



# 2023 PERFORMANCE REPORT

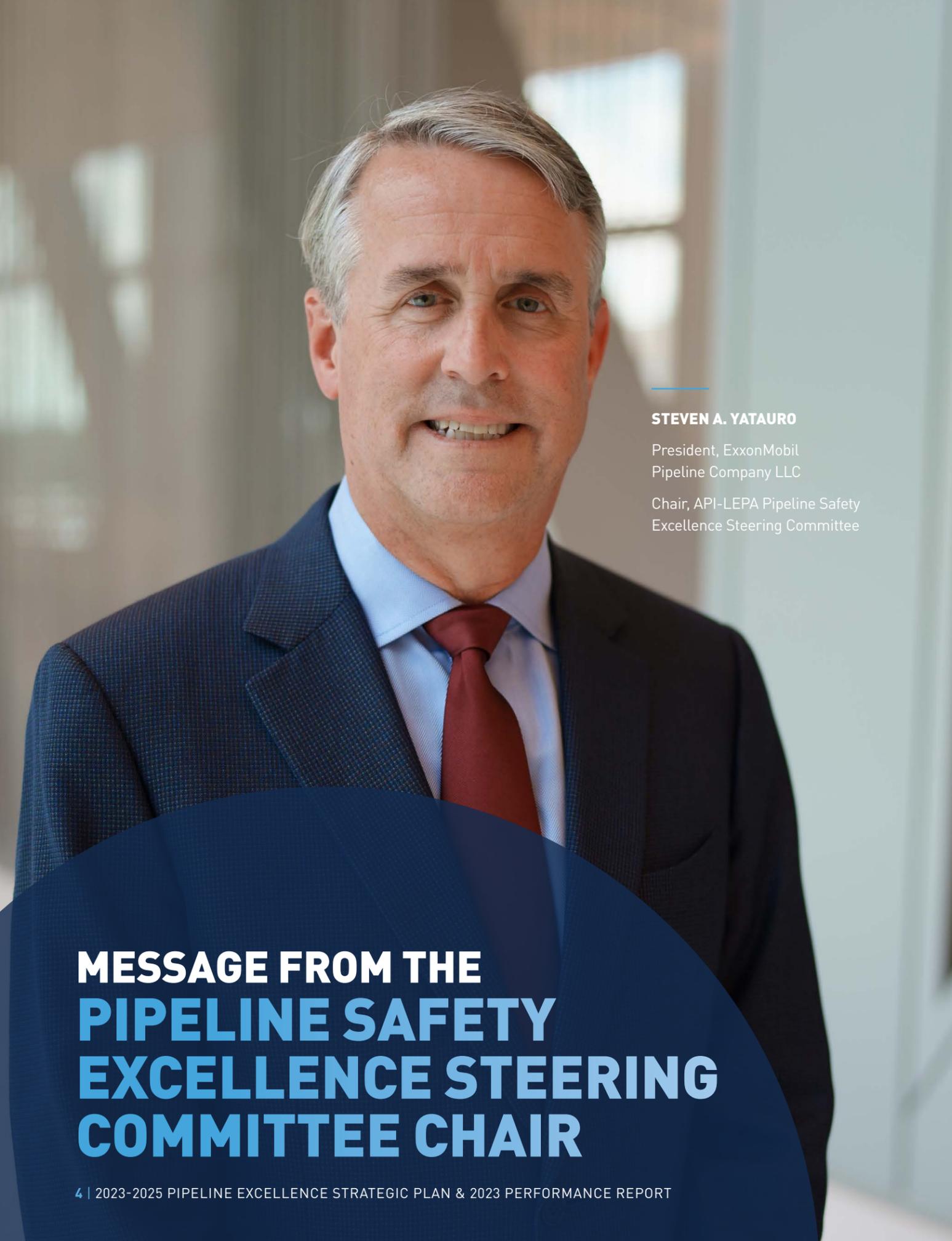
& 2023-2025 PIPELINE  
EXCELLENCE STRATEGIC PLAN

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

The **Liquids Energy Pipeline Association (LEPA)** promotes responsible policies, safety excellence, and public support for liquids pipelines. Its diverse membership includes large and small pipelines carrying crude oil, refined petroleum products, NGLs and other liquids.

# TABLE OF CONTENTS

<b>Message from the Pipeline Safety Excellence Steering Committee Chair</b>	<b>4</b>
<b>Pipeline Benefits</b>	<b>8</b>
<b>A Strategic Plan to Promote Pipeline Excellence</b>	<b>12</b>
<b>2023 Safety Performance Report</b>	<b>30</b>
<b>Data Appendix</b>	<b>44</b>
<b>Definitions and Notes</b>	<b>54</b>



**STEVEN A. YATAURO**

President, ExxonMobil Pipeline Company LLC

Chair, API-LEPA Pipeline Safety Excellence Steering Committee

**MESSAGE FROM THE PIPELINE SAFETY EXCELLENCE STEERING COMMITTEE CHAIR**

Today, pipelines carry energy from areas of production to refineries and ultimately consumers and manufacturers. Pipelines transport energy resources including crude oil, refined products like gasoline, diesel, and jet fuel, and natural gas liquids in a safe and environmentally friendly manner.

In a time when global energy security is paramount, pipelines reliably provide the affordable and abundant energy resources we rely on every day. Data from the 2023 annual performance report shows that total pipeline incidents have decreased twenty-three percent since 2019, with 87 fewer incidents in that span. Incidents impacting people or the environment have declined seven percent in the last five years. These safety improvements come as our country has built more pipelines and moved more energy resources, with liquids pipeline mileage and barrels delivered both increasing five percent since 2018.

With a goal of zero operating incidents, pipeline operators are devoted to continuous improvement. One area of focus has been pipeline operators' commitment to improving meaningful public and community engagement resulting in the development of a first of its kind industry recommended practice for pipeline public engagement. Operators partnered with government and public representatives over the course of several years to create a consensus-based approach to build trust, accountability, responsiveness, and transparency in how we engage the public. While the final Recommended Practice was published in March, many operators started their implementation journey in 2023.

Improved pipeline public engagement is an important part of keeping our current pipeline infrastructure operating safely and developing new pipeline networks. New pipelines are needed to transport the products that will support a future energy transition, including carbon dioxide, hydrogen, sustainable aviation fuel, and renewable diesel. Pipelines will play a critical role in both transporting any increased production of low carbon energy to consumers and delivering captured carbon emissions to permanent storage sites.

To enhance the safety of new CO<sub>2</sub> pipeline networks, pipeline operators are coming together to create a new, consensus-based recommended practice on CO<sub>2</sub> pipeline construction, conversion, operations, and maintenance. We will also continue safety initiatives for new and existing pipelines to mitigate pipeline corrosion, improve leak detection, and protect against cyber attacks. These initiatives, and many more, are reflected throughout the API-LEPA three-year strategic plan included in this year's report. Thank you for learning more about pipeline operators' commitment to safety and continuous improvement well into the future.

**STEVEN A. YATAURO**

President, ExxonMobil Pipeline Company LLC

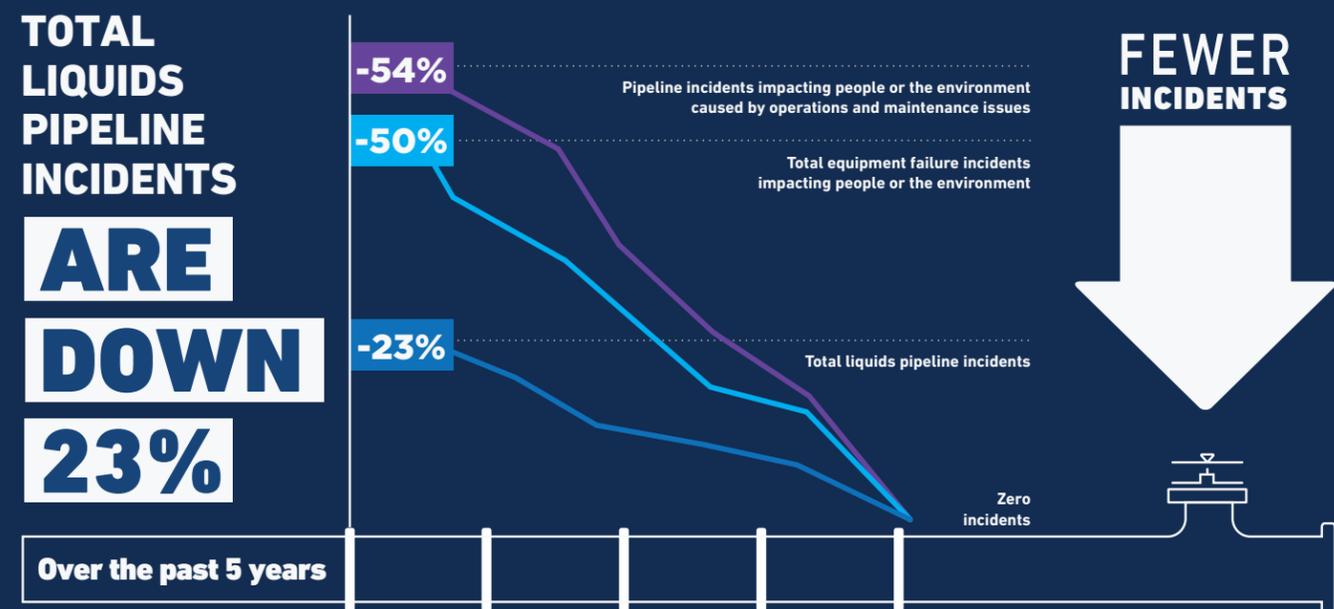
Chair, API-LEPA Pipeline Safety Excellence Steering Committee

“ With a goal of zero operating incidents, pipeline operators are devoted to continuous improvement. One area of focus has been pipeline operators’ commitment to improving meaningful public and community engagement resulting in the development of a first of its kind industry recommended practice for pipeline public engagement. ”

**Steven A. Yatauro**

President, ExxonMobil Pipeline Company LLC

Chair, API-LEPA Pipeline Safety Excellence Steering Committee



**EVEN AS PIPELINE MILEAGE AND BARRELS DELIVERED HAVE INCREASED ABOUT 5%**

Source: Data from the Pipeline and Hazardous Materials Safety Administration

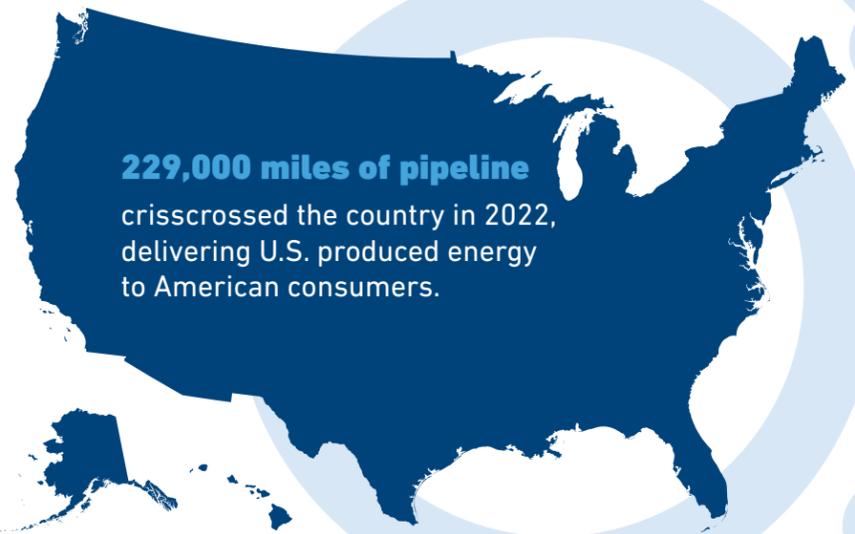


# PIPELINES DELIVER:



## In the Air

Jet fuel for airplanes is delivered to the airport by pipeline, making air travel possible.



**229,000 miles of pipeline** crisscrossed the country in 2022, delivering U.S. produced energy to American consumers.



## On the Road

9.8 billion barrels of petroleum products, like gasoline, jet fuel, and diesel were delivered by pipeline in 2022.



## At Home

Home heating fuel is transported by pipeline to cold-weather areas where tanker trucks complete the last leg of the delivery journey. Delivery trucks bringing packages rely on fuel transported by pipeline.



## Rural Areas

America used 800 million gallons of propane for agricultural purposes in 2022.



