
Office of Inspector General

Audit Report

HAZARDOUS LIQUID PIPELINE OPERATORS' INTEGRITY MANAGEMENT PROGRAMS NEED MORE RIGOROUS PHMSA OVERSIGHT

Pipeline and Hazardous Materials Safety Administration

Report Number: AV-2012-140

Date Issued: June 18, 2012





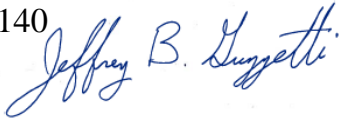
Memorandum

**U.S. Department of
Transportation**

Office of the Secretary
of Transportation
Office of Inspector General

Subject: **ACTION:** Hazardous Liquid Pipeline Operators' Integrity Management Programs Need More Rigorous PHMSA Oversight Pipelines and Hazardous Materials Safety Administration
Report No. AV-2012-140

Date: June 18, 2012

From: Jeffrey B. Guzzetti 
Assistant Inspector General
for Aviation and Special Program Audits

Reply to
Attn. of: JA-10

To: Pipeline and Hazardous Materials Safety Administrator

Every day, 175,000 miles of pipelines transport crude oil, refined petroleum products, and other hazardous liquids throughout the United States. These pipelines can be vulnerable to accidents caused by corrosion, pipe defects, and other factors. Between 2005 and 2010, 356 significant accidents that were IM-detectable¹ occurred, resulting in 6 deaths, 11 injuries, and \$852 million in clean-up costs. This includes an Enbridge spill in Marshall, MI, in July 2010 that resulted in \$550 million in damages.²

In 2001, the Pipeline and Hazardous Materials Safety Administration (PHMSA) issued the Hazardous Liquid Integrity Management (IM) rule to require pipeline operators to maintain IM programs. Such programs include plans, processes, and procedures aimed at reducing the likelihood and severity of accidents in High Consequence Areas (HCAs).³

¹ PHMSA defines "IM-detectable" as significant accidents that are caused by internal corrosion, pipe seam welds, and other factors that are potentially detectable by integrity assessments under the hazardous liquid IM rule. The definition also includes accidents with unknown causes.

² In May 2012, Enbridge filed a report with the Securities and Exchange Commission indicating that its previous Marshall spill clean-up estimate may increase by 40 percent for a total of about \$765 million. The accident is currently under investigation by the National Transportation Safety Board.

³ HCAs include unusually sensitive areas (defined as drinking water or ecological resource areas), urbanized and other populated places, and commercially navigable waterways. Approximately 77,000 miles (44 percent) of the Nation's pipelines are located in HCAs.

Given the significant public and environmental impact of pipeline accidents, we initiated this audit to assess the effectiveness of PHMSA's oversight of hazardous liquid pipeline operators' IM programs. Specifically, we assessed PHMSA's (1) inspection and enforcement activities, (2) requirements for non-line pipe facilities (e.g., valves, pump and meter stations, and storage tanks), and (3) data management and analysis capabilities.

We conducted the audit in accordance with generally accepted Government auditing standards prescribed by the Comptroller General of the United States. Exhibit A details our audit scope and methodology. Exhibit B lists the organizations we visited or contacted.

RESULTS IN BRIEF

PHMSA's inspection and enforcement program has accomplished much, but still faces multiple challenges that impact the Agency's oversight of operators' IM programs. Since the passing of the IM rule, PHMSA has inspected all pipeline operators at least once and operators have identified and repaired more than 35,000 defects over the last 10 years. However, PHMSA has recently accumulated a backlog of IM inspections, caused in part by the Agency redirecting resources to fulfill other inspection requirements. To address this issue, PHMSA plans to eliminate its 5-year periodic IM inspection goal and transition to an integrated risk-based inspection process by 2013. While this decision may allow PHMSA to conduct inspections more effectively, its success depends on the Agency's ability to implement other ongoing inspection planning initiatives. In addition, PHMSA does not perform sufficient onsite visits to hazardous liquid pipelines and facilities—whether in the form of field inspections or accident investigations—thereby missing important opportunities to identify and correct weaknesses in operator IM programs. Finally, the declining number of IM inspections may impact PHMSA's ability to enforce program requirements.

