

2017 ANNUAL LIQUIDS PIPELINE REPORT

**PIPELINE
SAFETY
EXCELLENCE
PERFORMANCE
REPORT &
STRATEGIC PLAN
2017–2019**

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, and home heating oil and industrial products like propane and ethane.



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A LETTER FROM THE PIPELINE SAFETY COMMITTEE CHAIR



Todd Denton
President, Phillips 66 Pipeline LLC
Chair, API-AOPL Pipeline Safety Excellence
Steering Committee

Pipelines connect Americans to the energy we need and use every day. Without pipelines, we cannot provide the necessary amount of gasoline for our cars, heating fuel for our homes, jet fuel for our airplanes or raw materials for manufacturing jobs. The construction and operation of pipelines provides good-paying jobs and property tax revenues for local communities across the nation.

As an industry responsible for delivering energy throughout our nation, we need to ensure that we do all we can to protect communities and the environment with safe pipeline operations.

Pipelines are the safest way to transport energy.

A barrel of crude oil or petroleum products reaches its destination safely by pipeline 99.999% of the time. However, we know we can do more to keep pipelines safe and are working together as an industry to improve pipeline safety performance.

Pipeline operators proactively inspect their pipelines, conduct preventative maintenance to keep pipes safe, monitor our pipelines 24/7 looking for signs of trouble and regularly plan and practice how to rapidly respond to a pipeline emergency, if one were to occur.

This report and the safety initiatives inside describe how we will use technology to improve our inspection capabilities, harness the latest engineering techniques to maintain our pipelines, utilize cutting edge organizational processes to improve operations and do a better job of reaching out to key stakeholders. Pipeline operators will continue to pursue key safety principles of continuous improvement, learning from experience and an industry-wide commitment to safety. I look forward to your review of our efforts and any suggestions you may have for our improvement.

Sincerely,

A handwritten signature in black ink, appearing to read "Todd Denton". The signature is fluid and cursive, written over a white background.



2016 PERFORMANCE SUMMARY

LIQUIDS PIPELINE INDUSTRY



207,792 miles
of liquid pipelines cross
America from production
areas to refineries to
consumers and
manufacturers



New pipelines are routed to
avoid environmentally sensitive
areas, built with advanced steel
and protective coatings, and
constantly monitored



After construction, a pipeline
project provides tens of millions
of dollars in local property taxes
each year, funding schools, police
and fire departments and roads

18.1 billion
barrels of crude oil and
petroleum products delivered
by pipeline in 2015, a 34%
increase since 2011



72,439 miles
of pipeline transport crude
oil from production areas to
U.S. refineries, a 29% increase
since 2011



10.9 billion
barrels of crude oil
delivered by in 2015, a
55% increase since 2011



99.999%
of crude oil and petroleum
products delivered by pipeline
reach their destination safely



Pipeline construction projects
create thousands of good paying
jobs in construction,
manufacturing, finance and
insurance, hospitality,
and health care



7.3 billion
barrels of petroleum
products delivered
by pipeline in 2015, a
11% increase since 2011

Total pipeline incidents
in 2016 are
down 10%
from 2015



67,547 miles
of pipeline transport
natural gas liquids to farmers
and industrial manufacturers



2017-2019 industry
initiatives support increased
stakeholder awareness,
enhanced emergency response
preparedness, improvements
in inspection technology, and
organizational excellence





2016 HIGHLIGHTS

In 2016, pipelines operators through API and AOPL were active on a variety of industry-wide pipeline safety improvement efforts. Operators developed industry-wide recommended practices for safe pipeline operation, advanced inspection capabilities and shared safety lessons learned through experiences of the past year.

In-Line Inspection (ILI) Technology Improvement

For the past several years, pipeline operators have worked individually, through joint industry consortiums, as well as through the collaborative research and development organization, Pipeline Research Council International (PRCI), to achieve advances in ILI systems and technology. Through the construction of a state of the art test facility, PRCI has become a world leader in the evaluation of ILI systems for both liquids and gas pipelines. In 2016, a joint study with PRCI and the United States Department of Transportation (DOT) was completed to establish a set of testing protocols and analysis procedures to assess the performance of certain ILI technologies. Using these specifications and guidelines, analysis was completed to confirm the capabilities to detect and size metal loss features on pipelines.

Industry Publications – Cracking & Alarm Management

In response to pipeline incidents involving cracking in the pipe body and welds, the pipeline industry published an entirely new Recommend Practice (RP) entitled *API RP 1176 Assessing and Management of Cracking in Pipelines*. API RP 1176 provides guidance to operators on how to appropriately assess and manage cracking defects with a particular focus on assessment methods.

In 2016, industry also published *API RP 1167, Pipeline SCADA Alarm Management*, to help operators determine the best methods to achieve and maintain successful alarm management systems. API RP 1167 will be instrumental in assisting operators in the implementation of the Pipeline Safety Management System (Pipeline SMS) Plan, Do, Check, Act Cycle (PDCA).

Pipeline Integrity Workshop

In October 2016, API and AOPL hosted a pipeline integrity workshop, with over 100 participants to review and discuss ongoing efforts of the industry in developing pipeline integrity guidance. A large portion of the discussion focused on how operators can incorporate the benefits of Pipeline Safety Management Systems (Pipeline SMS) into their integrity management programs. Industry is currently updating API RP 1160, *Managing Systems Integrity for Hazardous Liquids Pipelines* to in part reflect the recently developed *API RP 1173 – Pipeline Safety Management Systems (Pipeline SMS)*. Sessions discussed how to apply the PDCA management cycle inherent in a Pipeline SMS program to pipeline operations, such as the inspection and preventative maintenance activities of an integrity management program. In addition to providing structure to the planning and execution of integrity management activities, operators learned how PDCA and Pipeline SMS can improve operator inspections.

Pipeline SMS Workshops

In 2016, industry held two widely attended Pipeline SMS workshops, with over 100 attendees at each event, representing approximately 30 pipeline companies. The attendees of the workshops were Pipeline SMS practitioners from operating companies who are actively engaged in implementing the elements of API RP 1173. The workshops provided liquid pipeline operators with the tools and education to begin implementation of API RP1173. Participants received an excellent overview of available implementation tools, including the three foundational Pipeline SMS booklets, a gap analysis model, and a peer-to-peer sharing guide.

Pipeline Industry Practical Experience Sharing Portal

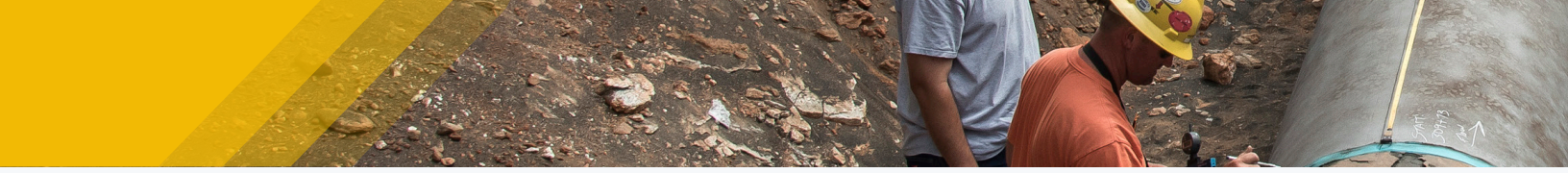
In August 2016, industry developed and implemented a new Pipeline Industry Practical Experience Sharing (PIPES) Portal to house shared industry safety learnings. The portal will be a structured program for the collection, management and periodic distribution of pipeline safety learnings. PIPES is free and creates an opportunity to review past safety presentations, safety alerts, near misses, etc., from various companies. Companies can share their own learnings by uploading them into the portal. The system will also hold member company presentations from industry-wide sharing events, such as the Pipeline Information eXchange (PIX).

Leak Detection Webinar

To educate operators on the publication of *API RP 1175, Pipeline Leak Detection and Program Management*, API and AOPL members hosted a webinar in November 2016 highlighting the important aspects of the RP. Over 100 individuals representing 50 different companies attended the event. A comprehensive review of the gap analysis tool was highlighted. Operators were encouraged to download the gap analysis tool to determine how their current leak detection program compared to the guidance in API RP 1175. Based on operator feedback, the webinar was highly successful and effective. As such, a workshop is planned to follow the API Pipeline Conference in 2017.

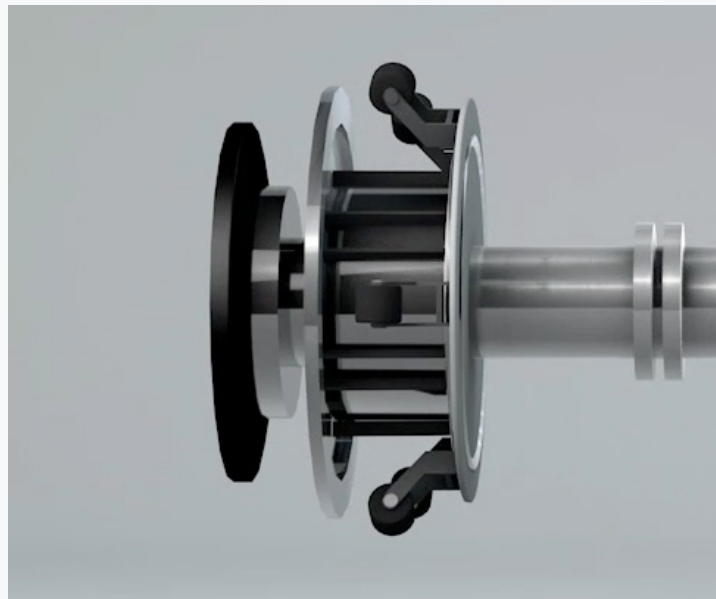
Emergency Response Capabilities

In 2016, industry began implementation of a communications campaign to increase stakeholder awareness of pipeline emergency response improvement opportunities. Efforts included the promotion of the free, on-line pipeline emergency training portal created by API, AOPL, and the National Association of Fire Marshals. The pipeline industry hosted the annual emergency response forum of pipeline operators and responders and conducted industry outreach through various media platforms and major annual gatherings of first responder professionals.



PIPELINE SAFETY AND EMERGENCY PREPAREDNESS

Safety, for both the public and operator personnel, is the number one priority for pipeline operators. While pipelines deliver 99.999% of crude oil and petroleum products safely to their destination, pipeline operators take a proactive approach to safety, performing preventative maintenance on their pipes, watching over their systems 24/7 and being ready to respond rapidly to an incident if one were to occur.



Proactive Pipeline Inspections and Preventative Maintenance

Pipeline operators proactively inspect their pipelines on a regular scheduled basis to identify potential issues and ensure the pipe remains safe. Operators use diagnostic tools called “smart pigs” that travel inside pipelines scanning the walls with technology similar to an ultrasound or MRI found in a doctor’s office. These hi-tech tools and regular inspections are critically important for operators in identifying and guarding against emerging pipeline issues before they potentially become a problem.

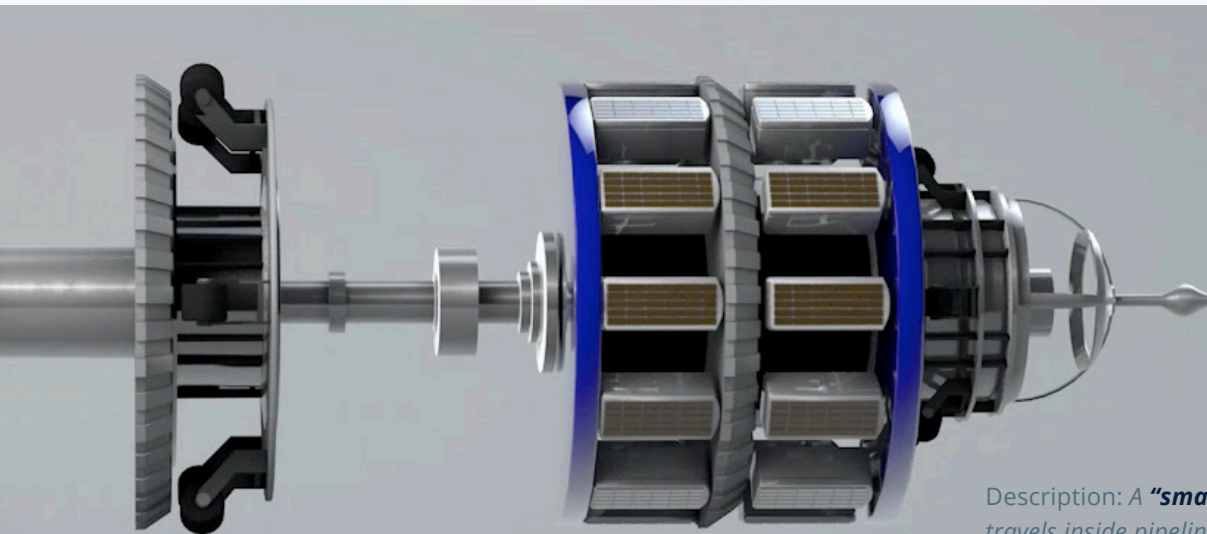
Pipeline operators also perform preventative maintenance on their pipes to address potential issues before they become a problem. For example, an inspection may tell a pipeline operator a small amount of corrosion is starting to form on the pipe. It may not yet pose a problem, but requires maintenance to keep the pipe in a safe condition. In response, the pipeline operator could take a number of actions including, reapplying protective coating, installing a patch or sleeve around the pipe or replacing that section of pipe.

24/7 Pipeline Monitoring and Rapid Shutdown

Pipeline operators monitor their pipelines from a central control center 24 hours a day, 7 days a week, 365 days a year. Specially trained controllers keep a watchful eye over pipeline pressure, flow and volume. Pipeline operators can quickly shut down a pipeline if monitoring technology suspects a leak. Pipeline control personnel are trained to shut down their systems, diagnose whether an alarm is showing a leak, and not restart until personnel determine the pipeline is operating safely.