**75,000 MILES**

PROPANE & NATURAL GAS LIQUIDS

**85,000 MILES**

CRUDE OIL

**5,000 MILES**

CARBON DIOXIDE

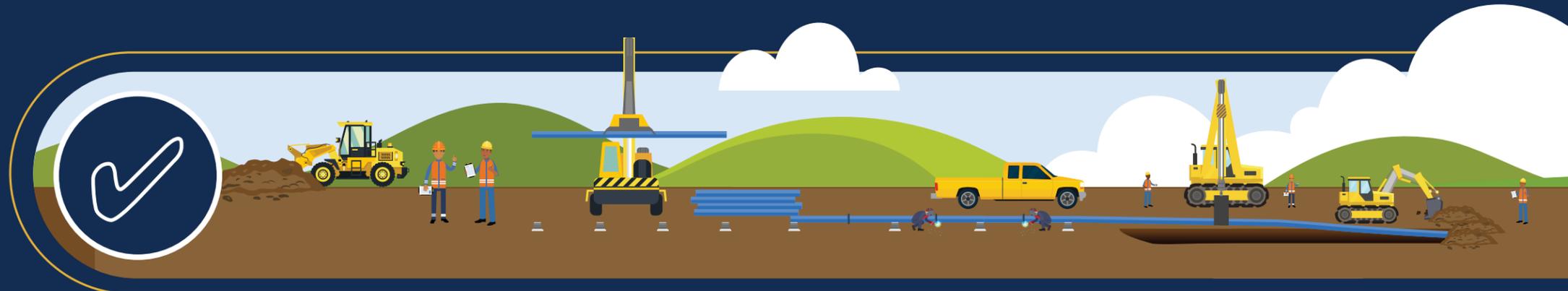
**64,000 MILES**

GASOLINE & JET FUEL

# PIPELINES ARE:

## Safe

U.S. pipelines deliver energy to Americans every day, and our industry is committed to its goal of operating with zero incidents through comprehensive safety management systems and robust safety programs, including the deployment of advanced inspection and leak detection technologies.

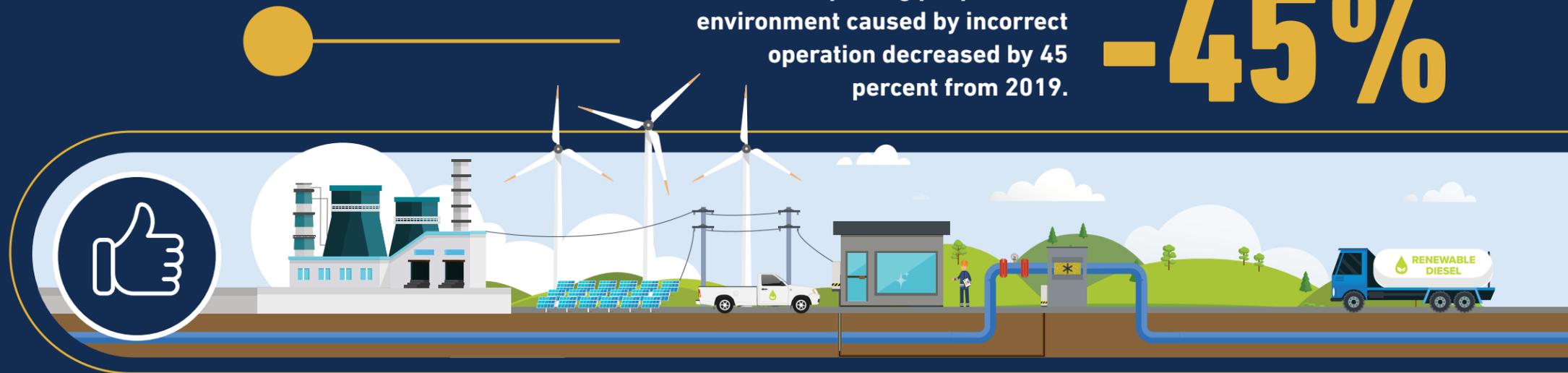


Incidents impacting people or the environment caused by incorrect operation decreased by 45 percent from 2019.

# -45%

## Reliable

Pipelines are one of the safest, most environmentally friendly ways to transport energy across the country, delivering reliable energy 24/7 every day of the year. Electric powered pipeline pumps help make pipelines the most sustainable way to deliver energy.



# 99.9999%

A barrel of energy delivered by pipeline safely reaches its destination 99.999% of the time.

## Part of Our Future

Fully harnessing American energy, including bringing the benefits of natural gas, oil and low carbon energy to all parts of the country, depends on new and existing infrastructure. The development of carbon capture, hydrogen and cleaner fuels like renewable diesel and sustainable aviation fuel will play a key role in meeting any meaningful emission reduction goals, especially in hard-to-decarbonize sectors like cement and steel. The safe and responsible build-out of pipelines is critical to transport these low carbon solutions.



A STRATEGIC PLAN TO

# IMPROVE PIPELINE EXCELLENCE

## ZERO INCIDENTS

Only with a goal of zero safety incidents can incidents be minimized.

## ORGANIZATION-WIDE COMMITMENT

Safety is emphasized at every level, from employees who accept personal responsibility for safety to managers who are vital to reinforcing a safety culture.

## A CULTURE OF SAFETY

Promoting 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 enhancing the performance of “in-line inspection tools” and remote sensing systems to innovative ways to analyze and interpret integrity data, operators constantly develop new ways to advance pipeline safety.

## ENGAGE WITH STAKEHOLDERS

Operators know that communicating and establishing a positive relationship with the public and other stakeholders is vital to improving safety.

2023-2025

# PIPELINE STRATEGIC GOALS

1

## PROMOTE ORGANIZATIONAL AND WORKFORCE EXCELLENCE

**Develop and promote a robust safety culture** through continuous improvement mechanisms and voluntary industry implementation of a Pipeline Safety Management System. **Transform industrywide sharing** into a robust, sustainable program and emphasize the benefits and power of data integration. **Attract, train and retain a work force** that is qualified to manage complex operations. **Boost operator and first responder planning**, preparedness and response capabilities.

2

## IMPROVE SAFETY THROUGH TECHNOLOGY AND INNOVATION

**Drive industrywide engagement** in advancing pipeline inspection capabilities to achieve the pipeline industry’s goal of zero incidents. **Create sustainable, workable frameworks** for operator leak detection management and enhance detection capabilities. **Improve corrosion detection and response capacity**, as well as geohazard detection and mitigation capabilities.

3

## INCREASE STAKEHOLDER AWARENESS AND ENGAGEMENT

**Improve industry’s engagement** with the public and government through the adoption and implementation of a recommended practice. **Promote robust and effective public awareness and damage prevention programs** to reduce excavation damage from all parties and protect critical infrastructure systems.

4

## ADDRESS CYBERSECURITY THREATS

**Prevent cybersecurity incidents from occurring** by engaging on effective policymaking, advancing cybersecurity best practices and promoting sharing and learning among operators and regulators. **Promote safe and timely responses** after cyber events through industrywide guidance.

5

## ADVANCE SAFE AND SUSTAINABLE ENERGY FUTURE

**Facilitate pipeline transportation and storage of CO<sub>2</sub>** through revised emergency planning and response guides for operators and expanded training for first responders. **Prepare guidance** for safe CO<sub>2</sub> pipeline construction and operations and participate in industry CO<sub>2</sub> pipeline research. **Limit environmental and community impacts** using a midstream conservation program for pipeline rights-of-way and expand liquids pipeline operator participation in environmental partnerships.

# GOAL 1

## PROMOTE ORGANIZATIONAL AND WORKFORCE EXCELLENCE

### OBJECTIVE 1.1

#### EXPAND SAFETY MANAGEMENT PRACTICES

Pipeline operators continue to make significant, proactive progress implementing API Recommended Practice (RP) 1173, *Pipeline Safety Management Systems (PSMS)* following the RP's 2015 publication. An Industry Team comprised of liquids and gas gathering, transmission and distribution operators, as well as contractor representatives, provides a unified approach to grow PSMS maturity, expand voluntary efforts and improve safety performance. The Team focuses on four strategic initiatives: increase industry participation, support operator and contractor journeys, engage stakeholders and provide governance and oversight.

In 2023, pipeline operators participated in a safety culture survey, published guidance on contractor SMS programs and began efforts to revise RP 1173, first edition. Over 20 US and Canadian operators joined a decade-long INGAA safety culture survey, measuring safety sentiments among over 30,000 pipeline employees and tracking data against past scores and trade-specific benchmarks. Transmission operators also responded to the 2023 PSMS annual survey, representing nearly 85 percent of mileage and showcasing advances in the percentage of companies increasing their maturity, closing priority gaps, conducting management reviews and evaluating maturity. The survey results will be a critical component of the 2023 PSMS Annual Report, along with highlights from three completed API PSMS Third-Party Assessments in 2023. After publishing a [PSMS: Contractor's Guide](#) in 2022, API developed an [Implementation Tool](#) to assist contractors and service providers in planning PSMS implementation and measuring the maturity of their safety programs. The API RP 1173 Task Group also kicked off efforts to revise

the first edition by 2025.

Actions from the federal government also characterized 2023, with PHMSA fielding its voluntary request for information among gas distributors in the fall. Additionally, the National Transportation Safety Board (NTSB) recommended that PHMSA offer an advisory bulletin to pipeline operators recommending they implement PSMS based on API RP 1173.

In 2024 and 2025, the Team will continue to support agency initiatives around voluntary PSMS implementation, including education and outreach on operators' proactive commitments and growing maturity. The Team will also help conduct a safety culture workshop where operators can exchange leading practices, lessons learned and successes as well as field the annual survey in the fall. API will also conduct several pilots and officially launch its Contractor Assessment Program alongside its operator-focused counterpart. Throughout this time, the API RP 1173 Task Group will further refine the first edition, including the incorporation of an annex for very small operators, before publication in 2025.

### OBJECTIVE 1.2

#### PROMOTE TIMELY SAFETY SHARING AND LEARNING

Liquids pipeline operators have a long track record of sharing and learning to drive continuous improvement in pipeline safety. The liquids pipeline industry has created a safety culture that constantly promotes the sharing of safety lessons and information. Sharing experiences and best practices is a cornerstone of operators' safety and integrity programs and is one of the pillars of PSMS. Through the API-LEPA Sharing & Learning Subteam (Subteam), the [Guide to Sharing](#) and [Guide to Learning](#) were developed to provide a clear and simple process for determining whether and how to share safety lessons with peers and facilitate lesson learning. Sharing and learning occurs routinely among pipeline operators at many levels through networking, webinars, podcasts, and other means. The liquids industry is building on these efforts to promote more deliberate and timely sharing of information and measure the benefits derived through surveys and interviews.

In 2023, API staff and member company representatives participated in seven (7) podcasts to share information on API standards, and safety and integrity programs. In May, a pipeline operator and PHMSA held a joint webinar with 750 attendees to accelerate the sharing and learning process following a girth weld failure that occurred in December 2022. In November, industry personnel gathered for the 2023 API Pipeline Information eXchange (PIX) Forum to share lessons learned with several hundred gathered personnel. In conjunction, the API-LEPA Leak Detection Subteam facilitated a workshop to develop a series of consensus-based, industry-wide Key Performance Indicators (KPIs)

for assessing Leak Detection program performance. The workshop was attended by more than 100 pipeline professionals with expertise in control room management, leak detection engineering, pipeline operations and controls, asset integrity management and regulatory compliance. The outcomes from the workshop will provide a basis for developing industry guidance and potential modifications to API RPs. Throughout the year, pipeline operator roundtable discussions and panel sessions on industry safety and integrity topics also occurred at API-LEPA Policy Group and Executive Leadership meetings.

For 2024 to 2025, the liquids industry will continue sponsoring informal roundtable discussions on a regular basis to address topic areas that affect pipeline operators. These informal exchanges will supplement webinars, workshops, safety tailgates, and the annual API PIX Forum and Pipeline Conference, which are well-established Sharing & Learning tools and forums currently used by the liquids industry. In addition, liquids operators will conduct peer-to-peer benchmarking sessions to promote information sharing at a more in-depth level related to similar challenges (e.g., corrosion failures at facilities). One of the key areas of focus will be on the timely sharing of safety information and lessons learned through pipeline integrity incidents. Industry will conduct member surveys following Sharing & Learning events to capture how operators are incorporating learnings into manuals, procedures, process improvements, training and other programs.



### OBJECTIVE 1.3

## ATTRACT, TRAIN AND RETAIN A QUALITY WORKFORCE

Pipeline operators require a technically educated and experienced workforce to manage complex operations. To maintain the safety of over 200,000 miles of U.S. liquids pipelines, operators need to attract, train and retain a sufficient workforce. Like any sector in the current economic environment, pipeline operators are facing challenges attracting and retaining employees who may increasingly be drawn to energy and infrastructure sectors perceived to have a larger role in the future. Industry leaders identified this objective as an emerging challenge demanding attention in both the short- and long-term.