PHMSA's oversight of non-line pipe facilities (which include valves, pump and meter stations, and storage tanks) is limited by less rigorous IM requirements. Even though facilities account for more than half of all hazardous liquid accidents, PHMSA does not require regular and consistent operator assessments of these facilities. In contrast, IM regulations require operators to assess their line pipe once every 5 years. PHMSA's requirements for facilities are less rigorous, because at the time the Agency drafted its IM requirements in 2000, the existing assessment technologies were of little benefit when inspecting such facilities (e.g., the assessment tools were not compatible with non-line pipe facilities). Instead, operators used other preventative and mitigative procedures, such as visual inspections and containment barriers. However, despite recent technological advances, PHMSA has not updated its IM requirements for non-line pipe facilities.

PHMSA has not resolved long-standing data management deficiencies or established meaningful analysis capabilities to improve its oversight. These deficiencies were previously identified by both the Government Accountability Office (GAO) and OIG in 2002 and 2006, respectively.⁴ While PHMSA has established a corrective action plan,⁵ the plan does not go far enough. First, shortcomings in PHMSA's data management and quality limit the usefulness of operator accident and annual reports in identifying pipeline safety risks. For example, PHMSA's plan does not include a data quality check to prevent operators from erroneously submitting the same annual report data from one year to the next. Second, PHMSA does not have a program for systematically analyzing data to identify hazardous liquid pipeline safety and accident trends. While PHMSA's corrective action plan does cite the need for establishing such a program (i.e., an "agenda for regular data analysis"), the Agency has yet to complete this effort. Third, the Agency lacks the capability to identify high-risk pipelines by linking accidents, oversight actions, and pipeline characteristics to their geographic location. While PHMSA has begun developing such a system, it will take years and additional resources to implement. Finally, PHMSA has not established performance measures for assessing the IM program's effectiveness. Instead, the Agency focuses on overall pipeline safety measures (e.g., number of fatalities and injuries) that provide no feedback on the IM program's impact. As a result, PHMSA is unable to fully gauge whether IM is having a positive effect on safety.

We are making several recommendations to improve PHMSA's oversight of the IM programs for hazardous liquid pipeline operators.

BACKGROUND

In December 2000, PHMSA issued the hazardous liquid IM rule,⁶ which requires pipeline operators to develop programs to assess, evaluate, and mitigate risks to their pipelines in or potentially affecting HCAs. Operator IM programs must include such elements as identifying pipelines affecting HCAs, conducting baseline and periodic re-assessments of those pipelines, identifying and repairing integrity threats, and measuring program effectiveness. Since the IM rule took effect, operators with pipelines that could affect HCAs have inspected their pipelines using methods such as in-line inspection (ILI) tools⁷ (i.e., "smart pigs").

⁴ GAO Report No. GAO-02-785, "PIPELINE SAFETY AND SECURITY: Improved Workforce Planning and Communication Needed," August 2002; and OIG Report No. AV-2006-071, "Integrity Threats To Hazardous Liquid Pipelines," September 18, 2006. OIG reports are available on our Web site at <http://www.oig.dot.gov/>.

⁵ PHMSA, Office of Pipeline Safety "Data Quality and Analysis Improvement Plan," Version 2, November 2009.

⁶ 49 CFR 195.452 (2001), "Pipeline Integrity Management in High Consequence Areas," went into effect on March 31, 2001. Although initially pertaining to large operators with 500 or more miles of hazardous liquid pipelines, the rule was expanded to include small operators with less than 500 miles of pipeline starting February 15, 2002.

⁷ In-line inspection tools examine the condition of a pipe-line and detect pipeline anomalies due to corrosion or pipe defects. They are inserted into the pipeline and are pushed along by the flowing product.

Moreover, operators have identified and repaired more than 35,000 pipeline defects that had the potential to become leaks in HCAs.

PHMSA also initiated an inspection program in 2002 to oversee hazardous liquid pipeline operators' IM programs. PHMSA and its 15 State partners⁸ follow inspection protocols designed to examine the development and implementation of an operator's IM program. However, the Agency's IM inspection program represents only one of many regulatory oversight responsibilities for both Federal and State inspectors who must also perform inspections of pipeline construction, operators' programs (e.g., operations and maintenance and operator qualifications), and several other types of specialized inspections.

