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PIPELINE SAFETY EXCELLENCE PERFORMANCE

2019 ANNUAL LIQUIDS REPORT

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.

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"OVER THE PAST FIVE YEARS, PIPELINE OPERATORS HAVE REDUCED THE NUMBER OF LIQUIDS PIPELINE INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT BY 20%"

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

Safety is at the heart of our business every minute of every day – and we continue to improve. Over the past five years, pipeline operators have reduced the number of liquids pipeline incidents impacting people or the environment by 20% even as pipeline miles and barrels delivered have risen. Pipelines remain one of the safest ways to deliver the energy we use every day, delivering their products safely 99.999% of the time.

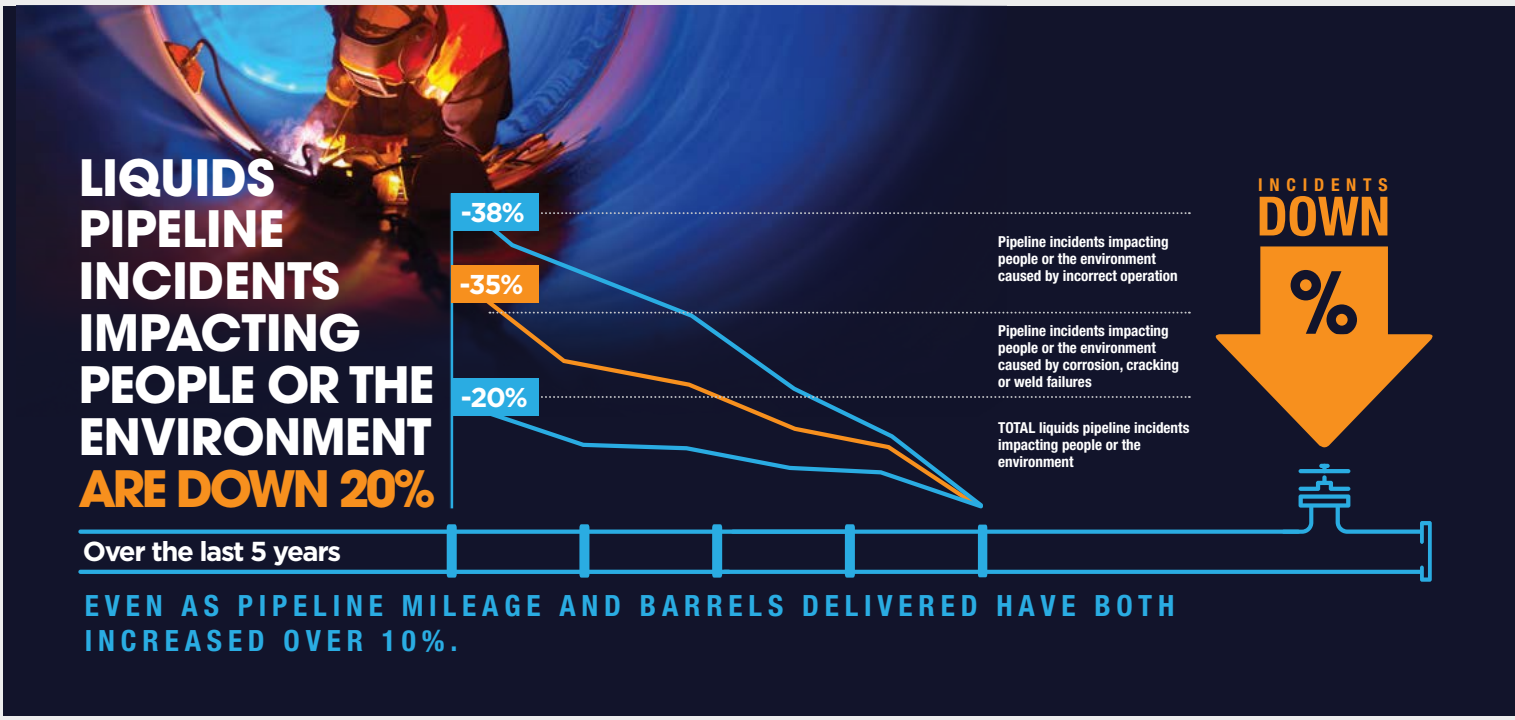
Our ongoing safety improvement efforts include implementing enhanced technologies to evaluate our assets, analyzing data and sharing learnings and best practices as we drive towards the industry goal of zero incidents. Summarized on the following page, and shown in more detail later in this report, is our safety track record over the last five years. In addition to fewer total pipeline incidents, releases caused by corrosion or pipe material failures are down 35% and incidents caused by incorrect operation are down 38% over the last five years.

Technology is a main driver of our continuous improvement. Ongoing industry-wide research and development initiatives will test and validate the performance of new "smart pig" inspection tools. Every year, we continue to improve and apply more advanced technologies. We are using ultrasonic, electromagnetic acoustic wave, and magnetic flux technologies to find ever-smaller issues in pipelines that we can repair long before they become a problem. We continue to improve the data modeling and analytics as well, enhancing our predictive capabilities.

Pipeline operators are also innovating in the ways we manage our organizations and enhance our safety cultures. In 2019, industry-wide efforts will promote wider adoption of pipeline safety management systems for companies throughout our industry, and in specific functions such as construction quality management, inspections and maintenance, and leak detection programs.

Pipelines benefit consumers and working Americans. Pipelines and the energy they deliver powers America and improves our lives every day. Delivering energy that fuels our country, providing jobs that drive our economy, keeping our employees safe, and protecting our neighbors and the environment are what motivates us. We look forward to sharing more about our safety commitment.

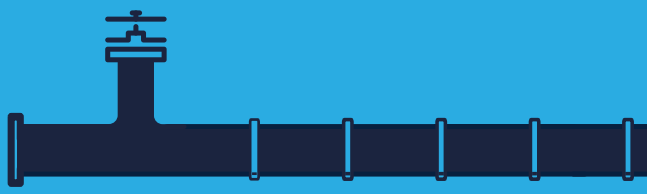
Sincerely,



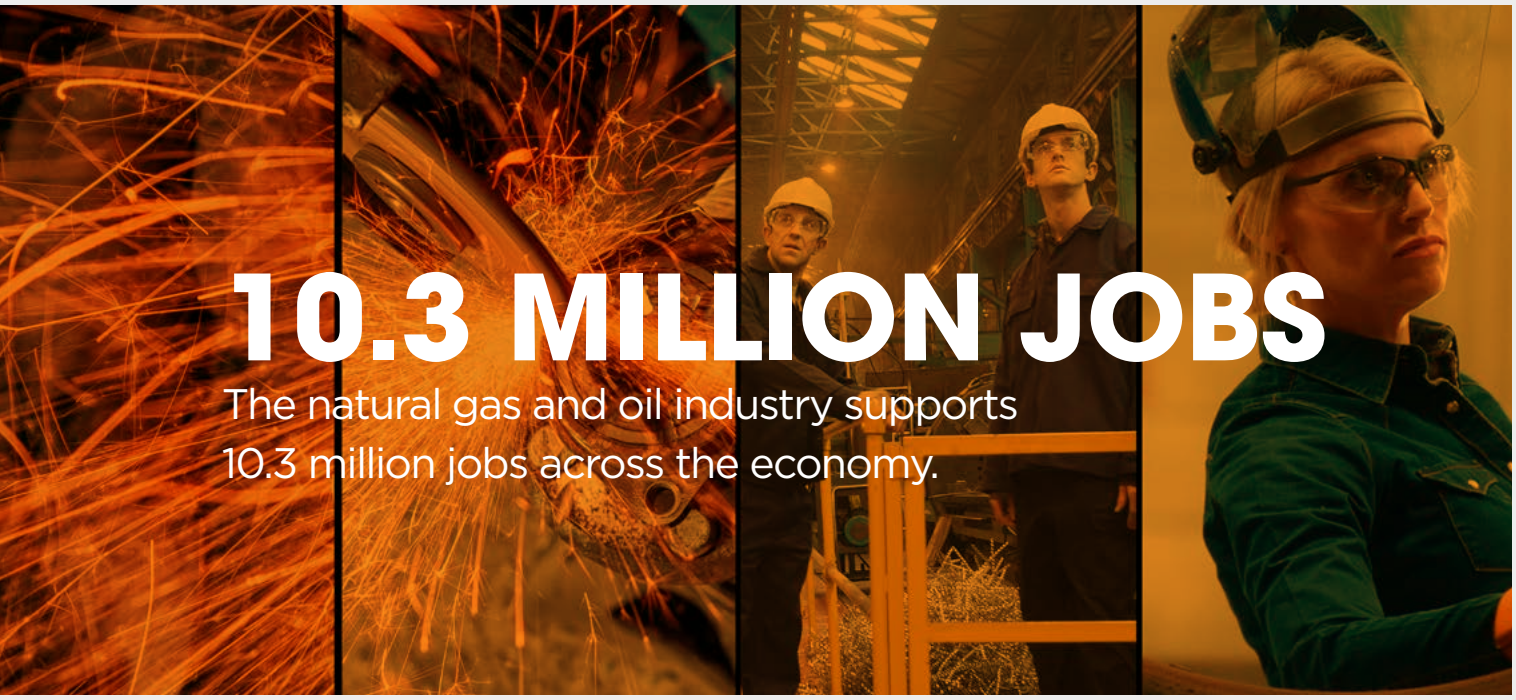
Implementing a Pipeline Safety Management System (Pipeline SMS) is a critical priority for the pipeline industry to effectively improve safety performance. To date, nearly

98% of liquid barrel miles

are implementing a Pipeline SMS, making valuable steps along the journey of implementation.

