OPERATOR ADVISORY **REISSUE**

REPORTING OIL PIPELINE RELEASES THAT IMPACT PEOPLE OR THE ENVIRONMENT, AND IN HIGH CONSEQUENCE AREAS

OVERVIEW

The petroleum pipeline industry has undertaken a voluntary performance tracking initiative, recording detailed information about spills and releases with their causes and consequences. Industry members of the American Petroleum Institute and the Association of Oil Pipe Lines believe that tracking and learning from spills will improve performance, thus demonstrating the industry's firm commitment to safety and environmental protection. The advisory bulletin utilizes information collected by PHMSA's accident report form to analyze the leading causes of accidents impacting people and the environment (IPEs) as well as spills reaching high consequence areas (HCAs), and provide recommendations for industry operators. This advisory is intended to provide operators with key findings related to HCA and IPE incidents and guidance on prevention of future incidents on pipeline systems.

KEY FINDINGS:

- IPE criteria are more appropriate than PHMSA's significant definitions for identifying the most impactful Crude, Refined Products, and Biofuel events.
- PHMSA tracks and publicly reports IPE accident rates for Hazardous Liquid Operators.
- Company reporting consistency is important when determining the most accurate responses to IPE related accident report questions such as whether soil or water was contaminated.

INTRODUCTION:

- A look at the National Performance Measures on PHMSA's website shows three different descriptive terms of Liquid Pipeline incidents; Significant Incidents, Serious Incidents, and Incidents impacting People or the Environment (IPE). While significant and serious incidents are established terms of looking at the accident data, they have been problematic in capturing the essence of pipeline safety and its impact on the public.
- In 2017, criteria for releases Impacting People or the Environment (IPE) were created via discussions between PHMSA's Office of Pipeline Safety (PHMSA), the Pipeline Safety Trust (PST), the American Petroleum Institute (API), and the Association of Oil Pipe Lines (AOPL). These new criteria use a subset of the questions answered in previously reported incidents to classify the releases as IPE or more specifically, Integrity Assessment-related or Operations and Maintenance-related IPEs. Since IPE classification is determined using multiple, specific criteria related to an incident, consistency, and awareness of those factors in incident reporting is becoming increasingly relevant.
- Understanding the impact of pipeline releases on people and the environment is crucial to understanding the industry's success in meeting the intent of the pipeline safety regulations, the effectiveness of the regulations, and in understanding if and how the regulations may need improvement. Guidance in PHMSA reporting that is directly related to IPE criteria may lead to inconsistent information being reported. This paper, while not suggesting any further guidance, is meant to raise awareness regarding the IPE classification process as it currently exists in the HL accident report form.

For further information on IPEs and discussion from PHMSA, visit PHMSA's National Pipeline Performance Measures.

TO LEARN MORE VISIT US:
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American Petroleum Institute

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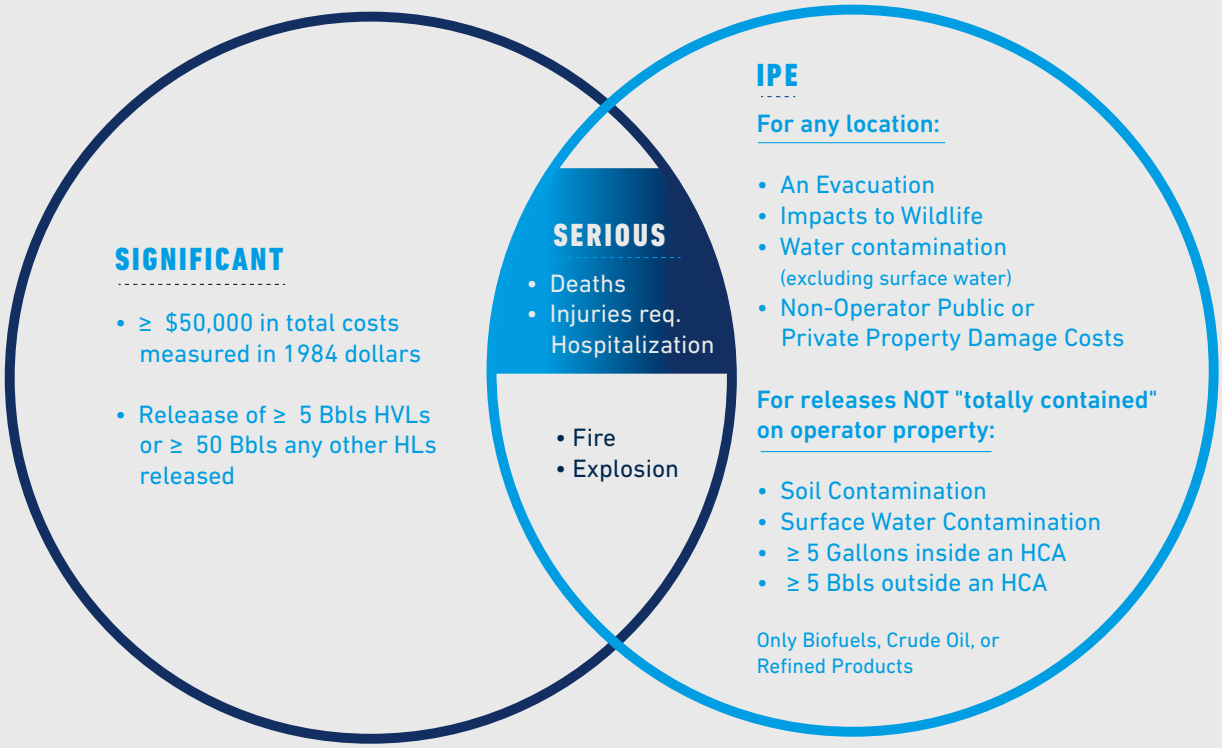
NEW FOCUS ON MEANINGFUL METRICS (IMPACTS TO THE PUBLIC AND ENVIRONMENT-IPE)