In 2023, API and LEPA reviewed workforce training, developed communications materials, engaged organized labor groups and continued outreach to underrepresented communities. Launched in 2022, SkillsReady by API serves as a foundational energy education program and facilitates opportunities for diverse and under-advantaged communities to begin entry-level industry positions. The program graduated its second cohort in 2023 as part of ongoing initiatives to attract and expose diverse populations to industry training and career opportunities. LEPA is also producing materials to assist company recruitment efforts, including videos harnessing member company professionals' testimonials on what they like and appreciate about working in the pipeline sector. The products can feed into job fair environments or support shorter clips for social media participation. API also brought organized labor representatives together with pipeline operators to discuss improved coordination through the development of an advanced notification guide when infrastructure projects are ready for bidding.

In 2024 and 2025, API will identify representatives for a Workforce Development (WFD) Group to review the existing SkillsReady curriculum and identify turnover prone or hard-to-fill entry-level positions. If necessary, the Group will look to build curriculum or expand the learnings to enhance the level of industry knowledge and preparedness for potential employees. Where possible,

the WFD Group will partner with local workforce training organizations, educational institutions and trade schools to supply the curriculum and support on-the-ground participation. LEPA will finalize the production of critical videos for recruitment and attraction efforts that operators can utilize for job fairs, outreach or social media applications. API will also continue engaging with labor unions on workforce issues to help ensure adequate and affordable supplies of skilled, trained labor is available when the need arises.

### OBJECTIVE 1.4

## BOOST OPERATOR AND FIRST-RESPONDER PLANNING, PREPAREDNESS AND RESPONSE CAPABILITIES

Successful pipeline emergency planning, training and response requires experience and coordination from multiple stakeholders. Pipeline operators have the ultimate responsibility for an emergency response. However, an effective response requires advance planning hand-in-hand between the operator and response authorities. Training and drilling by all parties are necessary to ensure skills are fresh and operational and that decision makers share a common understanding of the goals for the response should an event occur. Additionally, emergencies impacting pipelines can include weather disasters and cyber events.

In 2023, the pipeline industry through API and LEPA continued to support a [free, online pipeline response training program for first responders](#). Developed in partnership with the National Association of State Fire Marshals (NASFM), the program trains local emergency personnel to respond safely to a pipeline emergency. Over 18,000 individuals have completed the entire pipeline response program since its inception. Additionally, the API/LEPA Emergency Response Group (ER Group) facilitated cross-company participation and learnings in training and drills by sending personnel to peer company events to provide outside feedback. The ER Group in coordination with NASFM published a tactical guide for responding to a CO<sub>2</sub> pipeline event and a tactical guide for

responding on frozen water ways and in winter weather.

In 2024, the ER Group finalized a free, web based training for CO<sub>2</sub> pipeline response available on the <http://pipelines.training> platform, and publish a tactical guide on incident air monitoring. The ER Group will partner with other policy groups to engage the first responder community and further socialize these important preparedness resources on CO<sub>2</sub>, air monitoring, tank and winter weather responses. Industry also expects to grow its peer sharing and learning programs through response training and drills with increased in-person activity, including the development of a program assisting operators in responding to all hazards and emergencies impacting pipelines. The program will include ways to apply, train and drill on the incident command systems for extreme weather or cybersecurity-related incidents.



## GOAL 2

# IMPROVED SAFETY THROUGH TECHNOLOGY AND INNOVATION

### OBJECTIVE 2.1

## ADVANCE PIPELINE INSPECTION TECHNOLOGY AND ANALYTICS

The ability to detect and identify conditions that represent a threat to pipeline integrity is central to ensuring the safe operation and reliability of pipelines. Pipeline operators inspect their systems on regular schedules, looking for indications that pipelines need maintenance. Through these regular inspections, pipeline operators identify and fix issues before they become a problem. In-line inspection (ILI) and non-destructive examination (NDE) systems are the primary tools used for analyzing the health of pipelines, assessing integrity threats to pipeline systems and making decisions on when and where to make repairs. Through its internal company programs and membership in Pipeline Research Council International (PRCI), the liquids pipeline industry continuously drives improvements with service providers to advance inspection technologies and the analytical systems that process the data. Through these efforts, liquids pipeline operators have reported a decrease in pipeline releases that impact people or the environment and will continue to work toward a goal of zero incidents.

In 2023, industry significantly advanced test trials of the latest ILI technologies and their ability to detect mechanical damage and deformations, selective seam weld corrosion (SSWC), seam anomalies, cracking and hard spots. The ILI test trials are providing data to support improvements in ILI systems' specifications for detecting, identifying, locating and sizing features in pipelines. Significant progress was made in characterizing mechanical damage/pipeline dents and dents with coincident features including corrosion, gouges and pipeline welds. The results will be integrated into the second edition of API RP 1183, *Assessment and Management of Dents*

*in Pipelines, Appendix H.* This data provides a basis to support regulatory changes to dent anomaly response criteria, dent engineering critical assessment, and justification for using tools to evaluate the integrity of dents with coincident features. Also in 2023, multiple test trials were completed for cracking, seam anomalies and SSWC. The ILI trials have identified several improvement opportunities for alignment and coordination between field personnel and ILI service providers, addressed through further research. An important element of all ILI performance evaluations is providing the data from the test trials to the participating ILI Service Providers to determine if improvements can be made to data processing systems. Industry also developed technical guidance for the practical implementation of ILI performance validation technologies outlined in API Standard 1163, *In-line Inspection Systems Qualification*.

Work on NDE in 2023 focused on further development of x-ray computed tomography (XRCT) and its application to support development of industry reference standards for crack and seam anomalies. Establishing reference standards for crack anomalies will impact performance improvements for ILI and NDE technology, as well as training and qualifying the next generation of pipeline inspection personnel that will be incorporated into API's Individual Certification Program (ICP). Work in 2023 also addressed improvements to field guidance for alignment of NDE and ILI data for crack features (also applicable to other anomalies) and developing standard protocols for NDE techniques to be applied to assessing the impacts of anomalies on pipeline integrity and safety. The industry also continued to further develop industry databases for NDE technology performance through information sharing using the PRCI "Virtual" Technology Development Center. The liquids pipeline industry continued to develop new or revise existing standards, including API Bulletin 1178, *Integrity Data*

*Management and Integration*, API RP 1176, *Assessment and Management of Cracking in Pipelines*, and API RP 1183.

In 2024-2025, work will continue on advancing ILI and NDE technologies and reference standards for crack and seam anomaly detection and assessment to improve inspection and engineering assessment tools. Continuing work will also be conducted to drive ILI and NDE performance improvements for SSWC and hard spots. Development of procedures and training materials for improving NDE field measurements will be initiated in 2024 through API's ICP and PRCI sponsored workshops. Additionally, work will continue in 2024-2025 to update industry standards that pertain to pipeline integrity and will include revisions to API Standard 1163, *In-line Inspection Systems Qualification* to incorporate the recently completed technical guidance and the results of ongoing ILI performance evaluations and test trials. Updates will also continue for RP 1176 and RP 1183 during 2024-2025, with updates to each RP published during that period. API will also publish an additional Technical Report on crack ILI performance that includes an assessment of crack detection technologies. In February 2024, API published Technical Report 1190, *Crack ILI Response: Maximum Depth and Failure Pressure Ratio*, that addresses ILI for pipeline cracking and appropriate response criteria for energy pipelines.

### OBJECTIVE 2.2

## ENHANCE LEAK DETECTION CAPABILITIES

Liquids pipeline operators use multiple complementary programs to detect leaks and ruptures, including tracking product delivery volumes, monitoring pressure and flow sensors, and regular visual inspections of their systems from the ground and air. Operators are assisted by API RP 1175, *Leak Detection Program* and API RP 1130, *Computational Pipeline Monitoring for Liquids*. While RP 1130 and RP 1175 establish guidance on developing a program that is consistent with operating conditions and product types being transported, there is no industry-wide data on the types of systems, techniques and approaches used by operators in developing their individual leak detection programs.

In 2023, the API-LEPA Leak Detection Subteam (LD Subteam) completed its first industry-wide survey on leak detection programs that established the baseline for current industry performance and identified improvement opportunities. Through the survey and operator sharing of capabilities and needs, the LD Subteam formed five (5) separate Work Teams that are tasked with developing technical reports and guidance documents that relate to improving leak detection capabilities, working in coordination with API's Cybernetics and Control Room policy groups. The areas being addressed include:

- 1) Development of a risk tool for leak detection program development and analysis
- 2) Guidelines for over/short analysis
- 3) Potential rupture detection and reporting guidelines
- 4) Developing industry-wide consensus-based KPIs
- 5) Improving sensors and sensor placement on a pipeline system

The LD Subteam held a workshop attended by over 100 pipeline professionals that will serve as the basis for metrics to assess and improve leak detection program performance and benchmark against others. Also in 2023, the liquids industry advocated for and supported development and adoption of Leak Detection as a Strategic Research Priority (SRP) through PRCI, which made significant progress to advance leak detection R&D. In addition, API and LEPA participated in the PHMSA 2023 R&D Forum and presented on industry gaps and research needs.

Looking forward to 2024-2025, the liquids pipeline industry will advance leak detection programs/systems through the five Work Teams established under the LD Subteam and provide direction for the PRCI LD SRP. Guidance documents and PRCI R&D results will be published in 2024 and 2025 that will directly impact this objective. Continued collection of LD program data through the annual survey process will further define current capabilities, industry strengths and improvement opportunities.

### OBJECTIVE 2.3

## IMPROVE CORROSION DETECTION AND RESPONSE

Industry data has shown a recent increasing trend in corrosion-related pipeline incidents over the past several years. Corrosion continues to be the most frequent cause of incidents that impact people or the environment in liquid pipeline systems, and have remained focus in advancing ILI technology development and engineering assessment methods. To address the recent increase in corrosion incidents impacting people or the environment, industry has placed significant effort and attention on corrosion prevention, mitigation, detection and repair in recent years. Industry is undertaking a more detailed level of data analysis to better understand the root causes of corrosion-related failures, with emphasis on incidents that occur on pipeline rights-of-way (ROWs) and within liquids pipeline facilities that impact people or the environment.

In 2023, PRCI published a report to further improve the detection and sizing capabilities of the current state-of-the-art ILI that can measure corrosion anomalies. The report presents the results of test trials completed through PRCI funded research that evaluated ILI technologies' performance for characterizing difficult-to-inspect corrosion features and where improvements in corrosion detection and sizing are needed. API also continued work on the development of a Technical Report on best practices for liquids pipeline operators to improve corrosion management programs at facilities and reduce the number of incidents that occur, TR 1189, *Internal Corrosion Management for Liquids Pipelines Stations and Facilities*. TR 1189 will be published in 2024 and supplement the prior published API RP 1188, *Hazardous Liquid Pipeline Facilities Integrity Management* and the related API RP 1184, *Facility Construction Inspection*. Work was also completed in 2023 on evaluating corrosion incident data and sharing detailed information on incident analysis and root cause failure analysis (RCFA) to better understand the factors that are contributing to incidents.

Looking forward to 2024-2025, the Pipeline Integrity Group (PLIG) Corrosion Subteam is working on the development of a comprehensive industry standard that

addresses all aspects of corrosion integrity management for pipeline systems, including the application of modern engineering assessment methods for corrosion features. The PLIG Corrosion Subteam will develop a systematic process to complete detailed RCFA for corrosion incidents, continue to assess the differences between facility corrosion incidents versus those that occur on pipeline ROWs and make recommendations through Technical Bulletins or Reports. Also, throughout 2024-2025, the liquids pipeline industry will also continue its work with PRCI and ILI service providers to drive improvements in ILI systems' performance to detect and characterize corrosion features.

### OBJECTIVE 2.4

## INCREASE GEOHAZARD DETECTION AND MITIGATION CAPABILITIES

Geohazards caused by ground movement and landslides are increasingly recognized as a factor in pipeline failures within the industry. Recently, pipeline failures have occurred due to landslides that result from the increasing frequency of excessive precipitation events. These conditions place strain on pipelines that intersect with terrains where a threat of landslides exists. While some operators have built full geohazard management programs that help identify, characterize, monitor, assess and remediate geohazard sites, there is no industrywide consensus standard for developing a geohazard management and mitigation program and providing the tools to ensure pipeline assets remain fit-for-purpose. Therefore, guidance to operators for implementing and improving landslide hazard management programs is needed and is expected to help reduce the number of landslide-caused incidents.