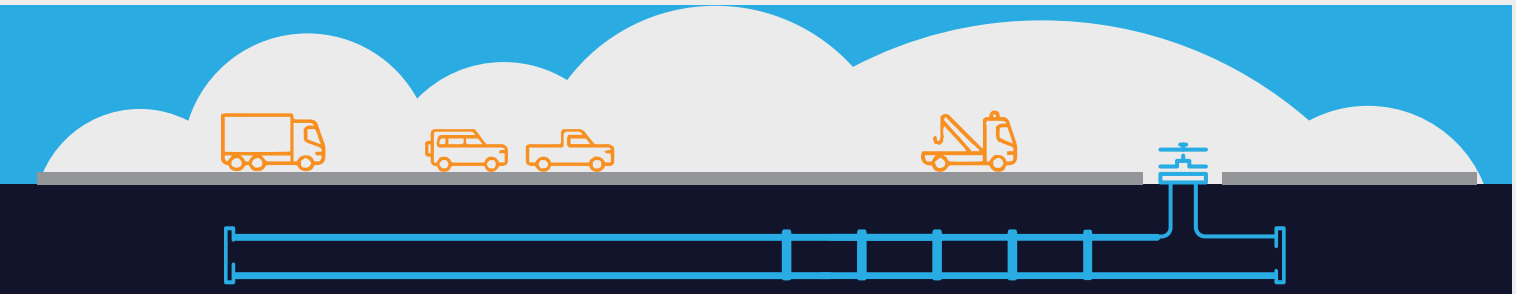


LIQUIDS PIPELINES DELIVER THEIR PRODUCTS SAFELY 99.999% OF THE TIME



10.3 MILLION JOBS

The natural gas and oil industry supports 10.3 million jobs across the economy.



TOTAL LIQUID PIPELINE MILES INCREASED

OVER 23,000 MILES

12% OVER THE LAST 5 YEARS

TO 215,736 MILES

OVER THE LAST FIVE YEARS

total crude oil and petroleum products barrels delivered by pipeline have increased 44%, or 6,563,309,091 barrels.

74%

of pipeline incidents are contained within operators' facilities, such as pump stations or tank farms

Crude oil pipeline incidents impacting people or the environment

ARE DOWN 21% OVER THE LAST 5 YEARS

PIPELINE SAFETY

Jay Burkhart, Pipeline Engineer, shows how pipeline operators are putting into practice the industry-wide goal to *Improve Safety through Technology and Innovation.*

JAY Burkhart

Jay Burkhart went from being an intern straight out of college to a full-time integrity engineer at Marathon Pipe Line LLC (MPL) and has been working there for the better part of a decade. He has witnessed dramatic advances in the technology used to inspect pipes. Jay and his MPL colleagues are responsible for inspecting every square inch of MPL's 6,000 miles of liquid pipelines to maintain public safety and protect the environment. "Before working for MPL, I didn't realize the size and scope of the work we do and the importance of it," Jay explained.

In September, Jay used a hi-tech inspection tool with the same kind of technology you might find in an ultrasound machine at your doctor 's office on a section of pipe in Illinois. Bouncing sound waves off the pipe's walls, the tool, affectionately called a "smart pig" in the pipeline world, gave him a digital picture of the health of the pipeline so his team could make sure everything was operating safely. He and other integrity engineers use the terabytes of data produced during these inspections to confirm the pipe's good condition or schedule specific sections for maintenance where needed.

He looks at his job as being part engineer and part pipeline historian. "There's been a lot of data gathering over the years to determine the best methods for managing a pipeline's mechanical integrity—what kind of steel it was made out of, who manufactured it, what coatings have been used and what products have flowed through it. In the past decade, inspection technology has improved by leaps and bounds. I can stand anywhere along hundreds of miles of pipeline and tell you what is going on at that location based on the inspection data."

ENVIRONMENTAL PROTECTION

Brian Rosebrock, Environmental Inspector, shows how pipeline operators pursue the industry-wide goal to *Promote Organizational Excellence* with construction quality management.

BRIAN Rosebrock

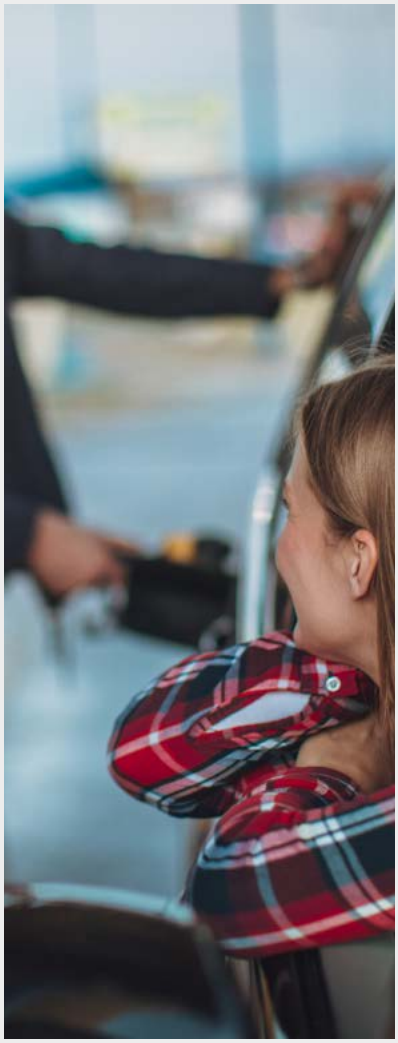
Part of Rosebrock's job as an environmental inspector includes evaluating the land and water throughout the pipeline construction process so that the land is restored to its original state or left better than it was before the project. Precautions are taken to guard against soil erosion, to facilitate proper water drainage, and to protect water quality.

"We use the environmental erosion control devices to limit impacts on the right-of-way," Rosebrock says. "Throughout the project, the water will be tested according to regulations. We improve the contours of the land, so it drains well, then we replant it and re-seed it with native vegetation." Prior to working on pipelines, Rosebrock was a hunting and fishing guide in Montana and Idaho.

"That is who I am. I love being outdoors. It's a better lifestyle for a family man. I'm proud of what I do because I can make a difference on these projects, make sure they are done as cleanly as possible and having a good reputation within the community helps get the next project done."

PIPELINE ECONOMIC AND CONSUMER BENEFITS

Klint VanWingerden, Oil Movements Engineering Manager, shows how safe pipelines benefit consumers, workers and the local economy.



KLINT VanWingerden

Klint VanWingerden has lived in Alaska all of his life, graduating from the University of Alaska and working engineering jobs before taking a position at Alyeska Pipeline (operator of the Trans Alaska Pipeline System, also known as TAPS) as an Oil Movements Engineering Manager.

TAPS has been a central part of Alaskan life for generations, providing one of the main sources of revenue for the state economy and affordable energy for Alaskans while also prioritizing the safety and protection of the pristine Alaskan environment. Klint's father worked on the pipeline, as did his brother, and Klint hopes that his children will someday follow their path as well – three generations of the family working on the Trans Alaska pipeline.

Klint says of the pipeline, "[it] has really enabled my family to enjoy a quality of life that otherwise wouldn't be here. You know, you look at a lot of infrastructure around Anchorage and Wasilla and Fairbanks that just wouldn't be here without the oil industry." Alyeska even sponsors Klint's team for the Iron Dog – a grueling 2,000-mile snowmobile race through some of the most remote and rugged landscapes in Alaska – something he only dreamt of doing as a kid. Now, he has participated in the race five times, something he says he never would have been able to do without Alyeska's support.

COMMUNITY OUTREACH

Jennifer Smith, Community Engagement Manager, shows how her efforts to share information with local communities strives to meet the industry-wide goal to *Increase Stakeholder Awareness and Involvement.*

JENNIFER Smith

Jennifer Smith enjoys nothing more than traveling across the wilds of Minnesota, whether it's hiking with her family on the weekends or meeting people all across the state for her job as Community Engagement Manager for Enbridge. She has worked with communities from Buffalo, New York all the way through North Dakota, building relationships with the people who reside near pipeline routes. Pipeline operators are required to notify landowners near their proposed or current pipeline routes about their plans, any changes in operations and any issues that may come up while the line is in operation, but for Jennifer the work is more than that – it's about the people she meets along the way.

A typical day for Jennifer might have her talking to local public officials or attending meetings of the local Rotary or Lions Club. She says, "We want the communities to know that we're there, our employees are there, and we want to be able to support the communities that are supporting us." Operators also often work with local nonprofits to invest in and support the communities where they operate. For Enbridge, that means grants for their 'Safe Communities' program which specifically supports emergency responders or investing in the local food bank and workforce development. For one community in Michigan, Enbridge was able to identify a local need and secure a grant to meet that need because of the relationships they built within the community. "[They were] so excited to be having the construction crews coming into town - they put bags together for the workers that had coupons and flyers for all of the local businesses, and held their big summer fair right downtown [with] a 'Welcome Pipeliners' tent."