The Significant and Serious Incident categories were introduced around 2005 as a way for PHMSA to focus on incidents that had noteworthy consequences. Significant incidents include fatalities and injuries requiring in-patient hospitalizations plus $50,000 or more in total costs, measured in 1984 dollars, plus Highly Volatile Liquids (HVL) releases of 5 barrels or more, or other hazardous liquid releases of 50 barrels or more, and releases resulting in an unintentional fire or explosion.

However, the cost criterion included in the significant incident criteria skews the number of reportable releases due to increased repair costs for pipelines. The $50,000 dollar total costs is based in 1984 dollars and captures all costs associated with the release including public/private property damages, environmental cleanup costs, and repair costs. The Serious incident category is a subset of the Significant incidents and only includes releases with fatalities and injuries requiring hospitalization. The Venn diagram below lists all the criterion for each incident category.

FIGURE 1. PHMSA INCIDENT CATEGORY CRITERIA VENN DIAGRAM



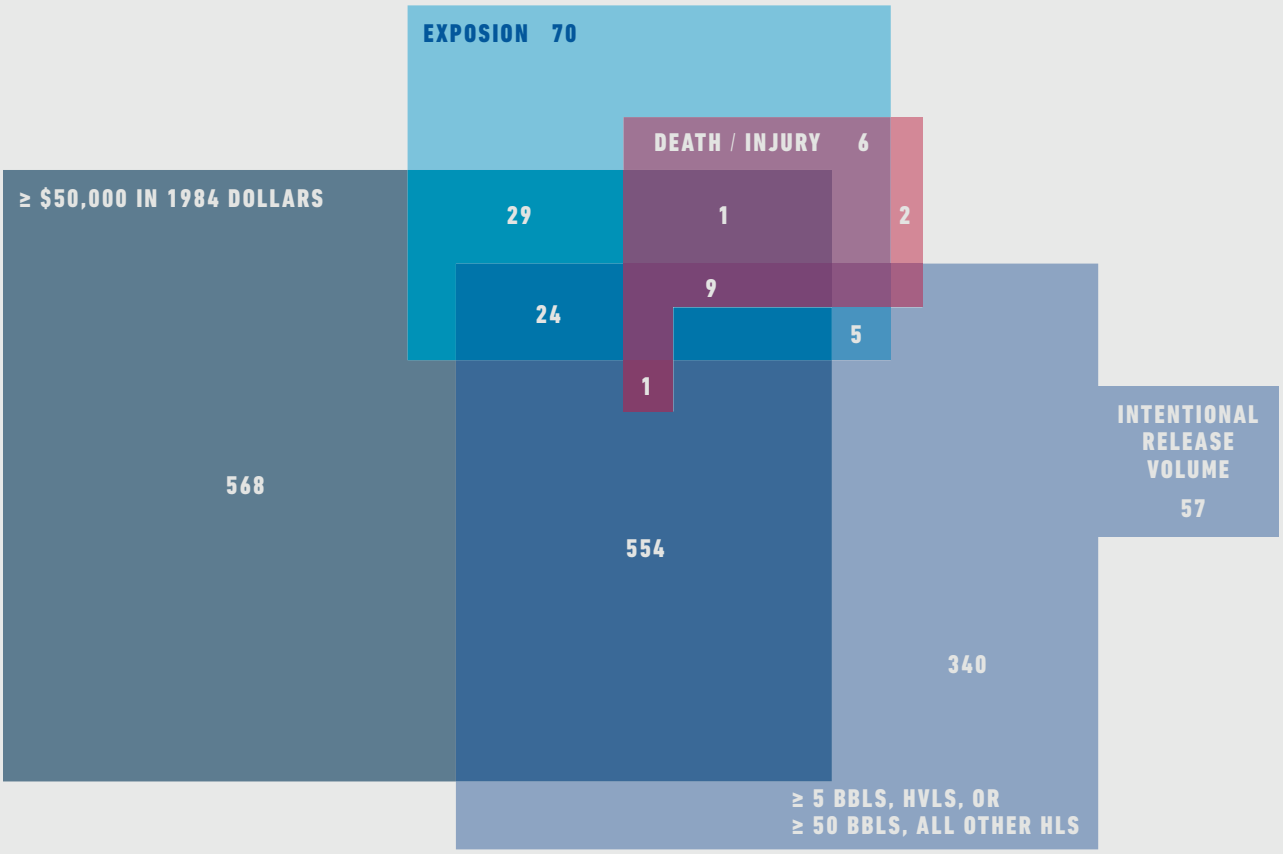
PHMSA has since collaborated with other organizations to better pinpoint incidents that actually impact people and the environment, thus the IPE category was developed throughout 2016 and formally adopted in 2017.