In 2023, API substantially advanced the development of the new API RP 1187, *Pipeline Integrity Management of Landslide Hazards*. API RP 1187 provides practical guidelines for effective management of ground movement hazards and reflects a collective effort of pipeline industry operators and geohazard Subject Matter Experts to leverage the extensive research that has been conducted on the impact of geohazards on pipeline integrity, including ongoing research being conducted by PRCI and others. The RP includes guidance

on conducting fitness-for-purpose (FFP) evaluation of pipelines within geohazard sites, as well as mitigation and remediation techniques that can be utilized as FFP limits are reached. API RP 1187 was drafted and issued for ballot voting in 2023 and comments received from a broad review by industry stakeholders are being reviewed and addressed to finalize the RP. API expects that API RP 1187 will be published in second quarter 2024 and a webinar will be scheduled to share the industry best practices contained in RP 1187.



GOAL  
3

# INCREASE STAKEHOLDER AWARENESS AND ENGAGEMENT

## OBJECTIVE 3.1

### IMPROVE STAKEHOLDER ENGAGEMENT

Public awareness, or one-way communication from the operator to the public, is a regulatory requirement addressed in API RP 1162, *Public Awareness Programs for Pipeline Operators*, and incorporated into federal regulations in 2005. Recognizing the need to increase its engagement with the public, the pipeline industry expanded public and community engagement efforts throughout the lifecycle of a pipeline, including the planning, construction and operations phases. The pipeline industry initiated the development of API RP 1185, *Pipeline Public Engagement*, in 2021 to provide consistent guidance for engaging the public, offering pertinent information, addressing concerns and establishing trust in long-term relationships.

In 2023, pipeline operators continued the implementation and refinement of their public awareness programs as outlined in API RP 1162 following the 2022 publication of the third edition. API and LEPA encouraged PHMSA to adopt the third edition by reference with current regulations referencing the antiquated first edition from 2003. Operators also partnered with public representatives and regulators to further develop API RP 1185, including a ballot that passed unanimously but did receive over 1,000 comments, leading to several months of comment resolution. Along with developing the RP itself, API/LEPA helped lead an Implementation Team to assist operators in putting this framework into practice by creating briefs, tactical booklets, training materials and information exchanges. API/LEPA members also conducted the 2023 Public Awareness Program Effectiveness Research Survey (PAPERS) to measure the effectiveness of their public awareness programs and identify improvements. Additionally, API helped socialize the recently published

[CO<sub>2</sub> Tactical Response Guide](#) with first responders through peer-to-peer outreach and liaison trainings to improve preparedness for CO<sub>2</sub> pipeline response.

In 2024 and 2025, the pipeline industry is focused on the completion and beginning stages of implementation for API RP 1185. API published the first edition of API RP 1185 on March 28, 2024. After publication, the industry will strive to demonstrate progress, likely through an annual survey of members, to showcase voluntary and proactive implementation efforts. The Team will conduct trainings, webinars and in-person workshops, similar to the Pipeline SMS journey, to facilitate operators' burgeoning maturity and conformance with the RP. It is also providing tactical guides and tools to demonstrate the flexible and scalable nature of the RP, allowing operators to tailor their engagement efforts to the specific needs of a local community or project environment. API is also planning a roadshow of pipe segments and leading technologies in specific states to increase energy literacy and community engagement. Additionally, API/LEPA will continue awareness and education to the first responder community on the CO<sub>2</sub> Response Guide as well as a free video-based training module on CO<sub>2</sub> pipeline response to improve preparedness should such an incident occur. As additional emergency response documents are finalized and published, API/LEPA will help communicate and socialize available guidance and resources with this critical stakeholder group.

## OBJECTIVE 3.2

### PROMOTE INNOVATIVE APPROACHES TO EXCAVATION DAMAGE PREVENTION

Excavation damage to underground energy pipelines remains a significant source of incidents impacting people or the environment. Despite decades of public awareness campaigns, one of the leading causes of pipeline incidents is excavation damage, with the failure to call or click 811 as the highest source of pipeline excavation incidents. Similarly, several incidents on submerged or underwater pipelines highlighted the need for additional guidance on safe digging during marine construction or dredging projects. The API/LEPA Damage Prevention Work Group (DPWG) has focused on closing state exemptions to the One Call process, standardizing One Call Center (OCC) data, improving marine damage prevention guidance and reducing first- and second-party incidents.

In 2023, the DPWG identified priority states with problematic exemptions to calling 811 before digging for certain stakeholder groups and began drafting legislation in coordination with API's Regional Staff and operators with assets in the area. The group also created a standardized list of Work Types for 811 tickets to replace the current system of open-form and inconsistent entries. DPWG members coordinated closely with similar associations to secure buy-in among OCC personnel, vendors, excavators and locators. The group also provided key subject matter expertise to improve guidance on preventing excavation damage to submerged pipelines and addressing the NTSB's recommendations for improved marine

damage prevention. The DPWG is also collecting first- and second-party excavation damage data to identify potential mitigants as the areas most under operator control.

In 2024 and 2025, the group will support the introduction of draft legislation in priority states to close exemptions and reinforce the use of calling or clicking 811 to better protect underground infrastructure. In consultation with regional staff, group members will identify sponsors to introduce state legislation, alleviate potential opposition and build coalitions to support this endeavor in both the 2024 and 2025 legislative sessions. Additionally, the DPWG will continue to support OCC data standardization to replace the current system of patchwork data collection and improve comparability across states. DPWG members will also advocate for inclusion of marine damage prevention guidance in the Common Ground Alliance's Best Practices publication and review marine damage prevention efforts. Using first- and second-party excavation data, the group will also identify leading causes and determine potential mitigations moving forward, along with initiatives to track unauthorized activity and advocate for the incorporation by reference of API RP 1162, third edition.



GOAL  
**4**

# ADDRESS CYBERSECURITY THREATS

## OBJECTIVE 4.1

### PREVENT CYBERSECURITY INCIDENTS

The U.S. pipeline network is critical to the functioning of the national energy supply and security, which makes it a prime target for cyberattacks. The 2021 ransomware attack provided examples of both the criticality of pipeline systems and the importance of pipeline cyber defenses. The pipeline industry shares the cybersecurity objectives of policy makers to protect critical infrastructure, provide reliable energy for society, safeguard public safety and the environment and protect the intellectual property and marketplace competitiveness of companies. Pipeline companies employ layers of security to protect against cascading failure, including mechanical controls that are not capable of being overridden through any cyber compromise of industrial control systems.

In 2023, API and LEPA supported member company engagement with the US Transportation Security Administration (TSA) as it continued to work to replace the existing temporary pipeline cybersecurity Security Directives (SDs) with a permanent program of cybersecurity regulatory requirements. With a rulemaking expected in 2024, industry worked with TSA to ensure that upcoming regulations set performance-based requirements, reflect pipeline-specific operational technology and allow company cybersecurity activities to adapt and evolve over time to meet constantly changing cyber threats. API and LEPA represented liquid pipeline operators at the Oil and Natural Gas Sector Coordinating Council (ONG-SCC), coordinating security activities between the U.S. Department of Energy (DOE), TSA, DHS Cybersecurity & Infrastructure Security Agency (CISA) and PHMSA. API also continued to promote the use of API Standard 1164, *Pipeline Control Systems Cybersecurity*

to help pipeline operators manage their cyber risks and as a means to achieve cyber security maturity. In November, API sponsored its 18th annual Cybersecurity Conference for the oil and natural gas industry, which was attended by almost 800 pipeline and cybersecurity professionals. The conference is one of many methods used by API to bring together leading cybersecurity experts from industry, government, academia and vendors to share insights and learn about the latest developments from cybersecurity professionals.

The focus for API and LEPA regarding cybersecurity work in 2024-2025 will be the continued tracking on the status of the TSA rulemaking and advocating for flexible, scalable, adaptable and practical cybersecurity regulations that are performance-based. Continued work with member companies on developing guidelines for improving management and controls of cybersecurity events will occur through workshops, operator peer-to-peer and roundtable discussions, and through API's policy groups and committees. The 19th annual API Cybersecurity Conference will again bring together the leading subject matter experts in cybersecurity to promote technology advancements, sharing and learning and exchanging industry best practices.

## OBJECTIVE 4.2

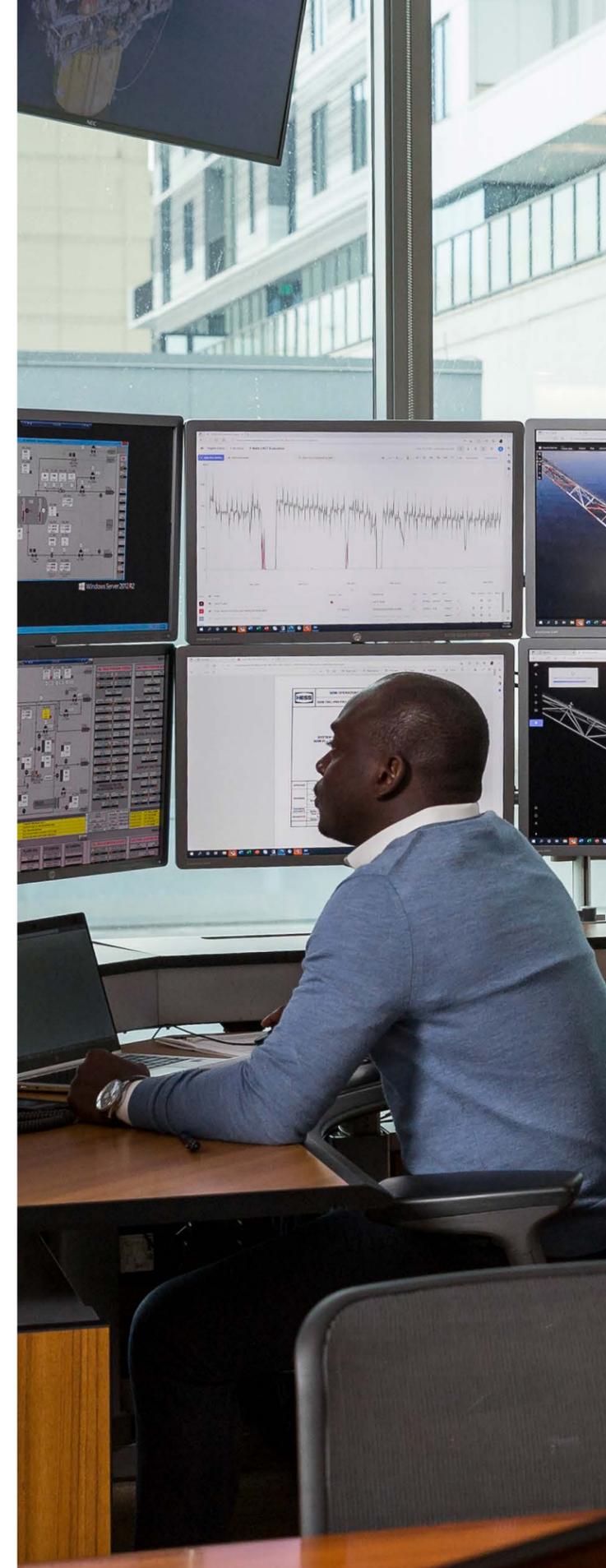
### SAFE AND TIMELY RESTART AFTER CYBERSECURITY EVENTS

A cyber incident can impact pipeline operations in multiple ways. It can affect business functions unrelated to pipeline operations, commercial systems supporting operations, and operational technology itself, or can necessitate temporary suspension of operations during an impact assessment. A crucial challenge for pipeline operators is not just to resume operations but to do so safely. Many of the safety assurance and control

systems built into a pipeline system are digital, remote and require electronic communications. Any decision to resume operations requires confidence that doing so will occur and continue safely.

During 2023, there was significant work conducted among the API-LEPA Performance Excellence Team and API Policy Groups related to a new initiative to develop industry-wide guidance for safely restarting and operating pipeline systems after a cyber or all hazard incident. This stems in part from the aftermath of the significant pipeline cybersecurity incident in May 2021 as well as the increased focus on the part of PHMSA and TSA in ensuring pipeline operators across the industry are prepared, and have the necessary procedures in place, to safely return systems to normal operations in the event of a cybersecurity incident. Although initiated to address a cyber incident, the guidance will include recommendations for assessing the impact of the cyber intrusion or all hazard event and an operator's ability to restart and safely operate the pipeline system.

The framework for the guidance document was developed in 2023 and work will continue in 2024, including an industry workshop that captured a diverse set of perspectives from a multi-disciplinary group and identified the scope and outline of the guidance. Based on the workshop, API has elevated the guidance document to a Recommended Practice, and is planning to create a steering group to finalize a scope and eventually form a task group to continue with content development. API envisions this framework to be scalable and flexible, non-prescriptive on operator response actions and risk-based in its approach to decision making.