Emergency Planning & Practicing

Pipeline operators have extensive emergency response plans to handle a pipeline incident if one were to occur. The federal government approves operator emergency response plans and operators share their plans with local authorities. Pipeline operators know in advance who to contact in case of an emergency and have support personnel and ready equipment to deploy to an incident site.



Description: A “**smart pig**” inspection tool that travels inside pipelines scanning the pipe walls.

PROTECTING THE ENVIRONMENT

Protecting the environment and preserving our nation's ecosystems are central components to pipeline design, construction and operations. Pipelines are routed to avoid sensitive areas, built with advanced steel and protective coatings, and monitored constantly. New pipelines are inspected in detail and tested before operations.





Protective Routes and Design Specifications

Pipeline operators protect the environment by designing the routes of their lines to avoid environmentally sensitive areas. Operators will also try to follow utility corridors with existing pipelines or power lines to significantly reduce disruptions. Prior to construction, operators conduct comprehensive assessments to ensure impacts to the environment are minimized. Environmental assessments consistently show pipeline projects have fewer impacts than other transportation alternatives.

Pipeline operators seek to minimize impacts on waterbodies. New pipelines are burrowed deep beneath major waterbodies, never coming into contact with the water itself. All pipelines are constructed from certified steel pipe that meets or exceeds federal quality regulations. After pipe segments are welded together end to end, the welds are x-rayed to ensure no defects are present.

New pipelines are allowed to begin service only after they pass pre-operation testing demonstrating they are problem free and ready for safe operations. Pipelines crossing bodies of water receive special attention from operators to ensure that ecosystems and water quality are protected. In rare circumstances, flooding can wash away a portion of a riverbed leaving a pipeline exposed and susceptible to breakage. To prevent the possibility of pipeline scouring, operators monitor flood events in real time and utilizing the latest recommended practices, regularly survey water crossings to assess channel migration and scour potential.

Emergency Response

Pipeline operators limit the impact to the environment if a release does occur with a rapid and coordinated response. Operators have extensive emergency response plans approved by the federal government and shared with local authorities. Pipeline operators regularly train their employees and practice their response plans to be ready for a pipeline incident. Pipeline operators know in advance who to contact in case of an emergency and have support personnel and equipment reserved to deploy to an incident site.





PUBLIC BENEFITS OF PIPELINES

Gasoline & Diesel for Our Cars & Trucks

Without pipelines, we wouldn't have the gasoline and diesel we put into our cars and trucks. Major pipelines deliver crude oil to refineries in the Gulf Coast and Midwest, which produce gasoline and diesel for American cities across the entire country.

Home Heating Fuel

Millions of homes in colder climates depend upon pipelines to keep their homes warm in the winter. Home heating oil or ultra-low sulfur diesel is sent by pipeline in large volumes to regional storage points. The journey for home heating fuel deliveries begins with a pipeline and ends with a truck making the final delivery.

Jet Fuel for Air Travel

The jet fuel in airplanes comes to airports by pipeline. Pipelines deliver the jet fuel from refineries to airport storage tanks.





Propane for Farming and Rural Heating

Rural communities depend upon pipelines to heat their homes and farms. Propane for rural home heating is transported to regional distribution centers by pipeline before delivery to homes by truck. Farmers use propane to dry their grain after harvest to reduce crop loss, adding harvest flexibility and improving yields through earlier harvest. Livestock operations use propane to heat their barns and keep livestock warm throughout the winter. Farmers can also use propane to power their irrigation pumps, heat greenhouses and power farm vehicles.

Pipeline Construction Spurs Jobs

New pipeline infrastructure offers American workers the opportunity for thousands of good-paying jobs and billions of dollars in worker payroll. A major pipeline construction project will directly put to work thousands of tradesman, teamsters, technicians and engineers. Tens of thousands more Americans will have jobs from pipelines because of the goods and services supplying the project, its workers and their personal spending. In this way, pipeline construction projects supply both construction jobs and many more types of good-paying jobs in manufacturing, finance and insurance, hospitality and health care.

Raw Materials Delivered to Manufacturers

Pipelines transport natural gas liquids from wells in places like eastern Ohio, western Pennsylvania and Texas to U.S. manufacturers: ethane to make plastics, butane for pocket lighters, and pentane to make styrofoam.

Consumer Goods Made from Pipeline Delivered Feedstocks

American consumers use products made from pipeline-delivered feedstocks. Beverage containers, clothing, carpet, cosmetics and pharmaceuticals all are made with raw material feedstocks delivered at some point by pipeline. U.S. workers drill wells and send petroleum products to pipelines, process raw materials into usable feed-stocks, process feed-stocks into base fibers, resins, and materials, and manufacture final products and packaging.

Community Benefits Continue After Pipeline Construction

After construction, a major pipeline project will provide tens of millions of dollars in property taxes each year. Local communities can use these revenues to fund increases to fire and police departments, teachers and schools and government operations.



A MESSAGE FROM PIPELINE LEADERSHIP

Industry's commitment to long-term safety includes the following shared pipeline safety 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.



David Murk
API Pipeline Director
American Petroleum Institute

We are proud to share with you the liquid pipeline industry's new pipeline safety strategic plan for 2017-2019 and performance highlights from 2016.

The new plan reflects the goals and objectives of over 50 pipeline member companies within API and AOPL. Since 2014, the pipeline industry has collaboratively worked together through the Pipeline Safety Excellence initiative to establish shared safety principles and commit to a long-term strategy that promotes continuous improvement and excellent safety performance. Through the support of API and the AOPL, pipeline operators volunteer their time on industry-wide safety teams that provide pipeline operators with the critical tools they need to more effectively identify risks, inspect and maintain their pipelines, and respond to emergencies or detect potential leaks. Additionally, pipeline operators proactively share lessons learned from prior incidents, and develop industry-wide best practices to improve pipeline safety and work together to implement improvement recommendations.



Andy Black
President & CEO
Association of Oil Pipeline Lines

Recognizing the need for longer term strategic planning, in 2017, the pipeline industry is lengthening its planning horizon to three years and broadening its pipeline safety strategic focus to encompass the full range of industry-wide safety improvement efforts. The 2017-2019 strategic plan will drive our industry to achieve advances in pipeline safety technology, improve ways to engage with our key stakeholders and communicate with the public, strengthen emergency preparedness and response planning, and adopt holistic pipeline safety management systems. Strategic planning and the establishment of long-term goals are critical to industry-wide pipeline safety improvements.

GOALS

Industry will focus on the following goals over the next three years:

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 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 drilling, 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 and second party damage.



To achieve success, pipeline operators through performance measures and annual review of data associated with each of the four industry-wide goals, will assess industry performance, and identify emerging trends to help ensure pipeline operators are focusing their attention where they will have the greatest positive impact on pipeline safety. In 2017, industry will develop these performance measures, build the framework to collect the data, and establish performance targets. Performance measures will be fully implemented in 2018. For this year's plan, our 2016 performance report highlights the long-term pipeline safety trends, as well as incidents by location, size, cause and commodity. Moving forward, our performance report will also reflect the performance measures established for each strategic goal.

Each year, an industry-wide strategic planning team will review the three-year plan to ensure its focus remains relevant and identify any emerging issues requiring attention. With periodic updates as appropriate, the three-year plan will remain a blueprint for its intended period providing direction and means to track and measure performance.

API and AOPL members are fully committed to maintaining the highest standards and establishing a strong foundation with the public by holding ourselves accountable and continually striving for improvement.

Sincerely,



David Murk
American Petroleum Institute



Andrew J. Black
Association of Oil Pipe Lines

2017–2019 GOALS



1

PROMOTE ORGANIZATIONAL EXCELLENCE

OBJECTIVE 1.1

EXPAND SAFETY MANAGEMENT PRACTICES

- Strategic Initiative: *Pipeline Safety Management Systems (Pipeline SMS)*
- Strategic Initiative: *Construction Quality Management (QMS)*
- Strategic Initiative: *Pipeline Integrity Management (IM)*

OBJECTIVE 1.2

PROMOTE BEST SAFETY PRACTICES SHARING

- Strategic Initiative: *Sharing & Learning*

OBJECTIVE 1.3

IMPROVE PIPELINE INTEGRITY THROUGH TECHNICAL DATA ANALYSIS

- Strategic Initiative: *Data Integration*





IMPROVE SAFETY THROUGH TECHNOLOGY AND INNOVATION

OBJECTIVE 2.1

IMPROVE PIPELINE INTEGRITY INSPECTION TECHNOLOGY

- Strategic Initiative: *Continuous Improvement of ILI Capabilities*

OBJECTIVE 2.2

ENHANCE INCIDENT IDENTIFICATION & RESPONSE

- Strategic Initiative: *Leak Detection and Response Management*



ENHANCE EMERGENCY RESPONSE PREPAREDNESS

OBJECTIVE 3.1

BOOST OPERATOR & FIRST RESPONDER PLANNING, PREPAREDNESS & RESPONSE CAPABILITIES

- Strategic Initiative: *Pipeline Emergency Planning, Preparedness & Response*

2017 – 2019 GOALS

4

INCREASE STAKEHOLDER AWARENESS & INVOLVEMENT

OBJECTIVE 4.1

IMPROVE STAKEHOLDER COMMUNICATION
ON ENERGY INFRASTRUCTURE AND PIPELINE
SAFETY

- Strategic Initiative: *Stakeholder Engagement*

OBJECTIVE 4.2

PROMOTE INNOVATIVE APPROACHES TO
ENHANCING DAMAGE PREVENTION

- Strategic Initiative: *Excavation Damage*



PROMOTE ORGANIZATIONAL EXCELLENCE







OBJECTIVE 1.1

Expand Safety Management Practices

Strategic Initiative: *Pipeline SMS*

1. Increase Pipeline Operator Commitment to Industry-Wide Pipeline SMS
2. Expand Incorporation of Pipeline SMS into Pipeline Operations
3. Improve Safety Performance and Safety Culture Resulting from Pipeline SMS

The safety performance of a complex industrial activity such as a pipeline is improved when the numerous different operational activities, risk factors and operating circumstances are managed holistically. Comprehensive safety management facilitates a greater awareness of current safety performance, opportunities for safety improvement and tracking of safety progress.

Pipeline operators collaborated with Pipeline and Hazardous Materials Safety Administration (PHMSA), state pipeline regulators and industry experts to develop [API RP 1173 – Pipeline Safety Management Systems \(Pipeline SMS\)](#). Through adoption and use of API RP 1173, pipeline operators will be able to customize the structure of safety management systems to their pipeline system, ensuring recurring review of pipeline safety progress, incorporation of learnings from pipeline industry trends, pipeline incident findings, audits, evaluations and regulator recommendations, and increased attention to safety culture. In 2015, the pipeline industry finalized API RP 1173 and in 2016 undertook extensive efforts to educate members on API RP 1173, gain commitments to implement the RP and provide resources to assess gaps between current operations and API RP 1173 elements.

In 2017 and beyond, pipeline operators will demonstrate progress conforming to the requirements of API RP 1173 and evaluate the effectiveness of their efforts in the form of safety performance improvements. The development of conformance tools will allow operators to evaluate their progress implementing API RP 1173. The pipeline industry will begin tracking data to show progress and improvement towards meeting the requirements of the API RP 1173 through the use of performance measures and benchmarking. Operators will be able to compare individual company conformance with industry-wide conformance. In 2018, operators will begin evaluating the effectiveness of their Pipeline SMS programs through the use of similar tools. The annual aggregation of both conformance and effectiveness data will allow API and AOPL to track emerging industry-wide safety culture and safety performance improvement trends.

2017-2019 ACTIVITIES

Expand Safety Management Practices

Strategic Initiative: **Pipeline SMS**

2017

- ◆ Develop conformance tools to help operators evaluate their implementation progress of API RP 1173 by:
 - ◇ Establishing performance measures that track progress and improvements to a pipeline operator's conformance with API RP 1173
 - ◇ Analyzing performance measures on an annual basis through the development of an annual report to demonstrate implementation progress of Pipeline SMS within the pipeline industry
 - ◇ Providing Pipeline SMS companies with their individual performance versus the industry performance on conformance with API RP 1173
 - ◇ Developing a conformance audit check list and protocols for operator and third party audits
- ◆ Issue a 2017 annual report summarizing the results of the conformance performance measures
 - ◇ Developing performance measures to assess growth and progress towards an operator's Pipeline SMS maturity
 - ◇ Providing committed Pipeline SMS companies with their individual company maturity versus the industry performance on Pipeline SMS maturity
- ◆ Incorporate operator feedback on the third party audit protocol and make adjustments as necessary
- ◆ Develop a tiered Pipeline SMS industry training program to educate pipeline professionals throughout all levels of pipeline management
- ◆ Develop a Pipeline SMS governance framework to manage data aggregation and analysis and ensure long-term sustainment of the program
- ◆ Develop a 2018 annual report that summarizes industry conformance, effectiveness to date and overall performance

2018

- ◆ Develop effectiveness tools for operators to evaluate performance by:
 - ◇ Objectively determine strengths and weaknesses of personnel and processes that support each element of the Pipeline SMS

2019

- ◆ Implement a sustainable long-term Pipeline SMS governance framework to support ongoing industry API RP 1173 implementation that includes processes to maintain industry conformance and effectiveness, operator training, third party audit protocols, and the development of an annual report



OBJECTIVE 1.1

Expand Safety Management Practices

Strategic Initiative: **Construction QMS**

1. **Increase Adoption of API RP 1177, Construction QMS Through Implementation, Training and Sharing Participation**
2. **Decrease Inspection Findings of Poor Construction Quality**
3. **Decrease New Construction Hydrostatic Pressure Test Failures**
4. **Decrease New Pipe Failures Occurring Within First Year of Operation**

Demand by U.S. consumers, workers and travelers for petroleum products, as well as changing and expanding production locations, requires construction of new pipelines.

