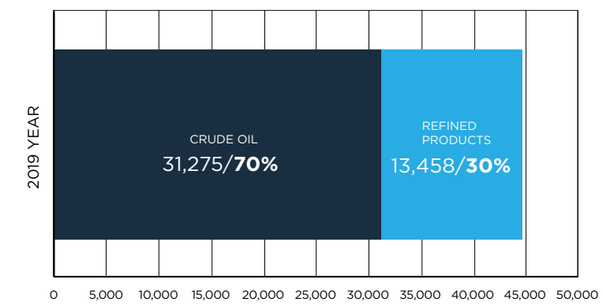
#11: ALL INCIDENTS BY COMMODITY (2015-2019)

In 2019, crude oil incidents represented 50% of total incidents, with refined products at 30% and natural gas liquids at 18% of total incidents. The number of annual crude oil incidents are down 24% from 2015.



#12: INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT BY COMMODITY (2019)

In 2019, there were 48 crude oil and 24 refined products incidents impacting people or the environment.

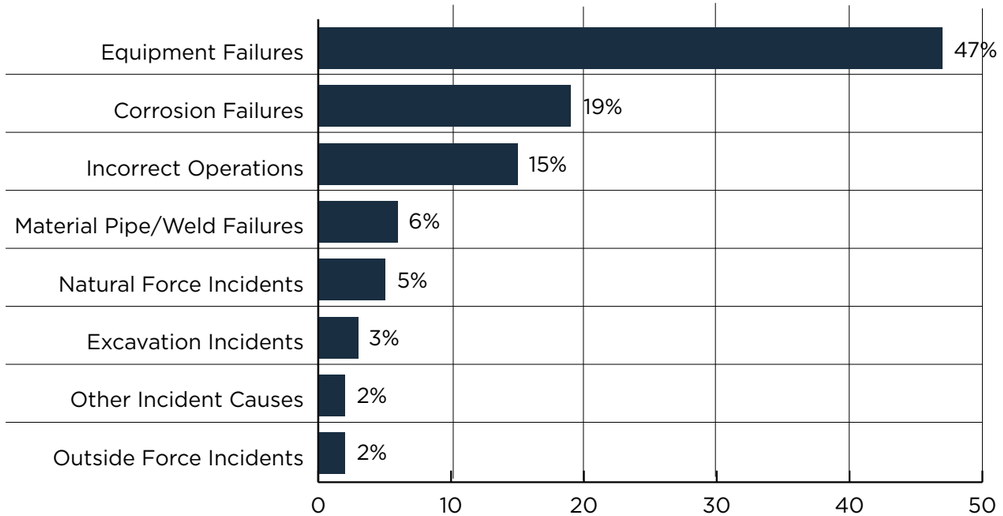


#13: PERCENTAGE OF BARRELS RELEASED IMPACTING PEOPLE OR THE ENVIRONMENT BY COMMODITY (2019)

Crude oil incidents impacting the people or the environment in 2019 represented 70% of the total, with refined products representing 30% of total incidents impacting people or the environment.