GOAL  
5

# SAFE AND SUSTAINABLE ENERGY FUTURE

## OBJECTIVE 5.1

### CO<sub>2</sub> PIPELINE TRANSPORTATION AND STORAGE

Over 5,000 miles of carbon dioxide pipelines currently operate in the United States. For over 40 years, pipelines have delivered CO<sub>2</sub> for use in energy, food production and medical applications, as well as the manufacture of products such as refrigerants, foam rubber, fire extinguishers and carbonated beverages. New CO<sub>2</sub> pipeline systems have been proposed and/or are under development to transport CO<sub>2</sub> from carbon capture locations to permanent underground storage sites. The safety record of CO<sub>2</sub> pipelines is strong, with substantially fewer incidents per mile over the last five years than both crude oil and refined products pipelines. Even as the safest method to transport large volumes of CO<sub>2</sub> long distances, opportunities exist to improve CO<sub>2</sub> pipeline-specific best practices around emergency planning and response, integrity management and stakeholder outreach.

In 2023, the API-LEPA Emergency Response Group developed a new [tactical guide](#) to help operators and first responders plan for and respond to CO<sub>2</sub> pipeline incidents. The guide was developed in coordination with

the National Association of State Fire Marshals (NASFM) and has supported the development of first responder CO<sub>2</sub> incident training materials, including an on-line training module operated by the pipeline industry in partnership with NASFM. The tactical guide also assists operators in incorporating topography and atmospheric conditions into incident modeling, as well as provide additional guidance for first responder consideration of surrounding communities. The API Construction and Operations Group and Pipeline Integrity Group formed a Task Group to initiate the development of a Recommended Practice for CO<sub>2</sub> transportation by pipeline, which will provide guidance for design, construction, operation and maintenance of new CO<sub>2</sub> pipelines and the conversion of existing pipelines into CO<sub>2</sub> service. API's CO<sub>2</sub> RP will complement existing standards on transporting CO<sub>2</sub> via pipeline while also filling gaps in those standards that have been identified. Also in 2023, API, LEPA and member companies supported pipeline sector research for CO<sub>2</sub> pipeline service, including participation in industry workshops sponsored through PRCI and PHMSA that were focused on CO<sub>2</sub> pipeline transportation safety. The focus on CO<sub>2</sub> transportation by pipeline is related to the expected publication in 2024 by PHMSA of a Notice of Proposed Rulemaking (NPRM) on improvements to CO<sub>2</sub> pipeline safety regulations, including new regulations for gas phase CO<sub>2</sub> pipelines.

During 2024-2025, API will continue with the development of the RP on CO<sub>2</sub> transportation by pipeline and coordinate with other standards development organizations to integrate existing reference materials on CO<sub>2</sub> pipeline safety into one comprehensive industry

guidance. Additionally, API, LEPA and member companies will support the implementation of research projects by PRCI and PHMSA that address key industry issues related to CO<sub>2</sub> pipeline operations and safety, including an assessment of an appropriate odorant, the effects of low-level constituents within CO<sub>2</sub> sources on pipeline integrity and best practices for preventing fracture propagation in CO<sub>2</sub> pipelines.

## OBJECTIVE 5.2

### LIMIT ENVIRONMENTAL AND COMMUNITY IMPACTS

While America's natural gas and oil companies have a responsibility to deliver the affordable and reliable energy the public needs and wants, we recognize we must also do so sustainably. That means reducing our impact on the environment when possible. API and LEPA members are actively working together to track and improve their sustainability performance while striving for appropriate engagement and transparency with communities and stakeholders. Right-of-way (ROW) conservation programs serve as one way of achieving these goals, providing an integrated and systematic approach to planning, implementing and sustaining ROW land management that is value-driven. The result is enhanced safety, community benefits, operational efficiencies and a healthier ecosystem, while maintaining state and federal regulatory compliance.

In 2023, several ROW conservation projects were initiated by API and LEPA member companies in coordination with local communities, state government, NGOs and academia. Numerous conservation projects are occurring in the field, including in IL, LA, PA, OK, TX, MN and TN. The Team continues to engage federal and state partners while working with academic institutions

and conservation groups. The ROW conservation efforts provide a scalable, adaptable approach that can be systematically applied by operators regardless of locations. API also formed strategic partnerships with Pheasants Forever and Quails Forever to support conservation efforts that promote healthy and sustainable habitats for those species.

In 2024 and beyond, API and LEPA member companies will continue to provide education and advocacy on the benefits of pipeline ROW conservation projects and work with NGOs and academia to further advance the range of applications that should be considered for ROW conservation. Additional ROW conservation projects are expected to be implemented in 2024 as the program continues to gain momentum. Additionally, API is currently building out a project toolkit for member use. API's Conservation Task Force will continue to engage with state and local stakeholder organizations to promote integrated vegetation management. Also through API's Regional Affairs teams, API will work with state legislatures to secure state funds for supporting pipeline ROW conservation programs.

## OBJECTIVE 5.3

### REDUCE EMISSIONS FROM PIPELINES, TANKS AND FACILITIES

With a continuing focus of government agencies, the general public and pipeline operating company boards of directors on methane emission reductions, climate change and ESG reporting, the liquids pipeline industry

is implementing programs to reduce emissions from pipeline systems.

In 2023, the API Hazardous Liquids Sustainability Work Group developed and approved two separate programs, *Energy Efficiency in Operations* and *Maintenance and Integrity*, which are modeled on similar programs being conducted for natural gas operations through [The Environmental Partnership \(TEP\)](#). These two new sustainability programs for hazardous liquid pipelines will capture data on improvements being made to reduce emissions and environmental impacts from pipelines, tanks and facilities operations. Annual reports will be prepared to demonstrate the impacts of the initiative and support ESG reporting for the liquids industry. A number of liquids pipeline operators have committed to participate in the two approved programs. Work was also conducted on a third hazardous liquid sustainability program, *Tank and Pipeline Facility Emission Reductions*, which focuses on reducing emissions at facilities and terminals.

In 2024, pipeline companies participating in TEP will confirm the program reporting parameters for the two approved programs and begin to capture data on improvements to reduce emissions. Efforts will continue in 2024 to increase participation and develop methods of consistent analysis for the first set of annual reports to be issued later this year. Also, the third program addressing emission reduction from tanks and pipeline facilities operations will be finalized and is expected to be approved in early 2024. The program will be rolled out following approval. A key target for liquids pipeline emission reductions is optimizing tank inspections, as work required to conduct tank out-of-service inspections (following API Standard 653) generate significant emissions and waste and are often not needed at the frequency mandated by regulation. In 2024, API and LEPA will work with PHMSA to support the incorporation of the latest edition of API Standard 653, which allows for a risk-based, performance-based approach to tank inspection.





# 2023 PERFORMANCE REPORT

## 2023 PERFORMANCE REPORT

# KEY PERFORMANCE INDICATORS

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

Particularly useful measures of pipeline safety examine incident size, location, commodity and cause. The liquids pipeline industry uses each one of the following measures to better understand pipeline incident trends and develop strategies for improving pipeline safety. As a sign of overall safety performance, the liquids pipeline industry tracks a core set of key performance indicators (KPIs). These KPIs are based primarily on incidents impacting people or the environment. They were created through a recommendation of the U.S. National Transportation Safety Board in a collaborative effort between PHMSA, pipeline operators and public pipeline safety advocates represented by the Pipeline Safety Trust. The pipeline industry tracks its performance with three industrywide KPIs:

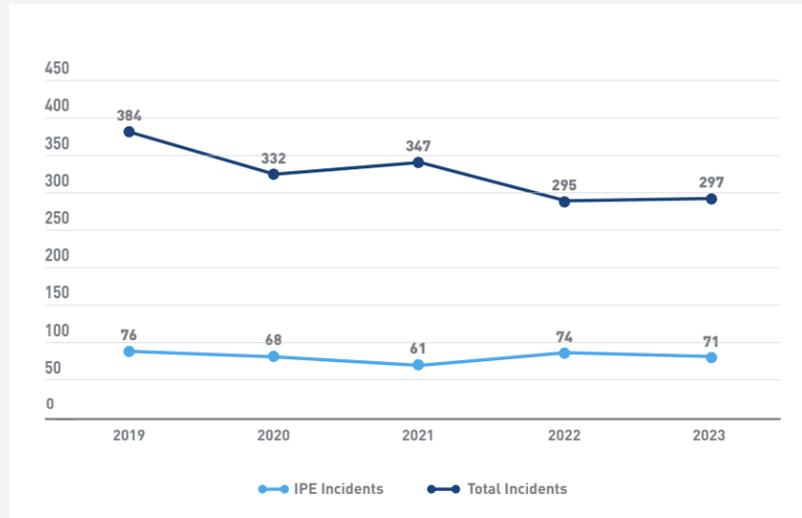
- 1 Total incidents impacting people or the environment
- 2 Integrity management incidents impacting people or the environment
- 3 Operations & maintenance incidents impacting people or the environment

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

# KEY PERFORMANCE INDICATORS

## 1 TOTAL INCIDENTS VS INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT (2019-2023)

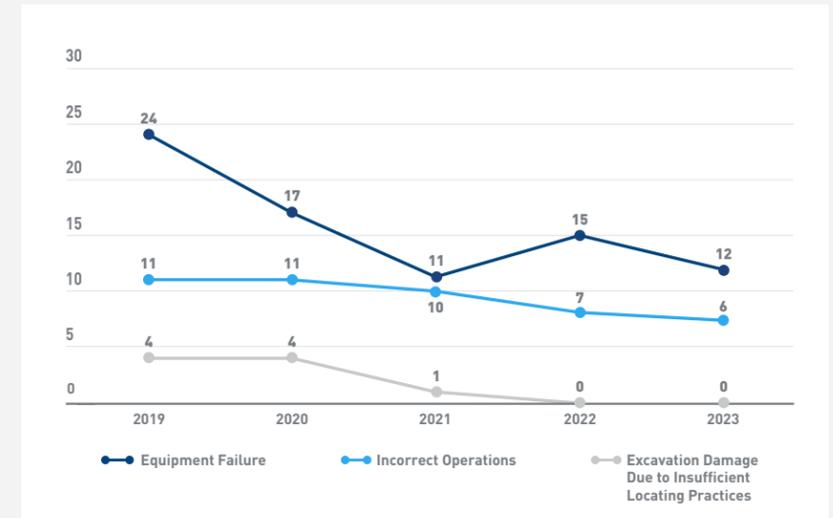
Pipeline incidents impacting people or the environment decreased 7 percent from 2019 to 2023. Total pipeline incidents were down, as well, dropping 23 percent over the last five years, with 87 fewer incidents in 2023 compared to 2019. A full description of the specific types of incidents impacting people or the environment can be found on page 54.



# KEY PERFORMANCE INDICATORS

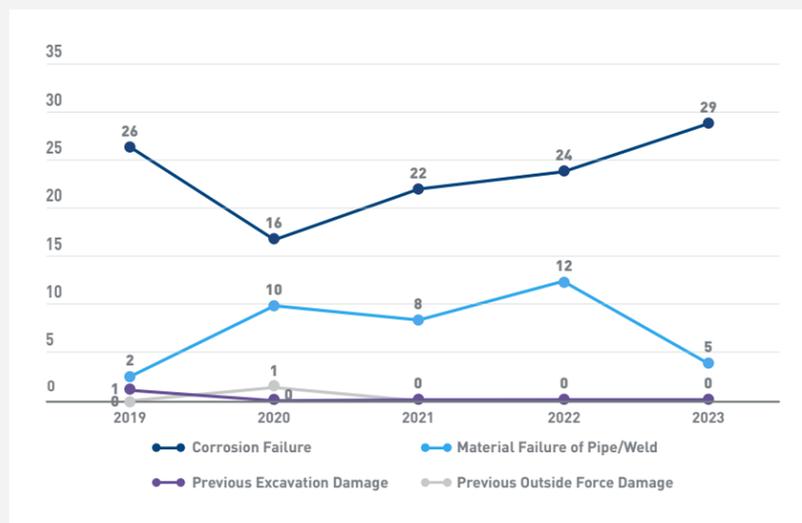
## 3 OPERATIONS & MAINTENANCE INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT (2019-2023)

Incidents related to maintaining pipeline equipment or operating the pipeline and its valves or pumps were down 54 percent over the last five years in areas impacting people or the environment. In these areas, incidents caused by incorrect operation decreased by 45 percent, while equipment failure decreased 50 percent from 2019 to 2023.



## 2 INTEGRITY MANAGEMENT INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT (2019-2023)

Incidents related to the pipeline itself, such as corrosion, cracking or weld failure, were up 17 percent over the last five years in areas impacting people or the environment. Corrosion failures impacting people or the environment were up 12 percent.