In August 2002, the GAO issued a report that examined PHMSA's approach to IM and found that PHMSA had experienced a number of problems with data completeness and accuracy.⁹ GAO stated that the Agency's accident reporting form contained too few causal categories, so that about 25 percent were "unknown." The Agency implemented several initiatives to enhance data quality, including increasing the number of causal categories on the accident reporting form. In September 2006, we issued a report on integrity threats to hazardous liquid pipelines.¹⁰ We found that operator annual reports contained inaccurate information on the number of "integrity threats" (i.e., defects), which hampered PHMSA's ability to analyze threat data, identify important trends, and focus limited inspection resources on areas of greatest concern. PHMSA addressed the problem by issuing new reporting guidelines to pipeline operators and directed IM inspectors to verify operator threat data.

INSPECTION AND ENFORCEMENT CHALLENGES LIMIT PHMSA'S ABILITY TO OVERSEE OPERATOR IM PROGRAMS

PHMSA's inspection and enforcement program faces multiple challenges that impact the Agency's oversight of operators' IM programs. Specifically, PHMSA has not met its IM inspection goals and has accumulated a backlog of IM inspections. To address this, PHMSA plans to transition to an integrated risk-based inspection process by 2013. However, a number of ongoing issues with the Agency's databases and risk analysis models may constrain this new inspection approach. In addition, PHMSA is missing potential opportunities to identify IM program weaknesses through field visits. Finally, with fewer IM inspections,

⁸ PHMSA has delegated inspection and enforcement authority to 15 State partners. These partners provide approximately 75 percent of the total inspector workforce (100 Federal and about 300 State). We will conduct a review of PHMSA's oversight of State partners in another audit beginning in 2012.

⁹ GAO Report No. GAO-02-785, "PIPELINE SAFETY AND SECURITY: Improved Workforce Planning and Communication Needed," August 2002.

¹⁰ OIG Report No. AV-2006-071, "Integrity Threats To Hazardous Liquid Pipelines," September 18, 2006.

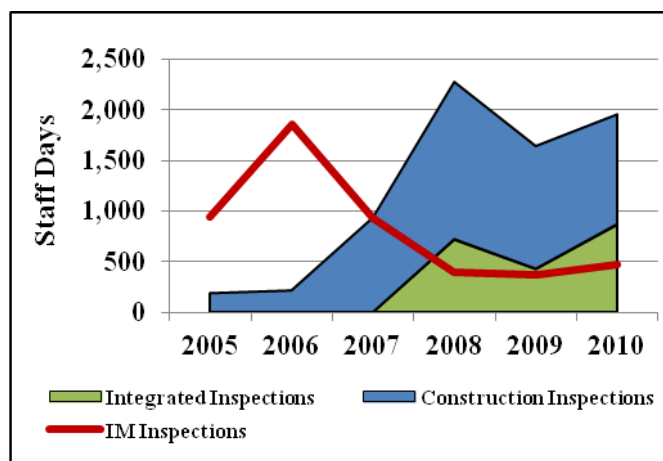
PHMSA's ability to enforce operator IM compliance with Federal regulations may be impacted.

PHMSA Has Not Met Its IM Inspection Program Goals

PHMSA has not met its IM inspection goals and faces a growing inspection backlog of operators' IM programs. In 2002, the Agency began inspecting operator IM programs with a goal of inspecting all operators at least once every 5 years. Since then, PHMSA has inspected all operator IM programs at least once and large operators two or more times. However, our analysis of 213¹¹ operators under Federal jurisdiction found that 47 (22 percent) did not receive an IM inspection within the Agency's stated goal of every 5 years. Recognizing the growing backlog, PHMSA scheduled 16 of these operators for inspection in 2011, which left 31 operators, plus another 18 (that are coming due), to be inspected in 2012. However, it is unlikely PHMSA can cover 49 operators in 2012 given that the Agency averages only around 22 IM inspections per year.

PHMSA's backlog of operators requiring IM inspections is due in part to a redirection of program resources towards other inspection priorities. IM inspections represent only one pipeline regulatory area that PHMSA inspects in any given year. As illustrated by figure 1, Agency staff resources¹² conducting integrated and construction inspections have recently increased, while staff resources dedicated to IM inspections have decreased.