INCIDENTS QUALIFYING AS SIGNIFICANT DID NOT FREQUENTLY IMPACT PEOPLE OR THE ENVIRONMENT.

In the 11 year period of 2010-2020, 568 out of 1,666 incidents were labeled as Significant based on meeting only the cost criterion, while 397 incidents met only the volume criterion. These incidents did not meet any other Significant incident criteria. The volume criterion is problematic because it does not differentiate between spills within facilities which are totally contained on operator property, and spills that left the operator's property.

More importantly, Significant incidents include volumes released both unintentionally and intentionally. In addition to these Significant unintentional releases, there were also 57 intentional CO2 and HVL releases that met the volume criterion. Although the Significant incident category was intended to capture incidents that had greater consequences than others, they do not measure impacts and include many incidents that had no impact on people or the environment. The IPE criteria, therefore, are meant to measure impacts to people and environment in a transparent and easily quantifiable manner, a move towards more meaningful metrics.

FIGURE 2. 2010-2020 SIGNICANT INCIDENTS BY CRITERIA MET (1,666 INCIDENTS)



INCIDENTS THAT OCCUR IN OR REACH HCAS DO NOT NECESSARILY IMPACT PEOPLE OR THE ENVIRONMENT.

49 CFR 195.452 requires that operators have an Integrity Management Program that has a process to identify which pipeline segments and facilities are located within a high consequence area or could affect high consequence areas. High Consequence Areas (HCAs) are polygons or defined geographic areas set by PHMSA or the Operator's Integrity Management Program.

What is a High Consequence Area?

A High Consequence Area Means:

(1) A *commercially navigable waterway*, which means a waterway where a substantial likelihood of commercial navigation exists.

(2) A *high population area*, which means an urbanized area, as defined, and delineated by the Census Bureau, that contains 50,000 or more people and has a population density of at least 1,000 people per square mile.

What is a High Consequence Area?

A High Consequence Area Means:

(3) An *other populated area*, which means a place, as defined, and delineated by the Census Bureau, that contains a concentrated population, such as an incorporated or unincorporated city, town, village, or other designated residential or commercial area.

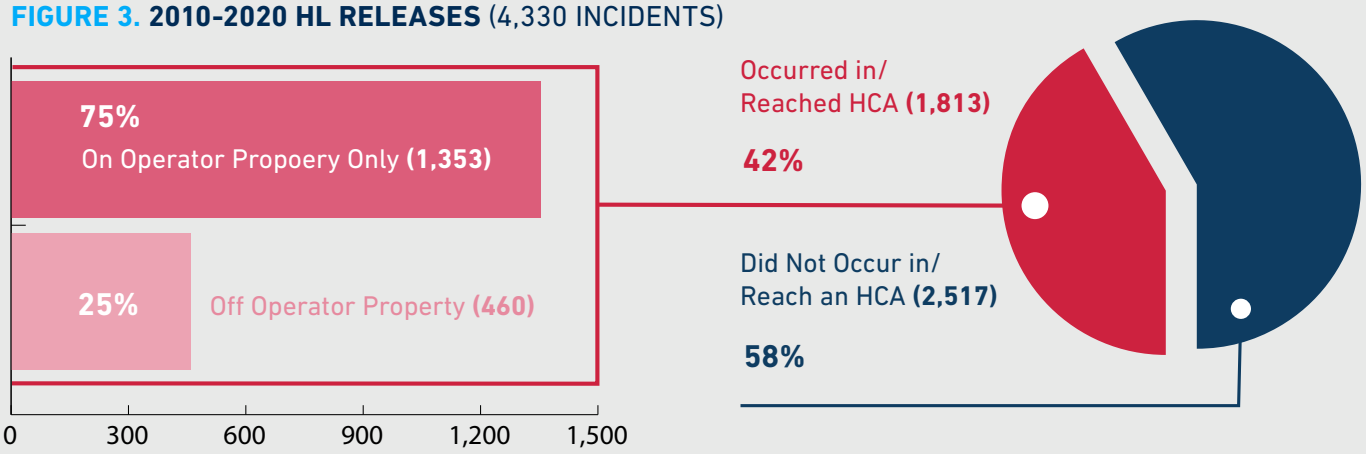
(4) An *unusually sensitive area*, as defined in § 195.6.

There are three parts to the HCA questions in the PHMSA accident report: a) did the release occur on a segment or facility that had been identified as one that could affect an HCA segment, b) did the release's spill zone actually occur in or reach an HCA, and c) if it occurred in or reached an HCA, what type of HCA and had the operator previously identified the potential for reaching that HCA in their IM program.

When looking at the number of accidents that impact or have the potential to affect the public, it is important to note that releases occurring in or reaching HCAs are poor indicators of actual impacts. A review of the PHMSA hazardous liquid release data indicates that most releases occurring in or reaching HCA(s) do not impact the HCA(s). It is also important to note that an HCA is not an Environmentally Sensitive Area as defined by the EPA. In fact, HCAs are focused primarily upon geography or spill zone.