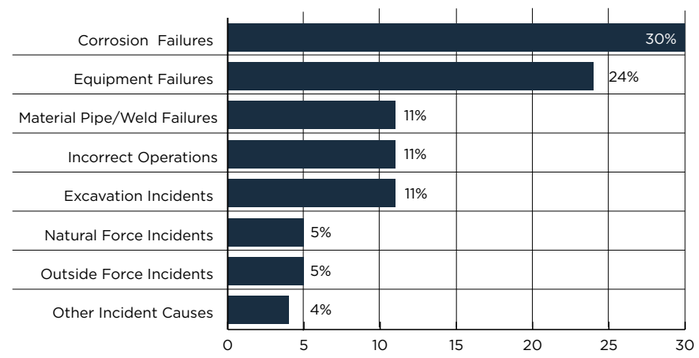


INCIDENTS BY CAUSE



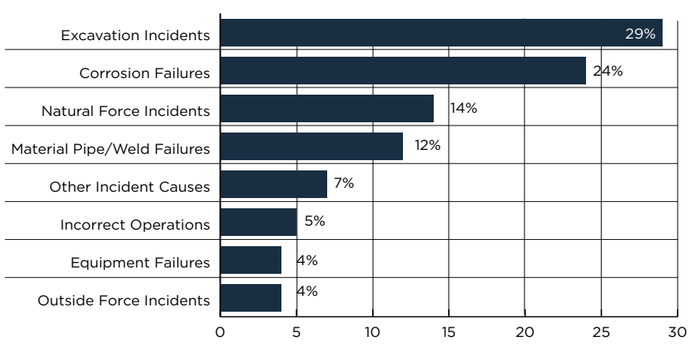
#14: LIQUIDS PIPELINE INCIDENTS BY CAUSE (2015-2019)

Equipment failure is the most frequent cause of liquids pipeline incidents. Over the last 5 years, equipment failure represented 47% of incidents, corrosion failure 19% and incorrect operation 15% of incidents. Material pipe/weld failures, which include cracking, a primary source of large volume releases, represented only 6% of incidents over the last 5 years.



#15: PERCENTAGE OF INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT BY CAUSE (2015-2019)

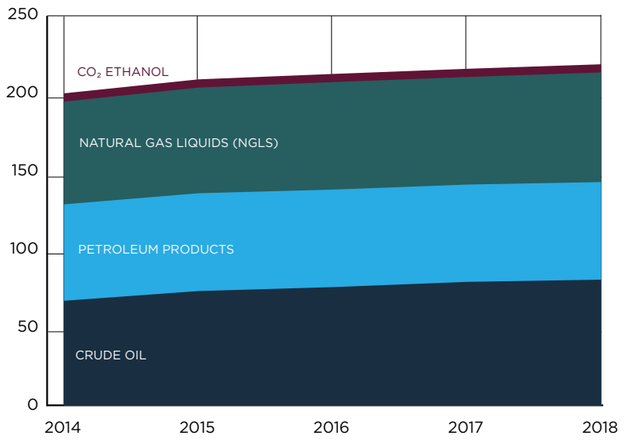
Over the last 5 years, corrosion (30%) was the most frequent cause of incidents impacting people or the environment, followed by equipment failure (24%), material pipe/weld failures (11%), incorrect operations (11%) and excavation incidents (11%).



#16: PERCENTAGE OF BARRELS RELEASED IMPACTING PEOPLE OR THE ENVIRONMENT BY CAUSE (2015-2019)

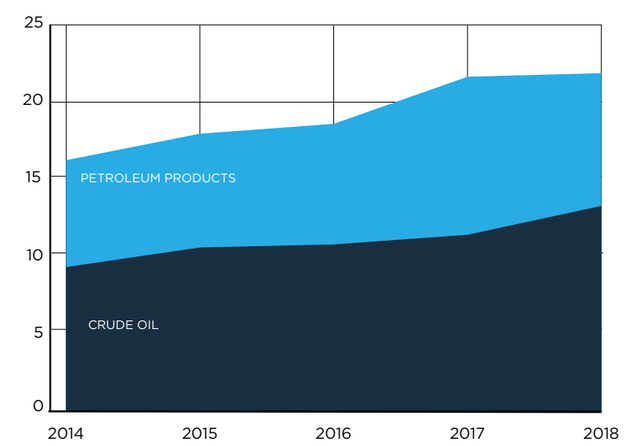
Excavation incidents (29%) were responsible for the most barrels released in incidents impacting people or the environment, followed by corrosion (24%), natural force incidents, such as flooding, earthquakes and lightning (14%), and material pipe/weld failures (12%). Equipment failure, the most frequent cause of all incidents, was the cause of only 4% of barrels released, reflecting the reduced proportion of operator property incidents impacting the people or the environment and the smaller average size of equipment failure incidents.

PIPELINE MILES & BARRELS DELIVERED



#17: MILES OF U.S. LIQUIDS PIPELINES BY PRODUCTS (2014-2018) (Thousands)

At the end of 2018 (the most recent year this data is available), there were 218,402 total miles of liquids pipelines, with crude oil pipelines representing 37% of the total at 80,477 miles. Over the last five years, the total miles of liquids pipelines increased 18,608 miles or 9% and crude oil pipelines increased 13,534 miles or 20%.



