



Pipeline Safety Excellence™



2015

# API - AOPL ANNUAL LIQUIDS PIPELINE SAFETY PERFORMANCE REPORT & STRATEGIC PLAN



energy **API**



**AOPL**®  
Association of Oil Pipe Lines

**ASSOCIATION OF OIL PIPE LINES (AOPL)**

represents liquid 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.

**AMERICAN PETROLEUM INSTITUTE (API)**

is the only national trade association that represents all aspects of America's oil and natural gas industry.



## A Letter from America's Liquids Pipeline Leadership

February 2015

Dear Reader,

Pipelines continue their record as one of the safest modes of energy transportation, delivering safely to their destinations more than 99.999% of the barrels of crude oil and petroleum products transported by pipeline in 2013. While this level of performance is a huge accomplishment, pipeline operators are not satisfied to stop there. Indeed, a core value of the liquids pipeline industry is continuous improvement - always searching for ways to do better, improve performance, and operate safer.

Continuous improvement is not only a way of operating, but also a necessity because pipeline operators hold the industry-wide goal of zero incidents. While we may operate our liquids pipelines at a 99.999% industry-wide safety rate, our ultimate goal is 100%. We acknowledge it is hard for any industry to never have an incident, but by striving for zero pipeline incidents we continue our mission of pipeline safety excellence. That is why in 2014 liquids pipeline operators launched the *Pipeline Safety Excellence*<sup>TM</sup> initiative. It reflects the shared industry-wide values and commitment we have to building and operating safe pipelines. In addition to embracing industry-wide safety goals, undertaking industry-wide safety improvement efforts, and annually reporting our industry-wide safety performance, the *Pipeline Safety Excellence*<sup>TM</sup> initiative includes an annual strategic plan to improve pipeline safety performance.

Strategic planning to improve pipeline safety is important to build on the success we have had improving pipeline safety to date. Since 1999, pipeline operators have reduced corrosion caused incidents by 76%, third party damage by 78% and the overall number of pipeline releases by 50%. The causes of remaining infrequent pipeline incidents are more complex, caused by more subtle, interrelated reasons, and thus require a more strategic, industry-wide effort.

In 2014, pipeline operators developed the first industry-wide strategic plan for pipeline safety performance improvement with four goals: 1) improve inspection technologies, 2) enhance threat identification & response, 3) expand safety culture & management practices, and 4) boost response capabilities. This effort produced exciting new research and development results on the capabilities of in-line "smart pig" inspection technology, industry-wide recommended practices for managing pipeline cracking, detecting leaks, responding to emergencies and managing pipeline safety systematically.

In 2015, pipeline operators are improving pipeline safety with new strategic initiatives to improve pipeline construction management and determine the appropriate uses of hydrostatic pipeline pressure. Strategic initiatives in 2015 also include implementation of recommended practices developed in 2014, completing and building upon the work of several initiatives begun in 2014. In all cases, the strategic initiatives reflect the top industry-wide efforts to improve pipeline safety performance.

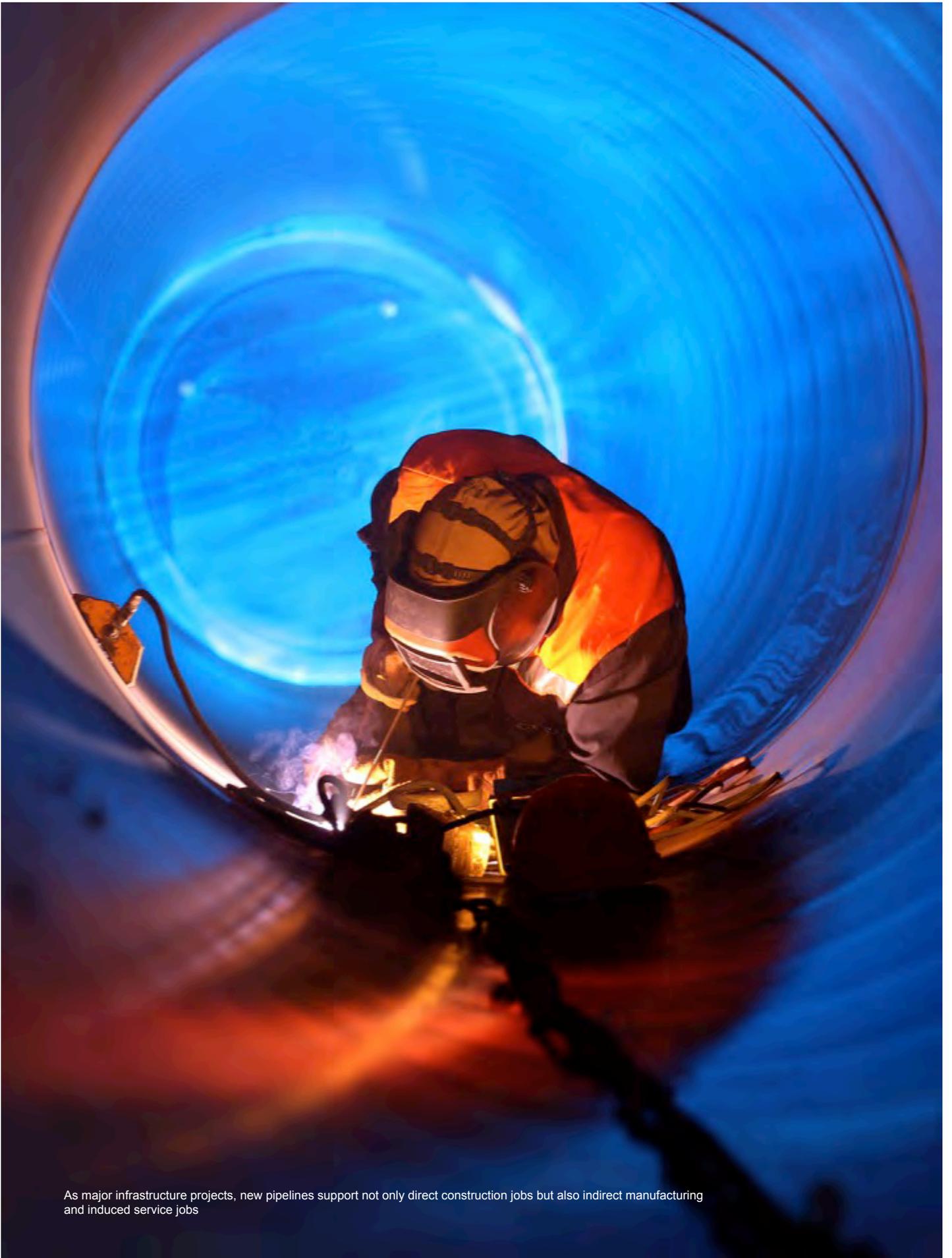
Sincerely,

A handwritten signature in blue ink that reads "Andrew J. Black".

Andrew J. Black  
AOPL President & CEO

A handwritten signature in blue ink that reads "Peter T. Lidiak".

Peter T. Lidiak  
API Pipeline Director



As major infrastructure projects, new pipelines support not only direct construction jobs but also indirect manufacturing and induced service jobs

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New pipelines undergo rigorous inspections before entering service

# LIQUIDS PIPELINE INDUSTRY PERFORMANCE SUMMARY

99.999%

In 2013, crude oil and petroleum products reached their destination safely by pipeline more than 99.999% of the time

-50%

Liquids pipeline releases along pipeline rights of way are down 50% from 1999 to 2013

\$2.1 Billion

Liquids pipeline operators spent more than \$2.1 billion on integrity management in 2013 evaluating, inspecting and maintaining their pipeline infrastructure

-76%

Corrosion as a cause of releases from liquids pipelines is down 76% from 1999 to 2013

-78%

Third-party caused damage to liquids pipelines is down 78% from 1999 to 2013

14.9 Billion

Liquids pipeline operators delivered 14.9 billion barrels of crude oil and petroleum products by interstate pipeline in 2013

192,396

Liquids pipeline operators operated 192,396 miles of pipeline in 2013 including 60,911 miles of crude oil, 63,532 miles of petroleum product, and 62,742 miles of natural gas liquids pipelines

47,089

Liquids pipeline operators inspected 47,089 miles of their pipelines with "smart-pig" in-line inspection tools in 2013

134

There were 134 releases in 2013 from onshore transmission liquids pipelines along pipeline rights of way

108,032

In 2013, 108,032 barrels of crude or petroleum product were released from onshore liquids pipelines along pipeline rights of way

55%

In 2013, incidents caused by natural or outside forces (lightening strike & landslide) or 3<sup>rd</sup> party excavation damage resulted in 55% of volumes released



## Pipeline Safety Excellence™ Initiative

Launched in 2014, the Pipeline Safety Excellence™ initiative is the U.S. liquid pipeline industry's pipeline safety performance improvement initiative. It reflects the shared values and commitment of pipeline operators to building and operating safe pipelines. It builds upon our industry safety programs in place since 2000. Summarized below and described in more detail in successive sections, the Pipeline Safety Excellence™ initiative includes:

### 1 Shared Pipeline Safety Principles

AOPL and API pipeline members embrace these industry-wide pipeline safety principles:

- Zero Incidents
- A Culture of Safety
- Learn from Experience
- Organization-Wide Commitment
- Continuous Improvement
- Safety Systems for Success
- Employ Technology
- Communicate with Stakeholders

### 2 Continuous Industry-Wide Safety Efforts

Industry-wide groups improving pipeline safety performance:

**Pipeline Safety Excellence Steering Committee** – pipeline operator executives guiding and ensuring pipeline safety performance achievement

**Performance Excellence Team** – pipeline operator senior managers sharing safety improvement techniques and advancing data management, safety culture and damage prevention initiatives

**Pipeline Integrity Work Group** – pipeline integrity managers pursuing advances in pipeline integrity management and developing industry-wide consensus recommended pipeline integrity practices

**Operations & Technical Group** – pipeline operations and engineering managers overseeing industry-wide pipeline recommended practices and coordination of research & development activities



## The Pipeline Safety Excellence™ initiative reflects the shared values and commitment of pipeline operators to building and operating safe pipelines

**Cybernetics Group** – pipeline control systems managers sharing advances and lessons learned about leak detection technology and pipeline control systems

**Public Awareness Group** – pipeline community outreach managers improving programs to raise public awareness of local pipelines and “call before you dig” programs

**Operator Qualification Work Group** – pipeline managers ensuring operator qualification practices meet requirements and contribute to safe operations and operating culture

**Environment, Health & Safety Group (EH&SG)** – pipeline managers promoting environment, health and personal safety issues within pipeline operators.

**Leadership Teams** – pipeline managers and subject matter experts pursuing targeted initiatives to improve safety priorities, such as emergency response capabilities and research and development

### 3 Annual Pipeline Safety Performance Reporting

Pipeline operators will annually measure and report industry-wide safety spending and performance to the public.

### 4 Annual Pipeline Safety Strategic Plan

Pipeline operators will annually develop a pipeline safety strategic plan guiding industry-wide efforts to improve pipeline safety over the coming year.