Figure 1. Competition for PHMSA Inspection Resources



Source: OIG analysis of PHMSA data

According to PHMSA, this decline was partially attributable to an increase in new construction inspections and the introduction of integrated inspections over this period. Based on these trends and the growing backlog of IM inspections, PHMSA officials acknowledged that they will not be able to meet their 5-year periodic IM inspection goal—even with current efforts to increase their inspector staffing levels. For example, in its fiscal year (FY) 2012 budget, PHMSA requested an

¹¹ In addition to the 213 operators under Federal jurisdiction, there were approximately 160 operators overseen by PHMSA's State partners in 2009.

¹² PHMSA tracks its resource usage by monitoring the total number of days spent on all inspection types but does not separate inspection days into hazardous liquid and gas pipelines.

additional 10 inspector positions. Although Congress has stated that it will grant that request, the Agency must first fill all of its 135 currently authorized positions (more than 10 are vacant) and complete a manpower study to support any additional inspection and enforcement resource needs.¹³

Data System and Risk Analysis Issues Constrain PHMSA's New Inspection Approach

Given the growing inspection backlog and the Agency's inability to meet the 5-year IM inspection goal, PHMSA plans to restructure its entire inspection program and transition to risk-based integrated inspections. Such inspections incorporate elements of multiple PHMSA inspection types, including IM, operations and maintenance, and operator qualifications. This transition may allow PHMSA to conduct its oversight more efficiently and effectively. However, its success will depend on fully implementing several ongoing initiatives to address data system and risk analysis issues that currently constrain PHMSA's inspection planning capabilities. For example:

- Tracking Pipeline Changes. PHMSA's inspection planning and coverage have been affected by the Agency's inability to effectively track changes in operators' pipeline assets. Occasionally, an operator may increase or decrease the number of pipelines that it operates (e.g., through acquisitions or divestitures), requiring subsequent changes to PHMSA's inspection plans to ensure that all pipelines and facilities are adequately covered. However, PHMSA has not required operators to provide notice of these asset changes, even though Agency officials told us that such information is necessary for effective inspection planning. Because PHMSA was unable to track operator infrastructure changes, inspection planners were not always aware of modifications to an operator's pipeline assets or associated IM safety programs. For example, during a 2006 IM inspection of a large operator, PHMSA did not inspect a subsidiary because inspectors were unaware that the subsidiary was operating under a separate IM program (therefore requiring its own inspection).

To improve pipeline asset tracking, PHMSA published a final rule in November 2010 requiring operators to notify the Agency of major changes, such as when they acquire or sell portions of their pipeline systems.¹⁴ Beginning in 2012, operators will be required to input these changes to a newly developed National Pipeline Safety Registry and will have until June 2012 to

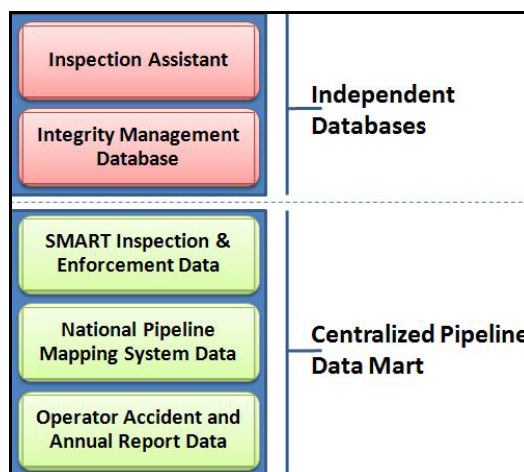
¹³ P.L. 112-90, the Pipeline Safety, Regulatory Certainty, and Job Creation Act of 2011. In addition, PHMSA has requested another 120 inspection and enforcement positions as part of its fiscal year 2013 budget request.

¹⁴ At the time of our review, the National Registry forms that will be used by the operators to notify PHMSA of their mergers and acquisitions were under PHMSA's review and still needed the Office of Management and Budget's approval.

validate their pipeline information and associated IM program coverage. While PHMSA's development of the National Pipeline Safety Registry is a positive step toward tracking pipeline infrastructure changes, data will not be available to inspection planners until July 2012 at the earliest. Follow through will be needed until the system is tested and fully operational.