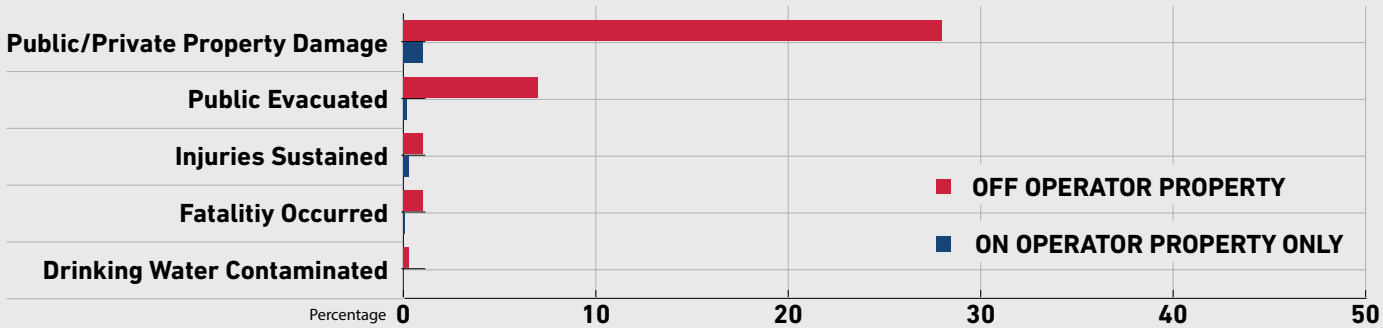
One of the reasons to move away from looking at accidents that occur in or reach HCAs is that 42% of releases occur inside of an HCA. 75% of these incidents are totally contained on operator-controlled property, and thus are reported as HCA because the facility or pipeline is inside an HCA, but they do not actually impact the HCA. The chart below shows the percent of releases occurring in or reaching an HCA and whether the spill was contained on operator property.

FIGURE 3. 2010-2020 HL RELEASES (4,330 INCIDENTS)



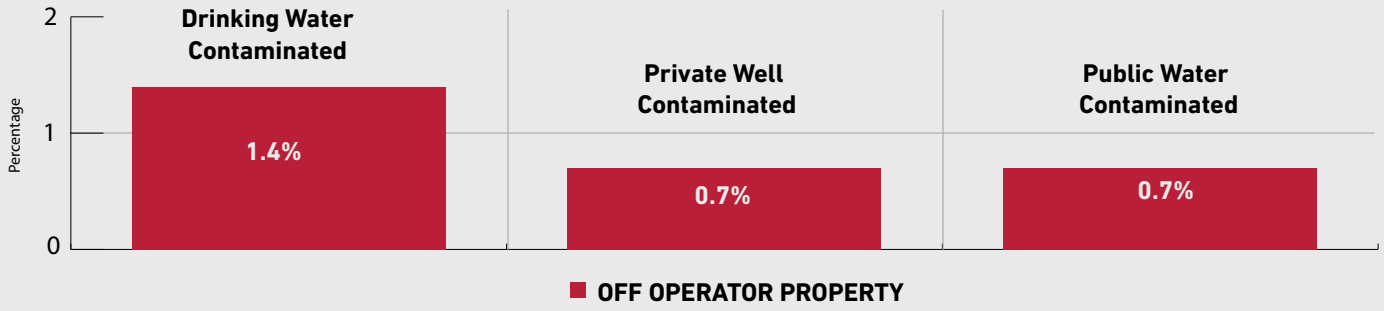
The following charts show the number of releases that occurred in or reached each HCA type and their impacts. The numbers may not add up to 100% because more than one impact can be selected per incident.

FIGURE 4. 2010-2020 IMPACTS FROM RELEASES OCCURRING IN/REACHINGA HIGH/OTHER POPULATION HCA (1,490)



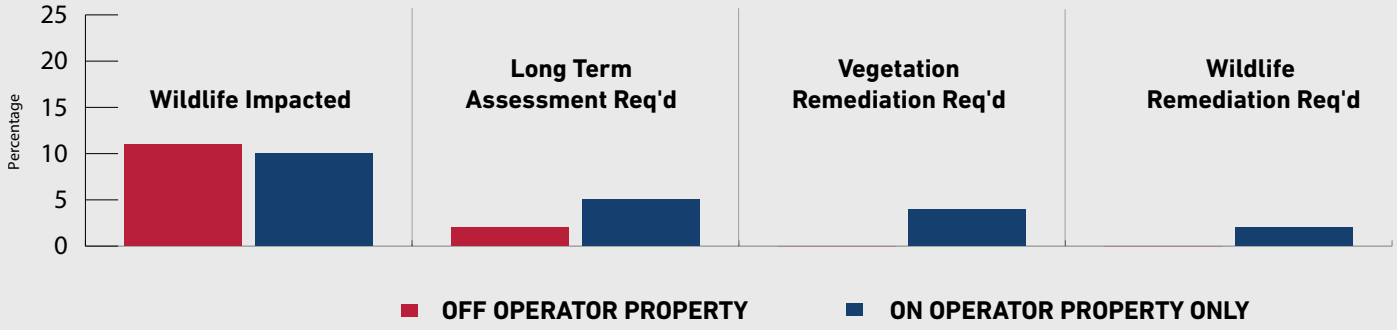
Out of the 1,813 incidents reaching HCAs, 1,490 incidents occurred in or reached a High Population or Other Population HCA. Approximately 92% of those had no impact to the public or the environment. Less than 1% involved injuries or fatalities or had any impact to public drinking water.