# North America's Energy Production Renaissance



- The United States and North America are in the midst of an energy production renaissance. Technologies such as horizontal drilling and hydraulic fracturing are yielding new supplies of crude oil and natural gas liquids
- According to the U.S. Energy Information Administration (EIA), U.S. crude oil production has grown by 3 million barrels per day (MMbbl/d) since January 2011<sup>1</sup>
- EIA projects U.S. crude oil production will grow 3.1 MMbbl/d to reach 9.6 MMbbl/d in 2019, approximately the U.S. historical high of 1970. Total production of crude oil and other petroleum liquids will grow from 11.1 MMbbl/d in 2012 to 14.6 MMbbl/d in 2019<sup>2</sup>
- North Dakota and Texas now provide nearly half of U.S. crude oil production, due mainly to horizontal drilling and hydraulic fracturing of shale and other tight formations. This spring, North Dakota production broke 1.0 MMbbl/d, nearly tripling its production in the last three years. Texas production in April 2014 passed 3.0MMbbl/d, more than doubling its production levels three years ago<sup>3</sup>
- Canadian crude oil production is expected to grow from 3.5 MMbbl/d in 2013 to 6.4 MMbbl/d in 2030, with 2.9 MMbbl/d of that increase coming from oil sands deposits<sup>4</sup>
- Delivering the benefits of this new North American energy production to U.S. workers and consumers is a challenge pipeline operators are embracing with increased pipeline mileage and delivery volumes

# 1 Shared Pipeline Safety Principles



These safety principles reflect the shared commitment of pipeline operators to safety. They represent not only aspirational goals all operators strive toward, such as zero incidents, but also everyday ways of doing business that promote continuous improvement and excellent safety performance:

**ZERO INCIDENTS** – Only with a goal of zero safety incidents can we minimize accidents. Pipeline operators believe that every incident is preventable and work to that high standard.

**ORGANIZATION-WIDE COMMITMENT** – Not only do senior leaders of pipeline companies value safety, but safety is emphasized at every level of the organization from employees who accept personal responsibility for safety to front-line managers who are vital to reinforcing a safety culture and implementing continuous improvement.

**A CULTURE OF SAFETY** – Pipeline operators embrace the need to provide a workplace culture where safety is an enduring value that all employees share, act upon, learn from, are rewarded for and judged upon.

**CONTINUOUS IMPROVEMENT** – Pipeline operators believe that no matter how safe they already are, they can always improve safety. Vision, commitment, culture, and systems are necessary to improve safety continuously.

**LEARN FROM EXPERIENCE** – Pipeline operators learn how they can improve safety from their own experiences, and by sharing lessons learned with and from other pipeline operators.

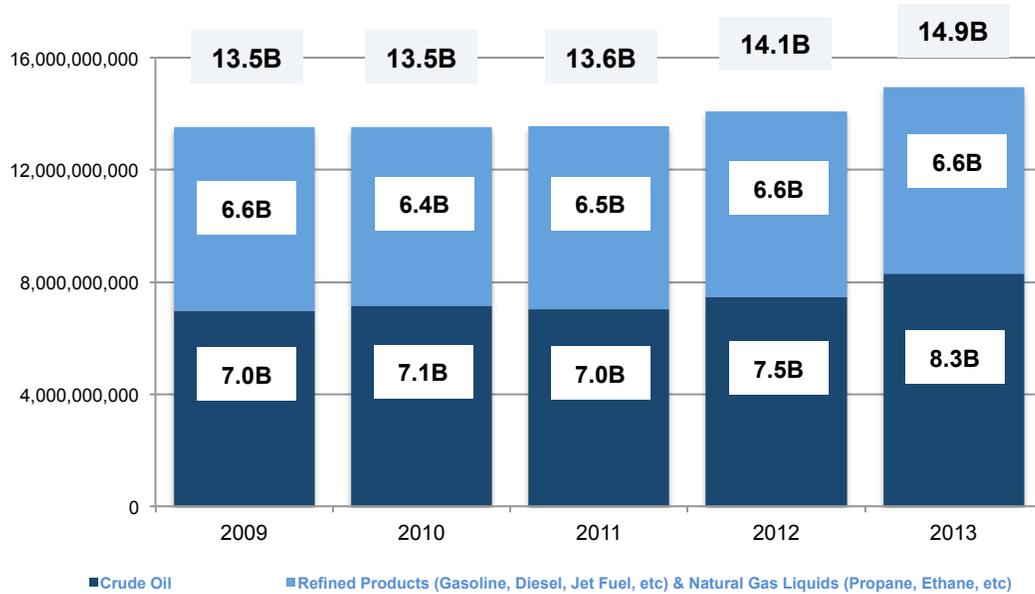
**SYSTEMS FOR SUCCESS** – Safety management systems demonstrate that safety efforts are succeeding by measuring performance, tracking changes and confirming improvements.

**EMPLOY TECHNOLOGY** – From in-line inspections with diagnostic robots traveling inside pipelines called “smart pigs” to innovative ways to interpret integrity data, operators constantly research and develop new ways to maximize safety.

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

# Liquid Pipelines Transported Nearly 15 Billion Barrels of Crude Oil and Petroleum Products in 2013

Barrels of Crude Oil & Petroleum Products Delivered by U.S. Transmission Pipeline



Source: AOPL compiled operator filings to the U.S. Federal Energy Regulatory Commission

- In 2013, transmission liquids pipelines delivered 8.306 billion barrels of crude oil, an 11.3% increase over 2012<sup>5</sup>
- In 2013, transmission liquids pipelines delivered 6.642 billion barrels of petroleum products such as refined products (gasoline, diesel, jet fuel, etc) and natural gas liquids (propane, ethane, butane, etc), a 0.4% increase over 2012
- In total, transmission pipelines delivered 14.948 billion barrels of crude oil and petroleum products in 2013, a 6.2% increase over 2012
- Over the 5 years from 2009 to 2013, transmission pipeline deliveries of crude oil rose 1.351 billion barrels, a 19.4% increase
- During the same 5 year time period, other petroleum products delivered by transmission pipeline increased 80.8 million barrels, or 1.2%
- Transmission pipelines include interstate pipelines or large intrastate, main- or trunk-line pipelines

## 2 Industry-Wide Pipeline Safety Teams

Liquids pipeline operators, through their membership in AOPL and API, participate in a host of ongoing industry-wide safety performance teams. Operators send their leadership, designate their staff and set aside time from their every-day duties to advance safety initiatives across the industry. Participants spend countless hours developing new pipeline safety standards, sharing safety learnings, and building safety programs, capacities and understandings for the benefit of all members.

Many industry-wide pipeline safety groups are long-standing, focusing on constant issue areas of operations or pipeline integrity. Others are recently created as result of new areas of emphasis or recommendations from safety investigators, regulators and from industry experience. Industry is constantly reviewing the work of these safety groups, assessing their progress and ensuring areas of highest priority are receiving the resources and personnel they demand. The following industry-wide safety groups pursued pipeline safety performance improvement goals:

### PIPELINE SAFETY EXCELLENCE (PSE) STEERING COMMITTEE

The PSE Steering Committee is a group of pipeline executives ensuring progress on industry-wide safety performance improvement initiatives. Each executive serves as a “champion” on one of the industry’s strategic initiatives supporting work on that initiative, facilitating additional resources if appropriate, keeping the PSE Steering Committee informed on initiative progress, and raising issues needing resolution with the broader group. In 2014, the PSE Steering Committee oversaw API-AOPL strategic initiatives to improve inspection technologies, enhance pipeline threat identification and response, expand safety culture and management practices, and boost response capabilities. The PSE Steering Committee will continue this executive leadership and oversight role in 2015.

### PERFORMANCE EXCELLENCE TEAM (PET)

The PET brings together senior managers from across industry to exchange the latest information on pipeline safety. PET members also engage in three standing subteams focusing on pipeline performance data management, pipeline damage prevention and safety culture. In 2014, PET led the pipeline industry’s annual industry-wide pipeline safety performance strategic planning process. In 2015, in addition to its strategic planning process role, PET will lead two 2015 Strategic Initiatives to *Implement the New API Recommended Practice on Pipeline Safety Management Systems* and also *Foster Pipeline Safety Culture with an Industry-Wide Sharing, Learning and Improvement Program*.

### PIPELINE INTEGRITY WORK GROUP (PIWG) -

The PIWG is an API led group of industry managers with responsibility for ensuring the integrity of the pipelines at their companies. They oversee programs to evaluate, inspect and perform maintenance on their systems. As part of PIWG, they share learnings and best practices to improve pipeline integrity. PIWG recently completed an update to the industry-wide standard for managing integrity of pipelines. In 2014, PIWG led two 2014 Strategic Initiatives to *Develop an API Recommended Practice (RP) on Crack Detection, Analysis and Response with an Emphasis on Seam-Related Cracks*, as well as *Develop Industry-Wide Guidance on Implementing Threat Data Integration Programs and Activities*.



Pipelines deliver gasoline and diesel fuel from refineries to cities across America

In 2015, PIWG will complete its RP development activities from 2014 and then lead three 2015 Strategic Initiatives to *Implement New API Recommended Practice on Crack Detection, Analysis and Response*, *Implement New Industry-Wide Guidance on Integrating Pipeline Threat Data*, and *Develop Industry-Wide Guidance on the Appropriate Use of Hydrotesting to Ensure Pipeline Safety*.

**OPERATIONS & TECHNICAL GROUP (OTG)** - The OTG is an API led group of industry managers with responsibility for pipeline operations and engineering. They meet regularly to share operating experiences and best practices. Each year, OTG hosts an industry-wide Pipeline Information eXchange to share information on incidents or near misses that yielded learnings and improvements in pipeline safety. OTG also facilitates the consideration and adoption of industry-wide operations and safety standards.

**CYBERNETICS WORK GROUP** – Cybernetics is an API led group of operations managers responsible for leak detection technology and control room systems. In 2014, Cybernetics undertook the 2014 Strategic Initiative to *Develop an API Recommended Practice for Leak Detection Program Management*. In 2015, the group will complete development of the RP and API 1149 technical report, and undertake the 2015 Strategic Initiative to *Implement the New API Recommended Practice for Pipeline Leak Detection Program Management*.

**PUBLIC AWARENESS GROUP (PAG)** – PAG is an API led group of community outreach managers working together to improve programs to raise public awareness of local pipelines and “call before you dig” programs.

**OPERATOR QUALIFICATION WORK GROUP (OQ)** – OQ is an API led group that ensures operator qualification practices meet regulatory requirements that contribute to safe operations and a safe operating culture.

**ENVIRONMENT, HEALTH & SAFETY GROUP (EH&SG)** – EH&SG is an API led group that promotes environment, health and personal safety issues within pipeline operators.

99.999%

Crude oil and petroleum products have a 99.999% chance of reaching their destination safely by pipeline

47,089

Liquids pipeline miles inspected with “smart pig” in-line inspection tools last year

-50%

Liquids pipeline incidents are down 50% since 1999

**PIPELINE SAFETY LEADERSHIP TEAMS** - In 2011, the executive leadership of the liquids pipeline industry launched several industry-wide teams to address specific safety performance issues. In 2012, they created an additional team to address emergency response. The groups take on special projects that are time sensitive or meet a specific program need.