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.

GOALS

1 PROMOTE ORGANIZATIONAL EXCELLENCE

Develop and promote an industry-wide safety culture through continuous improvement mechanisms, such as Pipeline SMS, Construction Quality Management Systems (QMS) and Pipeline Integrity Management (IM). Transform industry-wide sharing into a robust, sustainable program, and emphasize the benefits and power of data integration.

2 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. Accelerate the development and adoption of the most effective ILI tools. Create sustainable, workable frameworks for operator leak detection management.

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 INCREASE STAKEHOLDER AWARENESS & INVOLVEMENT

Improve pipeline operator and landowner relations through the adoption and implementation of an industry-wide training program. Advance public knowledge and engagement on the pipeline industry with a robust social media campaign plan focused on damage prevention, integrity management and emergency preparedness. Strive to eliminate first, second and third-party damage.

Promote Organizational Excellence

GOAL 1

Objective 1.1
Expand Safety Management Practices

STRATEGIC INITIATIVE: PIPELINE SAFETY MANAGEMENT SYSTEMS

In 2018, the Pipeline Safety Management System (SMS) Team continued the development of its One Industry, One Goal with gas and liquids operators working together to advance SMS. The team moved forward in 2018 with the theme of *"Making it Real."* Efforts were focused around providing tangible examples and guidance around implementation of Pipeline SMS. The team rolled out and presented multiple webinars on Pipeline SMS and industry tools, most notably the Evaluation Tool to help operators gauge how effective their Pipeline SMS are in advancing safety. The pipelinesms.org website was revamped to make tools and content easier for operators to find. Videos highlighting the importance of SMS were made and published online to help other operators see the benefits of Pipeline SMS. In an effort to continue to communicate the importance of SMS and industry progress in implementation, the Team made multiple presentations to a variety of key stakeholders throughout the year. Lastly, API has developed the framework for a third-party assessment program, including timelines, inspector qualifications and training materials, and will conduct a pilot assessment with a major liquid pipeline operator in the first quarter of 2019.

STRATEGIC INITIATIVE: CONSTRUCTION QUALITY MANAGEMENT SYSTEMS

With the 2017 publication of API Recommended Practice (RP) 1177, Steel Pipeline Construction Quality Management Systems (C-QMS), 2018 provided the C-QMS Team an important opportunity to advocate and educate on a leading industry practice enhancing safety during pipeline construction activities. Specifically, the C-QMS Team provided important tools on key elements of the RP through webinars, conferences and introduction to latest resources through a revamped C-QMS website. Pipeline operators also expanded the discussion to contractors who play a critical role in construction quality. Moving into 2019, the C-QMS Team will continue to strongly encourage API RP 1177 implementation while closely monitoring API RP 1169, *Basic Inspection Requirements-New Pipeline Construction* to ensure alignment.

STRATEGIC INITIATIVE: PIPELINE INTEGRITY MANAGEMENT

Through effective integrity management programs to inspect and maintain their pipeline systems, pipeline operators can significantly reduce adverse effects on the public, employees, and the environment. The goal is an error-free, spill-free, and incident-free operation of the pipeline. In 2019, API published the third edition of API RP 1160, *Managing System Integrity for Hazardous Liquid Pipelines*. This recommended practice provides a process that an operator can use to assess risks and make day-to-day decisions regarding the operation of a hazardous liquid pipeline. The third edition incorporates new learnings and experience into pipeline mechanics, while referencing the overarching "plan-do-check-act" cycle of pipeline safety management systems (API RP 1173). The document also contains references to leading industry publications, such as pipeline leak detection (API RP 1175), assessment and management of cracking in pipelines (API RP 1176), integrity data management and integration (API RP 1178), and hydrotechnical hazards for pipelines located onshore or within coastal areas (API RP 1133). The pipeline industry continues to support industry-wide understanding and implementation of these recommended practices.

Promote Organizational Excellence

Objective 1.2
Promote Best Sharing Practices

STRATEGIC INITIATIVE:
SHARING & LEARNING

The pipeline industry has a long history of sharing safety lessons and learning from best practices, incidents, near misses and close calls. In 2018, API and AOPL promoted and supported industry sharing opportunities through quarterly virtual tailgate meetings, the annual Pipeline Information eXchange (PIX) and safety culture sharings during industry-wide safety team meetings. This past year, API and AOPL also established a Sharing and Learning Subteam to formalize sharing processes and promote opportunities for information exchange to improve pipeline safety performance. The group is developing a guide to help operators weigh the risks and benefits of sharing. The guide will include suggested workflows and sample templates to address the challenges operators face when sharing safety information. In 2019, the group will roll out the completed Sharing and Learning Guide to the industry.

Promote Organizational Excellence

Objective 1.3
Improve Pipeline Integrity Through Technical Data Analysis

STRATEGIC INITIATIVE:
DATA INTEGRATION

Recognizing the importance of data integration across a broad spectrum of pipeline safety initiatives, there was a concerted effort in 2018 to advance aspects of Bulletin 1178, Integrity Data Management and Integration Guideline concepts into other key API documents in development, specifically RP 1160, *Managing System Integrity for Hazardous Liquid Pipelines*, Standard 1163, *In-line Inspection System Qualifications* and RP 1183, *Dent Fatigue and Mechanical Damage Integrity Management*.

In all three of these recommended practices, the leveraging of data integration processes is critical in supporting pipeline operators in the assessment of anomalies through risk-based engineering assessments. The value of data integration and newly released bulletin was shared through several important learning opportunities, API Pipeline Integrity Workshop (PIW), PIX and the API Pipeline Conference.

Improve Safety through Technology and Innovation

GOAL 2

Objective 2.1

Improve Pipeline Integrity Inspection Technology

STRATEGIC INITIATIVE:
CONTINUOUS IMPROVEMENT OF ILI CAPABILITIES

In 2018, pipeline operators made important strides to advance pipeline inspection technologies that find and fix issues before they become a safety problem. The ultimate objective of the pipeline industry's research and development program is to properly identify and mitigate the emerging risks associated with the transportation of hazardous materials and better understand the factors contributing to these risks. Industry is currently developing a protocol to validate and test the performance specifications published for ultrasonic crack detection, electromagnetic acoustic transmission, and spiral and circumferential magnetic flux leakage in-line inspection (ILI) tools. The project will ultimately enhance the current industry specifications and improve ILI crack tool capabilities.

Improve Safety through Technology and Innovation

Objective 2.2

Enhance Incident Identification and Response

STRATEGIC INITIATIVE:
LEAK DETECTION AND RESPONSE MANAGEMENT

Entering the third year since publication of API RP 1175, *Pipeline Leak Detection – Program Management,* the focus in 2018 continued to be driving implementation by our liquids pipeline operators. For the RP 1175 Implementation Team, that meant putting critical tools in the hands of our operators and providing the resources and training necessary to continue to increase awareness and understanding of the importance of a holistic approach to pipeline leak detection.

Specifically, API created an online e-training tool which provides foundational elements and key aspects of the RP an operator needs to know to begin the implementation journey. With a strong appetite for information, API witnessed a significant increase in the number of API and AOPL members accessing relevant roadmaps, guidance and resources through a dedicated leak detection site including the use of a gap assessment tool. In 2018, 84% of liquids barrel miles representing 42% of API and AOPL members utilized the gap assessment tool.

Enhance Emergency Response Preparedness

GOAL 3

Objective 3.1

Boost Operator & First Responder Planning, Preparedness & Response Capabilities

STRATEGIC INITIATIVE:

PIPELINE EMERGENCY PLANNING, PREPAREDNESS AND RESPONSE

The Pipeline Emergency Response Work Group (ERWG) made a concerted effort in 2018 to ensure that RP 1174, *Onshore Hazardous Liquid Pipeline Emergency Preparedness and Response*, is pushed to all operators. The ERWG produced and published an introductory presentation, Q&A documents, and a planning guide for implementation of RP 1174. The ERWG also hosted a tailgate call providing education on what RP 1174 is and the importance of companies committing to this RP. Continued effort promoting effective emergency response programs was made by member companies at conferences and by PHMSA regulators at trade conferences, resulting in operators who move 59% of barrels in the U.S. being committed to implementation of this RP.

In 2018, ERWG members utilized the tools and completed gap analyses on their individual management systems to the RP, and these analyses were reviewed as a group to gauge each operators' conformance baseline. The average conformance baseline to the RP is 93%, showing companies have been diligent in their implementation of ER management systems. The tools created for RP 1174 will help operators continuously improve ER management systems, in coordination and conjunction with RP 1173, *Pipeline SMS*.

Increase Stakeholder Awareness & Involvement

GOAL 4

Objective 4.1

Improve Stakeholder Communication on Energy Infrastructure and Pipeline Safety

STRATEGIC INITIATIVE:
STAKEHOLDER ENGAGEMENT

Engaging the public is a critical obligation of the pipeline industry. The annual *Pipeline Safety Excellence Performance Report* presents the industry's safety record and steps pipeline operators are taking to improve safety. In 2018, the pipeline industry actively communicated the benefits of pipelines, what we are doing to keep pipelines safe, and the steps we are taking to be good neighbors in the community. In 2019, the pipeline industry will develop new multimedia content, share information through social, print and electronic media, and engage communities and policymakers through events, forums and hearings. In 2018, API continued the development of RP 1162, *3rd Ed., Public Awareness Programs for Pipeline Operators*. In addition to operators, the task group is comprised of representatives from PHMSA and NAPSR, representatives of key stakeholders (emergency responders, agricultural community, excavators), industry consultants, public awareness vendors, and industry association staff. The task group is focused on improving how operators communicate and engage with those who live, work or dig near pipelines on topics such as pipeline locations, risks and hazards, damage prevention and emergency response.