- Database Accessibility. PHMSA's ability to efficiently plan inspections is also hindered by database constraints. PHMSA currently maintains inspection and enforcement data and results in multiple database systems: the IM Database, the Inspection Assistant, and the Safety Monitoring and Reporting Tool (SMART).¹⁵ However, these systems have limited or no interface between them, which requires inspectors to manually extract and analyze inspection results separately (see figure 2). To partially address these data connectivity

Figure 2. Database Interconnectivity



Source: OIG

issues, PHMSA developed the Pipeline Data Mart, a Web-based portal that inspectors use to access and analyze pipeline data from multiple data sources. In particular, inspectors use the Pipeline Data Mart to create pipeline operator profiles, a key component in planning integrated inspections.

Although the Agency has decided to use the Inspection Assistant to record all future inspection results, they have yet to provide needed connectivity between this system and the Pipeline Data Mart.¹⁶ Once the Agency provides this connectivity (currently planned for mid-2012), inspectors will be able to more efficiently plan integrated inspections. Additionally, PHMSA has initiated but not completed efforts to improve integrated inspection documentation requirements and processes. For example, PHMSA is developing standardized issue categories and severity indicators¹⁷ so that inspectors can report inspection results consistently and improve overall data analysis capabilities.

¹⁵ The IM Database contains IM inspection results, to include completed protocol forms, summary reports, and enforcement documentation. The Inspection Assistant contains integrated inspection results. SMART contains inspection summaries, operator information, enforcement history, and enforcement status.

¹⁶ In contrast, PHMSA does not plan on linking the IM database to the Pipeline Data Mart. Instead, inspectors will record all future results in the Inspection Assistant.

¹⁷ The development of these indicators was initiated as part of PHMSA's Data Quality and Analysis Improvement Plan, dated November 2010.

- **Identifying Risk Factors.** Effectively identifying key pipeline risk areas is another important factor in planning inspections. In transitioning to integrated inspections, PHMSA will rely on its Risk Ranking Index Model (RRIM)¹⁸ to identify those pipeline systems in greatest need of inspection. According to PHMSA officials, RRIM currently includes such risk factors as pipeline age and construction material. They also point to more recent improvements to RRIM, including linking enforcement actions, population numbers, and environmental factors to specific pipeline units. Nevertheless, several other key IM-related risk factors have not been included, such as changes in senior operator personnel or how often operators conduct in-line inspections. This information would further enhance the Agency's ability to consider IM risk factors when planning integrated inspections.

PHMSA's schedule to implement these data management and risk analysis improvements is ambitious and will challenge the Agency's ability to fully transition to an integrated inspection approach by 2013. Until PHMSA overcomes this challenge and successfully completes the transition, the Agency may not be able to ensure sufficient and consistent oversight of all IM programs.

PHMSA Is Missing Potential Opportunities To Identify IM Program Weaknesses Through Field Visits

PHMSA's overall IM inspection approach focuses on operators' IM program documentation rather than onsite observations and accident investigations. PHMSA completes the majority of its inspections by reviewing operators' policies, procedures, and other IM-related records, and rarely visits operators in the field to further test and verify IM program implementation. Between 2006 and 2010, PHMSA conducted 88 IM field tests¹⁹ involving only 41 of the 213 hazardous liquid pipeline operators (19 percent) under Federal jurisdiction. According to senior PHMSA officials, the Agency has intentionally focused its IM inspections on reviewing documentation (e.g., HCA identification maps, results from ILI tools, and repair records) at operators' headquarters to ensure operator IM programs contain all required elements. PHMSA officials stated that this approach makes the best use of its limited resources.

However, PHMSA misses opportunities to identify IM program weaknesses that may not be apparent through documentation review. For example:

- In an April 2006 field test, PHMSA found that an operator failed to properly classify a portion of its 26-inch crude oil pipeline as residing in an HCA (even though this pipeline went over a lake used to supply drinking water). In

¹⁸ PHMSA's first deployment of a risk ranking tool to identify pipeline units for inspection was in 1988.

¹⁹ IM Field tests are onsite observations of an operator's IM-related activities, such as launching and receiving of ILI tools or making pipeline repairs.

contrast, during the previous documentation-based IM inspection in June 2003, PHMSA noted numerous deficiencies with the operator's process for identifying HCAs but cited no specific lines as being misclassified.