**Research and Development/Enhanced Technology Team** – Coordinates industry efforts to research new in-line inspection capabilities to detect cracking and dents in pipes, in-line inspection data analysis and diagnosis, leak detection and enhanced excavation damage prevention technologies. Works in partnership with pipeline operators who are members of the Pipeline Research Council International research consortium of operators and technology providers conducting research and development projects on behalf of their members.

**Sharing Safety Practices and Lessons Learned Team** – Promotes wider dissemination of internal industry learnings to members through safety performance lesson forums and sessions. In 2014, the team worked with the Safety Culture subteam of PET on the 2014 Strategic Initiative to *Foster Pipeline Safety Culture with an Industry-Wide Sharing, Learning and Improvement Program*. Work on this initiative will continue in 2015.

**Damage Prevention Team** – Develops and promotes model One-Call provisions, advocates for strong damage prevention laws and enforcement, engages directly with excavator groups, and develops public education programs with other stakeholders.

**Emergency Response Team (ERT)** – Undertakes initiatives to improve operator and first responder emergency response capabilities. In 2014, the team launched a free, online training portal for first responders to gain specific pipeline emergency training at no cost to first responders. ERT twice convened an advisory board of first responder, law enforcement and emergency response leaders to provide input and guidance on ERT goals and initiatives. In June, ERT hosted the first annual Pipeline Safety Forum of pipeline operator emergency response personnel and federal, state and local first responders to share experiences and learnings. Also in 2014, ERT began development of an API Recommended Practice on Emergency Planning and Response. All of these activities together make up the Strategic Initiative to *Deploy a Nation-Wide Pipeline Emergency Response Training, Outreach & Standards Program*, which will continue in 2015.

>\$2.1 billion

Operators spent evaluating, inspecting and maintaining their pipelines and facilities in 2013

-76%

Drop in corrosion caused incidents since 1999

-78%

Drop in 3<sup>rd</sup> party excavation damage caused incidents in 1999

# Pipeline Operators Are Boosting Local Emergency Response Capabilities



## Listening

Pipeline operators seek advice on priorities and strategies from state and local first responder leadership through the Emergency Response Advisory Board

## Sharing

Pipeline operators and first responders share their experiences on lessons learned from past incidents and areas for improvement at the annual Pipeline Emergency Response Forum

## Assisting

Pipeline operators are providing first responders training on pipeline-specific emergency response through a free online training portal developed with the National Association of State Fire Marshalls

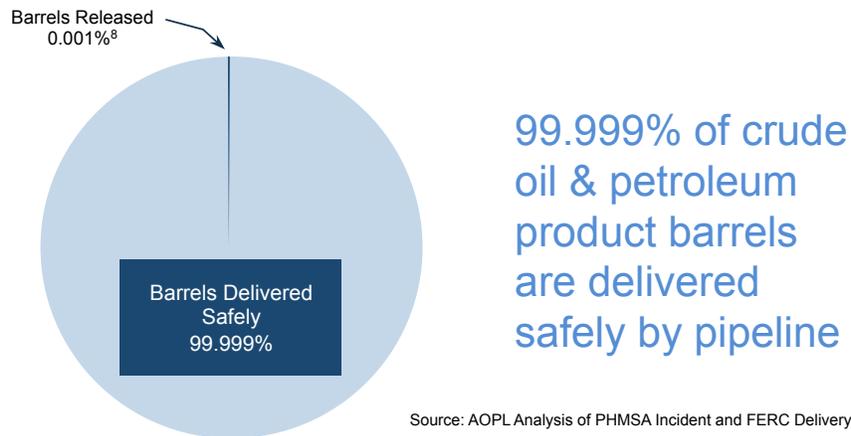
## Improving

Pipeline operators are improving their own emergency planning and response practices through regular emergency drills with operator personnel and first responders and a new industry-wide emergency response recommended practice

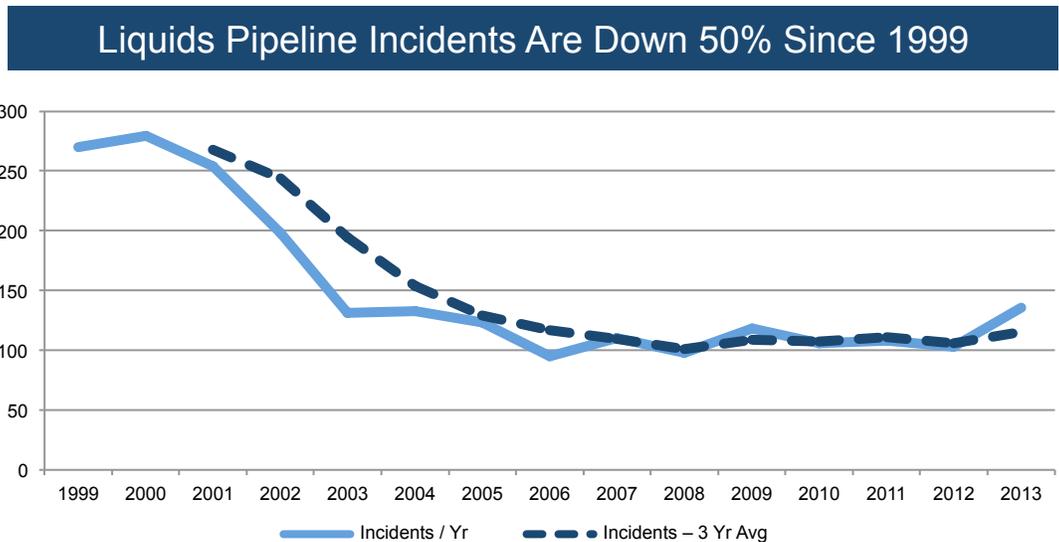
For more information visit: <http://www.aopl.org/safety/first-responder-pipeline-training/>

# 3 Pipeline Safety Performance Results

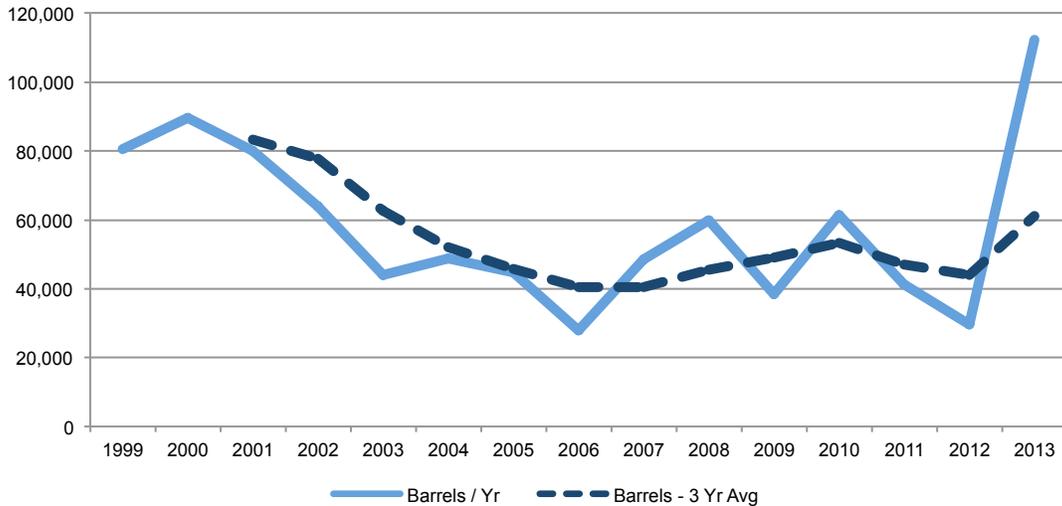
Pipelines are one of the safest ways to transport energy. In 2013, 99.9992% of crude oil and petroleum product barrels delivered by transmission pipeline arrived at their destination safely.<sup>6</sup> Over the last 5 years, crude oil and petroleum product transmission pipelines have delivered their barrels safely at or above 99.999% of the time.<sup>7</sup>



Pipeline safety has improved over time. In 2013, releases from liquids pipelines were down 50% since 1999.<sup>9</sup> These and several of the numbers which follow where noted are derived from the API Pipeline Performance Tracking System (PPTS). PPTS analysis focuses on onshore releases along the pipeline right-of-way, where pipelines come into contact with the public and environment.<sup>10</sup> Pipeline operators track this number as the most effective way to measure protection of the public and environment. Use of PPTS also ensures a consistent data set over time (versus the PHMSA data collection criteria, which changed substantially in 2002<sup>11</sup>). Data from 2013 is the most recent available. Data from 2014 is undergoing quality control checks and as with PHMSA data will start becoming available in the summer.



## Liquids Pipeline Barrels Released

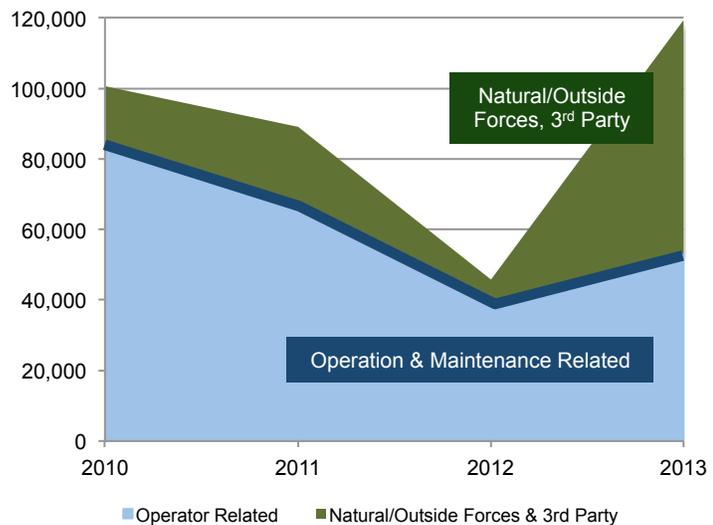


Source: Pipeline Right of Way Incidents, API Pipeline Performance Tracking System

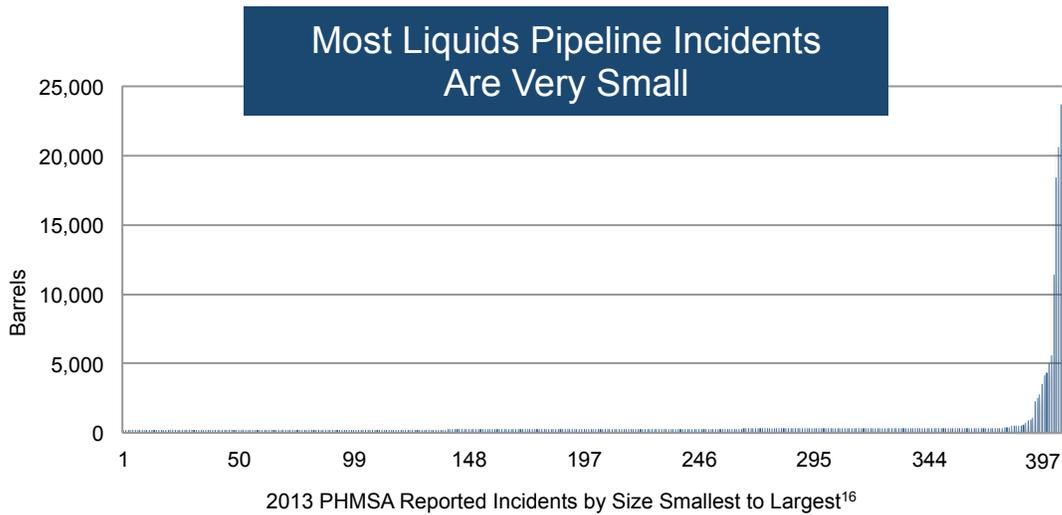
In 2013, barrels released from liquids pipelines were down 27% since 2001 when comparing three year averages, but up 40% on a year-to-year basis.<sup>12</sup> Examining individual years shows barrels released in 2012 were down 63% from 2001 before rising in 2013 to 40% above 2001 levels.<sup>13</sup> Comparison of three year averages allows analysis beyond one-time factors causing a spike up or down in individual years.