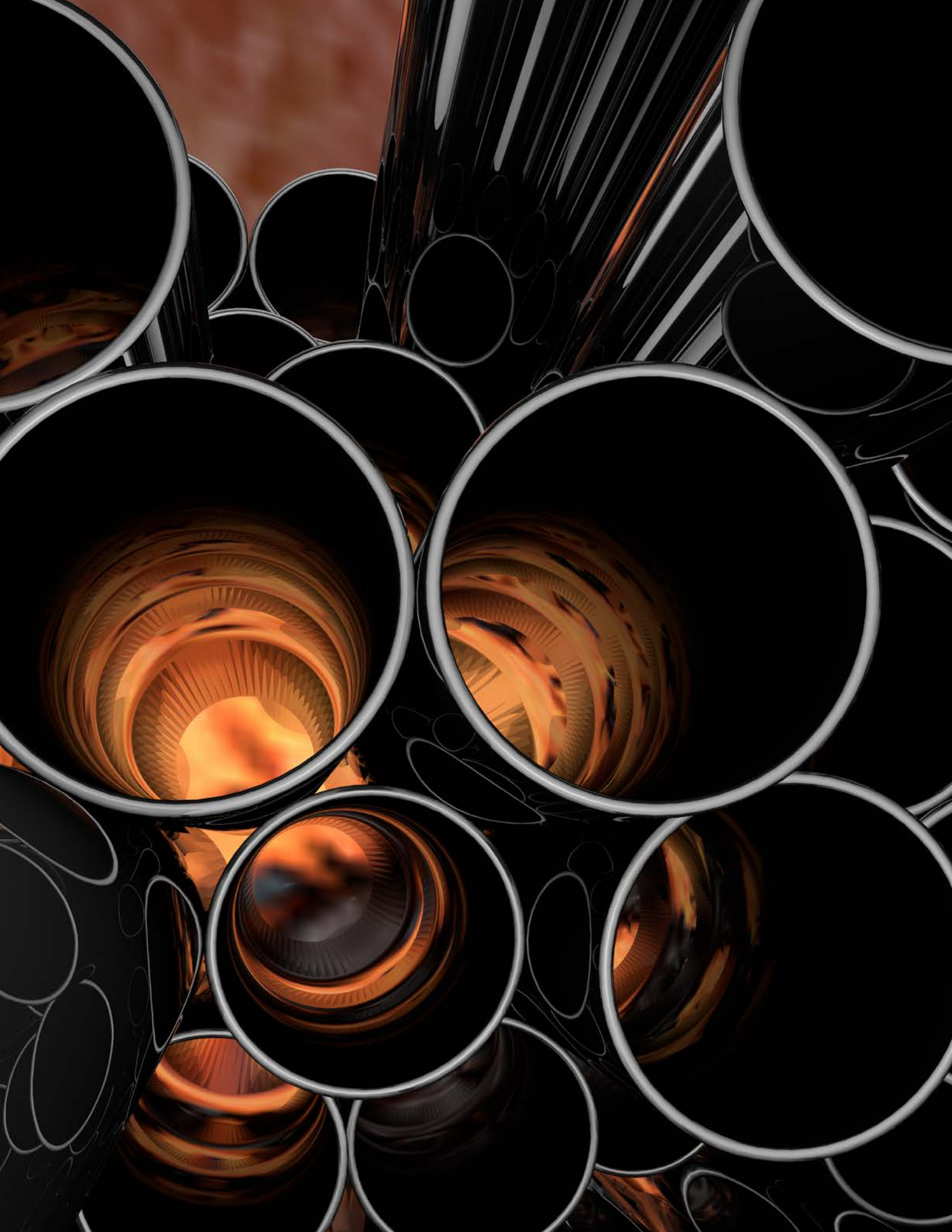
Increase Stakeholder Awareness & Involvement

Objective 4.2

Promote Innovative Approaches to Enhancing Damage Prevention

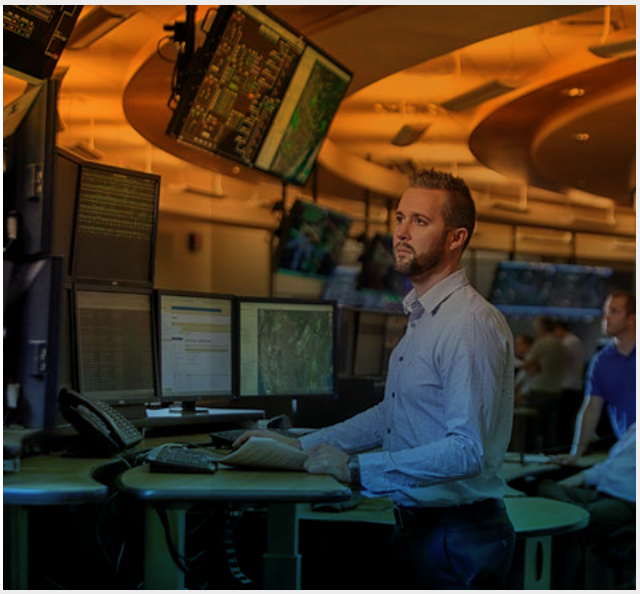
STRATEGIC INITIATIVE:
EXCAVATION DAMAGE

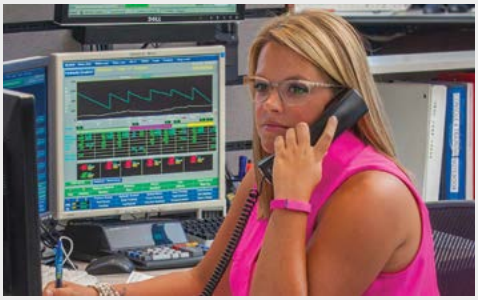
Pipeline operators work every day to prevent damage to their underground pipelines and even more importantly to protect the safety of the communities where they operate. Most unintentional pipeline strikes can be prevented. One tool operators have worked on this year is the industry *Damage Prevention Tool Box* with shared practices and lessons learned from operators to avoid damage to their pipelines. In 2018, the API/AOPL Damage Prevention Team collected data from operators to determine causes of operators' near misses from first, second, and third parties during the past two years. The survey found 92% of reported near misses (815 out of 883 total) were from third parties, with 73% (591) of those due to no "one call" being placed. All first and second near misses reported were due to not following the job excavation plan provided. The team also began reviewing PHMSA reportable incidents involving first and second party damages and determined that the leading causes were insufficient excavation practices and insufficient line locating. The team is currently planning a *2019 Damage Prevention and Public Awareness Workshop* and plans to have some sessions addressing these leading causes.



2018 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.

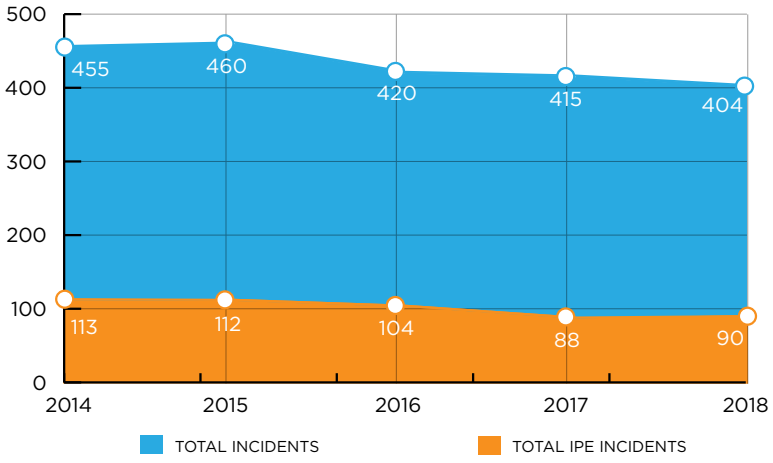
Particularly useful measures of pipeline safety examine incident size, location, commodity and cause. The liquids pipeline industry uses each one of the following measures to better understand pipeline incident trends and develop strategies for improving pipeline safety. As a sign of overall pipeline 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 20% over the last five years, all while pipeline mileage has increased 12% in that time.