#18: BARRELS DELIVERED BY U.S. LIQUIDS PIPELINE (2014-2018)
(Billions)

In 2018, there were a total of 21,804,225,267 crude oil and refined products barrels delivered by pipeline, with crude oil representing approximately 61% of the barrels delivered. Over the last five years, total liquid barrels delivered by pipeline have increased 35%, or 5,613,003,725. Crude oil barrels have increased 42%, or 3,945,306,143, while petroleum products have gone up 24%, or 1,667,697,582 barrels, in the last five years.



GRAPH #1: TOTAL INCIDENTS & TOTAL IPE INCIDENTS (2015-2019)

Year	IPE INCIDENTS	INCIDENTS	TOTAL
2015	112	348	460
2016	104	316	420
2017	88	327	415
2018	90	315	405
2019	72	311	383
Total Releases	466	1,617	2,083
% Change from 2015	**-36%**	**-11%**	**-17%**

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of March 2019.

GRAPH #2: IM IPE RELEASES (2015-2019)

Year	CORROSION FAILURE	MATERIAL FAILURE OF PIPE/ WELD	PREVIOUS EXCAVATION DAMAGE	PREVIOUS OUTSIDE FORCE DAMAGE	TOTAL INCIDENTS
2015	42	10	0	0	52
2016	27	17	2	0	46
2017	28	8	2	0	38
2018	18	14	1	1	34
2019	23	2	1	0	26
Total Releases	-45%	-80%	0	0	-50%

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of March 2019.

GRAPH #3: O&M IPE INCIDENTS (2015-2019)

Year	EQUIPMENT FAILURE	INCORRECT OPERATION	EXCAVATION DAMAGE	TOTAL INCIDENTS
2015	26	9	4	39
2016	21	16	1	38
2017	21	8	3	32
2018	24	11	7	42
2019	22	8	4	34
Total Releases	-15%	-11%	0%	-13%

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of March 2019.

GRAPH #4: PIPELINE SAFETY MANAGEMENT SYSTEM OPERATOR COMMITMENT

Year	% Commitment
2016	95
2017	97
2018	98
2019	98

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of March 2019

GRAPH #5: INCIDENTS INSIDE & OUTSIDE OF OPERATOR PROPERTY

Year	OUTSIDE OPERATOR PROPERTY	CONTAINED ON OPERATOR PROPERTY	TOTAL INCIDENTS
2015	127	333	460
2016	131	289	420
2017	120	295	415
2018	105	300	405
2019	90	293	383
Total Releases	**573**	**1,510**	**2,083**

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of March 2019.

GRAPH #6: PIPELINE INCIDENTS IMPACTING HCAs (2015-2019)

Year	OUTSIDE HCA	INSIDE HCA	TOTAL INCIDENTS
2015	269	191	460
2016	250	170	420
2017	238	177	415
2018	229	176	405
2019	220	163	383
% Change from 2015	**-18%**	**-15%**	**-17%**

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of March 2019.

GRAPH #7: TOTAL INCIDENTS & TOTAL IPE INCIDENTS (2015-2019)

Year	IPE INCIDENTS	INCIDENTS	TOTAL
2015	112	348	460
2016	104	316	420
2017	88	327	415
2018	90	315	405
2019	72	311	383
Total Releases	466	1,617	2,083
% Change from 2015	**-36%**	**-11%**	**-17%**

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of March 2019.

GRAPH #8: LIQUID PIPELINE INCIDENTS BY SIZE (2015-2019)

Year	≤ 5 BBLS	> 5 AND ≤ 50 BBLS	> 50 AND ≤ 500 BBLS	> 500 BBLS	TOTAL INCIDENTS
2015	302	83	52	23	460
2016	252	84	58	26	420
2017	248	100	42	25	415
2018	262	73	44	26	405
2019	246	79	39	19	383
Total Releases	1,310	419	235	119	2,083
% Change from 2015	**-19%**	**-5%**	**-25%**	**-17%**	**-17%**

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of March 2019.