Further analysis of the specific incidents in 2013 revealed 55% of the volume released was from incidents caused by outside forces.<sup>14</sup> Examples include natural forces (lightning strike: Mountrail, ND - 20,600 bbl, landslides: Wetzel, WV - 11,405 bbl), outside forces (3<sup>rd</sup> party barge strike: Lafourche, LA - 23,702 bbl) and 3<sup>rd</sup> party excavation damage (Midland, TX - 4,153 bbl).<sup>15</sup> Such outside force or natural damage incidents averaged only 19% of volumes released in the previous three years.

**55% of Barrels Released in 2013 Caused by 3<sup>rd</sup> Parties or Natural / Outside Forces**



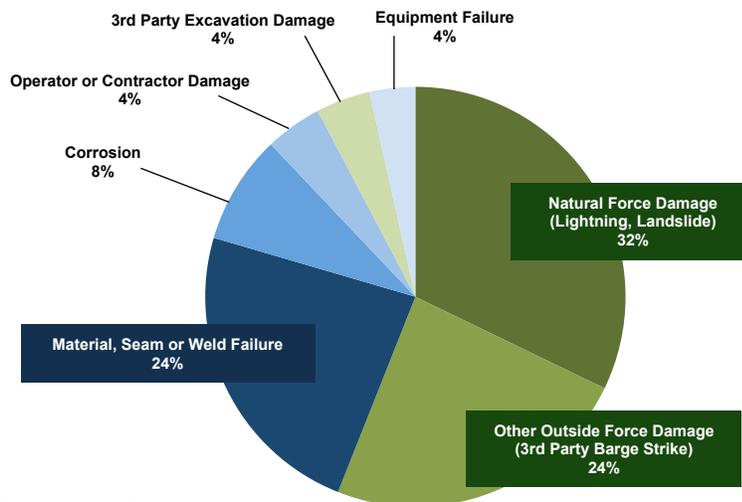
Source: PHMSA Pipeline Incidents Database



Analysis of the 397 pipeline incidents reported to PHMSA in 2013 shows most all were very small releases. As seen above, nearly 140 or 35% of releases in 2013 were smaller than 1 barrel, over 260 or two-thirds of releases in 2013 were 5 barrels or smaller, nearly 350 or 88% of the pipeline releases in 2013 were 100 barrels or smaller and only 20 releases were larger than 500 barrels.<sup>17</sup>

The pie chart below examines the causes of the ten largest pipeline releases in 2013.<sup>18</sup> The largest two causes of large releases in 2013 were natural or outside forces such as lightning strike, landslide, or 3<sup>rd</sup> party barge strike. The large spike in such incidents in 2013 compared to previous years is highlighted in the charts on the previous page. Material, seam or weld failure was the third largest cause and the highest operations or maintenance-related cause of a pipeline failure.

### Causes of Top 10 Liquids Pipeline Releases in 2013



Source: PHMSA Pipeline Incidents Database

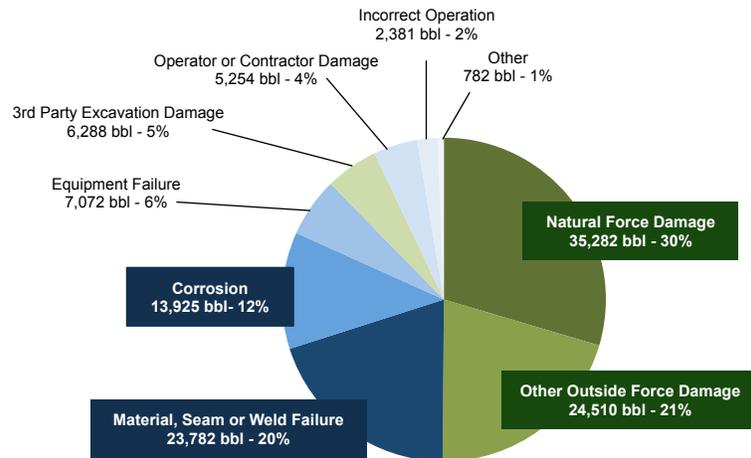
## Integrity Management Programs Protect Pipelines



Pipeline operators employ continuous programs of evaluation, inspection and maintenance of their pipelines to find and fix issues before they become larger problems.

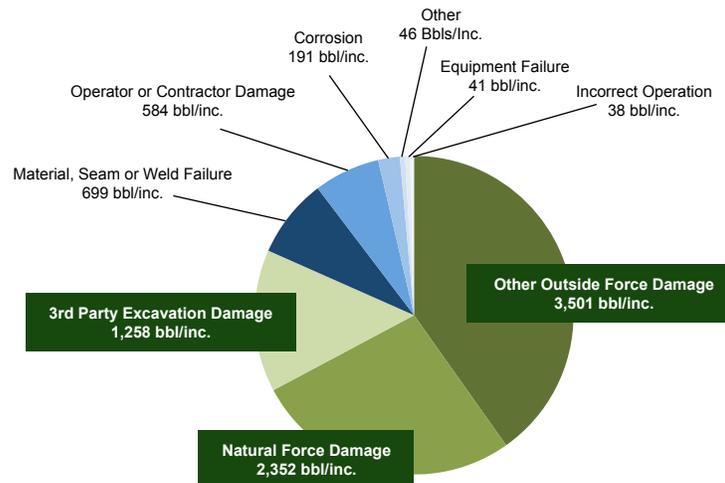
### 2013 Pipeline Incident Causes by Barrels<sup>19</sup>

Natural force damage and other outside force damage were the top two causes of pipeline incidents with material, seam or weld failure and corrosion ranking third and fourth. Material, seam or weld failure was the highest operator-related liquids pipeline release cause by barrels released.



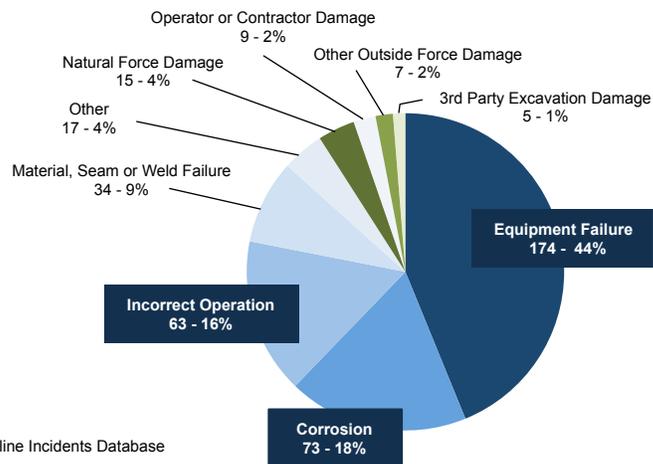
### 2013 Pipeline Incident Causes by Barrels per Incident<sup>20</sup>

Reflecting the causes of the largest releases in 2013, other outside force and natural force damage ranked as the highest causes by barrels per incident. Third party excavation damage ranked 6<sup>th</sup> in barrels released and 9<sup>th</sup> in number of incidents, but those few releases placed it 3<sup>rd</sup> in barrels per incident. Material, seam or weld failures released the most operation & maintenance-related barrels per incident.



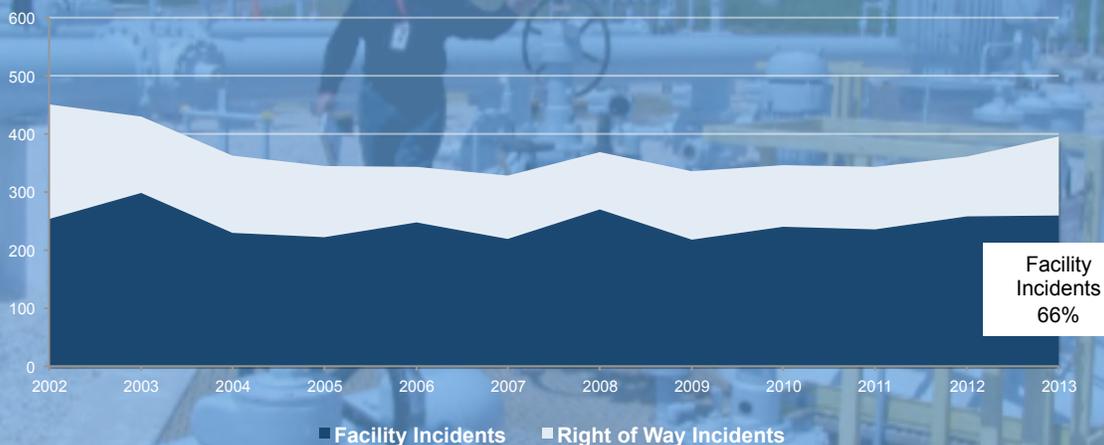
### 2013 Pipeline Incident Causes by Number of Incidents<sup>21</sup>

The most frequent causes of a liquids pipeline incident in 2013 were equipment failure, corrosion and incorrect operation. However, when measured by barrels per incident, each of these causes reflected relatively smaller incidents.



Source: PHMSA Pipeline Incidents Database

## Most Liquids Pipeline Incidents Are Inside Operator Facilities, with Lower Impact on the Public or the Environment



Source: Comparison of PPTS Pipeline Right of Way Incidents and PHMSA Total Pipeline Incidents

In 2013, approximately two-thirds of liquids pipeline incidents reported to PHMSA were inside operator facilities, such as pump stations or storage locations.<sup>22</sup> Pipeline operators place pumping facilities typically every 35 to 50 miles along a pipeline route to pump product through the pipeline. Storage locations, such as tank farms, most often are located at the beginning, junction point or end of a pipeline. These facilities are almost always fenced in with limited access to the public and include additional containment features to prevent release outside of the facility.

Incidents at facilities are usually smaller in size, involving leaks from pumps, valves or other equipment, not a large rupture in a pipeline. A facility release reported to PHMSA can be as small as 5 gallons or 1/8<sup>th</sup> of a barrel. Indeed, analysis on previous pages showed one-third of releases in 2013 under 1 barrel and two-thirds of releases at 5 barrels or less. Thus, the public is less likely to be impacted by facility releases because their smaller size, isolation from the public and additional containment. Nevertheless, operators do track and act to prevent and minimize facility releases through better training, maintenance and procedures.