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**

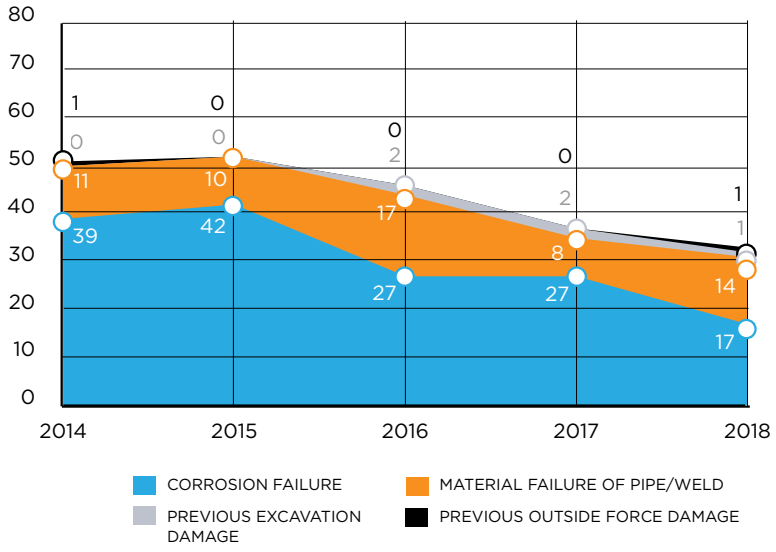
Integrity management incidents are those of the pipeline itself, such as corrosion, cracking or weld failure. Operations and maintenance causes include equipment failure or incorrect operations.

Key Performance Indicators



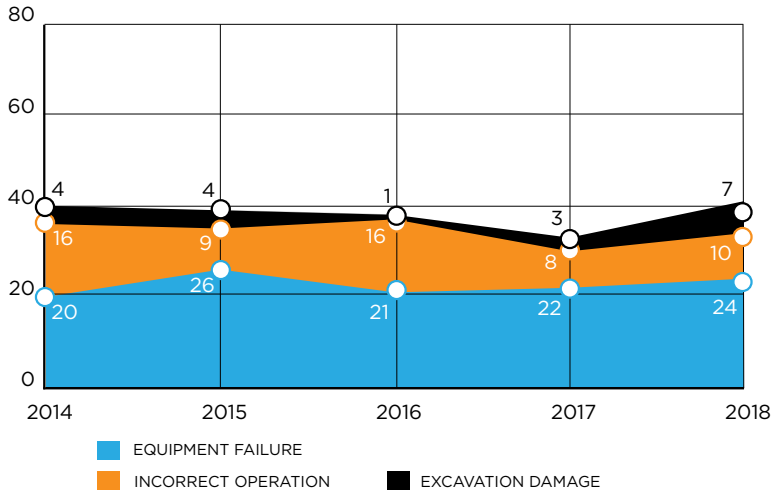
#1: TOTAL INCIDENTS & INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT (2014-2018)

Pipeline incidents impacting people or the environment decreased 20% over the last 5 years. Total pipeline incidents were down as well, dropping 11% over 5 years with 51 fewer incidents in 2018 compared to 2014. A full description of the specific types of incidents impacting people or the environment can be found on page 44.



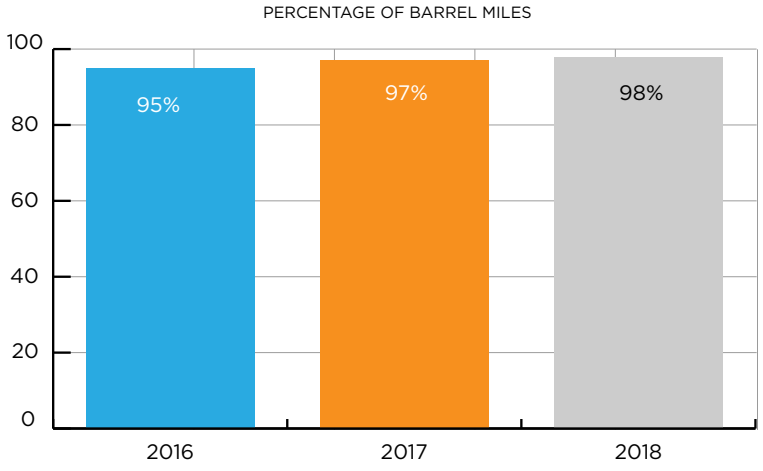
#2: INTEGRITY MANAGEMENT INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT (2014-2018)

Incidents related to the pipeline itself, such as corrosion, cracking or weld failure, were down 35% over the last 5 years in areas impacting people or the environment. In these areas, incidents caused by incorrect operation decreased by 38% while equipment failure increased 20% from 2014 to 2018.



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

Incidents related to installing and maintaining pipeline equipment or operating the pipeline and its valves or pumps were up 3% over the last 5 years in areas impacting people or the environment. In these areas, incidents caused by incorrect operations decreased by 38% while equipment failure increased 20% from 2014 to 2018.

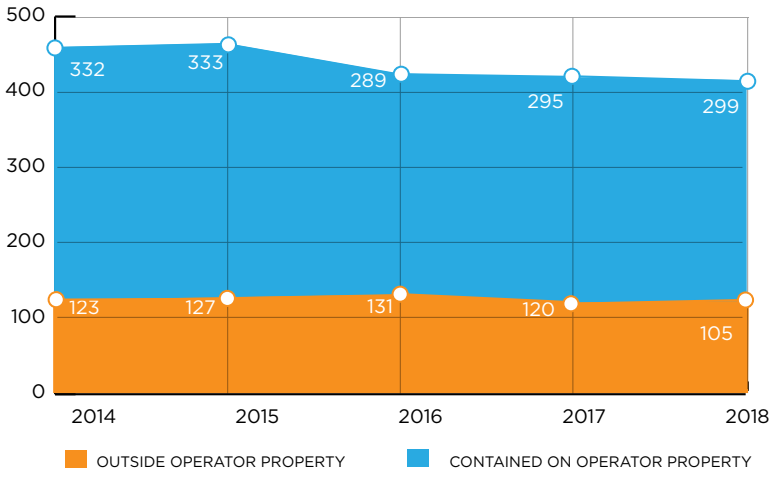


#4: PIPELINE SAFETY MANAGEMENT SYSTEMS OPERATOR COMMITMENT

In 2018, the pipeline industry increased liquids pipeline operator commitment to Pipeline Safety Management Systems from 95% of barrel miles to nearly 98% of barrel miles.

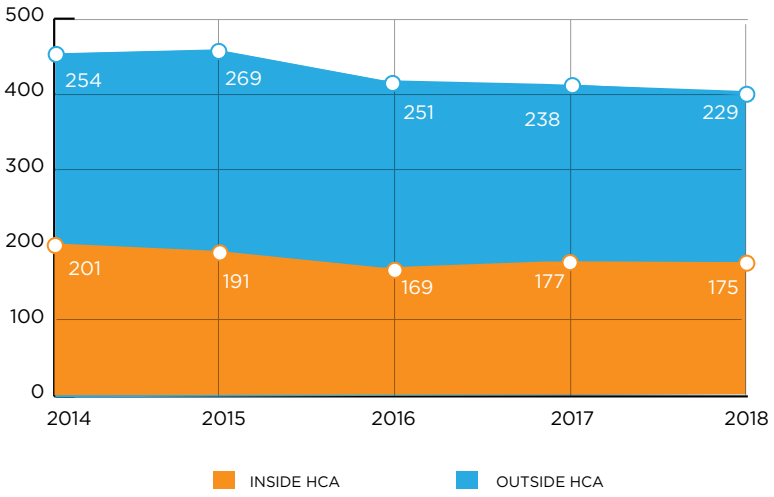
Incidents by Location

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.



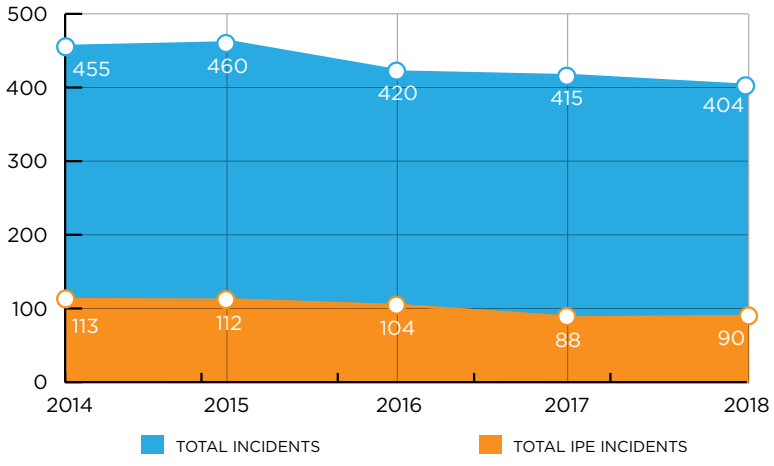
#5: PIPELINE INCIDENTS INSIDE & OUTSIDE OF OPERATOR PROPERTY (2014-2018)

In 2018, 74% 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 15% from 2014 to 2018.