FIGURE 5. 2010-2020 IMPACTS FROM RELEASES OCCURING IN/REACHING A DRINKING WATER USA (555)



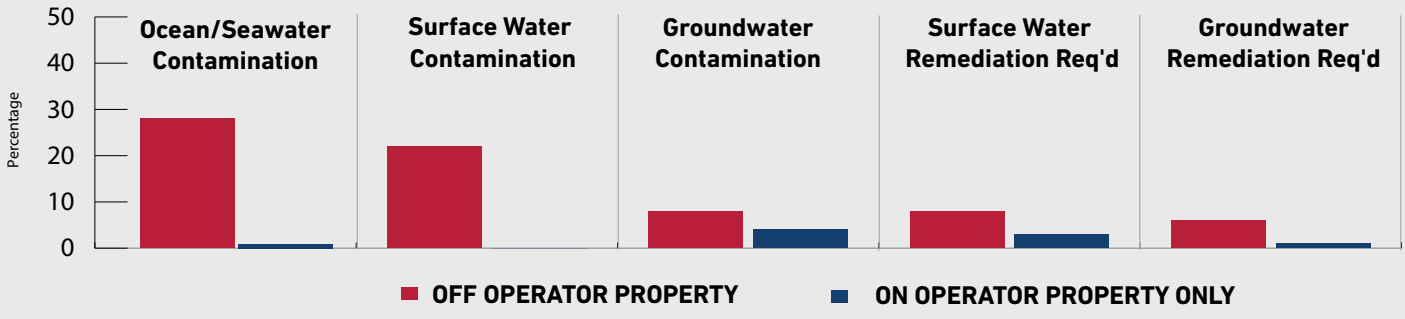
Out of the 1,813 incidents reaching HCAs, 555 incidents occurred in or reached a USA – Drinking Water. 99.6% of them had no impact to the public or the environment. Less than 0.5% of the incidents contaminated public drinking water or private well water.

FIGURE 6. 2010-2020 IMPACTS FROM RELEASES OCCURING IN/REACHING AN ECOLOGICAL USA (385)



Out of the 1,813 incidents reaching HCAs, 385 incidents occurred in or reached a USA - Ecological. Approximately 87% of them had no impact to the public or the environment. Less than 5% impacted wildlife (fish, birds, terrestrial).

FIGURE 7. 2010-2020 IMPACTS FROM RELEASES OCCURING IN/REACHING A COMMERCIALLY NAVIGABLE WATERWAY



Out of the 1,813 incidents reaching HCAs, 151 incidents occurred in or reached a Commercially Navigable Waterway. Approximately 83% of them had no impact to the public or the environment. Less than 19% impacted Ocean/ Seawater, Surface Water, or Groundwater. Less than 8% of the incidents required remediation.

INTEGRITY MANAGEMENT PROGRAMS IDENTIFY "COULD AFFECT" HCA AREAS

The following table shows the percentage of releases by HCA "could affects", whether Operators identified the release as occurring in a "could affect" area, whether that release reached an HCA, and if any of these releases reached an HCA without being appropriately identified as in a "could affect" area by the Operator prior to the release. 98% of the time, releases do not affect an HCA or are accurately identified by operators as "Could Affect". The most commonly unidentified HCA areas were Population HCAs and Drinking Water HCAs.