Pipeline operators can increase the quality of pipeline construction and the safety of newly operating pipelines through holistic management processes. The construction QMS strategic initiative aims to increase the quality of newly constructed pipelines and therefore, increase the integrity of the future U.S. pipeline network. Increased quality and integrity will help to reduce construction non-conformances and unplanned releases.

In 2017, the pipeline industry is delivering the benefits of a holistic construction quality management system by completing a best practices document that will guide pipeline operators on how to manage the pipeline construction process systematically from initial design verifications, through materials manufacturing, construction, inspection, testing and initiation of operations. [API RP 1177, Construction Quality Management Systems \(QMS\)](#) builds upon ongoing pipeline industry efforts to manage pipeline safety issues comprehensively. Through adoption and use of API RP 1177, pipeline operators will be able to decrease the number of construction quality inspection

and pre-operation testing failures, reduce post-construction correction and maintenance activities and improve new operations safety performance.

Following the publication of API RP 1177 in 2017, industry will strive to increase adoption of the RP through educational materials, industry workshops, and training. Activities in 2017 and 2018 will be focused on outreach and education, specifically highlighting the opportunity for operators to employ holistic safety management systems with the adoption of not only API RP 1177, but also the management practices outlined in API RP 1173 and the guidance in [API RP 1169, Basic Inspection Requirements for New Pipeline Construction](#).

Over the course of the next three years, industry will also track a number of performance indicators that will provide key insight into the adoption and effectiveness of construction QMS, such as the number of inspections, hydrostatic test failures, and first year failures. In 2019, industry will engage with PHMSA regarding lessons learned from API RP 1177 and on the effectiveness of the RP through the evaluation of the performance indicators.

2017-2019 ACTIVITIES

Expand Safety Management Practices

Strategic Initiative: **Construction QMS**

2017

- ◆ Publish API RP 1177
- ◆ Finalize and execute an implementation plan for API RP 1177 to assist operators with adoption
- ◆ Align the implementation plan with the holistic view of other safety management practices and RPs, emphasizing the similarities and differences between API RP 1173, API RP 1177, and *API RP 1160, Managing Systems Integrity for Hazardous Liquids Pipelines*

2018

- ◆ Organize a forum to review implementation status and solicit feedback on API RP 1177
- ◆ Host a workshop to discuss leading and lagging indicators that organizations may use to assess the effectiveness of a construction QMS for new pipeline construction

2019

- ◆ Coordinate cooperation between the API RP 1173 and API RP 1177 task groups to ensure document alignment during the RP revision process
- ◆ Host a workshop with PHMSA regarding improvements noted (failure statistics, inspection findings, etc.) in the previous three (3) years due to the industry acceptance of API RP 1177



OBJECTIVE 1.1

Expand Safety Management Practices

Strategic Initiative: Pipeline Integrity Management

1. Decrease Number of Incidents Impacting the Public or Environment
2. Increase Number of Operators Who Have Completed a Gap Analysis Against Updated API RP 1160
3. Increase Number of Operators With Integrity Knowledge Sharing Communication Plans and How Is It Being Used
4. Increase Number of Operators Implementing Threat Assessment Improvements, or Threats Confirmed by a New Technology

Pipeline operators use proactive inspections and preventative maintenance to keep pipelines operating safely. These efforts make up a pipeline operator's integrity management program. Pipeline integrity management programs are designed to regularly assess threats to pipeline systems, inspect and analyze the status of their pipelines and perform maintenance on identified issues in order to prevent releases. The pipeline industry's *API RP 1160, Managing Systems Integrity for Hazardous Liquids Pipelines* provides pipeline operators technical engineering guidance for assessing pipeline risk, using in-line inspection "smart-pig" inspection technology, criteria for performing repairs, analytic models for assessing pipe issues, and guidance for how frequently to re-inspect pipelines.

In addition to technical guidance, pipeline operators can also benefit from programmatic guidance to manage their pipeline integrity management activities more holistically. To meet this need, the pipeline industry is updating the API RP 1160 guidance around the *Plan-Do-Check-Act* cycle of a pipeline safety

managements system to obtain the benefits of recurring, structured program activities to assess and improve operations. The API RP 1160 update is also incorporating references to new or revised industry technical guidance for managing pipeline cracking (API RP 1176), integrating integrity data (API TR 1179), the appropriate uses of hydrostatic pressure testing (API TR 1178) and managing waterbody crossings (API RP 1133).

Following the finalization of revisions to API RP 1160 in 2017, the pipeline industry will focus on educating operators on the new guidance in an effort gain company commitments. In 2018, the pipeline industry will develop an implementation strategy to assist operators in their adoption of integrity management program (IMP) documents. In 2019 and beyond, it is the industry's goal to increase and maintain operator adoption of the guidance, evaluate the effectiveness of the RP and correspondingly, measure resulting changes in pipeline safety performance.

2017-2019 ACTIVITIES

Expand Safety Management Practices

Strategic Initiative: *Pipeline Integrity Management*

2017

- ◆ Finalize revisions and publish updated API RP 1160, 3rd edition
- ◆ Encourage industry-wide understanding and operator adoption of updated API RP 1160
- ◆ Develop a “road-map” document to assist operators in navigating API pipeline safety documents on integrity management

2019

- ◆ Update the API integrity management “road map” document
- ◆ Continue publication of an annual report that summarizes industry conformance and benchmarking on integrity management

2018

- ◆ Develop an implementation strategy to assist operators in assessing their conformance to the IMP documents
- ◆ Develop performance measures for assessing conformance to API pipeline safety integrity management documents
- ◆ Publish an annual report summarizing implementation progress and benchmarking on IM
- ◆ Complete the implementation of key aspects of *API TR 1178, Data Management and Integration Guideline*, as it relates to integrity management and track the progress of data integration
- ◆ Finalize revisions and publish *API RP 1163, In-line Inspection System Qualification Standard*



OBJECTIVE 1.2

Promote Best Safety Practices Sharing

- **Strategic Initiative:** *Sharing & Learning*

1. **Increase Percentage of Companies Contributing to Industry-Wide Pipeline Safety Sharing and Learning Program**
2. **Increase Number of Learning Bulletins to Pipeline Operators from Industry-Wide Pipeline Safety Sharing and Learning Program**

Each year, the pipeline industry hosts a number of events and activities to share pipeline safety lessons learned, including an annual safety sharing forum, quarterly safety sharing webinar tailgates and periodic alerts on industry and regulator-based safety improvement recommendations. The transparency of operators learning from one another and making necessary changes within their companies exemplifies the type of safety culture required to be successful in a hazardous liquid pipeline environment.

In 2016, the pipeline industry created and implemented a new Pipeline Industry Practical Experience Sharing (PIPES) Portal to house shared industry learnings, enabling participating operators to submit and access incident learnings, resulting in improved pipeline safety performance. A formal, structured program for the collection, management and periodic distribution of pipeline safety learnings will broaden participation in and contribution to these safety activities and ensure they continue on a recurring, sustainable basis.

Over the next three years, the API/AOPL Pipeline Safety Sharing & Learning Program will use the new PIPES Portal and ongoing safety events and activities to increase industry-wide sharing and operator incorporation of pipeline safety learnings. The Program will encourage contribution to the PIPES Portal, annual Pipeline Information eXchange (PIX) and quarterly safety tailgates with the goal of 90% participation in the use of the PIPES portal by 2019. To enhance the benefits coming from sharing and learning, the Program will issue periodic safety alerts to pipeline operators based on PIPES Portal submissions, PIX and the safety tailgates. Each year, industry will issue an annual report highlighting industry-wide sharing activities, the pipeline safety lessons shared through the program and documenting operational changes and safety performance improvements. If the industry fully utilizes the various sharing and learning opportunities made available, pipeline incidents will decrease through better practices, a stronger safety culture and improved overall safety performance.

2017-2019 ACTIVITIES

Promote Best Safety Practices Sharing

- **Strategic Initiative:** *Sharing & Learning*

2017

- ◆ Continue to promote and support the use of established industry learning opportunities such as virtual tailgate meetings, safety culture forums and the pipeline exchange workshop
- ◆ Issue regular alerts to PIPES learning portal participants based on individual needs
- ◆ Issue an annual report card summarizing the 2017 learning opportunities in the industry

2018

- ◆ Continue to institutionalize the PIPES learning portal with the pipeline industry
- ◆ Benchmark the learning and sharing program against that of other industries
- ◆ Continue to distribute learning bulletins from the portal
- ◆ Evaluate processes and solicit feedback on the use of the PIPES learning portal
- ◆ Issue an annual report card detailing the 2018 industry learning opportunities

2019

- ◆ Continue to distribute learning alerts to PIPES portal participants
- ◆ Issue an annual report card on the 2019 industry learning opportunities

G1

OBJECTIVE 1.3

Improve Pipeline Integrity through Technical Data Analysis

- **Strategic Initiative:** *Data Integration*

1. Integrate Industry Data Management Guidance into Operator Programs
2. Improve Data Integration Program Management

A successful pipeline IM program requires the ongoing integration and analysis of data from several sources. As PHMSA notes, **“integration is one of the most important aspects of the IM program, and operators must account for interaction between threats or conditions affecting the pipeline.”** The cumulative risk of multiple threats analyzed together may produce a higher level of risk than those same threats analyzed individually. However, effectively and efficiently integrating data in a variety of formats can be a challenge for operators if data is collected or stored in different locations across the organization or in different formats.

To address data quality and compatibility challenges, industry developed a technical report focusing on the various methodologies and processes used to spatially integrate and normalize data. In 2017, API will publish Technical Report *(TR) 1178 - Data Management and Integration Guideline*. The TR provides a compilation of methodologies and processes for integrating data that support integrity management programs. Throughout 2017, industry will also identify strategic opportunities to further encourage and assist liquids pipeline operators to incorporate the relevant aspects of the API TR.

To address programmatic and organizational challenges, API will include additional data integration guidance in its update of API RP 1160 for integrity management programs. API RP 1160 will guide pipeline operators on the procedures needed to identify integrity management data for risk analysis and the collection of integrity management data from across the organization. As a part of the API RP 1160 effort, programmatic data integration measures will be developed to track changes in the number of operators with written procedures for identifying and collecting data from across their organizations and the number of operators integrating pipeline, tool and integrity program performance data together with management of change measures. Performance metrics will be developed under API 1160 to track progress on data integration programs and assist operators in identifying potential gaps within their data management process. It is industry’s goal to provide operators with the tools to be able to effectively analyze and integrate integrity related data for successful risk management.

2017-2019 ACTIVITIES

Improve Pipeline Integrity through Technical Data Analysis

- **Strategic Initiative:** *Data Integration*

2017

- ◆ Publish API TR 1178 and encourage operator adoption
- ◆ Incorporate industry-wide data integration guidance for operators into API RP 1160 with references to API TR 1178
- ◆ Develop an implementation strategy for data integration related content of API TR 1178, API RP 1160, API RP 1173, and API RP 1177
- ◆ Assist operator understanding and usage of data identification guidance through industry-wide forums and webinars

2018

- ◆ Integrate API TR 1178 into appropriate industry documents
- ◆ Execute industry-wide data integration implementation strategy

IMPROVE SAFETY THROUGH TECHNOLOGY & INNOVATION





2

CAUTION
ATTACH
GROUNDING

G2

OBJECTIVE 2.1

Improve Pipeline Integrity Inspection Technology

- **Strategic Initiative:** *Continuous Improvement of ILI Capabilities*

1. **Increase Technology Company Participation in PRCI Research Projects Targeting ILI Improvements/Enhancements**
2. **Improve the Probability of Detection (POD), Probability of Identification (POI), and Anomaly Sizing Metrics for ILI Systems**

Pipeline operators use ILI tools to proactively inspect their pipelines to look for any potential issues and ensure their pipelines remain safe. Since 1999, widespread use of ILI tool, “smart pigs”, has helped pipeline operators reduce pipeline incidents by over 50% and corrosion caused incidents by nearly 70%. However, as the industry continues to strive for zero incidents, advancing ILI capabilities even further is a top priority. Data from ILI systems provides the foundation for threat identification and management, confirming the effectiveness of Preventive and Mitigative (P&M) measures, risk assessment, and identifying areas for pipeline safety performance improvement.

In 2017, industry efforts will build on the initial work on metal loss features and protocols development and focus on testing and analysis to assess ILI systems capabilities for detecting and discriminating metal loss (both through corrosion and gouging) and cracking within pipe dents. A second 2017 project will focus on detecting and sizing cracking in longitudinal seams of pipe, with an emphasis on low frequency electric resistance weld (LF-ERW) and flash weld (FW) pipe. In 2018, the pipeline industry will finalize

testing on crack size detection and corrosion anomalies. By 2019, industry plans to further ILI systems’ capabilities through increased testing and analysis that will be part of comprehensive performance studies on existing ILI systems. Industry will continue to capitalize on PRCI’s state-of-the-art ILI test facility, the Technology Development Center, to establish test protocols and procedures using an unparalleled set of pipeline samples/specimens to enable this work. The results of these studies will identify key focus areas for ILI systems’ improvements, foster improvements in existing technologies, and drive new technology development where needed.