#6: PIPELINES INCIDENTS INSIDE & OUTSIDE OF HCAS (2014-2018)

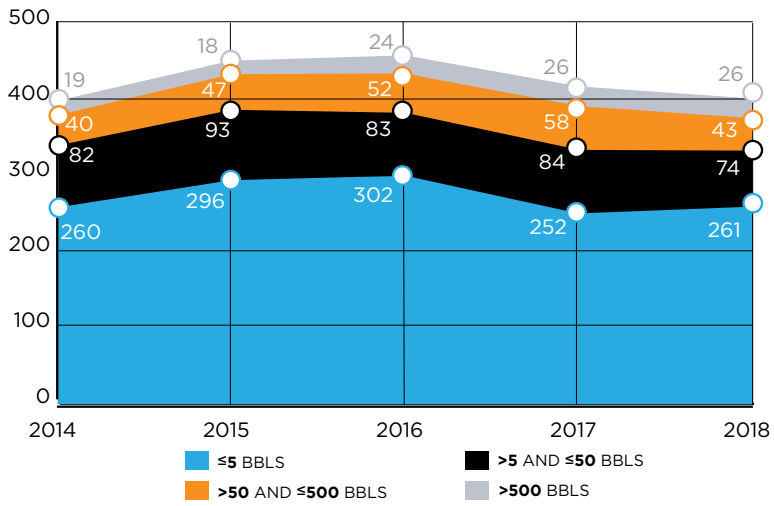
Liquids pipeline incidents occurring in high-consequence areas (HCAs) declined 13% over the last 5 years. Through federal regulation, PHMSA defines HCAs as areas of population concentration, commercially navigable waterways, or sensitive environmental locations. The percentage of pipeline incidents occurring in HCAs versus non-HCAs also declined from 44% to 43% from 2014 to 2018. 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 (2014-2018)

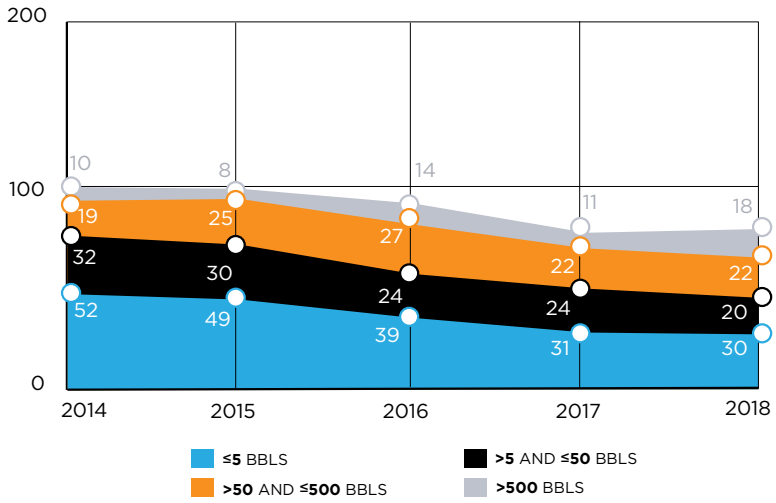
In 2018, approximately 90 liquids pipeline incidents impacted people or the environment, a 20% decrease over the last 5 years. Total pipeline incidents were down as well, dropping 11% over 5 years with 51 fewer incidents in 2018 compared to 2014. A full description of the specific types of incidents impacting people or the environment can be found on page 44.

Incidents by Size



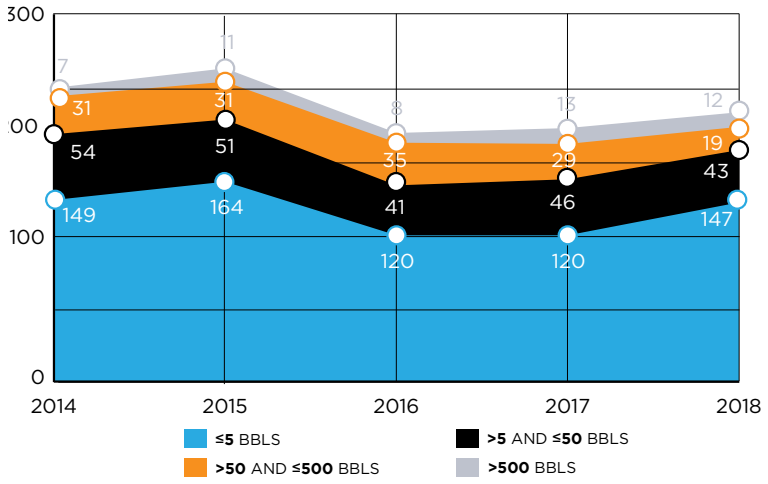
#8: LIQUID PIPELINE INCIDENTS BY SIZE (2014-2018)

Most pipeline incidents are small in size. In 2018, 65% of incidents were less than 5 barrels and 83% were less than 50 barrels. Large pipeline incidents are also the rarest. In 2018, only 6% of incidents were 500 barrels or larger.



#9: INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT BY SIZE (2014-2018)

Most incidents impacting people or the environment are small in size. In 2018, approximately 56% of such incidents were less than 50 barrels, with only 20% of incidents 500 barrels or larger.

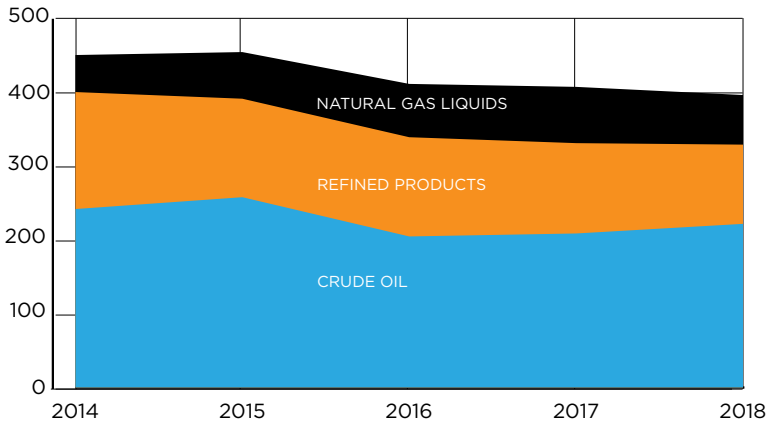


#10: CRUDE OIL INCIDENTS BY SIZE (2014-2018)

Similar to total incident trends, the majority of crude oil pipeline incidents are small in size. In 2018, 67% of crude oil incidents were 5 barrels or smaller and 86% of crude oil incidents were smaller than 50 barrels. Over the last 5 years, only 5% of crude oil incidents were over 500 barrels.

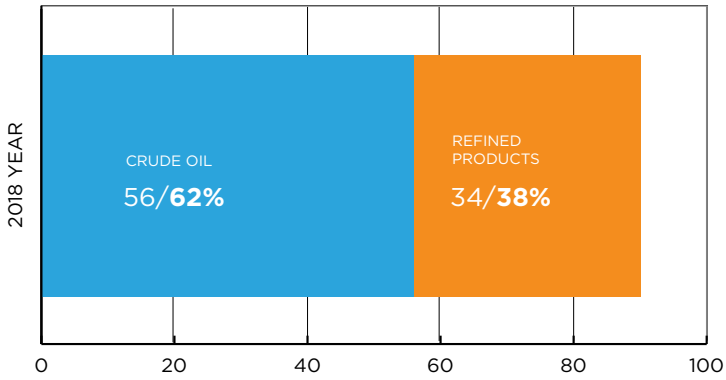
Crude oil incidents greater than 50 barrels have decreased 18%, from 38 to 31 incidents, even as pipeline mileage and barrels delivered have both increased more than 10% in the last five years.

Incidents by Commodity



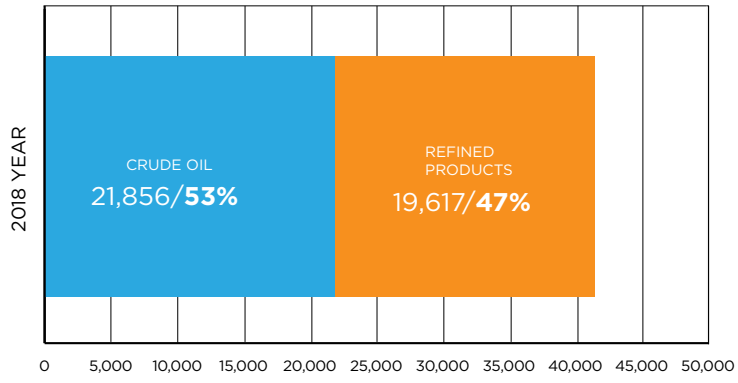
#11: ALL INCIDENTS BY COMMODITY (2014-2018)

In 2018, crude oil incidents represented 55% of total incidents, with refined products at 27% and natural gas liquids at 17% of total incidents. The number of annual crude oil incidents are down 14% from their peak in 2015 and down 8% from 2014.