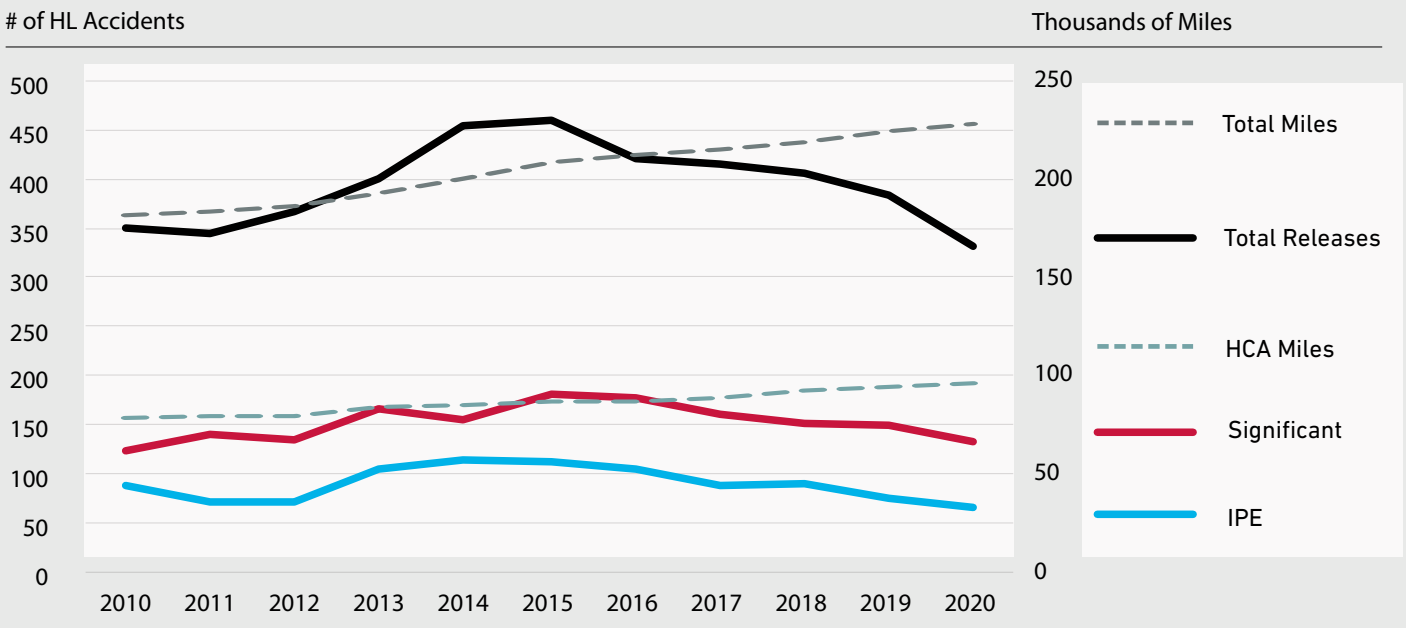
FIGURE 8. 2010-2020 HL RELEASES & HCAs

		Release Occurred in/ Reached HCA	
		YES	NO
Location Previously Identified as a **"Could Affect"** Area	YES	40.7%	14.3%
	NO	1.2%	43.8%

Operator "could-affect" models tend to be conservative, but a small percentage (1.2%) of spills reach or affect HCAs from pipeline segments that were not previously identified as "could-affect". Operators should continue to refine their "could-affect" models and continue to look for HCAs of which they are not currently aware.

TRENDS IN SIGNIFICANT INCIDENTS AND RELEASES IMPACTING PEOPLE AND THE ENVIRONMENT

FIGURE 9. SIGNIFICANT & IPE RELEASES



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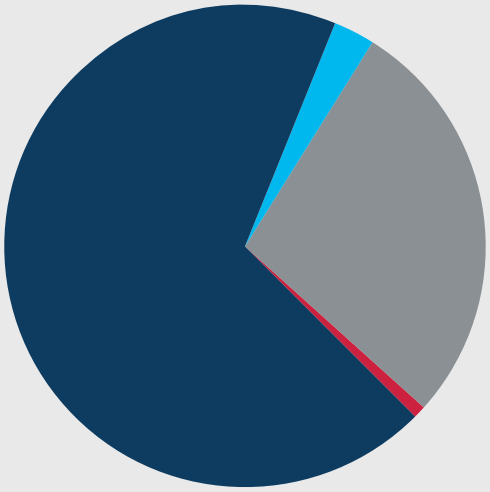
In the last 11 years, the number of hazardous liquid pipeline miles has risen by 26% while the number of total releases has decreased by 4% to 335 incidents in 2020. Similarly, while the number of miles being built within HCAs has risen by 22%, the number of significant incidents has slightly risen by a rate of 0.58 incidents per thousand miles, the number of incidents affecting people and the environment has dropped to a rate of 0.45 incidents per thousand miles.

The following pie charts show IPE releases in categories by causes related to either Integrity Management or Operations and Maintenance. Most IPE releases in the former category are due to corrosion and material failures of pipe or welds.

FIGURE 10. 2010-2020 INTEGRITY-RELATED IPES (423 INCIDENTS)



69% CORROSION FAILURE

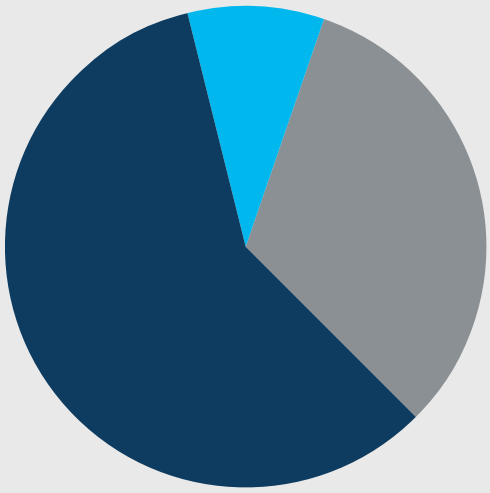
3% PREVIOUS EXCAVATION

27% MATERIAL FAILURE OF PIPE OR WELD

1% PREVIOUS OUTSIDE FORCE

Operations and Maintenance-related IPE releases are typically caused by equipment failures or incorrect operations. Excavation damage in this category includes first and second party damages as well as third part damages where locating practices were not sufficient.