2017-2019 ACTIVITIES

Improve Pipeline Integrity Inspection Technology

- **Strategic Initiative:** *Continuous Improvement of ILI Capabilities*

2017

- ◆ Perform ILI pull tests to develop an improved understanding of ILI performance on detecting mechanical damage (i.e., dents/deformations) and coincident features
- ◆ Determine the practicality of applying Magnetic Flux Leakage (MFL) ILI technology to detect pinhole anomalies in both liquids and natural gas pipelines
- ◆ Complete ILI testing for evaluating ILI systems performance for identifying metal objects that are in close proximity to pipelines using MFL technology
- ◆ Perform testing on a range of ILI technologies to improve the quantification of crack sizing, including depth and length of cracks and crack-like features
- ◆ Begin a quantitative performance evaluation of ILI technologies developed for difficult to inspect pipelines

2018

- ◆ Complete studies that compared ILI system performance for detecting and sizing corrosion anomalies
- ◆ Develop an industry standard for ILI reporting specifications with respect to dents, deformations and coincident features

- ◆ Finalize testing of ILI technologies to improve the quantification of crack sizing, including depth and length of cracks and crack-like features
- ◆ Develop calibration and reference standards for use in evaluating inspection systems

2019

- ◆ Continue testing to advance confidence in ILI systems' performance – improving on all levels, including POD, POI and sizing accuracy
- ◆ Test the next generation of MFL technologies in order to increase detection accuracy
- ◆ Conduct projects that compare ILI systems with hydrostatic pressure testing

G2

OBJECTIVE 2.2

Enhance Incident Identification & Response

- **Strategic Initiative:** *Leak Detection and Response Management*

1. **Increase Pipeline Operator Adoption of Industry-Wide Leak Detection Program (LDP) Management Guidance**
2. **Increase Adoption of Latest Industry-Wide LDP Management Guidance into Operations**
3. **Reduce Spill Size of Pipeline Incidents Impacting Public or Environment**

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 single program can help pipeline operators improve leak detection capabilities.

To meet this goal for a comprehensive leak detection program management, the pipeline industry developed *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 how to monitor overall LDPs. API RP 1175 will provide the framework for operators to establish comprehensive leak detection programs in their respective companies.

In 2016, pipeline operators formed an industry-wide implementation team to educate the industry and assist them with implementation of API RP 1175 into their operations. Over the next three years, the API RP 1175 implementation team will emphasize the importance of comprehensive leak detection program management through industry-wide workshops aimed at increasing operator adoption of API RP 1175. The team will also provide guidance on how to implement successful leak detection programs including gap assessment and training tools. Such workshops will create an opportunity to exchange ideas, challenges, and learnings from the adoption of API RP 1175. In 2017, industry will develop key performance indicators (KPI) to track RP adoption and measure company gap assessments. In 2018, industry will continue to track operator progress on achieving conformance through gap assessment tools and operator progress reports. By 2019, industry will evaluate the successes and challenges of the RP in order to make any needed revisions.

2017-2019 ACTIVITIES

Enhance Incident Identification & Response

- **Strategic Initiative:** *Leak Detection and Response Management*

2017

- ◆ Align industry, including practitioners and leaders of hazardous liquid pipeline operators, on the benefits and need to implement API RP 1175
- ◆ Host two face-to-face workshops (April 2017 and October 2017) for technical personnel and operations leaders to:
 - ◆ Enhance industry understanding regarding creating a risk-based LDP
 - ◆ Enable pipeline companies to share successes and learnings on LDP safeguard methods, technologies, and response protocols
- ◆ Develop KPI metrics on industry adoption of API RP 1175, completed gap assessments, and gaps closed to conform to the recommendations of API RP 1175
- ◆ Complete a 2017 report summarizing the degree of API RP 1175 adoption and issues identified

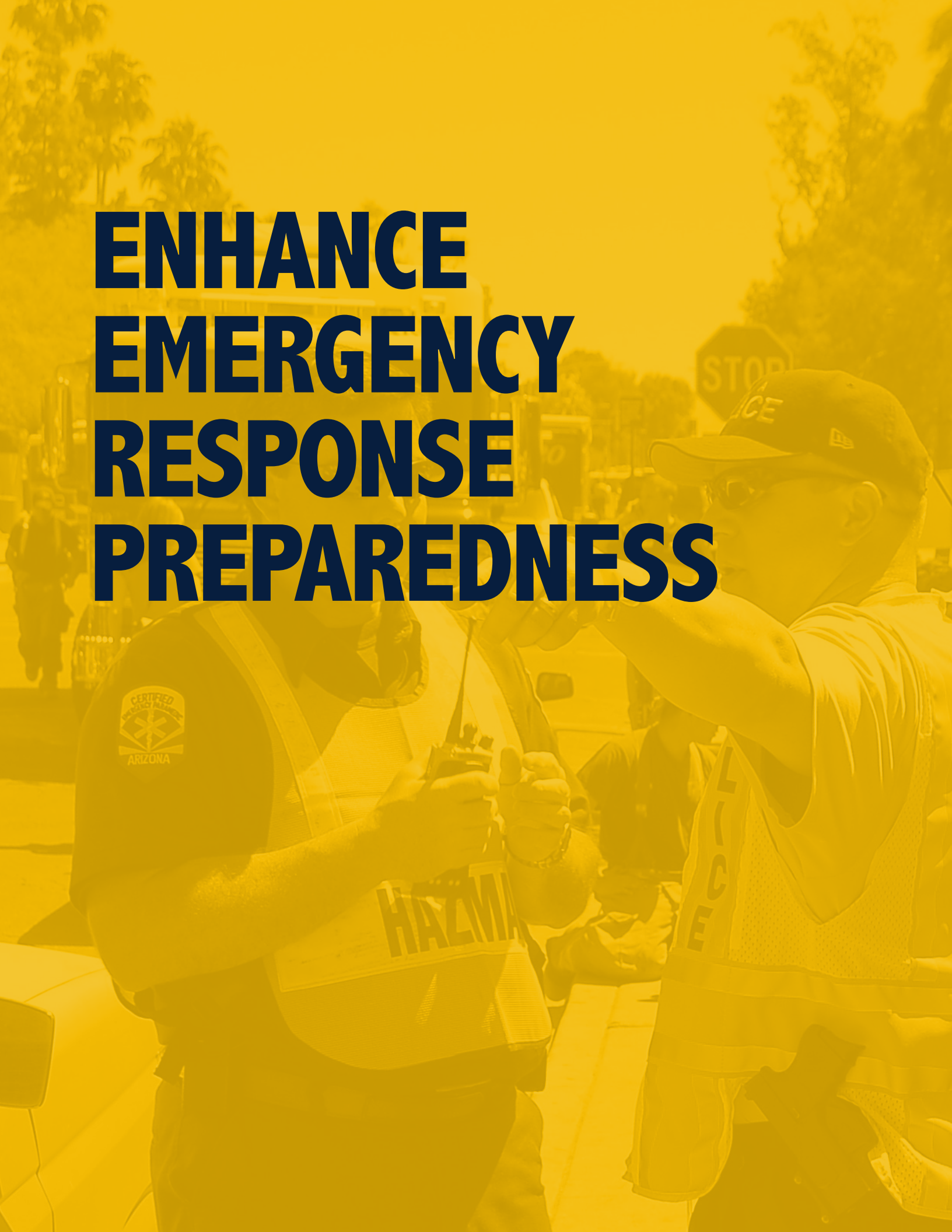
2018

- ◆ Conduct preliminary review of API RP 1175 1st edition for any changes needed and prepare proposed revisions for 2nd edition
- ◆ Update external stakeholders (National Transportation Safety Board (NTSB), PHMSA, Congress, and Public) on industry's progress to detect and respond to large and small leaks
- ◆ Update KPI metrics to include metrics that assess progress towards improving industry leak detection performance
- ◆ Promote operator peer-to-peer collaboration exchanges to share key learnings and strengthen respective LDPs

2019

- ◆ Maintain KPI metrics on industry LDP implementation and its influence on improving industry leak detection performance
- ◆ Continue to review API RP 1175 1st edition and pursue proposed revisions for 2nd edition

ENHANCE EMERGENCY RESPONSE PREPAREDNESS





G3

OBJECTIVE 3.1

Boost Operator & First Responder Planning, Preparedness & Response Capabilities

- **Strategic Initiative:** *Pipeline Emergency Planning, Preparedness & Response*

1. **Increase Pipeline Operator Implementation of API RP 1174 - Onshore Hazardous Liquid Pipeline Emergency Preparedness and Response**
2. **Increase Emergency Responder Training Course Enrollment Through the Pipeline Emergency Response Training Portal**

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, 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, engaging in peer to peer opportunities for drilling/exercising emergency response plans and sharing lessons learned from incidents.

In 2015, API published API RP 1174 - Onshore Hazardous Liquid Pipeline Emergency Preparedness and Response 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. Emergency responders can use the RP as a response tool to help prepare for a safe, timely, and effective response to a pipeline emergency.

To support API RP 1174, API and AOPL created an ongoing communications campaign, The More You Plan, to help operators remain informed of the latest response planning strategies and techniques through educational content on emergency preparedness.

Over the next three years, API and AOPL will continue to build out the communications campaign, The More You Plan, and promote the adoption of API RP 1174. In 2017, efforts will be focused on operator commitment to the RP and the development of key performance indicators to track progress on the successful application of the RP recommendations. With company commitments efforts underway by 2018, industry will begin measuring success and effectiveness through the key performance indicators. In 2019, industry will evaluate the aggregated conformance and effectiveness performance data to create an ongoing governance strategy for API RP 1174. This governance strategy will be complemented with outreach activities, such as biannual emergency response and preparedness forums, training through the pipeline emergency response training portal, and peer-to-peer sharing of learnings.

2017-2019 ACTIVITIES

Boost Operator & First Responder Planning, Preparedness & Response Capabilities

- **Strategic Initiative:** *Pipeline Emergency Planning, Preparedness & Response*

2017

- ◆ Continue implementation of communications campaign to hazardous liquid industry on API RP 1174
- ◆ Develop tools to help operators with API RP 1174 adoption:
 - ◇ Assist operators in assessing gaps with the RP, risk rank or prioritize the gaps, and develop closure plans to close the gaps identified
 - ◇ Develop performance measures that track progress and improvements to pipeline operator's conformance with API RP 1174
 - ◇ Analyze performance measures on an annual basis to demonstrate implementation progress
- ◆ Assess and develop plans to close higher risk gaps in emergency preparedness and response (e.g., responses on ice or swift water)

2018

- ◆ Review training courses on the Pipeline Emergency Response Training Portal
- ◆ Enhance the training library with new pipeline emergency response scenarios
- ◆ Implement performance measures and begin evaluating program effectiveness by:
 - ◇ Providing operators with a tool to objectively determine strengths and weaknesses of their personnel and processes that support API RP 1174

2019

- ◆ Implement a governance strategy that includes the following:
 - ◇ Evaluation of industry conformance
 - ◇ Evaluation of industry effectiveness
 - ◇ Annual report summarizing industry progress

A hand holding a pen over a document with a yellow overlay. The background is a blurred image of a hand holding a pen over a document, with a yellow overlay. The text is in a bold, dark blue font.

INCREASE STAKEHOLDER AWARENESS & INVOLVEMENT



G4

OBJECTIVE 4.1

Improve Stakeholder Communication on Energy Infrastructure and Pipeline Safety

- **Strategic Initiative:** *Stakeholder Engagement*

1. **Increase Media Outreach to Target Public Audiences on Pipelines and Safety**
2. **Increase Percentage of Target Audiences Who are Informed About Pipelines In Their Community and Understand That Pipelines are the Safest Way to Transport Oil and Natural Gas**
3. **Increase Percentage of Target Audiences Who are Familiar with 811/the One-Call System**
4. **Promote Operator Adoption and Implementation of Industry-Wide Landowner Relations Commitment and Core Training Program**

Engaging stakeholders about the benefits and safety of pipelines is vital to building public confidence in the communities where pipelines operate or are planned for construction. Sharing information about the pipeline industry's safety record and the multiple proactive and preventative safety efforts taken by operators to protect the public can influence perceptions and increase transparency. By engaging the public through focus groups and audience message testing, the pipeline industry can continue to refine communications designed to promote understanding and support for the industry.

Federal regulation requires all pipeline operators to engage in outreach efforts to increase public awareness of pipelines in local communities. Operators must establish and implement formal public awareness programs in accordance with *API RP 1162, Public Awareness Programs for Pipeline Operators*, of which the first edition was incorporated into law by reference. Public awareness programs must be designed to educate the public and other key stakeholders about pipeline locations, risks and hazards, damage

prevention, emergency response protocols and how to safely respond to a pipeline emergency. Changing technologies, shifting demographics and progress made since the law first went into effect are driving the industry to consider enhanced methods for communicating with target audiences to improve transparency and message effectiveness.

Part of building public trust involves developing a standard approach to working with landowners. Over the next three years, the pipeline industry will undertake programs, such as the *Liquids Pipeline Owner & Operator Commitment to Landowners and Landowner Relations Core Training program* to improve our interactions with key stakeholder groups. The pipeline industry will also focus on improving outreach and training for emergency responders, analyzing effectiveness data collection, and improving methods of communicating API recommended practices. During this time period, API RP 1162 will also be revised through a collaborative effort involving industry, external stakeholders, and other interested parties having a direct and material interest in pipeline public awareness programs.

2017-2019 ACTIVITIES

Improve Stakeholder Communication on Energy Infrastructure and Pipeline Safety

- **Strategic Initiative:** *Stakeholder Engagement*

2017

- ◆ Leverage API surveys to gauge stakeholder's understanding of pipeline operations, emergency readiness and pipeline safety, including damage prevention, and share with industry at selected conferences, where deemed appropriate
- ◆ Begin the revision process of API RP 1162 by engaging industry leaders, regulators, and key stakeholders to enhance recommended practices on public awareness
- ◆ Expand social media activities to build a proactive approach in communicating key messages related to damage prevention, integrity management, emergency preparedness, and others
- ◆ Finalize Landowner Relations Commitment and Core Training Program, educate pipeline operators on the program and obtain commitment of operators to adopt and implement
- ◆ Develop pipeline communications materials on pipeline safety, proactive inspections, preventative maintenance, emergency response, detecting leaks, environmental protection, public benefits or pipelines, stakeholder outreach and eminent domain

2018

- ◆ Continue revision process for API RP 1162, 3rd edition
- ◆ Communicate API survey findings and share with industry
- ◆ Implement expanded pipelines social media campaign, leveraging partnerships with midstream-related associations
- ◆ Host the Emergency Response Forum
- ◆ Encourage and measure adoption and participation in Landowner Relations Commitment and Core Training Program

2019

- ◆ Finalize API RP 1162, 3rd edition and encourage industry adoption through a communications plan, workshops, and sharing the best practices
- ◆ Reevaluate strategic plan initiatives to assess effectiveness and revise strategy as needed

G4

OBJECTIVE 4.2

Promote Innovative Approaches to Enhancing Damage Prevention

- **Strategic Initiative:** *Excavation Damage*

1. **Evaluate the Effectiveness of Public Awareness Programs Through the Public Awareness Program Effectiveness Research Study**
2. **Decrease the Number of Operator and Contractor Excavation Damage Incidents**
3. **Lower the Number of Third Party Incidents**

Excavation damage remains a threat to pipeline safety and therefore, a top priority for the industry. Incidents from excavation damage are collected and categorized as “first party,” “second party” or “third party” damage. Improvements in excavation damage are a shared responsibility between the pipeline industry and the public.