While fewer in number, operators place an emphasis on incidents which could impact the public or environment. The PPTS database tracks pipeline incidents along the public "right of way." These are the cleared pathways pipelines travel, primarily underground, through public areas from facility to facility. Focusing on right of way incidents allows operators to analyze and develop strategies against the types of incidents with the greatest potential to impact the public or environment.

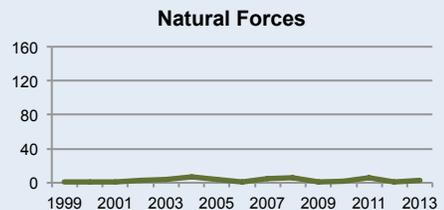
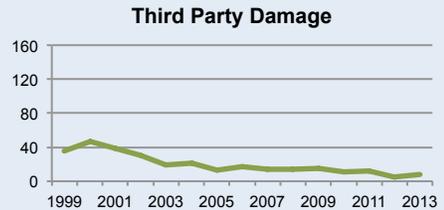
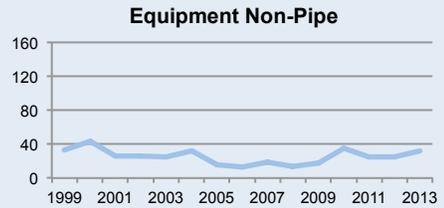
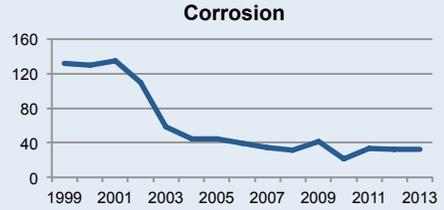
The tables on the next page display right of way incidents from the PPTS database. The steep drop in the number of corrosion caused incidents is apparent, the result of improved "smart pig" in-line inspection technology and integrity and corrosion management programs. Other incident causes, such as materials, seams and welds, non-pipe equipment and operator error are relatively flat over time. Incidents caused by third-party excavation (e.g. utility companies accidentally digging and striking pipelines) are down over time, reflective of efforts to increase public awareness and 811 "call-before-you-dig" programs.

Corrosion as a Cause of Pipeline Incidents is Down 76% Since 1999<sup>23</sup>

Third-Party Damage to Pipelines is Down 78% Since 1999<sup>24</sup>

Most Other Causes of Pipeline Incidents are Relatively Flat Over Time

Source: Pipeline Right of Way Incidents, API Pipeline Performance Tracking System



## Manufacturing Jobs Supplied by Pipelines



Pipelines deliver industrial raw materials for good-paying manufacturing jobs in refining, chemicals, plastics, pharmaceuticals, fertilizer, and fabrics

# Pipeline Performance Results Takeaways

1

## **99.999% of Crude Oil and Petroleum Product Barrels Delivered by Pipeline Reach their Destination Safely**

The 99.999% safety rate makes pipelines one of the safest ways to deliver energy

2

## **Liquids Pipeline Incidents Are Down 50% Since 1999**

Improved pipeline inspection technology and regular evaluation, inspection and maintenance greatly reduced the number of corrosion and overall pipeline incidents along pipeline right of ways

3

## **Most Barrels Released in 2013 Caused by Natural or Outside Forces or 3<sup>rd</sup> Party Excavation**

– A lightning strike, landslide, river barge strike and third-party excavation damage resulted in 55% of the barrels released from liquids pipelines in 2013

4

## **Corrosion Caused Pipeline Incidents Down 76% Since 1999**

Regular use of in-line inspection “smart pig” tools designed to detect pipe metal loss and corrosion control produced a significant drop in corrosion caused incidents

5

## **Third-Party Damage Caused Incidents Down 78% Since 1999**

Support for “call-Before-You-Dig” 811 programs has led to a large decline in incidents from 3<sup>rd</sup> party excavation

6

## **Most Pipeline Incidents Are Very Small in Size**

35% of releases in 2013 were smaller than 1 barrel and two-thirds of releases were 5 barrels or smaller

7

## **Two-Thirds of Pipeline Incidents Are Inside Operator Facilities**

66% of incidents are within operator facilities such as pump stations or tank facilities, and one-third are along a pipeline right of way

8

## **Equipment Failure Was the Most Frequent Incident Cause**

Equipment failure (pumps & valves) caused 44% of pipeline incidents, corrosion 18% & incorrect operation 16%

9

## **Materials, Seam or Weld Failure Caused the Most Operations & Maintenance-Related Barrels Released**

– While natural and outside forces resulted in the most barrels released, materials, seam or weld failure led operation or maintenance volumes

10

## **The Most Frequent Incident Causes are the Smallest**

The three most frequent incident causes - incorrect operation, equipment failure and corrosion – were also the smallest in barrels per incident

# Pipeline Integrity Management

Pipeline operators use an integrity management (IM) program to evaluate, inspect and maintain their pipelines. IM programs harness diagnostic technologies to scan operators' pipelines, and analytic software to review inspection results and isolate potential issues for maintenance. Operators then perform maintenance on their pipelines on a schedule based upon the degree of risk posed by each issue detected. The goal of the IM program is to identify and treat symptoms long before they grow into problems.

In 2013, liquids pipeline operators spent \$2.1 billion on integrity management evaluating, inspecting and performing maintenance on their pipeline systems.<sup>25</sup> Total IM spending reflected \$1.7 billion on pipeline and related facilities and \$378 million on storage tank integrity management. Operator IM efforts included 1,455 internal pipeline inspections by "smart-pig" in-line inspection devices, covering 47,089 miles of pipeline. Based upon the results of those inspections, operators performed 12,374 digs of pipeline sections for maintenance.

Operators use their IM programs to protect High Consequence Areas (HCAs), defined as unusually sensitive environmental areas, urbanized areas and other populated places and commercially-navigable waterways. Operators identify all of the HCAs through which their pipelines pass or could affect and develop written assessment plans with the inspection methods they will use for each HCA segment, a schedule for each assessment, and the technical basis for risk factors they used

In selecting specific inspection tools and setting the assessment schedule. While HCA or could affect HCA Segments represent approximately 45% of liquids pipeline mileage, in practice pipeline operators assess and inspect approximately 90% of their pipeline mileage.<sup>26</sup>

Operators perform assessments on a continuing schedule not to exceed every 5 years. The risk represented by a specific segment is used to determine the actual, and more frequent if needed, testing schedule. After inspections, IM programs require analysis of the results and repair of identified defects within defined time limits, depending on their severity. The issues identified on a pipe segment will also inform scheduling of the next inspection and any potential operational changes. Every year, this cycle of evaluation, inspection and maintenance repeats, rotating through all of the operator's pipe segments.

Operators are making improvements to their integrity management programs and the tools they use to ensure pipeline safety. Ever more sophisticated inspection technologies using magnetic fields or ultrasonic waves are allowing operators to detect the smallest, most subtle potential defects in pipes. Improved analytic techniques are allowing operators to model pipe features and predict their impact on a pipe's integrity. Spending on both integrity management inspections and maintenance, as well as inspection tool technology research and development, reflects pipeline operator commitment to operating safe pipelines.



# Pipeline Integrity Management



**>\$2.1 Billion**

Operators Spent Evaluating, Inspecting & Maintaining their Pipelines & Facilities



**1,455**

In-Line Inspection  
"Smart-Pig" Tool Runs

**2013**



**47,089 Mi.**

Miles of Pipeline Inspected with In-Line "Smart-Pig" Tools



**12,374**

Digs by Operators  
for Further Inspection  
or Pipeline Maintenance

Source: Integrity Management Data Assembled by Survey of AOPL and API Pipeline Members – 2013 Is the Most Recent Year for which Data Is Available

# 2015 API-AOPL LIQUIDS PIPELINE SAFETY PERFORMANCE STRATEGIC PLAN

## Goal 1: Improve Inspection Technology Capabilities

**Strategic Initiative 1.1:** Improve In-Line Inspection (ILI) “Smart Pig” Technology Capabilities to Detect Pipeline Cracking

## Goal 2: Enhance Threat Identification & Response

**Strategic Initiative 2.1:** Implement New API Recommended Practice on Crack Detection, Analysis and Response

**Strategic Initiative 2.2:** Implement New Industry-Wide Guidance on Integrating Pipeline Threat Data

**Strategic Initiative 2.3:** Develop Industry-Wide Guidance on the Appropriate Uses of Hydrotesting to Ensure Pipeline Safety

## Goal 3: Expand Safety Culture & Management Practices

**Strategic Initiative 3.1:** Implement New API Recommended Practice on Pipeline Safety Management Systems

**Strategic Initiative 3.2:** Foster Pipeline Safety Culture with an Industry-Wide Sharing, Learning and Improvement Program

**Strategic Initiative 3.3:** Develop an Industry-Wide Construction Quality Management System

## Goal 4: Boost Response Capabilities

**Strategic Initiative 4.1:** Implement New API Recommended Practice for Pipeline Leak Detection Program Management

**Strategic Initiative 4.2:** Deploy a Nation-Wide Pipeline Emergency Response Training, Outreach and Standards Program

## 4 Pipeline Safety Strategic Plan

The 2015 API-AOPL Annual Liquids Pipeline Safety Strategic Plan reflects industry-wide goals and initiatives liquids pipeline operators will undertake jointly in 2015 to improve pipeline safety. Teams of operators are continuously undertaking industry-wide safety improvement efforts through standing API and AOPL committees. The 2015 Strategic Plan represents those top initiatives approved by the leadership of the pipeline industry for executive-level attention, support and resources. Industry-wide support combined with leadership at the executive level reflects the shared pipeline safety values described above of *Organization-Wide Commitment and Safety Culture*.

The strategic plan is organized into four goals: 1) improve inspection technologies, 2) enhance threat identification and response, 3) expand safety culture and management practices, and 4) boost response capabilities. These goals are at the heart of preventing and minimizing pipeline incidents. They involve improving the tools pipeline operators use, the skills of their employees, and the capabilities of their organizations. They address issues of technology, procedures, management and leadership. This strategic and comprehensive approach reflects what is necessary to reach the shared pipeline safety value of *Zero Incidents*.

Pursuing the pipeline safety value of *Learn from Experience*, specific Strategic Initiatives reflect recommendations from safety investigators, lessons learned from pipeline incidents and review of safety performance data. Recommendations from agencies such as the U.S. National Transportation Safety Board and the U.S. Pipeline and Hazardous Materials Administration provide opportunities for improvement for specific operators and the industry at-large. Pipeline operators also gather together regularly to exchange pipeline safety information and share experiences for safety improvement. Additionally, the API Pipeline Performance Tracking System as seen above, along with PHMSA incident data, provides a source of pipeline safety trends confirming the success of efforts or highlighting the need for safety improvement efforts.