#12: INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT BY COMMODITY (2018)

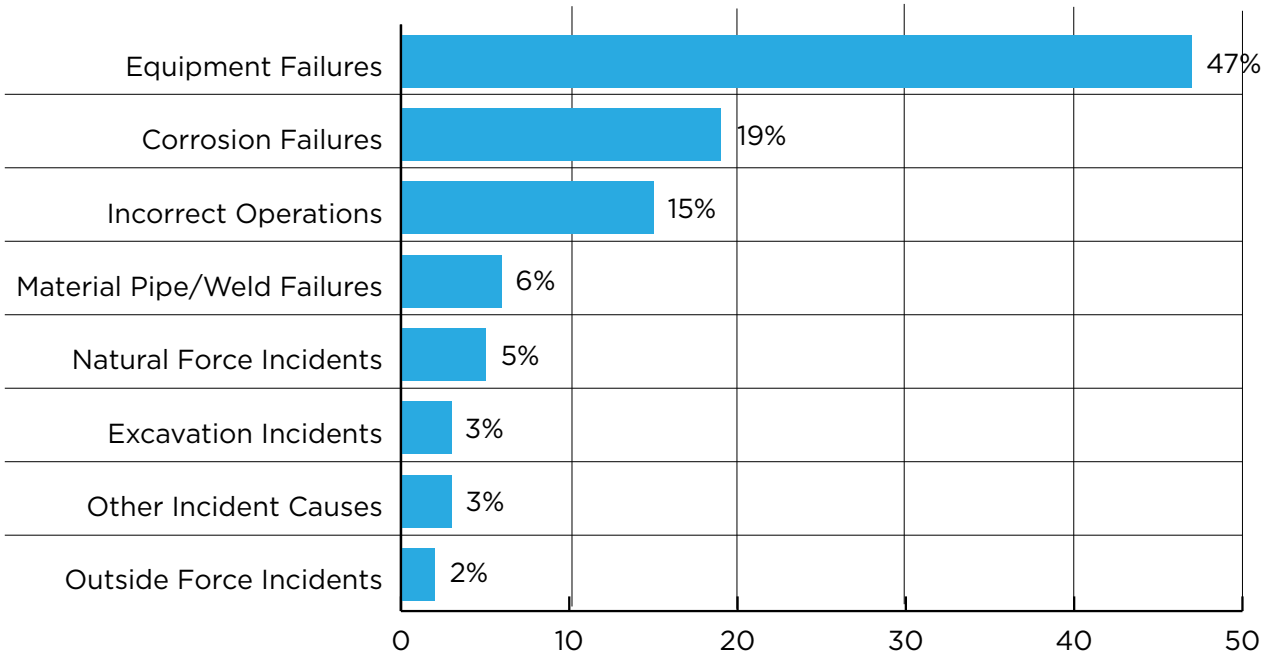
In 2018, there were 56 crude oil and 34 refined products incidents impacting people or the environment.



#13: PERCENTAGE OF BARRELS RELEASED IMPACTING PEOPLE OR THE ENVIRONMENT BY COMMODITY (2018)

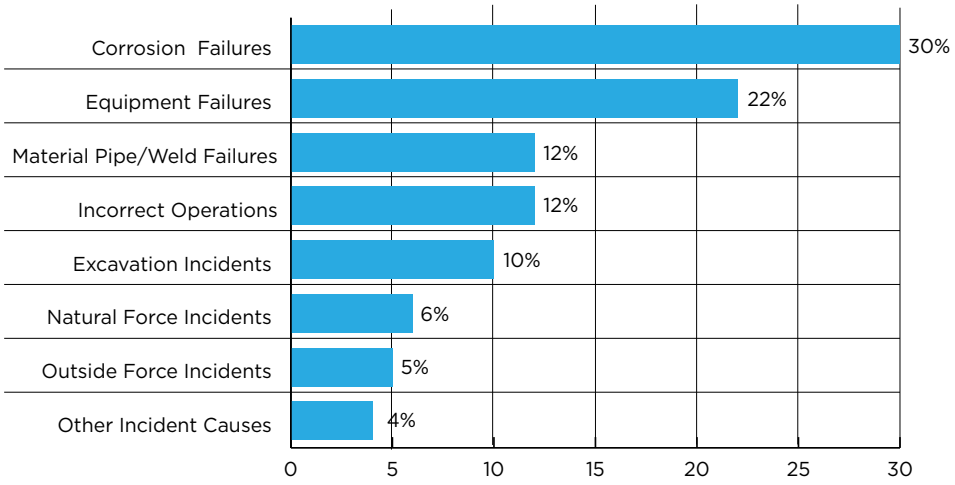
Crude oil incidents impacting the people or the environment in 2018 represented 53% of the total, with refined products representing 47% of total incidents impacting people or the environment. The percentage of crude oil barrels released out of all incidents impacting people or the environment is up 11% from 2014, while the percentage of refined products is down 11%.

Incidents by Cause



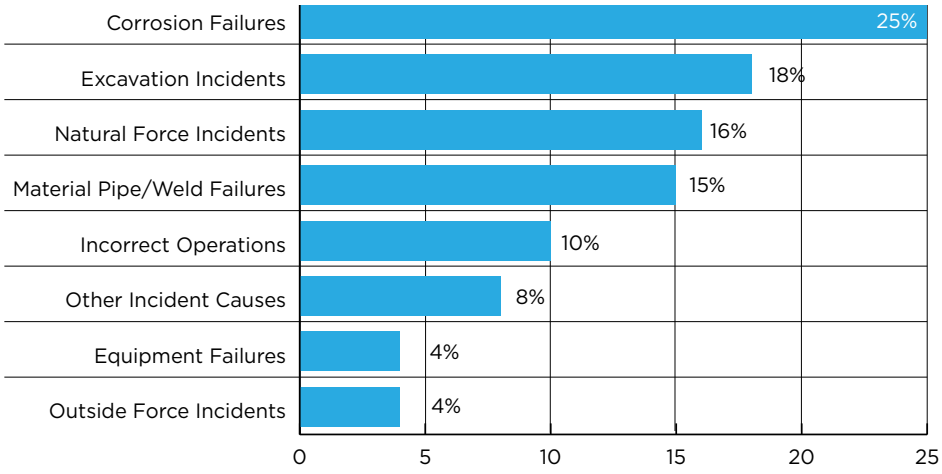
#14: LIQUID PIPELINE INCIDENTS BY CAUSE (2014-2018)

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 (2014-2018)

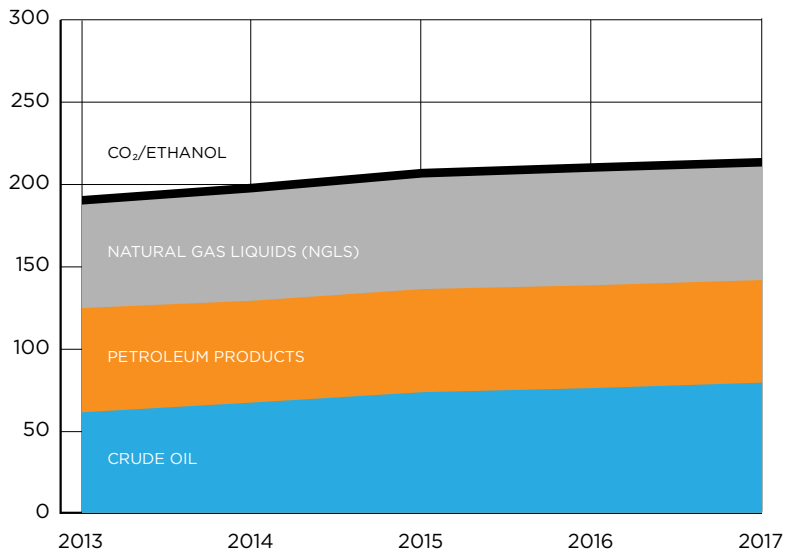
Over the last 5 years, corrosion (30%) was the most frequent cause of incidents impacting people or the environment, followed by equipment failure (22%), material pipe/weld failures (12%), incorrect operations (12%) and excavation incidents (10%).



#16: PERCENTAGE OF BARRELS RELEASED IMPACTING PEOPLE OR THE ENVIRONMENT BY CAUSE (2014-2018)

Corrosion (25%) was responsible for the most barrels released in incidents impacting people or the environment, followed by excavation incidents (18%), natural force incidents, such as flooding, earthquakes and lightning (16%), and material pipe/weld failures (15%). 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.

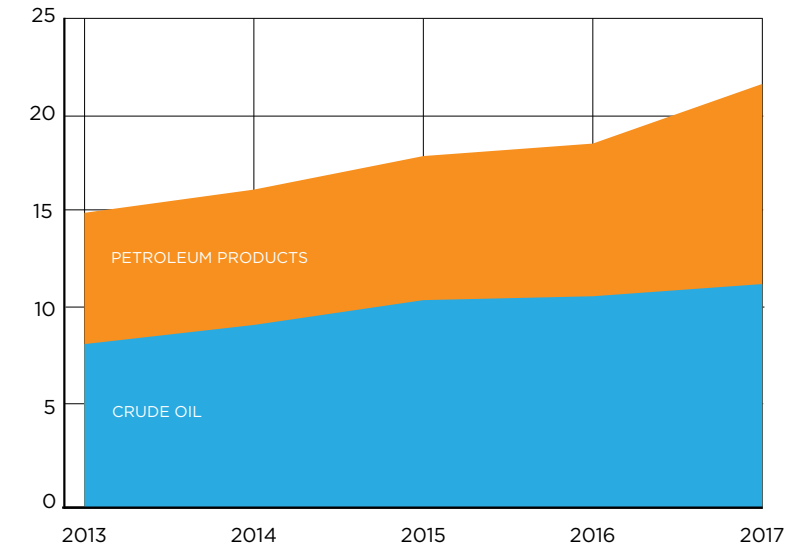
Pipeline Miles & Barrels Delivered



#17: MILES OF U.S. LIQUIDS PIPELINES BY PRODUCTS (2013-2017)

(Thousands)

At the end of 2017 (the most recent year this data is available), there were 215,736 total miles of liquids pipelines, with crude oil pipelines representing 37% of the total at 79,192 miles. Over the last five years, the total miles of liquids pipelines in-creased 23,324 miles or 12% and crude oil pipelines increased 18,105 miles or 30%.