Over the years, industry has responded to this threat of excavation damage with numerous awareness activities to help operators and the public in guaranteeing safety. To encourage public awareness, operators work closely with the Common Ground Alliance (CGA) to promote “*Call-Before-You-Dig*.” The program encourages homeowners and utility providers to call “811” before excavation to provide operators an opportunity to mark their lines, preventing potential incidents. Individual company public awareness programs are also critical to ensure individuals are aware of the underground pipelines in and around their homes and businesses. In 2015, industry launched the “*Excavation Tool Box*,” which provides a collection of damage prevention shared learnings and practices for onshore, hazardous liquid transmission pipeline operators. Operators have access to information to assist in analyzing and reviewing existing procedures. The toolbox

has become an incredible asset for operators to learn from one another and improve their processes and external outreach.

To evaluate the effectiveness of company public awareness programs, API, AOPL, and the Interstate Natural Gas Association of America (INGAA) developed a *Public Awareness Program Effectiveness Research Survey (PAPERS)* to the public, emergency officials, local public officials, and excavators. The survey, conducted every two years, measures operator effectiveness in communicating pipeline safety messages to external stakeholders with operator specific data. Industry will continue to leverage the results of *PAPERS* in 2017-2019 to help reduce excavation damage incidents.

Over the next three years, industry teams will build off of existing programs and push several new initiatives to promote innovative approaches to continually raise the awareness of 811 and support the development of new technology, ultimately improving damage prevention. Each year, industry will continue to develop new topics for the excavation tool box, and accordingly measure industry usage. In 2017, industry will also develop a plan for eliminating first and second party damage, followed by implementation in 2018 and 2019.

2017-2019 ACTIVITIES

Promote Innovative Approaches to Enhancing Damage Prevention

- **Strategic Initiative:** *Excavation Damage*

2017

- ◆ Create a plan to promote the use of the Excavation Tool Box and track the usage
- ◆ Develop a social media campaign to communicate safety and environmental topics
- ◆ Develop a process to review API RPs and corresponding communications plans that may impact public awareness or external communication
- ◆ Develop a plan to address first and second party damage

2018

- ◆ Develop performance measures linked to the Common Ground Alliance (CGA), such as, how many companies utilize the CGA best practices and the number of companies participating in CGA
- ◆ Continue to develop content production for social media campaign. Explore stakeholder-specific content, such as a public officials communication outreach to improve perception and influence on/for the industry
- ◆ Implement an industry program to eliminate first and second party damage

2019

- ◆ Continue to review API RPs and corresponding communications plans that may impact public awareness or external communications
- ◆ Evaluate performance measures related to company involvement in the CGA
- ◆ Implement and measure the success of the industry program developed in 2018 for eliminating first and second party damage



2016

PERFORMANCE REPORT





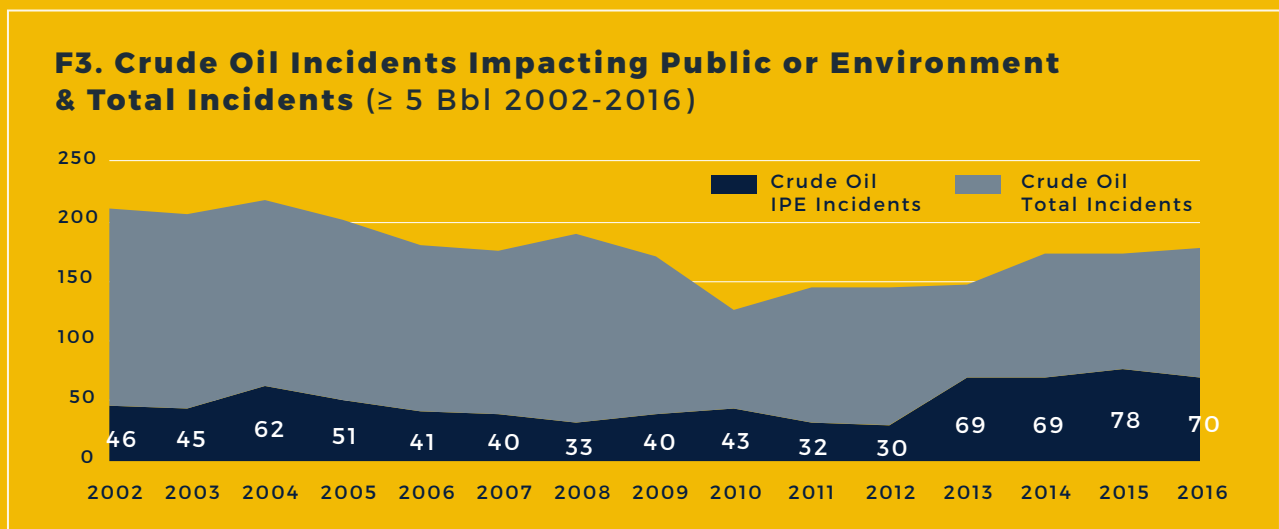
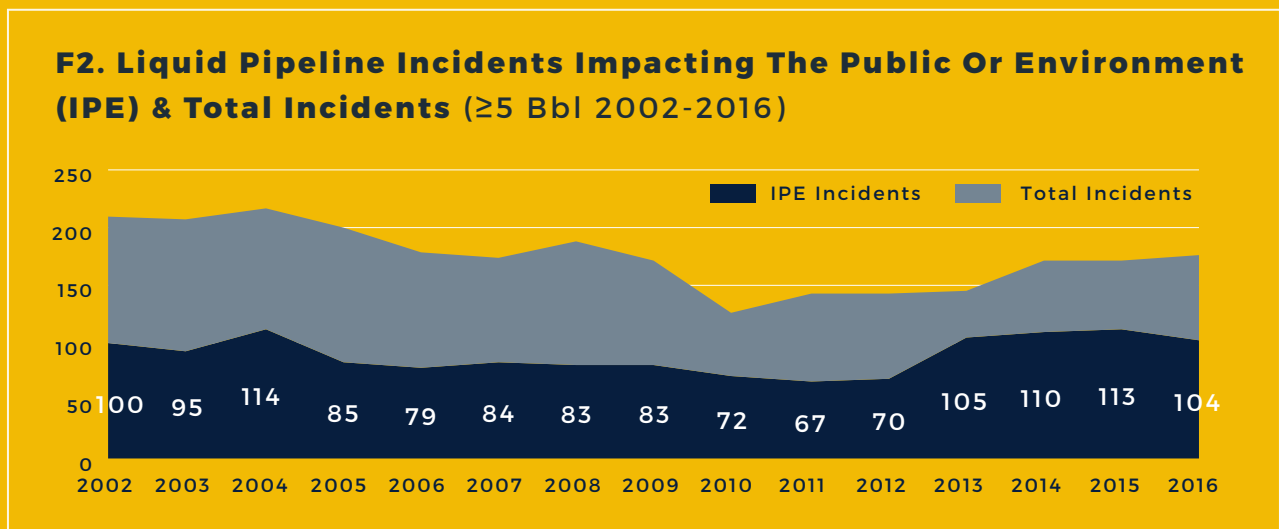
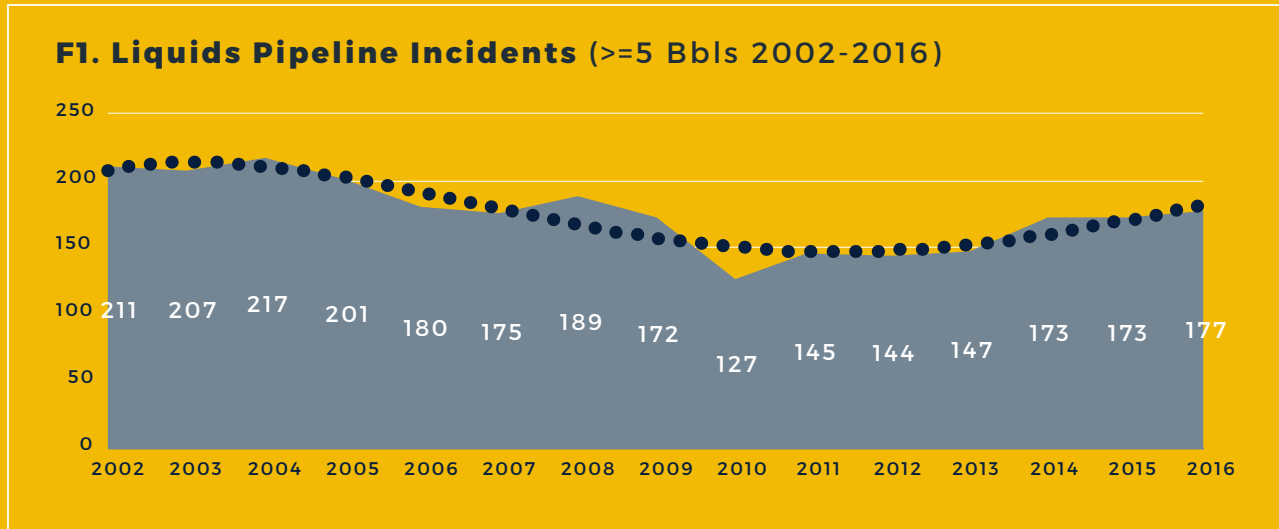
LONG-TERM SAFETY TRENDS

The pipeline industry tracks indicators of pipeline safety to measure our performance, successes and areas needing improvement

Total incidents of all sizes and types from liquids pipelines over the last 15 years shows a decline in incidents during the first 10 years until a recent trend of a growing number of incidents. Charts and graphs in succeeding pages will analyze the types and locations of incidents providing a guide for industry's targeted safety improvement efforts. (See Figure 1)

One measure of a release's impact is a new metric developed by PHMSA with pipeline operators and safety advocates entitled Incidents Impacting the Public or Environment (IPE). As will be discussed further below, many pipeline releases are actually very small or occur within operator property with no meaningful impact on the public. Likewise, some pipeline releases do impact the public or environmental areas in a meaningful way. The long-term trend of IPE incidents shows a decline in IPE release from 15 to 5 years ago with an increase and then leveling off from 5 years ago to the present. (See Figure 2)

Crude oil IPE incidents reflect overall pipeline trends declining from 15 to 5 years ago before increasing and then leveling off between 5 years ago and the present. The 70 crude oil releases impacting the public or environment in 2016 represent approximately 17% of the total 415 releases from liquids pipelines in 2016. A desire by the pipeline industry to improve pipeline safety performance led to the creation and launch of the Pipeline Safety Excellence initiative in 2014. Industry-wide efforts under the program are addressing pipeline safety issues from improving inspection technologies to cracking in pipe, safety management systems, leak detection program management and emergency response capabilities. (See Figure 3)