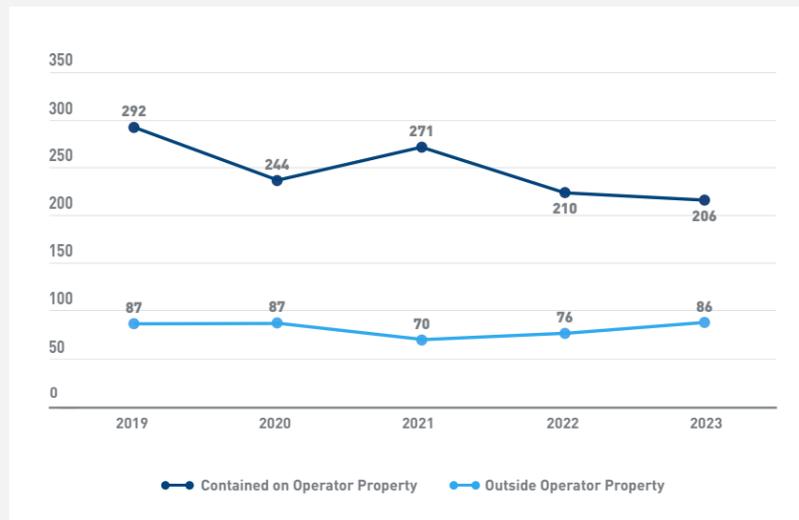


# INCIDENTS BY LOCATION

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

## 4 PIPELINE INCIDENTS INSIDE AND OUTSIDE OPERATOR PROPERTY (2019-2023)

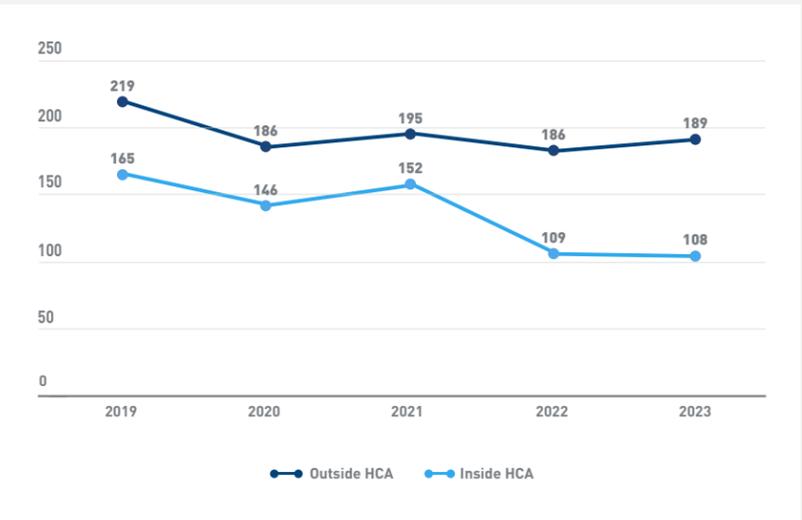
In 2023, 69 percent of incidents from liquids pipelines were contained within an operator’s property. Examples of pipeline operator properties include pump stations, tank farms and terminals. Incidents on operator property decreased 29 percent from 2019 to 2023.



# INCIDENTS BY LOCATION

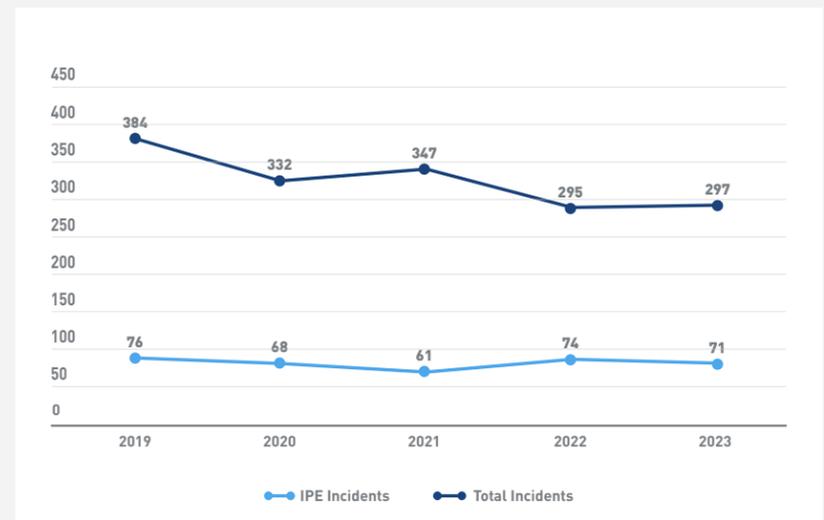
## 5 PIPELINE INCIDENTS INSIDE & OUTSIDE HCAs (2019-2023)

Liquids pipeline incidents occurring in high consequence areas (HCAs) declined 35 percent over the last five years. Through federal regulation, PHMSA defines HCAs as areas of population concentration, commercially navigable waterways or sensitive environmental locations. HCA data differs from incidents impacting people or the environment because, under PHMSA regulation, an incident can have no impact on people or the environment, remain wholly within an operator’s facility and still count as an HCA if that facility is surrounded by an HCA.



## 6 TOTAL INCIDENTS VS INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT (2019-2023)

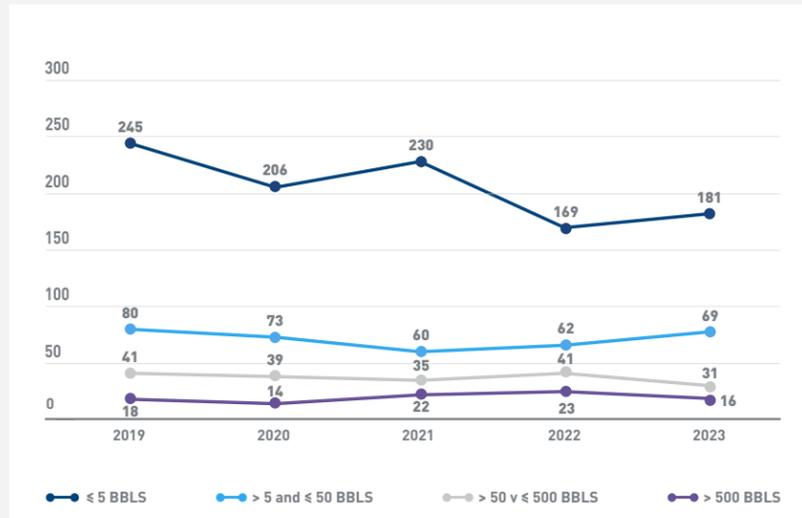
Pipeline incidents impacting people or the environment decreased 7 percent over the last five years. Total pipeline incidents were down, as well, dropping 23 percent over five years, with 87 fewer incidents in 2023 compared to 2019. A full description of the specific types of incidents impacting people or the environment can be found on page 54.



# INCIDENTS BY SIZE

## 7 LIQUIDS PIPELINE INCIDENTS BY SIZE (2019-2023)

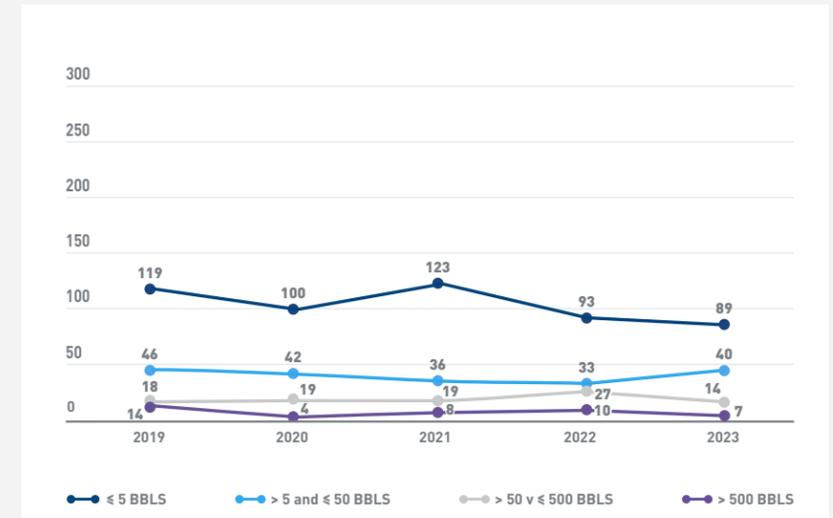
Most pipeline incidents are small. In 2023, 61 percent of incidents were less than five barrels and 84 percent were less than 50 barrels. Large pipeline incidents are also the rarest. In 2023, only 5 percent of incidents were 500 barrels or larger, and these large incidents are down 11 percent over the last five years.



# INCIDENTS BY SIZE

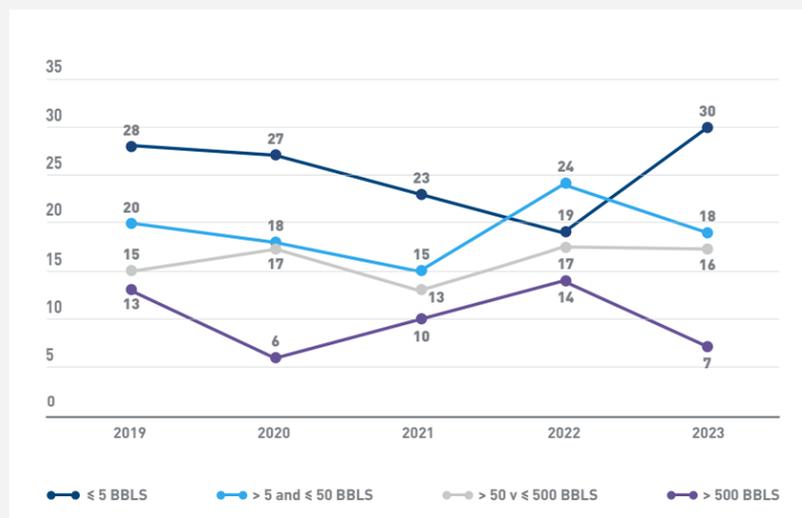
## 9 CRUDE OIL INCIDENTS BY SIZE (2019-2023)

Similar to total incident trends, the majority of crude oil pipeline incidents are small in size. In 2023, 59 percent of crude oil incidents were five barrels or smaller and 86 percent of crude oil incidents were smaller than 50 barrels. Over the last five years, only 5 percent of crude oil incidents were over 500 barrels. Large crude oil releases are down 50 percent since 2019.



## 8 INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT BY SIZE (2019-2023)

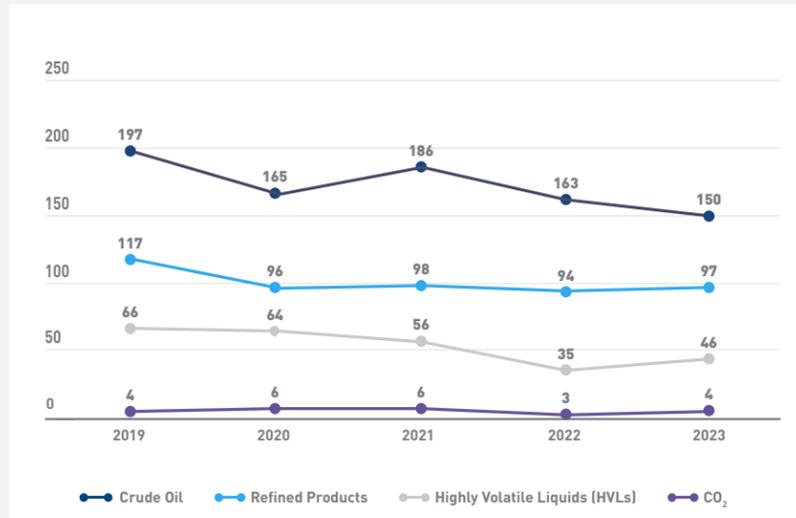
Most incidents impacting people or the environment are small. In 2023, approximately 68 percent of such incidents were less than 50 barrels, with only 10 percent of incidents impacting people or the environment 500 barrels or larger. Large incidents impacting people or the environment are down 46 percent over the last five years.