Strategic Initiatives in 2015 will include industry-wide implementation of the newly developed pipeline safety management system (PSMS) recommended practice (RP). The PSMS RP was developed through API by a group of liquids and natural gas pipeline operators, federal and state regulators, and expert members of the public. Discussed in detail below, this effort reflects the shared pipeline safety values of *Systems for Success* and *Communicate with Stakeholders*. Similarly, many of the research and development efforts by the pipeline industry are conducted through a joint research partnership between liquids and natural gas pipeline operators, North American, European and Asian companies, as well as technology vendors. Thus, the Strategic Initiative to improve in-line inspection technology reflects the shared pipeline safety values to *Communicate with Stakeholders* and *Employ Technology*.

Finally, the API-AOPL Pipeline Safety Excellence™ 2015 Strategic Plan is the second industry-wide strategic plan after the first in 2014. The plan was developed after conversations with regulators, safety experts, industry-wide safety improvement groups, and pipeline operators. The liquids pipeline industry will develop and publicly release their strategic plan each year at the beginning of the year. This commitment to an open and inclusive planning process, as well as annual planning, reflects the shared pipeline safety values of *Continuous Improvement* and *Communicate with Stakeholders*.

The remaining pages of this report provide the accomplishments and unfinished work of 2014, remaining challenges to pipeline safety, and the 2015 Strategic Initiatives. In 2015, we will complete development of industry-wide recommended practices begun in 2014 on pipeline crack detection and management, pipeline safety management systems, leak detection program management and emergency planning and response. Industry-wide implementation of these recommended practices will be a central theme of 2015. The 2015 Strategic Plan also includes two new Strategic Initiatives to develop industry-wide guidance on the appropriate uses of hydrostatic pressure pipeline testing and a recommended practice for a pipeline construction quality management system. The list of efforts is long and the workload great, but pipeline operators are committed to safety performance improvement and pipeline safety excellence.

## Strategic Goal 1

# Improve Inspection Technology Capabilities

### Challenge

In-line inspection (ILI) tools, also known as “smart pigs,” are the most technologically advanced and sophisticated inspection tools available to pipeline operators. An ILI smart pig traveling through a pipeline, scanning the pipe as it goes, permits operators to gather and analyze the most comprehensive data to assess a pipeline’s health and integrity. ILI technology allows operators to detect potential issues in a pipeline before they become a problem and perform preventive maintenance, repairs and/or replacements to address issues long before they lead to a failure.

Advances in magnetic-based ILI technology have enabled pipeline operators to reduce corrosion as a cause of pipeline incidents by nearly 80% over the last 15 years. ILI technology providers and operators are currently harnessing ultrasound, combinations of magnetic and ultrasound, and advanced computer analytic techniques to find and diagnose potential cracks in pipelines. Several crack-focused ILI technologies are performing well. However, opportunities exist to push this technology even further to find subtle, hard-to-detect pipe anomalies and determine pipe characteristics. Identifying latent defects in certain welds and seam areas, in some cases dormant since manufacturing and original pipeline installation, is especially challenging given their long history of incident free and safe operation.

### 2014 Accomplishments

#### ***2014 Strategic Initiative #1: Improve the Capabilities of In-Line Inspection (ILI) Technologies to Detect and Diagnose Cracks***

In 2014, liquids pipeline operators undertook Strategic Initiative #1 to improve ILI capabilities to detect and diagnose cracks. Working through the joint research and development organization Pipeline Research Council International, the project assessed ILI crack capabilities by comparing ILI inspection results with first-hand field excavation results at the same locations. Operators contributed over 50,000 data records of an ILI measurement, field measurement or both. The project assembled a database of the records and conducted an analysis of the measurements. Five different ILI crack tools were assessed on: rate of defect detection, probability of correct identification, defect length and depth sizing accuracy, and accuracy in estimating burst pressure. Based on the extensive trove of data collected and analyzed, all ILI tools met vendor specifications for detection, identification and depth sizing. The one exception was a broader than desired performance range for ILI depth measurement of defects in welds.

### 2015 Strategic Initiative 1.1

#### **Improve the Capabilities of In-Line Inspection (ILI) Technologies to Detect and Diagnose Pipeline Cracking**

##### **Description**

Pipeline operator’s ability to detect and diagnose cracking in pipelines, especially cracks in seams, remains a real and perceived challenge for industry. The project would build upon the 2014 strategic initiative and associated PRCI project correlating ILI tool data and confirmatory dig data to establish the capability of ILI technology to accurately measure potential crack issues.

<b>Outcomes:</b>	<ul style="list-style-type: none"> <li>• Reports validating that ILI tools can detect crack anomalies</li> <li>• Information that supports the appropriate use of ILI tools</li> </ul>
<b>Timeline</b>	2015
<b>Lead</b>	PRCI Research Project Team with API/AOPL Research & Development Team, OTG and PIWG



<b>Strategic Goal 2</b>	<b>Enhance Threat Identification &amp; Response</b>
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**Challenge**

Identifying threats to pipelines includes both the need to detect and diagnose issues. Inspection technology will provide operators with data on their pipelines. Operators must then sift through and analyze that data to identify even the most subtle indications of a potential problem. Inspection data must be combined with other sources of risk information from metal characteristics to operating patterns to diagnose a true picture of the health of a pipeline.

Successfully integrating and analyzing these different sources and forms of data remains a challenge for operators. Data relevant to a pipeline's integrity is generated, collected, managed or stored by different organizations with different responsibilities and lines of authority. Threats are identified at different points in time, through different processes. Audits and evaluations are conducted by different entities or components of the organization. The effectiveness of procedures or organizations is not captured with the same types of performance measures designed for specific activities. Complex systems, organizations or projects need more holistic and comprehensive management systems to ensure top performance.

Hydrostatic pressure testing, or “hydrotesting” a pipeline with water under pressure, is used most frequently by pipeline operators to establish the integrity and safe operating pressure of a newly constructed pipeline. Operators also hydrotest pipelines when other inspection technologies cannot be used, such as in a pipeline with bends or diameters too tight for in-line inspection “smart pigs” to travel. Less frequent are the cases where operators hydrotest pipelines even when ILI inspection technology is available and applicable. Hydrotesting is sometimes by design destructive of a pipeline. The pressure of a hydrotest is expected to expand the pipe to a degree where imperfections in the pipe will burst, allowing for their detection and maintenance. Some are concerned that a hydrotest at high pressures will cause new problems or exacerbate otherwise benign existing conditions in a pipe. A hydrotest is a pass-fail snapshot in time. Such a snapshot is appropriate at certain times, such as confirming a new pipe is ready to enter service. However, defects in an existing pipe that may have developed over time and do not fail during a hydrotest remain invisible to the operator. In the midst of these different positives and negatives, pipeline operators lack universally accepted guidance on when hydrotesting is appropriate for a given pipeline. Pipeline operators would benefit from further guidance on the appropriate uses of hydrotesting.

## 2014 Accomplishments

### ***2014 Strategic Initiative #2: Develop an API Recommended Practice on Crack Detection, Analysis and Response with an Emphasis on Seam-Related Cracks***

In 2014, a broad array of pipeline operators joined together under the leadership of the Pipeline Integrity Work Group to develop the new API Recommended Practice 1176 on crack detection, analysis and response. Building on current industry recommendation practices such as API 1160 for implementing pipeline integrity management programs, this RP focuses on the specific threat area of pipeline cracks, with an emphasis on seam-related cracks. The RP provides crack management program recommendations and guidance on the inspection, assessment and mitigation of cracking threats, addressing both seam related and environmentally induced mechanisms. The RP provides extensive discussion of specific threat mechanisms associated with cracking, establishing flaw sizes and analyzing crack growth, methods and technologies for finding and assessing cracks, and how and when to respond to potential cracks in a pipeline.

### ***2014 Strategic Initiative #3: Develop Industry-Wide Guidance on Implementing Threat Data Integration Programs and Activities***

In 2014, members of the industry-wide Pipeline Integrity Work Group significantly advanced development of guidance to help fellow pipeline operators implement data integration programs to support integrity and risk management processes. Pipeline operators collect and store a large amount of data on the health of their pipelines from inspection results to operating patterns and maintenance histories. This project will provide operators guidance on managing and integrating data to empower comprehensive and holistic integrity analysis, which is expected to improve overall pipeline safety performance through an improved ability to accurately assess risks, diagnose threats, plan inspections and conduct maintenance.



## 2015 Strategic Initiative 2.1

### Implement the New API Recommended Practice on Crack Detection, Analysis and Response

#### Description

Encourage and assist liquids pipeline operators to adopt the new industry-wide API recommended practice (RP) on crack detection, analysis and response. After development of the crack RP in 2014, an industry-wide team will develop and begin to carry out a plan to educate operators on the new RP. The team will host a number of forums and events to discuss the RP and strategies for its successful implementation. Pipeline operator executives will reinforce the value of the RP to their organizations, and API will leverage industry-wide events throughout the year to provide repeated opportunities for operators to hear the importance of the RP, receive guidance on its implementation, and share learnings and successes from its adoption.

<b>Outcomes</b>	<ul style="list-style-type: none"> <li>• An RP implementation plan to outline steps industry will take to educate, encourage and assist industry adoption of the RP</li> <li>• Implementation tools designed to assist operators of all sizes and levels of sophistication, as appropriate</li> <li>• Host or participate in industry sessions or events to educate, encourage and assist member adoption of the RP</li> <li>• Development of mechanisms to collect information on level of RP adoption, associated program changes and resulting performance improvements resulting from adoption of the RP</li> </ul>
<b>Timeline</b>	2015
<b>Lead</b>	Pipeline Integrity Work Group

## 2015 Strategic Initiative 2.2

### Implement Industry-Wide Guidance on Integrating Pipeline Threat Data

<b>Description</b>	Encourage and assist liquids pipeline operators to adopt the new industry-wide guidance on integrating pipeline safety threat data. After development of the guidance in 2014, an industry-wide team will develop a series of implementation tools to educate operators on the new guidance. The team will participate in a number of forums and events to discuss the guidance as well as strategies for its successful implementation. Pipeline operator executives will reinforce the value of the guidance to their organizations, and industry-wide events throughout the year will provide repeated opportunities for operators to hear the importance of the guidance, receive guidance on its implementation, and share learnings and successes from its adoption.
<b>Outcomes</b>	<ul style="list-style-type: none"> <li>• A guidance implementation plan to outline steps industry will take to educate, encourage and assist industry adoption of the guidance</li> <li>• Implementation tools designed to assist operators of all sizes and levels of sophistication, as appropriate</li> <li>• Host or participate in industry sessions or events to educate, encourage and assist member adoption of the RP</li> <li>• Development of mechanisms to collect information on level of guidance adoption, associated program changes and resulting performance improvements</li> </ul>
<b>Timeline</b>	2015
<b>Lead</b>	Pipeline Integrity Work Group

## 2015 Strategic Initiative 2.3

### Develop Industry-Wide Guidance on the Appropriate Uses of Hydrotesting to Ensure Pipeline Safety

<b>Description</b>	Develop industry-wide guidance on the appropriate uses for hydrotesting. Differentiate the potential goals and uses of hydrotesting, such as establishing a pipe as fit for service, determining the integrity of a pipeline, or identifying its specific tolerances or limitations. Describe the scenarios or situations where hydrotesting is recommended, where it might be damaging, or where another inspection technology provides a pipeline operator with more pipeline safety benefits than hydrotesting.
<b>Outcomes</b>	<ul style="list-style-type: none"><li>• Development of industry-wide hydrotesting usage guidance</li></ul>
<b>Timeline</b>	2015
<b>Lead</b>	Pipeline Integrity Work Group

## Strategic Goal 3

### Expand Safety Culture & Management Practices

#### Challenge

In addition to the challenge of advancing further the technology addressed in Goal 1, and the challenge of integrating different data types and sources in Goal 2, pipeline operators also face the challenge of integrating their procedures and organizations to achieve higher levels of safety performance. Operation of pipelines involves multiple, complex activities including design, construction, operations and maintenance. Accidents with high consequences rarely occur due to a safety breakdown in a single activity, but instead result when sometimes minor weaknesses in multiple areas align to produce a failure.