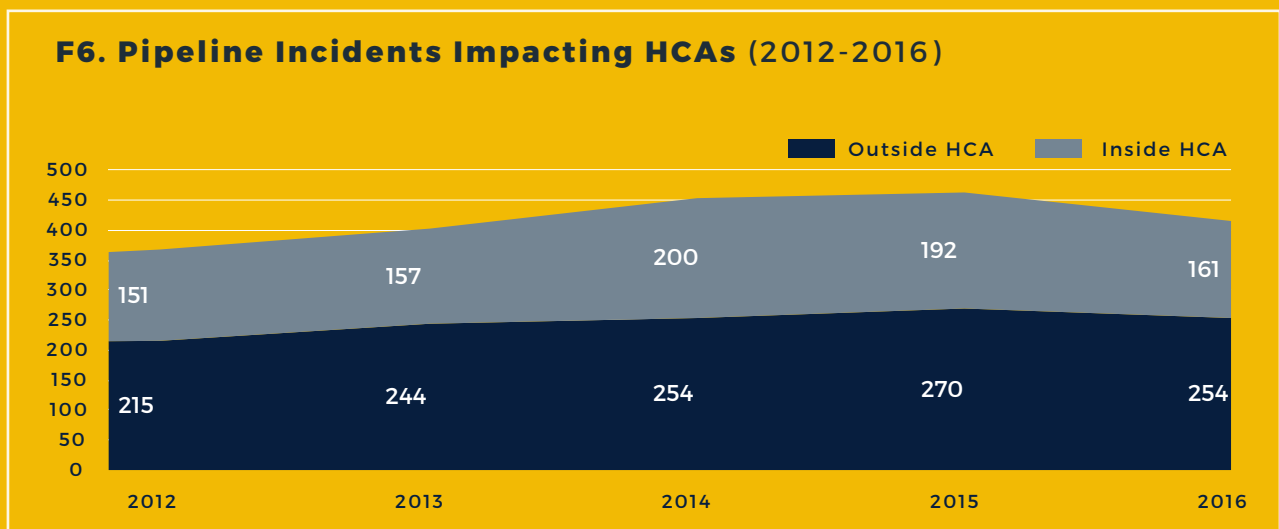
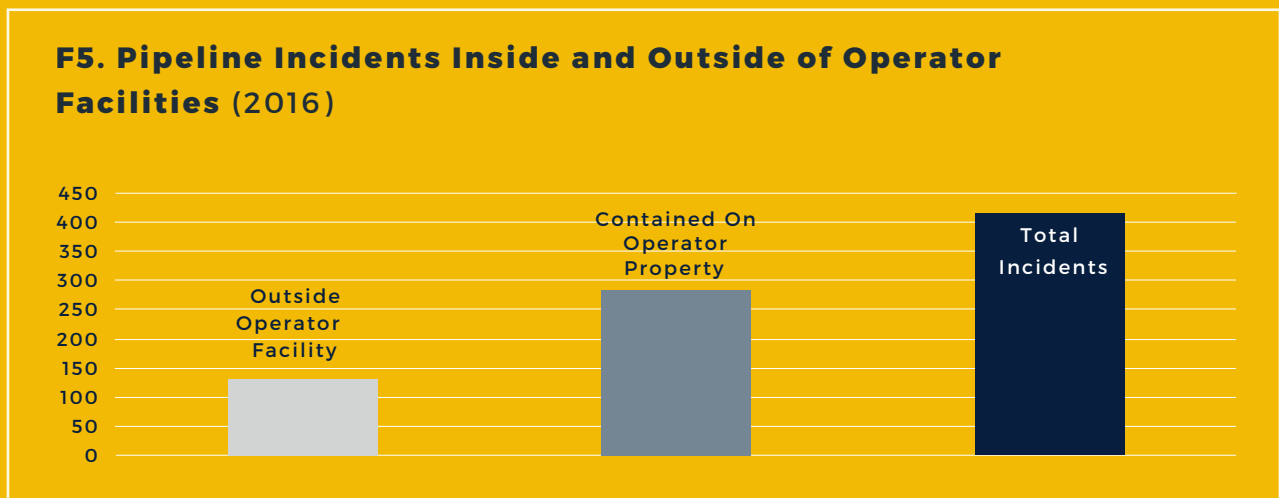
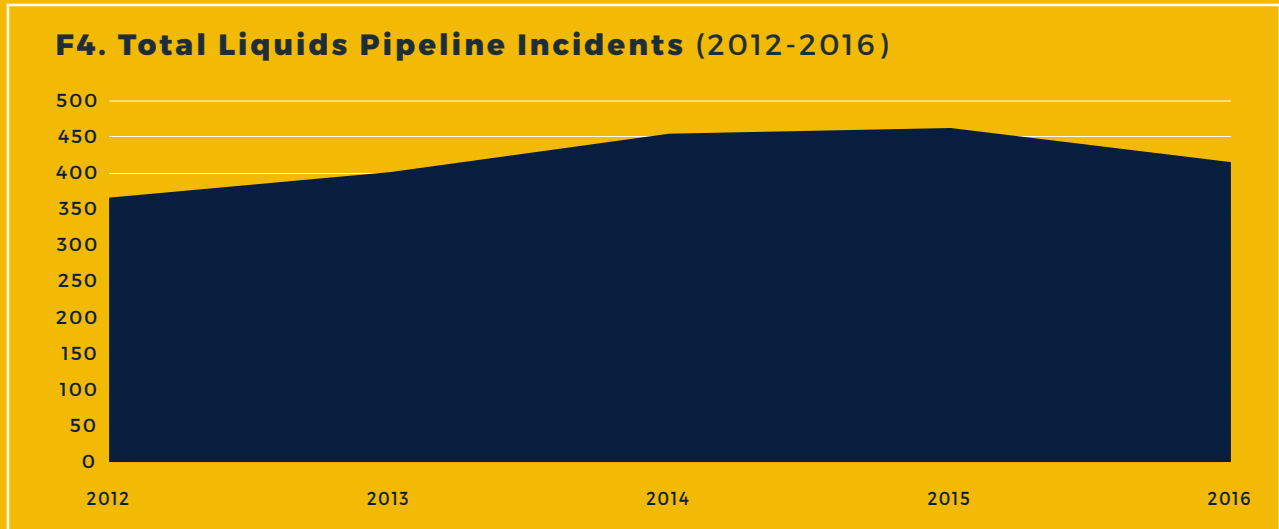


INCIDENTS BY LOCATION

In 2016, there were approximately 415 total incidents from liquids pipelines, a 10% decrease from 2015. This total figure includes incidents of all size and locations. While the number of total incidents in 2016 was 13% higher than 2012, with 43 fewer incidents than 2015 and 39 fewer incidents than 2014. (See Figure 4)

In 2016, 68% of incidents from liquids pipelines occurred and were wholly contained within an operator's facility. Specifically, in 2016, there were 284 facility incidents and 131 incidents outside of facilities in public spaces. Examples of pipeline operator facilities include pump stations, tank farms, and tanker transfer racks. PHMSA requires pipeline operators to report the facility incidents, and while they are a useful measure of operations, they do not reach public spaces or the environment. While incidents in public spaces constitute only 32% of the total incidents, reducing this number is a top priority for industry. (See Figure 5)

Within pipeline incidents occurring in public spaces, PHMSA and industry identify those in high-consequence areas (HCAs), defined as area of population concentration or sensitive environmental locations. Both PHMSA and pipeline operators want to ensure pipeline safety efforts are prioritized and greater emphasis placed on reducing incidents that impact the public or environment. In 2016, the 161 incidents impacting HCAs declined by 16% from 2015. (See Figure 6)





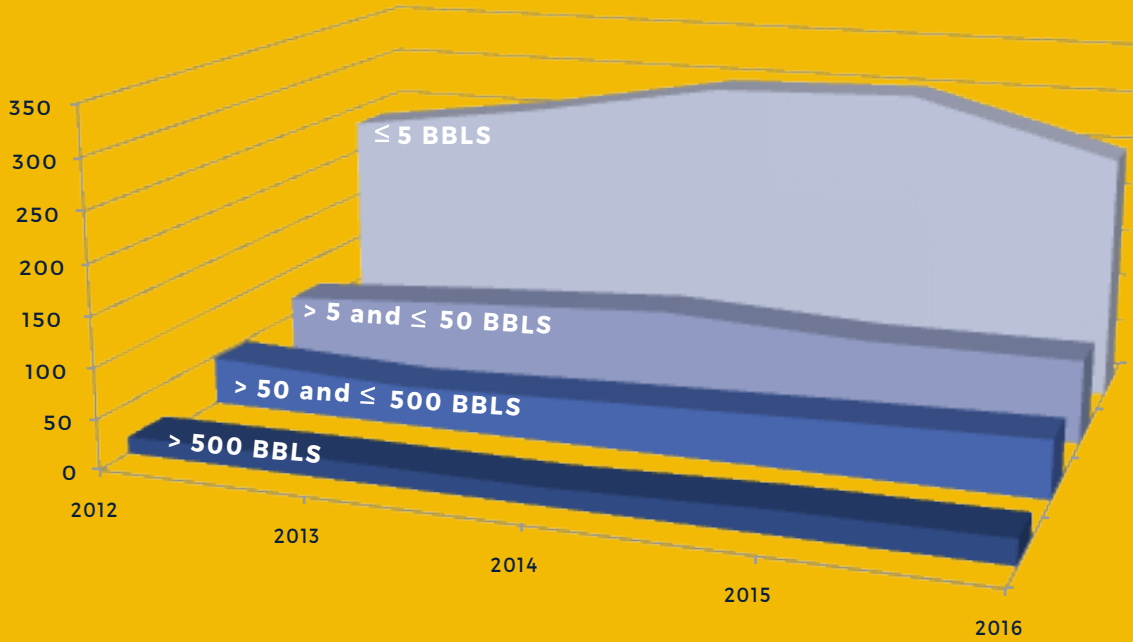
INCIDENTS BY SIZE

The vast majority of liquids pipeline incidents are small in size. In 2016, 60% of pipeline incidents were less than 5 barrels and 80% of incidents were 50 barrels or less. Large pipeline incidents have the greatest impact on the public or environment. In 2016, only 6% of pipeline incidents were 500 barrels or larger. Over the last 5 years, crude oil incidents less than 5 barrels increased 7% from 232 to 248 and the number of crude oil incidents 500 barrels or larger increased 47% from 17 to 25. Over the same period, total releases increased 13% from 366 to 415.

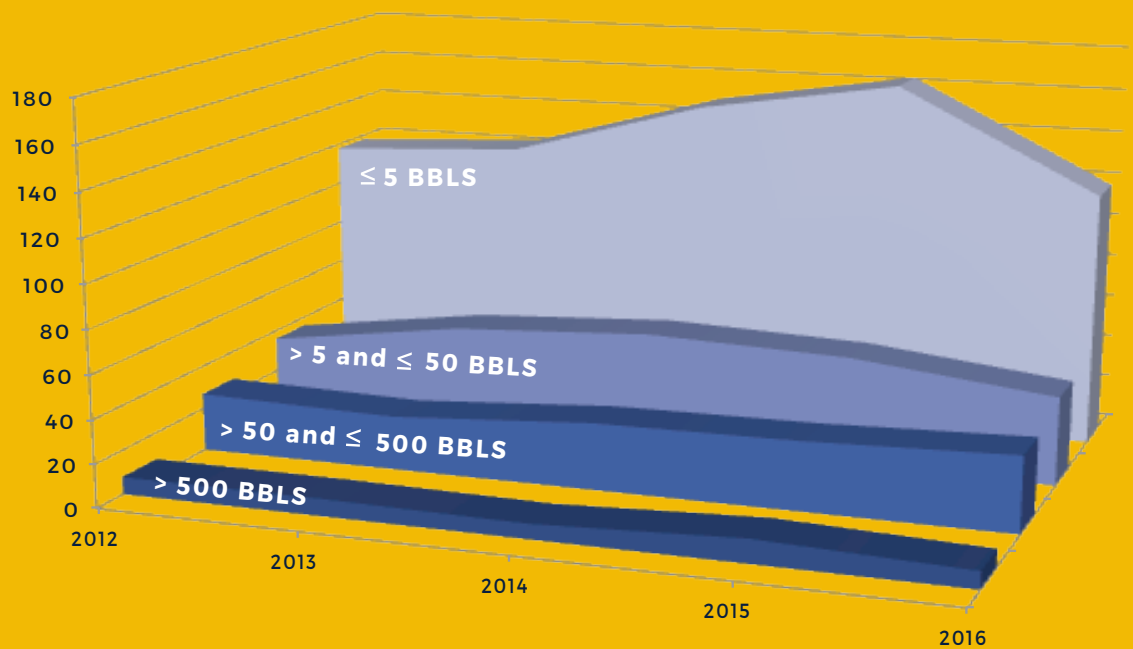
(See Figure 7)

Similar to total incident trends, the majority of crude incidents are small in size. In 2016, 58% of crude oil incidents were 5 barrels or smaller. Only 8 crude oil incidents or 4% of total crude oil incidents in 2016 were over 500 barrels. Over the last 5 years, while the total number of crude oil incidents increased 7%, the number of crude oil incidents larger than 500 barrels was unchanged. (See Figure 8)

F7. Liquid Pipeline Incidents By Size (2012-2016)



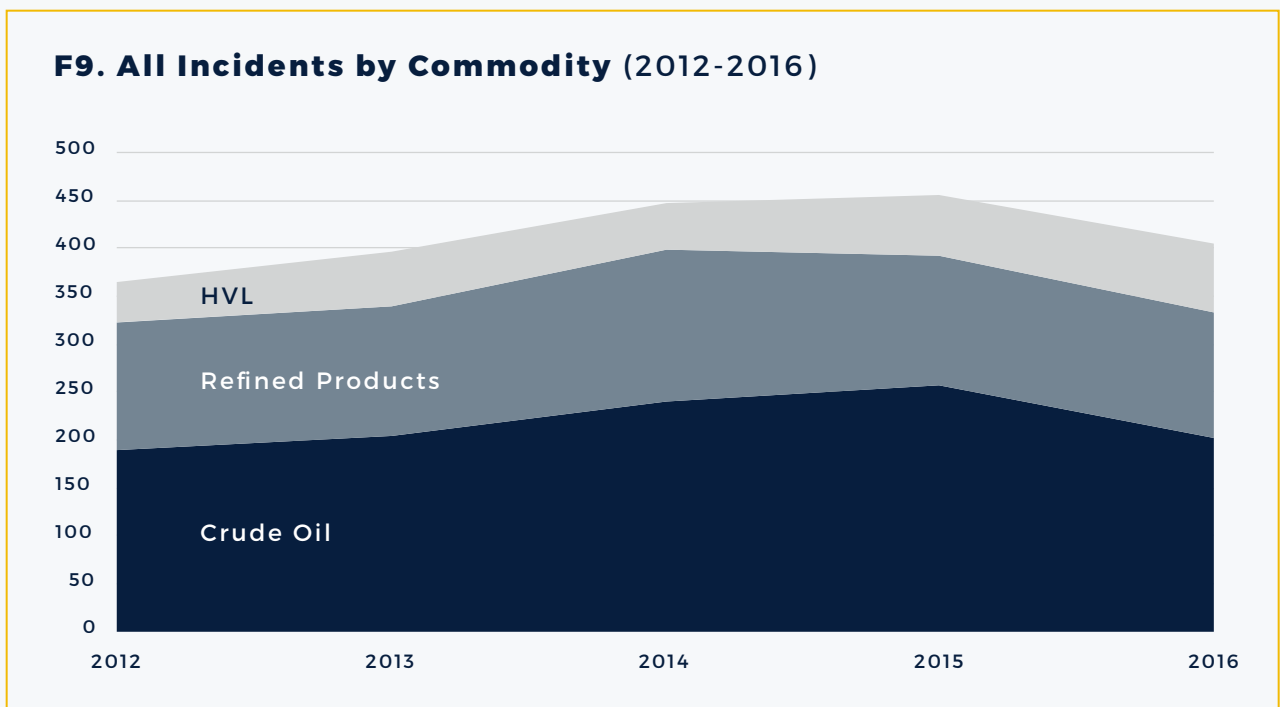
F8. Crude Pipeline Incidents By Size (2012-2016)