#18: BARRELS DELIVERED BY U.S. LIQUIDS PIPELINE (2013-2017)

(Billions)

In 2017, there were a total of 21,572,198,940 crude oil and refined products barrels delivered by pipeline, with crude oil representing approximately 53% of the barrels delivered. Over the last five years, total liquid barrels delivered by pipeline have increased 44%, or 6,563,309,091. Crude oil barrels have increased 37%, or 3,058,440,600 barrels, while petroleum products have gone up 52%, or 3,504,868,491 barrels, in the last five years.

Data Appendix

GRAPH #1: TOTAL INCIDENTS & INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT (2014-2018)

Year	Incidents Impacting People or the Environment	Total Incidents
2014	113	455
2015	112	460
2016	104	420
2017	88	415
2018	90	404
% Change from 2014	**-20%**	**-11%**

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

GRAPH #2: INTEGRITY MANAGEMENT INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT (2014-2018)

Year	Corrosion Failure	Material Failure of Pipe/Weld	Previous Excavation Damage	Previous Outside Force Damage	Total IM IPE Incidents
2014	39	11	0	1	51
2015	42	10	0	0	52
2016	27	17	2	0	46
2017	27	8	2	0	37
2018	17	14	1	1	33
% Change from 2014	**-56%**	**27%**	**-**	**0%**	**-35%**

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

GRAPH #3: OPERATIONS & MAINTENACE INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT (2014-2018)

Year	Equipment Failure	Incorrect Operation	Excavation Damage	Total O&M IPE Incidents
2014	20	16	4	40
2015	26	9	4	39
2016	21	16	1	38
2017	22	8	3	33
2018	24	10	7	41
% Change from 2014	**20%**	**-38%**	**75%**	**3%**

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

GRAPH #4: BAR CHART FOR 2018 INDICATING OPERATOR COMMITMENT TO PSMS

Year	% Commitment
2016	95
2017	97
2018	98

Source: API and AOPL Membership Survey.

GRAPH #5: PIPELINE INCIDENTS INSIDE & OUTSIDE OPERATOR PROPERTY (2014-2018)

Year	Outside Operator Facility	Contained on Operator Property	Total Incidents
2014	123	332	455
2015	127	333	460
2016	131	289	420
2017	120	295	415
2018	105	299	404
% Change from 2014	**-15%**	**-10%**	**-11%**

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

GRAPH #6: PIPELINE INCIDENTS IMPACTING HCAs (2014-2018)

Year	Outside HCA	Inside HCA	Total Incidents
2014	254	201	455
2015	269	191	460
2016	251	169	420
2017	238	177	415
2018	229	175	404
% Change from 2014	**-10%**	**-13%**	**-11%**

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

GRAPH #7: TOTAL INCIDENTS & INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT (2014-2018)

Year	Incidents Impacting People or the Environment	Total Incidents
2014	113	455
2015	112	460
2016	104	420
2017	88	415
2018	90	404
% Change from 2014	**-20%**	**-11%**

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

Data Appendix

GRAPH #8:	LIQUID PIPELINE INCIDENTS BY SIZE (2014-2018)				
Year	**≤ 5 Bbls**	**> 5 and ≤ 50 Bbls**	**> 50 and ≤ 500 Bbls**	**> 500 Bbls**	**Total Incidents**
2014	296	93	47	19	455
2015	302	83	52	23	460
2016	252	84	58	26	420
2017	248	100	42	25	415
2018	261	74	43	26	404
% Change from 2014	**-12%**	**-20%**	**-9%**	**37%**	**-11%**

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

GRAPH #9:	IPE INCIDENTS BY SIZE (2014-2018)				
Year	**≤ 5 Bbls**	**> 5 and ≤ 50 Bbls**	**> 50 and ≤ 500 Bbls**	**> 500 Bbls**	**Total Incidents**
2014	52	32	19	10	113
2015	49	30	25	8	112
2016	39	24	27	14	104
2017	31	24	22	11	88
2018	30	20	22	18	90
% Change from 2014	**-42%**	**-38%**	**16%**	**80%**	**-20%**

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

GRAPH #10:	CRUDE OIL INCIDENTS BY SIZE (2014-2018)				
Year	**≤ 5 Bbls**	**> 5 and ≤ 50 Bbls**	**> 50 and ≤ 500 Bbls**	**> 500 Bbls**	**Total Incidents**
2014	149	54	31	7	241
2015	164	51	31	11	257
2016	120	41	35	8	204
2017	120	46	29	13	208
2018	147	43	19	12	221
% Change from 2014	**-1%**	**-20%**	**-39%**	**71%**	**-8%**

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

GRAPH #11: INCIDENTS BY COMMODITY (2014-2018)

Year	Crude Oil	Refined Products	Highly Volatile Liquids (HVLs)	CO_2	Biofuel/Ethanol	Total Incidents
2014	241	158	50	5	1	455
2015	257	133	63	7	0	460
2016	204	134	72	9	1	420
2017	208	122	76	9	0	415
2018	221	109	67	5	2	404
% Change from 2014	**-8%**	**-31%**	**34%**	**0%**	**100%**	**-11%**

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

GRAPH #12: INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT BY COMMODITY (2014-2018)

Year	Crude Oil	Refined Products
2014	71	42
2015	75	37
2016	69	35
2017	54	34
2018	56	34
% Change from 2014	**-21%**	**-19%**

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

GRAPH #13: PERCENTAGE OF IPE BARRELS RELEASED BY COMMODITY (2014-2018)

Year	Crude Oil	Refined Products
2014	42%	58%
2015	70%	30%
2016	64%	36%
2017	56%	44%
2018	53%	47%
% Change from 2014	**11%**	**-11%**

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

Data Appendix

GRAPH #14: LIQUIDS PIPELINE INCIDENTS BY CAUSE (2014-2018)

Cause	Total Incidents	Percentage
Equipment Failures	1,014	47%
Corrosion Failures	405	19%
Incorrect Operations	317	15%
Material Pipe/Weld Failures	140	6%
Natural Force Incidents	102	5%
Excavation Incidents	75	3%
Other Incident Causes	59	3%
Outside Force Incidents	42	2%
Total	**2,154**	

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

GRAPH #15: TOTAL IPE INCIDENTS BY CAUSE (2014-2018)

Cause	Total Incidents	Percentage
Corrosion Failures	152	30%
Equipment Failures	113	22%
Material Pipe/Weld Failures	60	12%
Incorrect Operations	59	12%
Excavation Incidents	52	10%
Natural Force Incidents	29	6%
Outside Force Incidents	23	5%
Other Incident Causes	19	4%
Total	**507**	

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

GRAPH #16: IPE BARRELS RELEASED BY CAUSE (2014-2018)

Cause	Barrels Released	Percentage
Corrosion Failures	45,337	25%
Excavation Incidents	32,269	18%
Natural Force Incidents	27,806	16%
Material Pipe/Weld Failures	26,071	15%
Incorrect Operations	17,681	10%
Other Incident Causes	14,751	8%
Outside Force Incidents	7,606	4%
Equipment Failures	7,510	4%
Total	**179,030**	

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

GRAPH #17: MILES OF US LIQUIDS PIPELINE (2013-2017)

	2013	2014	2015	2016	2017
Crude Oil	61,087	66,943	73,055	75,710	79,192
Petroleum Products	63,351	61,766	62,634	62,461	62,349
Natural Gas Liquids (NGLs)	62,768	65,792	67,673	68,725	68,943
CO_2/Ethanol	5,190	5,276	5,241	5,195	5,237
Total Miles	**192,412**	**199,793**	**208,618**	**212,105**	**215,736**

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

GRAPH #18: BARRELS DELIVERED (2013-2017)

	2013	2014	2015	2016	2017
Crude Oil	8,324,012,774	9,300,051,343	10,563,693,124	10,760,706,300	11,382,453,374
Petroleum Products	6,684,877,075	6,891,170,199	7,335,091,475	7,774,085,019	10,189,745,566
Total Barrels	**15,008,889,849**	**16,191,221,542**	**17,898,784,599**	**18,534,791,319**	**21,572,198,940**

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

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 2018.

API RECOMMEND PRACTICE

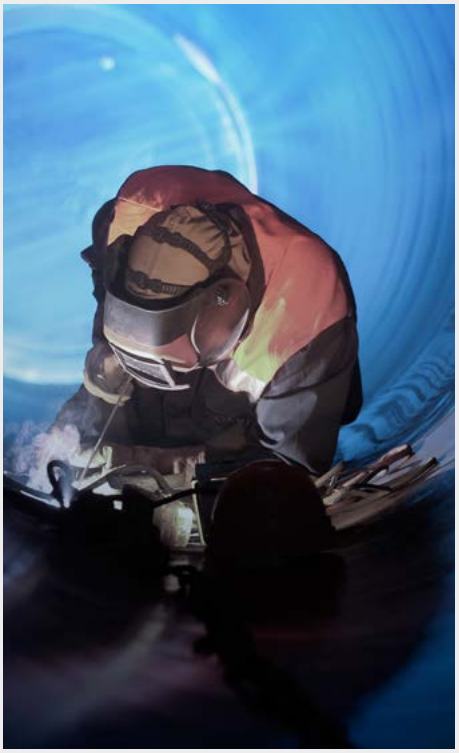
Documents that communicate proven industry practices; RPs may include both mandatory and non-mandatory provisions.

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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