Safety efforts for each activity of an organization are important, but more effective safety performance is achieved when viewing activities as linked and addressing them holistically. A comprehensive, systematic effort is needed to manage complex processes with multiple, dynamic activities and circumstances. Organization-wide integration of safety efforts requires management leadership and a safety culture at all levels of the organization. For pipeline safety performance, the organization must be aware of its safety status, know which parts of the organization depend on each other for the information and actions, assess weaknesses and opportunities for learning, and make changes based on safety needs and learnings. Pipeline construction also involves multiple steps to ensure the system performs safely as designed. Pipeline initial design, materials manufacturing, construction, testing and initiation of operations are all complex, interdependent steps, which would benefit from comprehensive, systematic management.

## 2014 Accomplishments

### ***2014 Strategic Initiative #4: Deploy Pipeline Safety Management Systems to Improve Pipeline Safety Performance***

In 2014, a team composed of liquids and gas pipeline operators, federal and state pipeline safety regulators, and expert members of the public worked to develop a pipeline safety management system (PSMS). The U.S. National Transportation Safety Board in its review of the Marshall, MI pipeline rupture recommended pipeline operators adopt a pipeline-specific SMS to bring holistic and systematic organizational management of safety efforts. SMS has worked well for the aviation, nuclear and chemical industries, and NTSB believed SMS would help pipeline operations as well. In response to the NTSB recommendation, the American Petroleum Institute (API)-led group developed a formal framework for PSMS to help pipeline operators monitor, measure and improve pipeline safety performance continuously over time. The development group, together with the U.S. Pipeline and Hazardous Materials Safety Administration, convened two public forums to discuss the safety benefits other industries such as aviation derived by implementing their own SMS, and to present publicly pipeline-specific SMS. The development team held one round of public comment on the draft PSMS and two rounds of industry comment during the approval phase. The final product has received the commendation of safety experts and regulators alike. The PSMS will take the form of API Recommended Practice.



**2014 Strategic Initiative #5: Foster Pipeline Safety Culture with an Industry-Wide Sharing, Learning and Improvement Program**

In 2014, industry-wide teams including the Performance Excellence Team of senior pipeline managers, its Safety Culture Subteam, and the Operations and Technical Group shared pipeline safety lessons through a number of forums. In October, operators hosted the daylong Pipeline Information eXchange (PIX) workshop for operators to hear presentations from their colleagues on incidents and near misses over the last year and shared their safety lessons. Operators also convened a number of conference call “virtual tailgates” throughout the year to share safety and operational lessons to ensure pipeline managers and staff received the latest news on incidents and learnings. Operators also engaged each other in peer-to-peer meetings to benefit from company exchange of safety lessons. Additionally, pipeline executives held moderated sessions at each of their industry-wide meetings on the topic of safety culture. At the same time, the industry-wide Sharing Practices & Learning Leadership Team worked to develop a formal program to document these safety sharings and measure the extent to which operators made changes to their operations or practices for improving pipeline safety. In the future, the Team expects to produce measures of the performance improvements resulting from pipeline safety sharing activities.

**2015 Strategic Initiative 3.1**

**Implement the Newly Developed Pipeline Safety Management System to Improve Pipeline Safety Performance**

<b>Description</b>	Encourage and assist liquids pipeline operator adoption of the new industry-wide Pipeline Safety Management System (PSMS) Recommended Practice (RP). Major principles of the RP are scalability and flexibility. The implementation team will develop education, implementation and assessment tools appropriate to all levels of operator expertise and the full-range of previous experience with SMS. This strategic initiative will provide pipeline operators with multiple opportunities and avenues to learn about the PSMS, tools for operators to assess and compare their current management practices with the framework, and suggestions for implementing part or all of the PSMS framework in their own organizations as appropriate and applicable.
<b>Outcomes</b>	<ul style="list-style-type: none"><li>• An RP implementation plan to outline steps industry will take to educate, encourage and assist member adoption of the RP</li><li>• Implementation tools for education, implementation and assessment of the PSMS RP among liquids pipeline operators</li><li>• Multiple forums, sessions and interaction opportunities for education, implementation and assessment of the PSMS RP</li><li>• End of year analysis and reporting on the degree of PSMS RP penetration and adoption among liquids pipeline operators</li></ul>
<b>Timeline</b>	2015
<b>Lead</b>	Performance Excellence Team

### 2015 Strategic Initiative 3.2

#### Foster Pipeline Safety Culture with an Industry-Wide Sharing, Learning and Improvement Program

<b>Description</b>	Expand and build upon industry-wide pipeline safety sharing methods with new structure and process to document learning among sharing recipients, operational changes reflecting lessons learned, and measurement of resulting improved pipeline safety performance. Industry currently engages in several sharing activities.
<b>Outcomes</b>	<ul style="list-style-type: none"><li>• Program to provide structure and process for documenting pipeline safety sharing events, follow-up steps taken by participants that added value, and resulting pipeline safety improvements</li><li>• A summary report of sharing, learning and improvement examples at end of each year</li></ul>
<b>Timeline</b>	2015
<b>Lead</b>	Performance Excellence Team Safety Culture Subteam with the Sharing Practices and Learning Leadership Team

### 2015 Strategic Initiative 3.3

#### Develop an Industry-Wide Construction Quality Management System

<b>Description</b>	Develop an industry-wide recommended practice for liquids and gas pipeline construction quality management system (QMS). As with a pipeline SMS, the pipeline QMS will ensure quality considerations are integrated holistically across the complex, multiple steps of pipeline construction. The pipeline construction QMS will allow operators to manage the construction process comprehensively and systematically from initial design, through materials manufacturing, construction, testing and initiation of operations.
<b>Outcomes</b>	<ul style="list-style-type: none"><li>• An industry-wide Pipeline Quality Management System Recommended Practice</li></ul>
<b>Timeline</b>	2015-2016
<b>Lead</b>	Pipeline Construction QMS Task Team



## Strategic Goal 4    **Boost Response Capabilities**

### Challenge

Pipelines can stretch thousands of miles and travel through diverse locations from urban to rural, mountainous to flat, wet to arid, warm or cold. Through all of these environments and conditions, pipeline operators employ a host of strategies to detect potential pipeline incidents and ruptures. Pipeline operators use aerial overflights, ground patrols, flow and pressure monitoring equipment, volume calculations, as well as notifications from their own personnel and the public to detect potential incidents. Recommended practices or standards exist for many of these individual monitoring and detection activities. However, pipeline operators face the challenge of integrating all of these diverse activities into a single, holistic detection program.

In the rare instances when a leak or rupture is detected, both pipeline operators and first responders are committed to rapid emergency response. Pipeline operators partner with state and local fire departments, law enforcement, emergency notification groups and the public to prepare for and respond to incidents. However, many first responders, especially in rural or smaller communities, lack resources for their own pipeline specific response training. Through engagement with first responders, pipeline operators can learn the best ways to tackle these problems, boost awareness of pipeline issues and strategies, and improve their own capabilities to plan for and respond to incidents.

## 2014 Accomplishments

### ***2014 Strategic Initiative #6: Develop an API Recommended Practice for Leak Detection Program Management***

In 2014, a team of liquids pipeline leak detection and control room managers worked together with participation from PHMSA to develop a new API recommended practice for leak detection program management. The RP builds upon existing API standards and RPs for individual leak detection systems by focusing on holistic management of leak detection systems. The RP provides guidance on developing a leak detection culture and strategy, selection of leak detection systems, monitoring both individual and overall leak detection program performance, testing, alarm management, control center procedures, training, roles and responsibilities, equipment maintenance, management of change and leak detection performance improvement. As the calendar year closed, the team continued to refine its draft RP and gather expert and initial public comment before undergoing the formal RP balloting process for final approval in the first half of 2015.

### ***2014 Strategic Initiative #7: Deploy a Nationwide Pipeline Emergency Response Training, Outreach & Standards Program***

The API-AOPL Emergency Response team undertook multiple activities in 2014 to boost operator and first responder pipeline emergency response capabilities. In August, the team launched an online pipeline emergency response training program free to first responders. Produced in association with the National Association of State Fire Marshalls, the online portal is designed to deliver pipeline specific training to local first responders who otherwise would miss out on training due to budget or time constraints. To date, 1,000 first responders have registered for the course and 450 have completed the training. In June, the team hosted a national pipeline emergency response forum in Houston, which allowed pipeline operators and emergency responders to exchange insights and learnings. The daylong session reviewed recent pipeline responses and discussed successes and areas for future improvement. In April and November, the team convened the Emergency Response Advisory Board of pipeline executives, senior government officials, and leaders of the fire, law enforcement and emergency notification communities to gather the insights of those stakeholders on improving pipeline emergency response. Throughout the year, the team led a group of pipeline operators, federal regulators and national first responder representatives in development of an industry-wide pipeline emergency response recommended practice. Initial drafts of the RP were completed and broader public review and input is under way. Additionally, representatives of the team exhibited and presented industry-wide emergency response efforts at numerous conferences of fire, law enforcement and emergency response professionals. Conferences included the International Association of Chiefs of Police, the National Association of State Fire Marshalls and the International Oil Spill Conference.