GRAPH #9: IPE INCIDENTS BY SIZE (2015-2019)

YEAR	≤ 5 BBLS	> 5 AND ≤ 50 BBLS	> 50 AND ≤ 500 BBLS	> 500 BBLS	TOTAL INCIDENTS
2015	49	30	25	8	112
2016	39	24	27	14	104
2017	31	24	22	11	88
2018	31	19	22	18	90
2019	26	20	14	12	72
Total Releases	176	117	110	63	466
% Change from 2015	**-20%**	**-27%**	**-8%**	**0%**	**-36%**

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of March 2019.

GRAPH #10: CRUDE OIL INCIDENTS BY SIZE (2015-2019)

YEAR	≤ 5 BBLS	> 5 AND ≤ 50 BBLS	> 50 AND ≤ 500 BBLS	> 500 BBLS	TOTAL INCIDENTS
2015	164	51	31	11	257
2016	120	41	35	8	204
2017	120	46	29	13	208
2018	148	42	19	12	221
2019	118	46	18	13	195
Total Releases	670	226	132	57	1,085
% Change from 2015	**-28%**	**-10%**	**-42%**	**18%**	**-24%**

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of March 2019.

GRAPH #11: INCIDENTS BY COMMODITY (2015-2019)

YEAR	CRUDE OIL	REFINED PRODUCTS	HIGHLY VOLATILE LIQUIDS (HVLS)	CO_2	BIOFUEL/ ETHANOL	TOTAL INCIDENTS
2015	257	133	63	7	0	460
2016	204	134	72	9	1	420
2017	208	122	76	9	0	415
2018	221	110	67	5	2	405
2019	195	116	68	4	0	383
% Change from 2015	**-24%**	**-13%**	**8%**	**-43%**	**0**	**-17%**

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of March 2019.

GRAPH #12: TOTAL IPE INCIDENTS BY COMMODITY

YEAR	CRUDE OIL	REFINED PRODUCTS
2015	75	37
2016	69	35
2017	54	34
2018	56	34
2019	48	24
% Change from 2015	**-36%**	**-35%**

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of March 2019.

GRAPH #13: PERCENTAGE OF IPE BARRELS RELEASED BY COMMODITY (2015 - 2019)

YEAR	CRUDE OIL	REFINED PRODUCTS
2015	70%	30%
2016	64%	36%
2017	56%	44%
2018	53%	47%
2019	70%	30%
% Change from 2015	**0%**	**0%**

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of March 2019.

GRAPH #14: LIQUIDS PIPELINE INCIDENTS BY CAUSE (2015-2019)

CAUSE	TOTAL INCIDENTS	PERCENTAGE
Equipment Failures	984	47%
Corrosion Failures	388	19%
Incorrect Operations	321	15%
Material Pipe/Weld Failures	131	6%
Natural Force Incidents	97	5%
Excavation Incidents	72	3%
Other Incident Causes	48	2%
Outside Force Incidents	42	2%
Total	**2,083**	

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of March 2019.

GRAPH #15: TOTAL IPE INCIDENTS BY CAUSE (2015-2019)

CAUSE	TOTAL INCIDENTS	PERCENTAGE
Corrosion Failures	138	30%
Equipment Failures	114	24%
Incorrect Operations	52	11%
Material Pipe/Weld Failures	51	11%
Excavation Incidents	50	11%
Natural Force Incidents	22	5%
Outside Force Incidents	21	5%
Other Incident Causes	18	4%
Total	**466**	

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of March 2019.

GRAPH #16: PERCENTAGE OF IPE BARRELS RELEASED BY CAUSE (2015-2019)

CAUSE	BARRELS RELEASED	PERCENTAGE
Excavation Incidents	57,695	29%
Corrosion Failures	48,335	24%
Natural Force Incidents	27,756	14%
Material Pipe/Weld Failures	24,626	12%
Other Incident Causes	14,005	7%
Incorrect Operations	10,603	5%
Outside Force Incidents	7,603	4%
Equipment Failures	7,479	4%
Total	**198,106**	

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of March 2019.