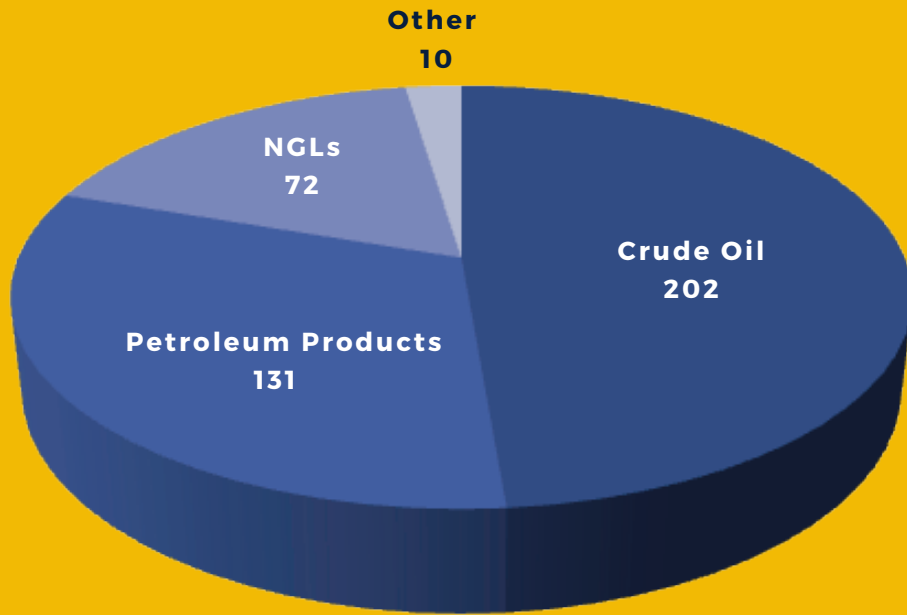
INCIDENTS BY COMMODITY

Crude oil incidents typically make up about half of total liquids pipeline incidents. In 2016, crude oil incidents represented 49% of total incidents and 45% of total barrels released from liquids pipelines. (See Figure 9 and 10)

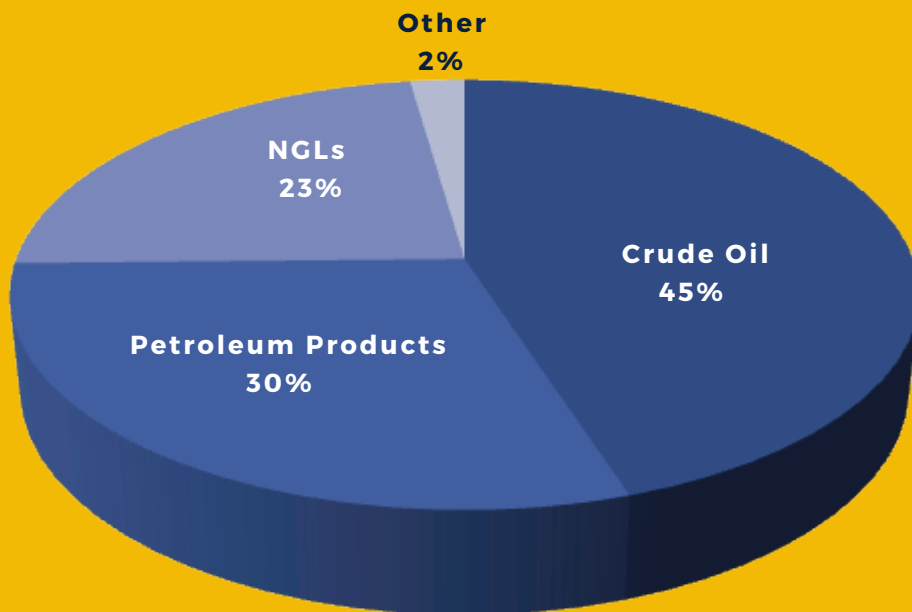
Incidents by commodity reflect overall trends over the last 5 years with an increase from 2012 to 2015 and then a decrease from 2015 to 2016. Crude oil incidents fell by 56 incidents or 22% from 2015 to 2016, driving the overall decline in total incidents over last year. (See Figure 11)



F10. 2016 Incidents by Commodity (2016)



F.11 Percentage of Barrels Released by Commodity (2016)



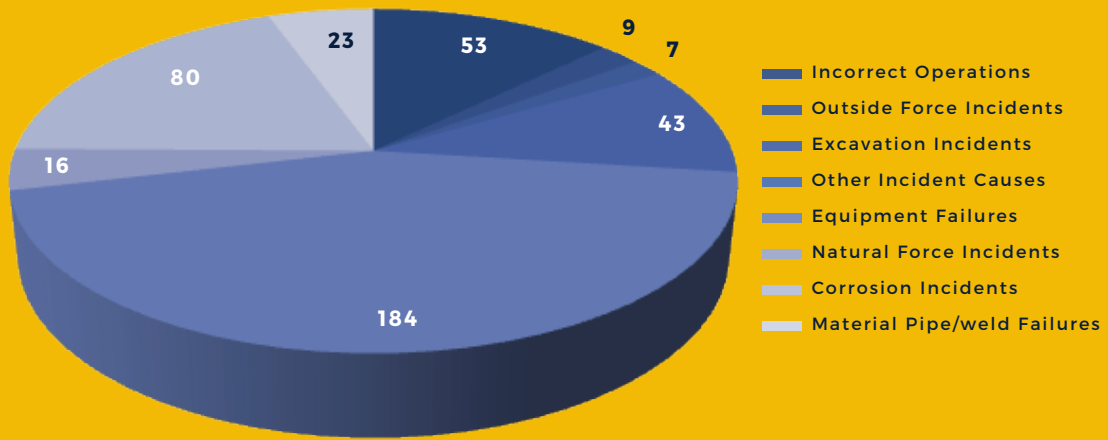


INCIDENTS BY CAUSE

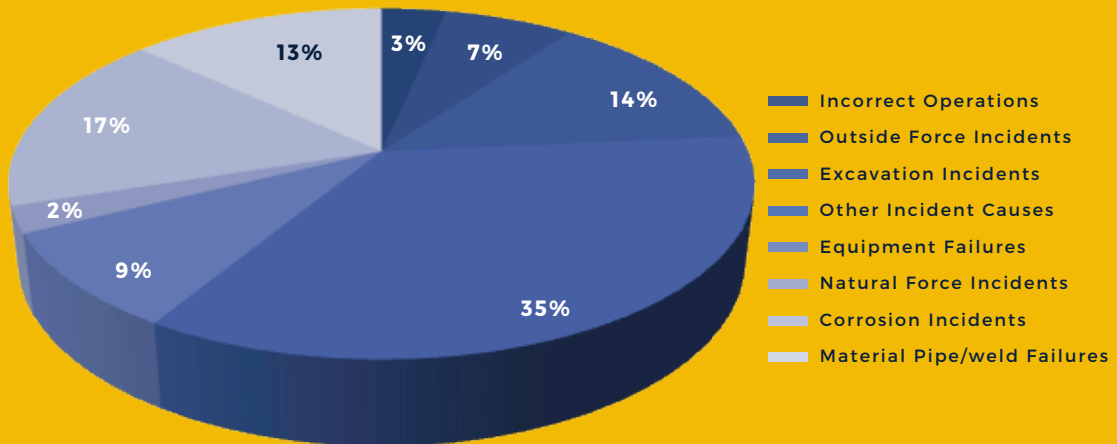
Operations & Maintenance (O&M) failures are the most frequent cause of a pipeline incident. Examples include a valve set to the wrong position or a failure of a pump seal. While these incidents are most frequent, they are also the smallest in barrel size and most often occur within an operator's facility. Integrity Management (IM) incidents, such as corrosion or failures in the pipe metal or weld, are more likely to lead to larger sized incidents in public spaces. Many of the industry-wide safety improvement efforts focus on IM issues to prioritize protecting the public and environment. (See Figure 12 and 13)

Excavation damage occurs when someone, such as a utility contractor, operator maintenance personnel, or farmer, accidentally strikes the pipe. In 2016, there were 7 incidents caused by excavation damage with 3 caused by a third-party, 1 by a second-party contractor of a pipeline operator and 3 by unknown parties in the past. While excavation damage is not as frequent as other liquids pipeline incident causes, it is a major source of personal injury and very preventable. Public awareness programs by operators and public campaigns, such as **Call 811 Before You Dig** seek to prevent excavation damage. (See Figure 14)

F12. Liquids Pipeline Incidents by Cause (2016)

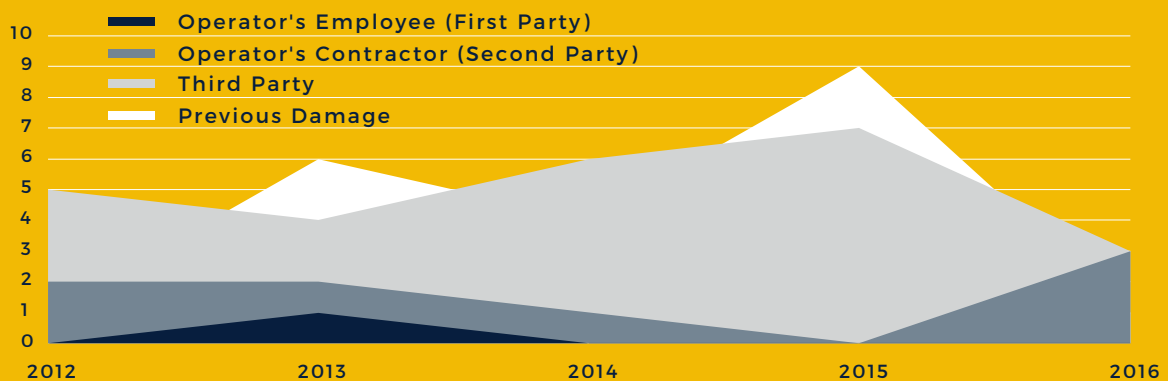


F13. Percentage of Barrels Released by Cause (2016)



F14. EXCAVATION DAMAGE (2012-2016)

Total Incidents



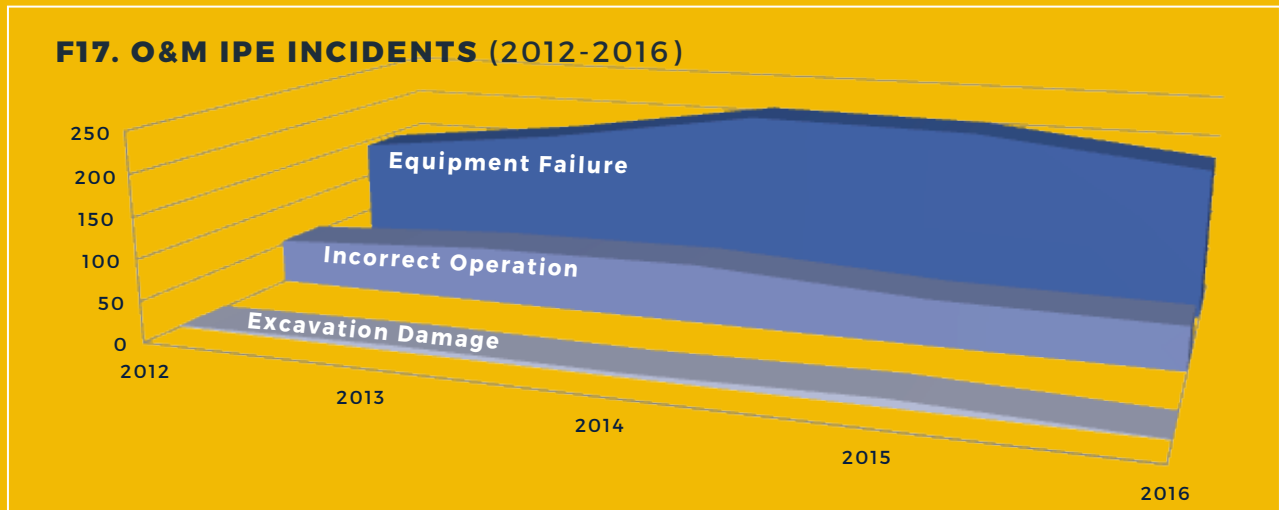
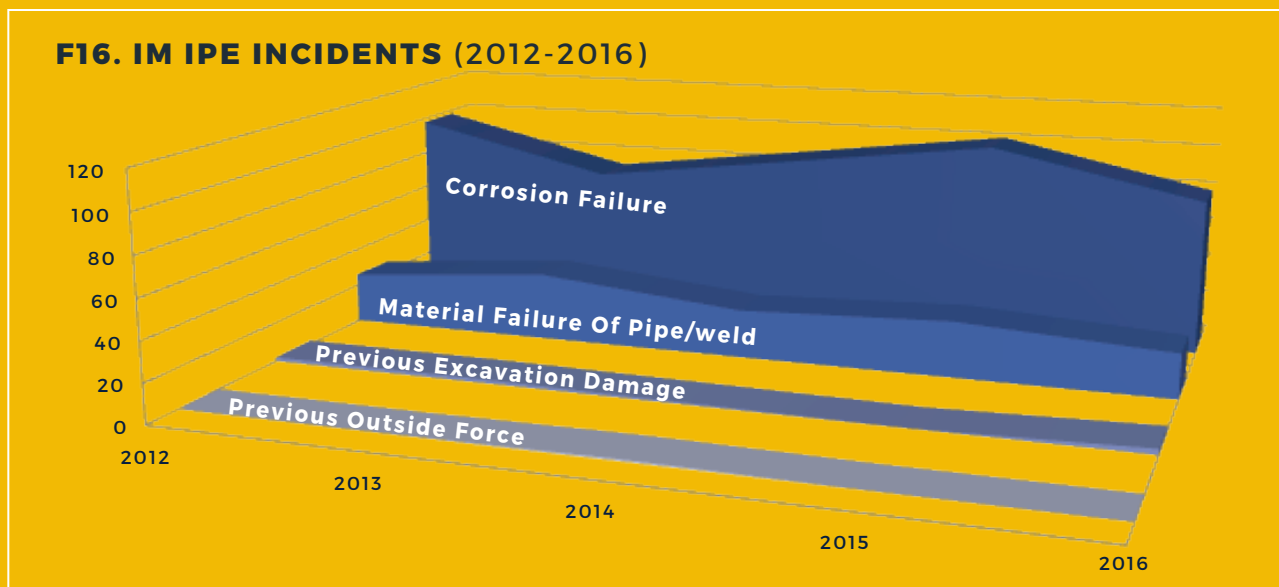
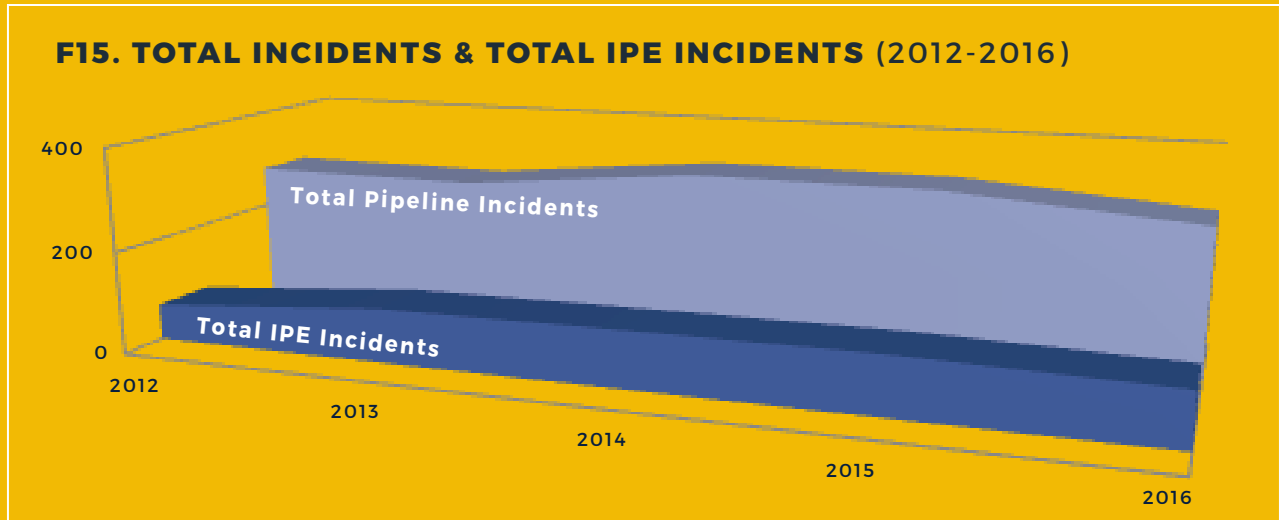
MEANINGFUL METRICS