# INCIDENTS BY COMMODITY

## 10 ALL INCIDENTS BY COMMODITY (2019-2023)

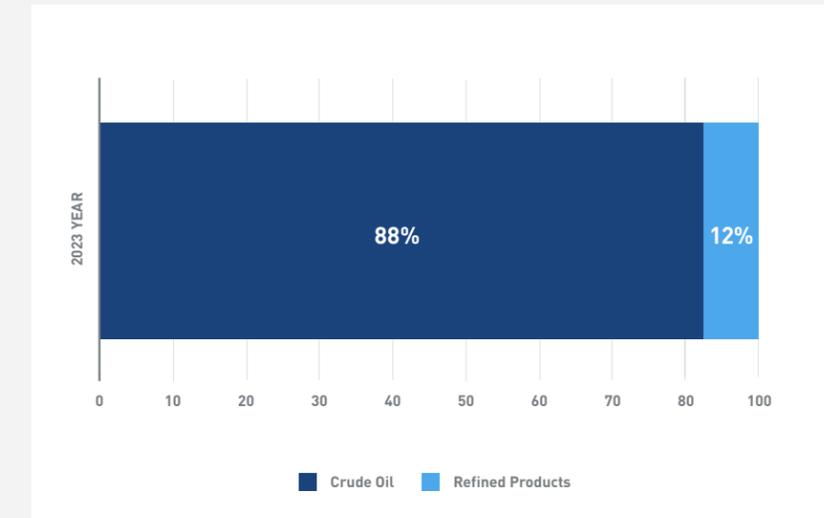
In 2023, crude oil incidents represented 51 percent of total incidents, with refined products at 33 percent and natural gas liquids at 15 percent of total incidents. The number of annual crude oil incidents is down 24 percent from 2019. Carbon dioxide pipeline incidents represented 1 percent of total liquids pipeline incidents in 2023.



# INCIDENTS BY COMMODITY

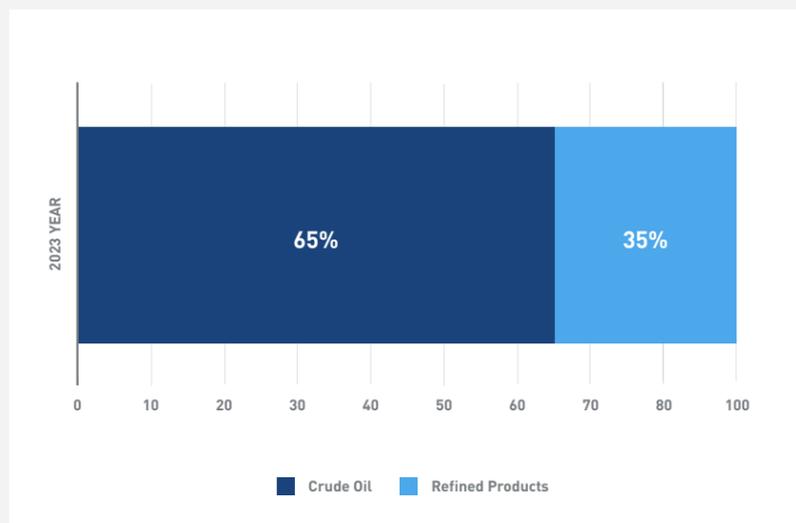
## 12 PERCENT OF BARRELS RELEASED IMPACTING PEOPLE OR THE ENVIRONMENT BY COMMODITY (2023)

Crude oil incidents impacting people or the environment in 2023 represented 88 percent of the total, with refined products reflecting 12 percent of released barrels from liquids pipelines.



## 11 TOTAL INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT BY COMMODITY (2023)

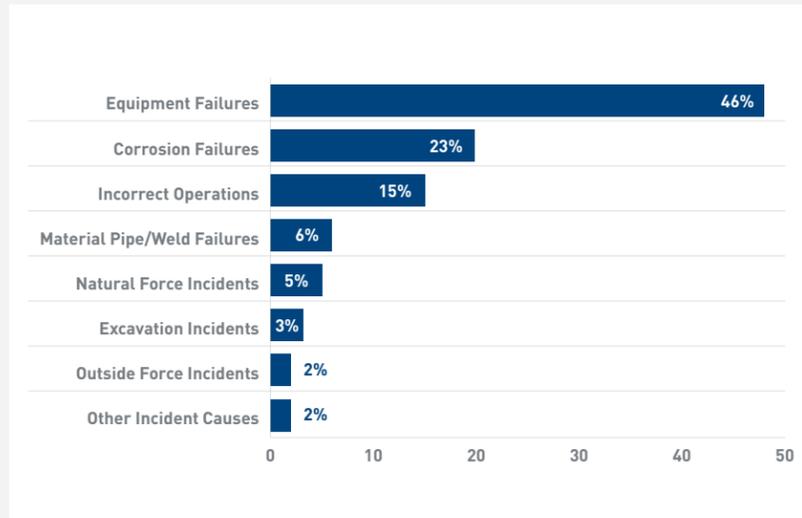
In 2023, there were 46 crude oil incidents (65 percent) and 25 refined products incidents (35 percent) impacting people or the environment.



# INCIDENTS BY CAUSE

## 13 LIQUIDS PIPELINE INCIDENTS BY CAUSE (2019-2023)

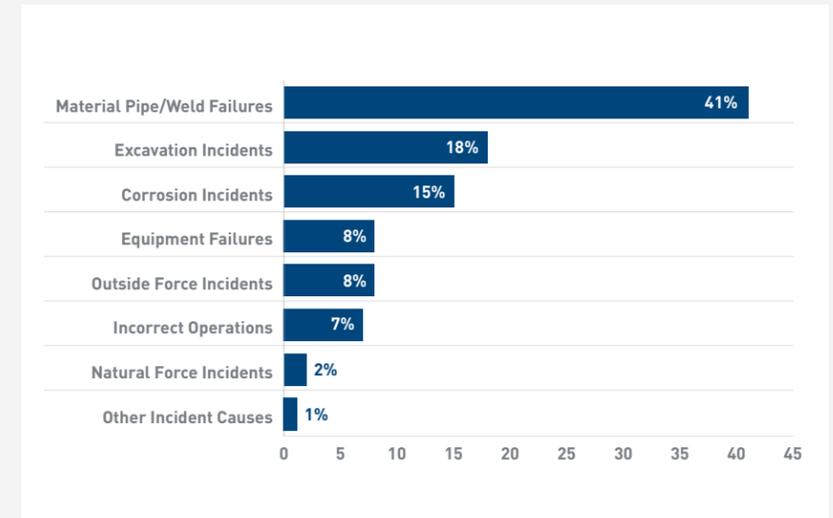
Equipment failures is the most frequent cause of all liquids pipeline incidents. Over the last five years, equipment failures represented 46 percent of incidents, corrosion failures 23 percent and incorrect operation 15 percent. Material pipe/weld failures, which include cracking, a primary source of large volume releases, represented only 6 percent of incidents since 2019.



# INCIDENTS BY CAUSE

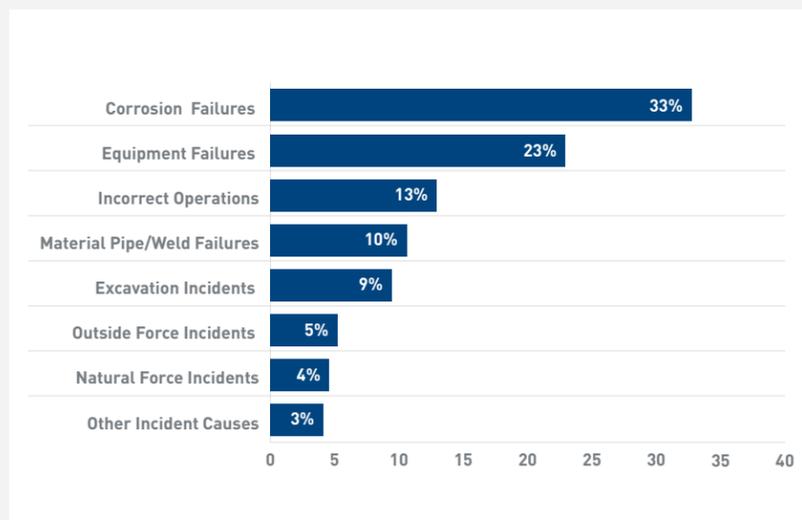
## 15 PERCENT OF BARRELS RELEASED IMPACTING PEOPLE OR THE ENVIRONMENT BY CAUSE (2019-2023)

Material pipe/weld failures (41 percent) were responsible for the most barrels released in incidents impacting people or the environment, followed by excavation incidents (18 percent) and corrosion failures (15 percent).



## 14 TOTAL INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT BY CAUSE (2019-2023)

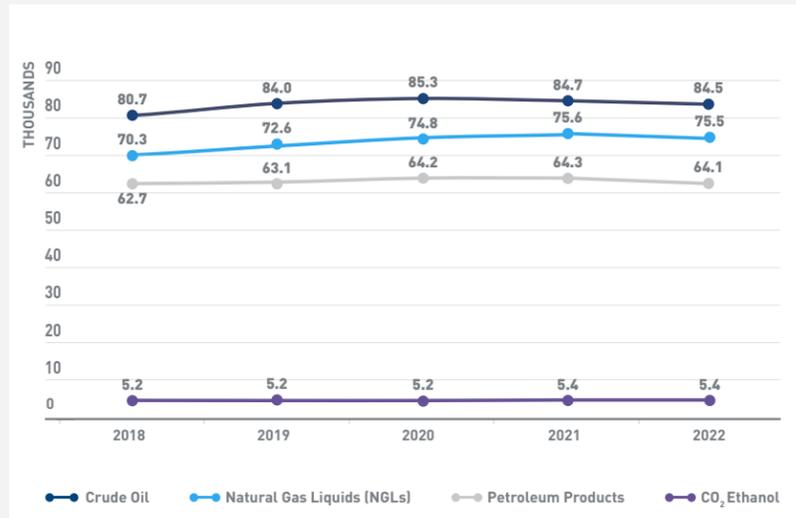
Over the last five years, corrosion failures (33 percent) were the most frequent cause of incidents impacting people or the environment, followed by equipment failures (23 percent), incorrect operation (13 percent) and material pipe/weld failures (10 percent).



# PIPELINE MILES AND BARRELS DELIVERED

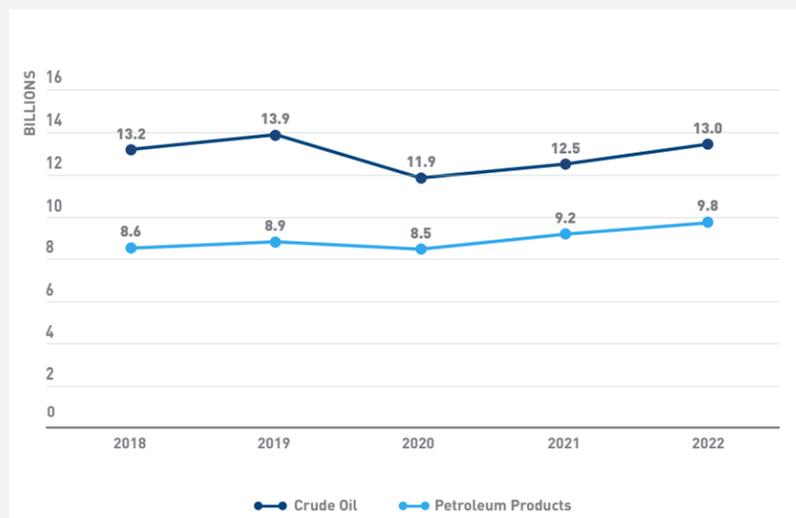
## 16 MILES OF U.S. PIPELINE BY PRODUCTS (2018-2022) (thousands)

At the end of 2022 (the most recent year this data is available), there were 229,463 total miles of liquids pipelines, with crude oil pipelines representing 37 percent of the total at 84,508 miles, refined products at 28 percent (64,095 miles) and natural gas liquids reflecting 33 percent (75,456 miles). Total liquids pipeline mileage is up 5 percent over the last five years, with crude oil pipeline mileage rising 5 percent and natural gas liquid mileage increasing by 7 percent between 2018 and 2022.



## 17 BARRELS DELIVERED BY U.S. PIPELINE (2018-2022) (billions)

In 2022, there were a total of 22.8 billion crude oil and refined products barrels delivered by pipeline, with crude oil representing approximately 57 percent of the barrels delivered and refined products 43 percent of the barrels delivered. Total barrels delivered reflect a 5 percent increase from 2018.