FIGURE 11. 2010-2020 OPERATIONS & MAINTENANCE-RELATED IPES (379 INCIDENTS)



59% EQUIPMENT FAILURE

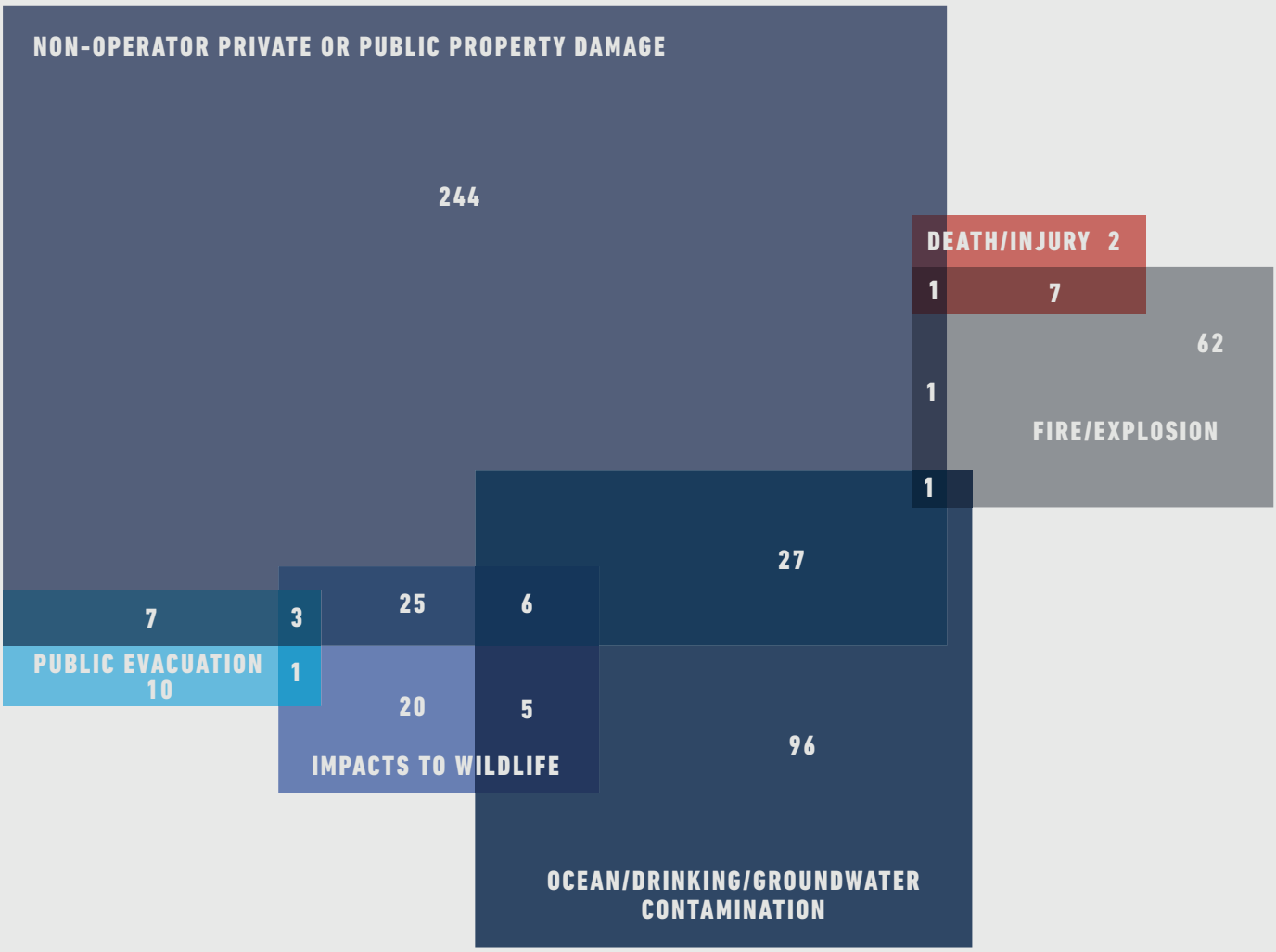
9% OPERATOR CAUSED EXCAVATION DAMAGE

32% INCORRECT OPERATION

VENN DIAGRAM OF ALL IPE INCIDENTS

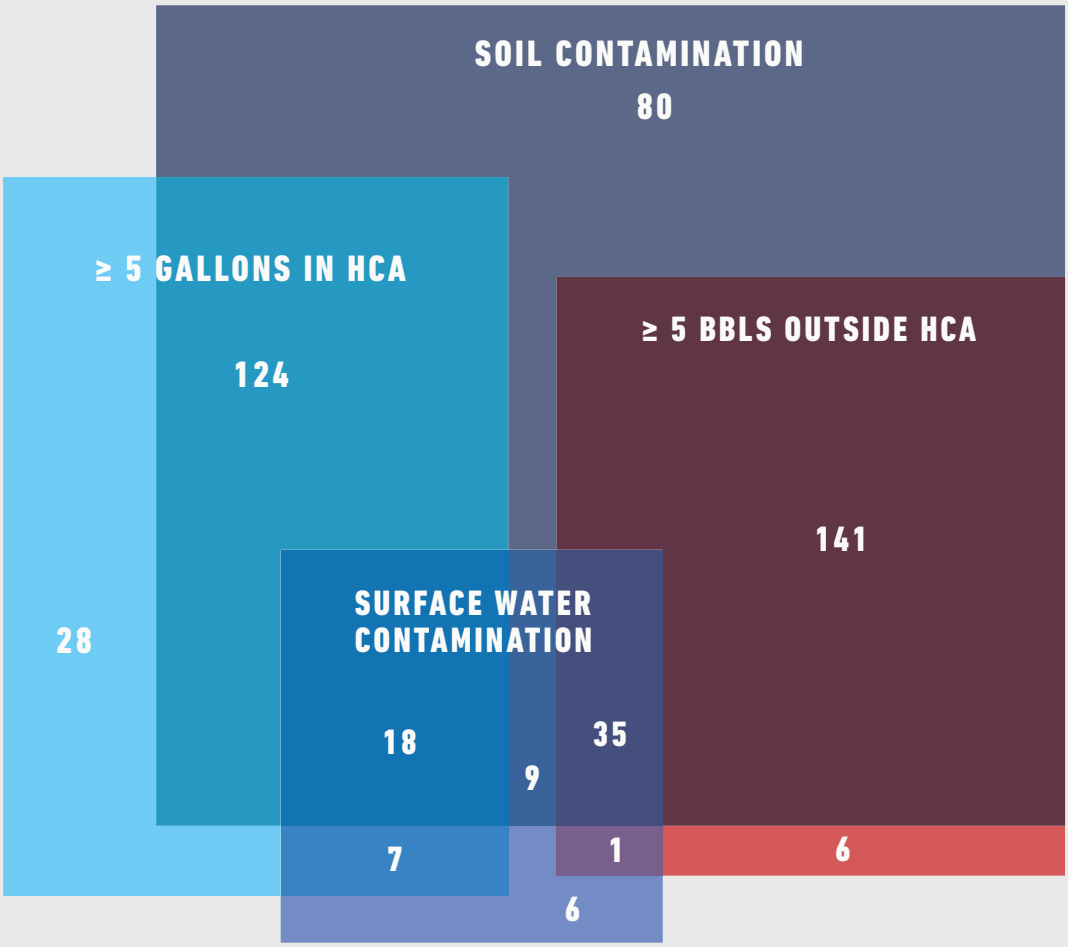
Non-operator, private or public property damage costs criterion was most often singly met for category 1 IPE releases. Private or public property damages may include physical damage to the property of others, the cost of environmental investigation and remediation of a site, laboratory costs, third party expenses such as engineers or scientists, and other reasonable costs, for a site not owned or operated by the operator. According to the instructions accompanying the PHMSA accident report form, these costs **should not** include any litigation or legal expenses related to the accident.

FIGURE 12. 2010-2020 CATEGORY 1 IPE RELEASES MEETING EACH CRITERIA (524)



Soil contamination is the most common single criterion met by the category 2 IPE releases. However, more often than not, the soil contamination and either volume criteria are met together. There are no guidelines provided for what soil volume, or remediation requirements constitute soil contamination in the PHMSA hazardous liquid accident instructions, leading operators to use their own guidelines when indicating soil contamination.

FIGURE 13. 2010-2020 CATEGORY 2 IPE RELEASES MEETING EACH CRITERIA (455)



33% of all IPE releases meet only one criterion, which is either soil contamination or private property damage costs.

89% of all category 2 IPE releases were reported to have contaminated soil.

17% of all category 2 IPE releases were reported to have contaminated surface water.

57% of the volume categories did not result in either a fire/explosion, injuries or fatalities, public evacuations, public or private property damage, and impacts to wildlife.