GRAPH #17: MILES OF U.S. PIPELINE (2014-2018)

	2014	2015	2016	2017	2018
Crude Oil	66,943	73,171	75,695	79,047	80,477
Petroleum Products	61,767	62,634	62,435	62,317	62,495
Natural Gas Liquids (NGLs)	65,792	67,667	68,849	68,887	70,208
CO_2/Ethanol	5,292	5,256	5,210	5,250	5,221
Total Miles	**199,793**	**208,728**	**212,189**	**215,502**	**218,402**

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of March 2019.

GRAPH #18: BARRELS DELIVERED BY U.S. LIQUIDS PIPELINE (2014-2018)

	2014	2015	2016	2017	2018
CRUDE OIL	9,300,051,343	10,563,693,124	10,760,706,300	11,382,453,374	13,245,357,486
PETROLEUM PRODUCTS	6,891,170,199	7,335,091,475	7,774,085,019	10,189,745,566	8,558,867,781
TOTAL BARRELS	**16,191,221,542**	**17,898,784,599**	**18,534,791,319**	**21,572,198,940**	**21,804,225,267**

Source: U.S. Federal Energy Regulatory Commission

DEFINITIONS & NOTES

BARRELS

One barrel of crude oil or petroleum products is equivalent to 42 gallons.

BARRELS RELEASED

The Department of Transportation's Pipelines and Hazardous Materials Safety Administration (PHMSA) also requires operators to report intentional releases of natural gas liquids in gas form into the atmosphere during maintenance activities. Unintentionally released barrels of crude oil and petroleum products forms the basis of barrels released data and analysis in this report. PHMSA also requires operators to report intentional releases of natural gas liquids in gas form into the atmosphere during maintenance activities. This process displaces residual hydrocarbons in gas state from the section of pipeline set to undergo maintenance. Barrels released data in this report does not include intentional blowdown releases.

IN-LINE INSPECTION DEVICE OR "SMART PIG"

An in-line inspection (ILI) device, commonly referred to as a "smart pig", is a diagnostic tool that travels inside the pipeline scanning the pipe walls for imperfections and recording the data for later analysis.

NATURAL GAS LIQUIDS

Petroleum products that are liquid when traveling through a pipeline under high pressure and a gas at atmospheric pressure are referred to generally as natural gas liquids (NGLs). Examples of NGLs transported by pipeline include: propane, ethane and butane. They occur naturally in petroleum deposits and are produced along with crude oil or natural gas (methane). NGLs are separated from the crude oil and natural gas after production and sent to manufacturers (ethane, butane) as an industrial raw material sent to manufacturers to produce consumer goods such as polymers, fertilizers and home goods, or to other commercial, agricultural or residential uses (propane).

INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT (IPE) CRITERIA

If either criterion 1 or 2 below is met for a crude oil or refined products pipeline the incident counts as IPE:

TIER 1. Regardless of location of incident:

Fatality; or
Injury requiring in-patient hospitalization; or
Ignition; or
Explosion; or
Evacuation; or
Wildlife impact; or
Water contamination = ocean/seawater, groundwater, or drinking water or public/non-operator private property damage

TIER 2. For location of incident "Not totally contained on operator-controlled property"

Unintentional release volume greater than or equal to 5 gallons and in an HCA; or
Unintentional release volume greater than or equal to 5 barrels and outside of an HCA; or Water contamination; or Soil contamination

PIPELINE SAFETY EXCELLENCE PERFORMANCE REPORT

PHMSA INCIDENT REPORTING

Pipeline operators regulated by PHMSA are required to report data related to pipeline incidents including location, cause and consequences. PHMSA compiles this information in a publicly available online database. The pipeline safety data used in this report was obtained from PHMSA in March 2020.

API RECOMMENDED PRACTICE (RP)

Documents that communicate proven industry practices; RPs may include both mandatory and non-mandatory provisions.

REFINED PRODUCTS

Products derived from the process of refining crude oil. Examples of refined products include: gasoline, kerosene, and lubricating oil.

CRUDE OIL

Includes condensate, light, medium, and heavy unrefined hydrocarbons extracted from underground petroleum formations.



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