## 2015 Strategic Initiative 4.1

### Implement the Newly Developed API Recommended Practice for Operator Leak Detection Program Management

<b>Description</b>	Encourage and assist liquids pipeline operator adoption of the newly developed API recommended practice for operator leak detection program management. After the RP is completed in mid-2015, an industry-wide implementation team will develop implementation tools to educate operators on the new guidance. The team will participate in a number of forums and events to discuss the guidance and strategies for its successful implementation. Pipeline operator executives will reinforce the value of the guidance to their organizations, and industry-wide events throughout the year will provide repeated opportunities for operators to hear the importance of the guidance, receive guidance on its implementation, and share learnings and successes from its adoption.
<b>Outcomes</b>	<ul style="list-style-type: none"><li>• An RP implementation plan to outline steps industry will take to educate, encourage and assist member adoption of the RP</li><li>• Implementation tools for the education, implementation and assessment of the RP among liquids pipeline operators</li><li>• Participation in multiple opportunities for education, implementation and assessment of the RP</li><li>• End of year analysis and reporting on the degree of RP penetration and adoption among liquids pipeline operators</li></ul>
<b>Timeline</b>	2015
<b>Lead</b>	Cybernetics Work Group

## 2015 Strategic Initiative 4.2

### Deploy a Nationwide Pipeline Emergency Response Training, Outreach and Standards Program

<b>Description</b>	Execute a multi-pronged strategy to boost pipeline emergency response capabilities of pipeline operators and first responders. Major 2015 efforts include promotion, operation and improvement of the free, online pipeline emergency training program, completion of the industry-wide pipeline emergency response RP, upgrade of the annual emergency response forum of pipeline operators and responders, continuation of the bi-annual emergency response advisory board of pipeline executives and leaders of the law enforcement and response community, and additional industry outreach through major annual gatherings of first responder professionals.
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<b>Outcomes</b>	<ul style="list-style-type: none"><li>• An industry-wide Emergency Response RP</li><li>• Upgrade and promotion of the free, online pipeline emergency response training program</li><li>• Two meetings of the Emergency Response Advisory Board</li><li>• Exhibition and presentation at multiple first responder conferences</li></ul>
<b>Timeline</b>	2015-2016
<b>Lead</b>	API-AOPL Emergency Response Team

# Pipeline Performance Results & Data

Total Barrels of Crude Oil and Petroleum Products Delivered by Transmission Pipeline in 2013	14.948 Billion
Total Barrels Delivered by Pipeline Percent Increase over 2012	6.2%
Crude Oil Barrels Delivered by Transmission Pipeline in 2013	8.306 Billion
Crude Oil Barrels Delivered by Transmission Pipeline Increase over 2012	845.1 million
Crude Oil Barrels Delivered by Transmission Pipeline Percent Increase over 2012	11.3%
Crude Oil Barrels Delivered by Transmission Pipeline Increase from 2009 to 2013	1.351 Billion
Crude Oil Barrels Delivered by Transmission Pipeline Percentage Increase from 2009 to 2013	19.4%
Petroleum Products Barrels Delivered by Transmission Pipeline in 2013	6.642 Billion
Petroleum Products Barrels Delivered by Transmission Pipeline Percentage Increase over 2012	0.4%
Total Liquids Pipeline Miles Operated in 2013	192,396
Total Liquids Transmission Pipeline Miles Operated Increase from 2009 to 2013	16,431
Crude Oil Transmission Pipeline Miles Operated in 2013	60,911
Crude Oil Transmission Pipeline Miles Operated Increase from 2012	3,448
Crude Oil Transmission Pipeline Miles Operated Percentage Increase from 2012	6.0%
Crude Oil Transmission Pipeline Miles Operated Increase from 2009 to 2013	8,174
Crude Oil Transmission Pipeline Miles Operated Percentage Increase from 2009 to 2013	15.5%
Refined Products Transmission Pipeline Miles Operated in 2013	63,532
Refined Products Transmission Pipeline Miles Operated Percentage Decrease from 2012	-0.8%
Natural Gas Liquids Transmission Pipeline Miles Operated in 2013	62,742
Natural Gas Liquids Transmission Pipeline Miles Operated Increase from 2012	2,881
Natural Gas Liquids Transmission Pipeline Miles Operated Percentage Increase from 2012	4.8%
Natural Gas Liquids Transmission Pipeline Miles Operated Increase from 2009 to 2013	5,509
Natural Gas Liquids Transmission Pipeline Miles Operated Percentage Increase from 2009 to 2013	9.6%

Total Amount Spent Evaluating, Inspecting and Maintaining Liquids Pipeline Infrastructure	\$2.1 Billion
Amount Spent Evaluating, Inspecting and Maintaining Liquids Pipeline and Related Facilities	\$1.7 Billion
Amount Spent Evaluating, Inspecting and Maintaining Liquids Storage and Related Facilities	\$380 Million
Miles of Liquids Pipeline Inspected with In-Line "Smart Pig" Inspection Tools	47,089
Number of Liquids Pipeline Inspections with In-Line "Smart Pig" Inspection Tools	1,455
Number of Digs by Operators for Further Inspection or Pipeline Maintenance	12,374
Liquids Pipeline Public Awareness Spending	\$19 Million

Percentage of Barrels Reaching their Destination Safely by Liquids Pipeline in 2013	99.9992%
Total Number of Incidents Reported to PHMSA in 2013	397
Percentage Increase in Total Incidents Reported to PHMSA from 2012 to 2013 (1yr)	9.1%
Percentage Increase in Total Incidents Reported to PHMSA from 2009 to 2013 (5yrs)	16.8%
Number of Incidents Along Pipeline Rights of Way in 2013	134
Incidents Along Pipeline Rights of Way Percentage of Total in 2013	34%
Percentage Increase in Incidents Along Pipeline Rights of Way from 2012 to 2013 (1yr)	55.8%
Percentage Increase in Incidents Along Pipeline Rights of Way from 2009 to 2013 (5yr) <sup>(API PPTS)</sup>	13.6%
Percentage Decrease in Incidents Along Pipeline Rights of Way from 1999 to 2013 <sup>(API PPTS)</sup>	-50.4%
Number of Incidents At or Contained within Operator Facilities in 2013	263
Incidents At or Contained within Operator Facilities Percentage of Total in 2013	66%
Percentage Decrease in Incidents At or Contained within Operator Facilities from 2012 to 2013	-5.4%

## Pipeline Performance Results & Data (cont.)

Total Barrels of Crude Oil and Petroleum Products Released as Reported to PHMSA in 2013	119,276
Percentage Increase in Total Barrels Released from 2012 to 2013 (1yr)	160%
Percentage Increase in Total Barrels Released from 2009 to 2013 (5yrs)	116.8%
Barrels of Crude Oil and Petroleum Products Released Along Liquids Pipeline Rights of Way in 2013	108,032
Pipeline Rights of Way Barrels Released Percentage of Total in 2013	90.6%
Percentage Increase in Barrels Released Along Pipeline Rights of Way from 2012 to 2013	240.5%
Percentage Increase in Barrels Released Along Pipeline Rights of Way from 2009 to 2013 (API PPTS)	180.8%
Percentage Increase in Barrels Released Along Pipeline Rights of Way from 1999 to 2013 (API PPTS)	34.0%
Barrels of Crude Oil and Petroleum Products Released At and Contained within Operator Facilities in 2013	11,243
Barrels Released At and Contained within Operator Facilities Percentage of Total in 2013	9.4%
Total Barrels Released in 2013 because of Natural or Outside Forces or 3 <sup>rd</sup> Party Damage	66,081
Barrels Released because of Natural or Outside Forces or 3 <sup>rd</sup> Party Damage Percentage of 2013 Total	55.4%
Percentage Incr. in Bbl. Released because of Nat'l or Outside Forces or 3 <sup>rd</sup> Party Dam. from 2012 to 2013	956.2%
Total Barrels Released in 2013 because Operation or Maintenance Causes	53,195
Barrels Released because of Operation or Maintenance Causes Percentage of 2013 Total	44.6%
Percentage Increase in Barrels Released because of Operation or Maintenance Causes from 2012 to 2013	34.3%
Percentage of 2013 Incidents <1 Barrel	34.8%
Percentage of 2013 Incidents <=5 Barrels	64.5%
Percentage of 2013 Incidents <=100 Barrels	87.2%

Pipeline Right of Way Incidents by Cause							
Cause	1999	2009	2012	2013	'99 – '13	'09 – '13	'12 – '13
Corrosion	132	41	32	32	-75.8%	-22.0%	0.0%
Equipment	33	18	25	32	-3.0%	77.8%	28.0%
Mat/Seam	31	21	15	27	-12.9%	28.6%	80.0%
Nat. Forces	1	1	1	3	200.0%	200.0%	200.0%
Op Error	19	10	12	23	21.1%	130.0%	91.7%
Other	18	12	13	11	-38.9%	-8.3%	-15.4%
3 <sup>rd</sup> Party	36	15	5	8	-77.8%	-46.7%	60.0%
<b>Total</b>	<b>270</b>	<b>118</b>	<b>103</b>	<b>136</b>	<b>-49.6%</b>	<b>15.3%</b>	<b>32.0%</b>

Source: API, Pipeline Performance Tracking System

# Notes

1. Today in Energy, *U.S. Liquid Fuels Production Growth More Than Offsets Unplanned Supply Disruptions*, U.S. Energy Information Administration, Aug. 27, 2014.
2. *Annual Energy Outlook 2014*, U.S. Energy Information Administration, Apr. 2014.
3. Today in Energy, *North Dakota and Texas Now Provide Nearly Half of U.S. Crude Oil Production*, U.S. Energy Information Administration, Jul. 2014.
4. *Crude Oil Forecast, Markets and Transportation*, Canadian Association of Petroleum Producers, Jun. 9, 2014.
5. *U.S. Liquids Pipeline Usage & Mileage Report*, AOPL, Oct. 2014 (note: this is the source for all of the data bullets on this page of the report).
6. AOPL comparison of PHMSA reported hazardous liquid (crude oil and petroleum products) gross barrels spilled and total crude oil and petroleum products barrels delivered by transmission pipeline as reported to FERC.
7. Id.
8. Pie chart not to scale. A true-to-scale wedge representing 0.001% would be imperceptibly small to the naked eye.
9. Pipeline Right of Way Incidents, API Pipeline Performance Tracking System, 2014.
10. The liquid pipeline industry tracks pipeline safety performance through its 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 safety. Reflecting approximately 85% of the liquid pipeline mileage regulated by PHMSA, data submitted includes releases that are 5 gallons or more if released to soil, and any size released to water. Industry focuses its PPTS analysis on onshore releases along the pipeline right-of-way, where pipelines come into contact with the public and the environment. While PHMSA frequently includes facility releases when displaying performance results, these releases are usually small and contained within the facility fence line. PPTS' focus on releases along the pipeline right-of-way allows industry to identify what efforts are succeeding and where improvements can do the most to protect the public and the environment.
11. Starting in 2002, PHMSA lowered its reporting threshold to 5 gallons. This had the effect of more than tripling reported incidents from previous PHMSA levels. PHMSA data sources such as *PHMSA Pipeline Incidents: (1999-2013)* reflect this stark jump from 2001 to 2002. PHMSA's reporting threshold change was based in part on the recommendation of pipeline operators who have reported into the API Pipeline Performance Tracking System at the lower 5 gallon threshold since its inception in 1999.
12. *Supra* note 9.
13. Id.
14. AOPL analysis of 2010-2014 All Reported Onshore Hazardous Liquid Incidents, *Hazardous Liquid Accident Data – January 2010 to Present (ZIP)*, U.S. Pipeline and Hazardous Materials Safety Administration, Jan. 2015.
15. Id.
16. Bar chart not to scale. Incidents 1 to 350 would be too small true-to-scale to appear on the page. Those incidents are enlarged enough to be perceptible for illustrative purposes.
17. *Supra* note 13.
18. Id.
19. Id.
20. Id.
21. Id.
22. *Supra* note 13.
23. *Supra* note 9..
24. Id.
25. AOPL Survey of Member Companies, 2014.
26. AOPL Survey of Member Companies, 2010.



[www.aopl.org](http://www.aopl.org)

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