Impacting People and the Environment (IPE) is a more relevant criteria to identify the most impactful incidents for hazardous liquids pipelines than the "Significant" criteria. Approximately 18% of category 2 IPE incidents met the soil contamination criteria, without triggering any other criteria. For spills to soil not meeting any other criteria, consider the requirements for remediation when determining if the soil contamination criteria were met.

For determining if surface and ground water have been contaminated, consider the applicable guidelines for environmental quality and remediation.

APPENDIX A:

WHAT ARE ACCIDENTS IMPACTING PEOPLE OR THE ENVIRONMENT (IPE)?

A Crude Oil, Refined Products, or Biofuel release is classified as an IPE release if either criterion 1 or 2 below is met:

1. Regardless of Location of Accident (B10)

If any is true

- A fatality (A12),
- An Injury requiring in-patient hospitalization (A13),
- A fire (A15),
- An Explosion (A16),
- A member of the general public evacuated (A17),
- Wildlife impacted (D1),
- Ocean/Seawater, Groundwater, or Drinking Water contaminated (D5a),
- Public/Non-Operator Private Property was damaged (D8a)

2. If Location of Accident (B10) is not "TOTALLY CONTAINED ON OPERATOR CONTROLLED PROPERTY" and any of the below is true:

- Unintentional Release Volume >= to 5 gallons (A9) **AND** the release occurred in or reached an HCA (D7),
- Unintentional Release Volume >= to 5 barrels (A9) **AND** the release did not occur in or reach an HCA (D7),
- Surface Water contaminated (D5a),
- Soil contaminated (D2)

IPE commodities tend to remain liquid upon release from a pipeline system whereas Highly volatile liquids and carbon dioxide vaporize upon release and thus are excluded from the performance measures.

For more on IPEs, see PHMSA's link for Crude Oil/Refined Petroleum/Biofuel Pipeline Performance Measures, Accidents Impacting People, or the Environment.

Visit us at: https://www.phmsa.dot.gov/data-and-statistics/pipeline/national-pipeline-performance-measures