DATA TABLES

# KEY PERFORMANCE INDICATORS

1 TOTAL INCIDENTS VS INCIDENTS IMPACTING PEOPLE AND THE ENVIRONMENT (2019-2023)			
YEAR	IPE INCIDENTS	NON-IPE INCIDENTS	TOTAL INCIDENTS
2019	76	308	384
2020	68	264	332
2021	61	286	347
2022	74	221	295
2023	71	226	297
<b>Total Releases</b>	<b>350</b>	<b>1305</b>	<b>1655</b>
<b>% Change Since 2019</b>	<b>-7%</b>	<b>-27%</b>	<b>-23%</b>

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety, March 2024

2 INTEGRITY MANAGEMENT INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT (2019-2023)					
YEAR	CORROSION FAILURE	MATERIAL FAILURE OF PIPE/WELD	PREVIOUS EXCAVATION DAMAGE	PREVIOUS OUTSIDE FORCE DAMAGE	TOTAL INCIDENTS
2019	26	2	1	0	29
2020	16	10	0	1	27
2021	22	8	0	0	30
2022	24	12	0	0	36
2023	29	5	0	0	34
<b>Total Releases</b>	<b>117</b>	<b>37</b>	<b>1</b>	<b>1</b>	<b>156</b>
<b>% Change Since 2019</b>	<b>12%</b>	<b>150%</b>	<b>-</b>	<b>-</b>	<b>17 %</b>

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety, March 2024

DATA TABLES

# KEY PERFORMANCE INDICATORS

3 OPERATIONS AND MAINTENANCE INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT (2019-2023)				
YEAR	EQUIPMENT FAILURE	INCORRECT OPERATION	EXCAVATION DAMAGE DUE TO INSUFFICIENT LOCATING PRACTICES	TOTAL INCIDENTS
2019	24	11	4	39
2020	17	11	4	32
2021	11	10	1	22
2022	15	7	0	22
2023	12	6	0	18
<b>Total Releases</b>	<b>79</b>	<b>45</b>	<b>9</b>	<b>133</b>
<b>% Change Since 2019</b>	<b>-50%</b>	<b>-45%</b>	<b>-100%</b>	<b>-54%</b>

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety, March 2024

# INCIDENTS BY LOCATION

4 PIPELINE INCIDENTS INSIDE AND OUTSIDE OF OPERATOR PROPERTY (2019-2023)				
YEAR	OUTSIDE OPERATOR PROPERTY	CONTAINED ON OPERATOR PROPERTY	OFFSHORE	TOTAL INCIDENTS
2019	87	292	5	384
2020	87	244	1	332
2021	70	271	6	347
2022	76	210	9	295
2023	86	206	5	297
<b>Total</b>	<b>406</b>	<b>1223</b>	<b>26</b>	<b>1655</b>
<b>% Change Since 2019</b>	<b>-1%</b>	<b>-29%</b>	<b>0%</b>	<b>-23%</b>

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety, March 2024

DATA TABLES

# INCIDENTS BY LOCATION

5 PIPELINE INCIDENTS INSIDE AND OUTSIDE HCAS (2019-2023)			
YEAR	OUTSIDE HCA	INSIDE HCA	TOTAL INCIDENTS
2019	219	165	384
2020	186	146	332
2021	195	152	347
2022	186	109	295
2023	189	108	297
<b>Total Releases</b>	<b>975</b>	<b>680</b>	<b>1655</b>
<b>% Change Since 2019</b>	<b>-14%</b>	<b>-35%</b>	<b>-23%</b>

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety, March 2024

6 TOTAL INCIDENTS VS INCIDENTS IMPACTING PEOPLE AND THE ENVIRONMENT (2019-2023)			
YEAR	IPE INCIDENTS	NON-IPE INCIDENTS	TOTAL INCIDENTS
2019	76	308	384
2020	68	264	332
2021	61	286	347
2022	74	221	295
2023	71	226	297
<b>Total Releases</b>	<b>350</b>	<b>1305</b>	<b>1655</b>
<b>% Change Since 2019</b>	<b>-7%</b>	<b>-27%</b>	<b>-23%</b>

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety, March 2024

DATA TABLES

# INCIDENTS BY SIZE

7 LIQUID PIPELINE INCIDENTS BY SIZE (2019-2023)					
YEAR	≤ 5 BBLS	> 5 AND ≤ 50 BBLS	> 50 AND ≤ 500 BBLS	> 500 BBLS	TOTAL INCIDENTS
2019	245	80	41	18	384
2020	206	73	39	14	332
2021	230	60	35	22	347
2022	169	62	41	23	295
2023	181	69	31	16	297
<b>Total Releases</b>	<b>1031</b>	<b>344</b>	<b>187</b>	<b>93</b>	<b>1655</b>
<b>% Change Since 2019</b>	<b>-26%</b>	<b>-14%</b>	<b>-24%</b>	<b>-11%</b>	<b>-23%</b>

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety, March 2024

8 INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT BY SIZE (2019-2023)					
YEAR	≤ 5 BBLS	> 5 AND ≤ 50 BBLS	> 50 AND ≤ 500 BBLS	> 500 BBLS	TOTAL INCIDENTS
2019	28	20	15	13	76
2020	27	18	17	6	68
2021	23	15	13	10	61
2022	19	24	17	14	74
2023	30	18	16	7	71
<b>Total Releases</b>	<b>127</b>	<b>95</b>	<b>78</b>	<b>50</b>	<b>350</b>
<b>% Change Since 2019</b>	<b>7%</b>	<b>-10%</b>	<b>7%</b>	<b>-46%</b>	<b>-7%</b>

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety, March 2024

DATA TABLES

# INCIDENTS BY SIZE

9 CRUDE OIL INCIDENTS BY SIZE (2019-2023)					
YEAR	≤ 5 BBLS	> 5 AND ≤ 50 BBLS	> 50 AND ≤ 500 BBLS	> 500 BBLS	TOTAL INCIDENTS
2019	119	46	18	14	197
2020	100	42	19	4	165
2021	123	36	19	8	186
2022	93	33	27	10	163
2023	89	40	14	7	150
<b>Total Releases</b>	<b>524</b>	<b>197</b>	<b>97</b>	<b>43</b>	<b>861</b>
<b>% Change Since 2019</b>	<b>-25%</b>	<b>-13%</b>	<b>-22%</b>	<b>-50%</b>	<b>-24%</b>

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety, March 2024

# INCIDENTS BY COMMODITY

10 ALL INCIDENTS BY COMMODITY (2019-2023)						
YEAR	CRUDE OIL	REFINED PRODUCTS	HIGHLY VOLATILE LIQUIDS (HVLS)	CO <sub>2</sub>	BIOFUEL/ETHANOL	TOTAL INCIDENTS
2019	197	117	66	4	0	384
2020	165	96	64	6	1	332
2021	186	98	56	6	1	347
2022	163	94	35	3	0	295
2023	150	97	46	4	0	297
<b>Total Incidents</b>	<b>861</b>	<b>502</b>	<b>267</b>	<b>23</b>	<b>2</b>	<b>1655</b>
<b>% Change Since 2019</b>	<b>-24%</b>	<b>-17%</b>	<b>-30%</b>	<b>0%</b>	<b>-</b>	<b>-23%</b>

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety, March 2024

DATA TABLES

# INCIDENTS BY COMMODITY

11 TOTAL INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT BY COMMODITY (2019-2023)			
YEAR	CRUDE OIL	REFINED PRODUCTS	BIOFUEL/ETHANOL
2019	51	25	0
2020	36	31	1
2021	36	24	1
2022	56	18	0
2023	46	25	0
<b>Total Incidents</b>	<b>225</b>	<b>123</b>	<b>2</b>
<b>% Change Since 2019</b>	<b>-10%</b>	<b>0%</b>	<b>-</b>

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety, March 2024

12 PERCENT OF BARRELS RELEASED IMPACTING PEOPLE OR THE ENVIRONMENT BY COMMODITY (2023)		
YEAR	CRUDE OIL	REFINED PRODUCTS
2019	70%	30%
2020	10%	90%
2021	55%	45%
2022	87%	13%
2023	88%	12%
<b>% Change Since 2019</b>	<b>18%</b>	<b>-18%</b>

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety, March 2024

DATA TABLES

# INCIDENTS BY CAUSE

## 13 LIQUID PIPELINE INCIDENTS BY CAUSE (2019-2023)

CAUSE	TOTAL INCIDENTS	PERCENTAGE
Equipment Failures	756	46%
Corrosion Failures	377	23%
Incorrect Operations	243	15%
Material Pipe/Weld Failures	94	6%
Natural Force Incidents	77	5%
Excavation Incidents	42	3%
Outside Force Incidents	34	2%
Other Incident Causes	32	2%
<b>Total</b>	<b>1655</b>	<b>100%</b>

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety, March 2024

## 14 TOTAL INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT BY CAUSE (2019-2023)

CAUSE	TOTAL INCIDENTS	PERCENTAGE
Corrosion Failures	116	33%
Equipment Failures	79	23%
Incorrect Operations	45	13%
Material Pipe/Weld Failures	36	10%
Excavation Incidents	31	9%
Outside Force Incidents	18	5%
Natural Force Incidents	13	4%
Other Incident Causes	12	3%
<b>Total</b>	<b>350</b>	<b>100%</b>

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety, March 2024

DATA TABLES

# INCIDENTS BY CAUSE

## 15 BARRELS RELEASED IMPACTING PEOPLE OR THE ENVIRONMENT BY CAUSE (2019-2023)

CAUSE	BARRELS RELEASED	PERCENTAGE
Material Pipe/Weld Failures	84,400	41%
Excavation Incidents	37,982	18%
Corrosion Failures	30,728	15%
Equipment Failures	17,355	8%
Outside Force Incidents	15,905	8%
Incorrect Operations	13,974	7%
Natural Force Incidents	4,918	2%
Other Incident Causes	1,593	1%
<b>Total</b>	<b>206,855</b>	<b>100%</b>

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety, March 2024

**DATA TABLES**

# PIPELINE MILES AND BARRELS DELIVERED

**16** MILES OF U.S. PIPELINE BY PRODUCT (2018-2022)

	2018	2019	2020	2021	2022
Crude Oil	80,741	84,015	85,307	84,776	84,508
Petroleum Products	62,720	63,117	64,187	64,313	64,095
Natural Gas Liquids (NGLs)	70,269	72,632	74,794	75,613	75,456
CO <sub>2</sub> /Ethanol	5,221	5,164	5,167	5,355	5,403
<b>Total Miles</b>	<b>218,951</b>	<b>224,928</b>	<b>229,454</b>	<b>230,057</b>	<b>229,463</b>

Source: Pipeline and Hazardous Materials Safety Administration, PHMSA Pipeline Safety, March 2024

**17** BARRELS DELIVERED BY U.S. PIPELINE (2018-2022)

	2018	2019	2020	2021	2022
Crude Oil	13,235,435,698	13,935,745,435	11,874,328,801	12,531,034,346	13,021,837,140
Petroleum Products	8,558,867,781	8,856,466,147	8,509,216,644	9,215,504,691	9,818,936,330
<b>Total Barrels</b>	<b>21,794,303,479</b>	<b>22,792,211,582</b>	<b>20,383,545,445</b>	<b>21,746,539,037</b>	<b>22,840,773,470</b>

Source: U.S. Federal Energy Regulatory Commission



## APPENDIX

# DEFINITIONS & NOTES

### BARRELS

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

### BARRELS RELEASED

PHMSA requires operators to report intentional releases of natural gas liquids in gas form into the atmosphere during maintenance activities. Unintentionally released barrels of crude oil and petroleum products form the basis of “barrels released” data and analysis in this report. This process displaces residual hydrocarbons in gas state from the section of pipeline set to undergo maintenance. Barrels released data in this report does not include intentional blowdown releases.

### IN-LINE INSPECTION DEVICE, OR “SMART PIG”

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

### NATURAL GAS LIQUIDS

Petroleum products that are liquids when traveling through a pipeline under high pressure and gases at atmospheric pressure are generally referred to 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 crude oil and natural gas after production and sent to manufacturers (ethane, butane) as an industrial raw material to produce consumer goods such as polymers, fertilizers and home goods, or for other commercial, agricultural or residential uses (propane).

### INCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT (IPE) CRITERIA

If the criteria in either tier below is met for a crude oil or refined products pipeline, the incident counts as IPE:

**TIER 1:** Regardless of location of incident: fatality; injury requiring inpatient hospitalization; ignition; explosion; evacuation; wildlife impact; water contamination (ocean/seawater, groundwater or drinking water); or public/ non-operator private property damage.

**TIER 2:** For location of incident “not totally contained on operator-controlled property”: unintentional release volume greater than or equal to five gallons and in an HCA; unintentional release volume greater than or equal to five barrels and outside of an HCA; water contamination; or soil contamination.

### PHMSA INCIDENT REPORTING

Pipeline operators regulated by PHMSA are required to report data related to pipeline incidents, including location, cause and consequences. PHMSA compiles this information in a publicly available online database. The pipeline safety data used in this report was obtained from PHMSA in March 2024.

### RECOMMENDED PRACTICE

Documents that communicate proven industry practices. RPs may include both mandatory and nonmandatory provisions.

### REFINED PRODUCTS

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

### CRUDE OIL

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





**FOR MORE INFORMATION, CONTACT:**

John Stoody at [Jstoody@Liquidenergypipelines.org](mailto:Jstoody@Liquidenergypipelines.org)

Sam Minifie at [Minifies@Api.org](mailto:Minifies@Api.org)