In 2017, PHMSA began tracking a new category of incidents Impacting the Public or Environment (IPE). Given the array of different data and metrics PHMSA collects, the NTSB recommended PHMSA develop a core set of “meaningful metrics” most reflective of public safety and environmental protection. PHMSA, jointly with industry and pipeline safety advocates, developed IPE incidents to reflect those incidents with the greatest impact on public safety and the environment. IPE incidents include all incidents resulting in personal injury, as well as those in a public space (not within an operator’s facility) over 5 gallons in a HCA and 5 barrels in other public spaces.

IPE incidents designated by PHMSA as meaningful metrics represent approximately 25% of total liquids pipeline incidents each year. Reflecting the trend of all pipeline incidents, IPE incidents are up over the last 5 years, rising from 70 to 104, but down since 2015, falling from 113 to 104 or 8% since last year. (See [Figure 15](#))

PHMSA further organizes IPE incidents into two main categories reflecting the state of the pipe itself and actions by the operator. IM releases are caused by failures of the pipe, such as corrosion, cracking or a failure of the pipe metal or weld. Since 2012, IM releases are down 16%, corrosion caused incidents down 18% and incidents caused by a failure of pipe metal or weld seams down 12%. (See [Figure 16](#))

O&M IPE incidents reflect actions by pipeline operators to manage their pipeline network. Operations activities, such as installing and maintaining equipment and operating the pipeline and its valves, pumps and storage equipment, make up O&M IPE. Total O&M IPE incidents are 18% higher over the last 5 years. Equipment failure in 2016 was 28% higher than 2012, although incorrect operations was 4% lower. Both equipment failure and incorrect operations have declined in the last 2 years with equipment failure IPE incidents down 15% and incorrect operation IPE incidents down 26% since 2014. (See [Figure 17](#))





APPENDIX

PIPELINE

SAFETY

DATA &

DEFINITIONS



MILES OF U.S. PIPELINE (2011-2015)

	2011	2012	2013	2014	2015
Crude oil	56,102	57,464	61,087	66,742	72,439
Petroleum Products	64,141	64,054	63,363	61,762	62,553
Natural Gas Liquids (NGLs)	58,600	59,862	62,769	65,827	67,547
CO ₂ /Ethanol	4,751	4,856	5,211	5,296	5,253
Total Miles	183,594	186,236	192,430	199,627	207,792

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of February 2017.

TOTAL MILES (2015)

Crude	72,439
NGL	67,547
Petroleum Products	62,553
Total Miles	207,792

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of February 2017.

BARRELS DELIVERED BY U.S. PIPELINE (2011-2015)

	2011	2012	2013	2014	2015
Crude oil	7,031,632,001	7,460,710,613	8,324,012,774	9,300,051,343	10,858,317,269
Petroleum Products	6,539,979,731	6,618,479,649	6,684,877,075	6,891,170,199	7,278,500,447
Total	13,571,611,732	14,079,190,262	15,008,889,849	16,191,221,542	18,136,817,716

Source: U.S. Federal Energy Regulatory Commission

TOTAL LIQUIDS PIPELINE INCIDENTS (≥ 5 BBLs 2002-2016)

F1.	YEAR	TOTAL INCIDENTS
	2002	211
	2003	207
	2004	217
	2005	201
	2006	180
	2007	175
	2008	189
	2009	172
	2010	127
	2011	145
	2012	144
	2013	147
	2014	173
	2015	173
	2016	177

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of February 2017

LIQUID PIPELINE INCIDENTS IMPACTING THE PUBLIC OR ENVIRONMENT (IPE) & TOTAL INCIDENTS (≥ 5 BBLs 2002-2016)

F2.	YEAR	TOTAL IPE INCIDENTS	TOTAL NON-IPE INCIDENTS	TOTAL INCIDENTS
	2002	100	111	211
	2003	95	112	207
	2004	114	103	217
	2005	85	116	201
	2006	79	101	180
	2007	84	91	175
	2008	83	106	189
	2009	83	89	172

LIQUID PIPELINE INCIDENTS IMPACTING THE PUBLIC OR ENVIRONMENT (IPE) & TOTAL INCIDENTS (≥5 BBLs 2002-2016)

F2.	YEAR	TOTAL IPE INCIDENTS	TOTAL NON-IPE INCIDENTS	TOTAL INCIDENTS
	2010	72	55	127
	2011	67	78	145
	2012	70	74	144
	2013	105	42	147
	2014	110	63	173
	2015	113	60	173
	2016	104	73	177

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of February 2017.

CRUDE OIL INCIDENTS IMPACTING PUBLIC OR ENVIRONMENT & TOTAL INCIDENTS (≥ 5 BBLs 2002-2016)

F3.	YEAR	CRUDE OIL IPE INCIDENTS	CRUDE OIL NON-IPE INCIDENTS
	2002	46	165
	2003	45	162
	2004	62	155
	2005	51	150
	2006	41	139
	2007	40	135
	2008	33	156
	2009	40	132
	2010	43	84
	2011	32	113
	2012	30	114
	2013	69	78
	2014	69	104
	2015	78	95
	2016	70	107

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of February 2017.

TOTAL LIQUIDS PIPELINE INCIDENTS (2012-2016)

F4.	YEAR	TOTAL INCIDENTS
	2012	366
	2013	401
	2014	454
	2015	462
	2016	415

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of February 2017.

PIPELINE INCIDENTS INSIDE AND OUTSIDE OF OPERATOR FACILITIES (2016)

F5. YEAR	OUTSIDE OPERATOR FACILITY	CONTAINED ON OPERATOR PROPERTY	TOTAL RELEASES	% CONTAINED ON OPERATOR PROPERTY	% OUTSIDE OPERATOR FACILITY
2016	131	284	415	68%	32%

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of February 2017.

PIPELINE INCIDENTS IMPACTING HCAS (2012-2016)

F6.	YEAR	OUTSIDE HCA	INSIDE HCA	TOTAL INCIDENTS
	2012	215	151	366
	2013	244	157	401
	2014	254	200	454
	2015	270	192	462
	2016	254	161	415

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of February 2017.

LIQUID PIPELINE INCIDENTS BY SIZE (2012-2016)

F7. YEAR	≤ 5 BBLs	> 5 and ≤ 50 BBLs	> 50 and ≤ 500 BBLs	> 500 BBLs	TOTAL INCIDENTS
2012	232	69	48	17	366
2013	260	82	40	19	401
2014	296	93	47	18	454
2015	302	83	53	24	462
2016	248	84	58	25	415
% of 2016 Total	54%	18%	13%	5%	-
5 YR Change	7%	22%	21%	47%	13%

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of February 2017.

CRUDE OIL INCIDENTS BY SIZE (2012-2016)

F8. YEAR	≤ 5 BBLs	> 5 and ≤ 50 BBLs	> 50 and ≤ 500 BBLs	> 500 BBLs	TOTAL CRUDE INCIDENTS
2012	118	36	27	8	189
2013	123	49	25	8	205
2014	149	54	31	7	241
2015	164	51	32	11	258
2016	118	41	35	8	202
% of 2016 Total	58%	20%	17%	4%	-
5 YR Change	0%	14%	30%	0%	7%

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of February 2017.

INCIDENTS BY COMMODITY (2012-2016)						
F9. YEAR	CRUDE OIL	REFINED PRODUCTS	HVL	CO₂	BIOFUEL/ ETHANOL	TOTAL INCIDENTS
2012	189	134	41	2	0	366
2013	205	134	57	5	0	401
2014	241	157	50	5	1	454
2015	258	134	63	7	0	462
2016	202	131	72	9	1	415
2016 vs. 2012 % Change	7%	-2%	76%	-	-	13%
2016 vs. 2015 % Change	-22%	-2%	14%	-	-	-10%

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of February 2017.

INCIDENTS BY COMMODITY (2016)					
F10. & F11.	CRUDE OIL	PETROLEUM PRODUCTS	NGL	OTHER	TOTAL
Barrels Released	33979.18	22434.95	17414.86	1709.44	75538.43
Number of Incidents	202	131	72	10	415
Percentage of Barrels Released	45%	30%	23%	2%	-

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of February 2017.

LIQUIDS PIPELINE INCIDENTS BY CAUSE (2016)

F12. & F13.	TOTAL INCIDENTS	BARRELS RELEASED	PERCENTAGE
Incorrect Operations	53	2541.58	3%
Outside Force	9	5037.71	7%
Excavation	7	10197.8	14%
Other Causes	43	26577.63	35%
Equipment Failures	184	6743.63	9%
Natural Force	16	1815.35	2%
Corrosion	80	12635.68	17%
Material Pipe/Weld Failures	23	9989.05	13%

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of February 2017.

EXCAVATION DAMAGE (2012-2016)

F14.	2012	2013	2014	2015	2016	TOTAL INCIDENTS
Operator's Employee (First Party)	0	1	0	0	0	1
Operator's Contractor (Second Party)	1	6	4	9	1	21
Third Party	5	4	6	7	3	25
Previous Damage	2	2	1	0	3	8
Total Annual Incidents	8	13	11	16	7	55

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of February 2017.

TOTAL INCIDENTS & TOTAL IPE INCIDENTS (2012-2016)		
F15. YEAR	Non-IPE	IPE
2012	280	70
2013	278	105
2014	324	110
2015	324	113
2016	290	104

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of February 2017.

IM IPE RELEASES (2012-2016)					
F16. YEAR	CORROSION FAILURE	MATERIAL FAILURE OF PIPE/ WELD	PREVIOUS EXCAVATION DAMAGE	PREVIOUS OUTSIDE FORCE	TOTAL INCIDENTS
2012	98	26	2	0	126
2013	74	35	2	0	111
2014	88	25	1	1	115
2015	102	29	0	0	131
2016	80	23	3	0	106
2016 vs. 2012 % Change	-22%	-21%	-	-	-19%
2016 vs. 2015 % Change	-18%	-12%	-	-	-16%

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of February 2017.

O&M IPE INCIDENTS (2012-2016)

F17. YEAR	EQUIPMENT FAILURE	INCORRECT OPERATION	EXCAVATION DAMAGE	TOTAL INCIDENTS
2012	144	55	2	201
2013	174	69	7	250
2014	216	72	5	293
2015	212	56	10	278
2016	184	53	1	238
2016 vs. 2012 % Change	-13%	-5%	-	-
2016 vs. 2015 % Change	28%	-4%	-	-

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety as of February 2017.



DEFINITIONS & NOTES

Barrels

One barrel of crude oil or petroleum products contains 42 gallons.

Barrels Released

Pipeline operators report to PHMSA the number of barrels released unintentionally during each pipeline incident. 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, called “blowdown,” vents the gas product 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 or to other commercial, agricultural or residential uses (propane).

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 on-line database.

Pipeline Performance Tracking System

The liquids pipeline industry tracks pipeline safety performance internally through the Pipeline Performance Tracking System (PPTS) maintained by the American Petroleum Institute. Created in 1999, PPTS allows the pipeline industry to know the state of the overall pipeline system, analyze emerging trends, and focus its resources on the issues most important to improving pipeline system. Consistent reporting of pipeline incident data since 1999 makes PPTS an important source of long-term pipeline safety trends.

API Recommend Practice (RP)

RPs are documents that communicate proven industry practices and may include both mandatory and non-mandatory provisions.



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