- In a February 2009 field test, PHMSA found that an operator lacked documentation to demonstrate a contract employee was qualified to analyze and recommend repairs to pipeline defects during a dig inspection. In contrast, during a prior documentation-based IM inspection in May/June 2008, PHMSA found no issues related to the operator's process for repairing pipeline defects.

Agency officials stated that once PHMSA transitions to integrated inspections, inspectors will be able to use PHMSA's new "IM Field Implementation Directive,"²⁰ which will incorporate field visits with reviews of operator documentation to test IM program implementation. However, until the Agency completes these actions, it remains unknown whether these new inspections will lead to more field testing of operator IM programs.

PHMSA also conducts only a limited number of onsite accident investigations, which can provide another important opportunity for identifying weaknesses in operators' IM programs. Of the 31 significant accidents in our audit sample,²¹ PHMSA or its State partners conducted onsite accident investigations for only 12. Overall, PHMSA conducted such investigations on 39 percent (195 of 500)²² of all significant accidents between 2005 and 2010. According to Agency policy,²³ PHMSA typically conducts onsite accident investigations only when one or more specific conditions (e.g., fatalities or multiple serious injuries, major environmental or property damage) are present. Otherwise, PHMSA relies on the operator to determine an accident's cause and make any necessary program improvements to prevent a reoccurrence.

However, as past accidents have shown, conducting more accident investigations can help PHMSA prevent future accidents and identify weaknesses in operators' IM programs. For example:

- Following an April 2009 spill in Toledo, OH, PHMSA's accident investigation found that the pipeline section was improperly designed when installed. As a result, the line was susceptible to cracking due to fluctuating temperatures. A year earlier, an adjacent line at this same location experienced an accident due

²⁰ The IM Field Implementation Directive will be used to test an operator's implementation of their IM program. Specifically the inspector will review data integration, HCA identification, threat assessments, dig site verification, and implementation of preventive and mitigative measures.

²¹ In selecting this sample, we used data from 2005 through 2010 for hazardous liquid accidents identified as occurring within or could affect HCAs.

²² Between 2005 and 2010, there were 692 significant accidents; however, 192 of these accidents occurred in States that would have primary responsibility for conducting the onsite accident investigation.

²³ PHMSA, "Failure Investigation Policy," January 2011.

to this same condition. However, it was not until after the second accident that PHMSA conducted an onsite investigation. Had the Agency investigated the first accident, it may have identified the risk to the adjacent line.

- Following a June 2010 spill near Salt Lake City, UT, in which 800 barrels of crude oil were leaked into a creek. PHMSA’s investigation identified a number of IM and other program-related issues (e.g., the operator failed to install grounding devices to prevent electrical arcing) that may have contributed to the cause of the accident.²⁴ As a result, PHMSA issued an enforcement action against this operator, demonstrating the importance of accident investigations.

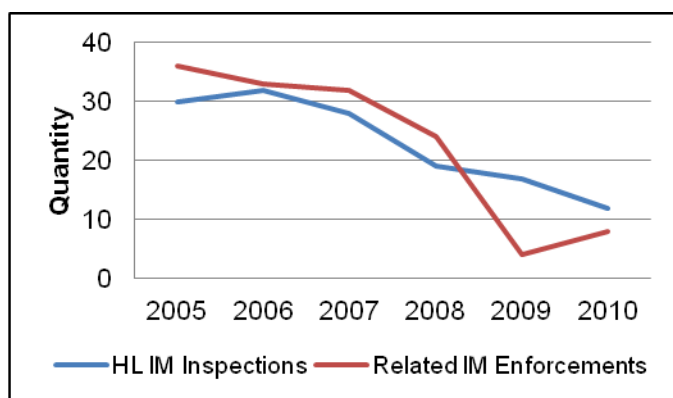
PHMSA officials believe their current policy and criteria for when to conduct accident investigations is sufficient, considering the cost of such site visits weighed against other resource needs and priorities. However, as we point out, the criteria has resulted in PHMSA investigating less than half of all significant accidents, thereby limiting the Agency’s opportunities to identify and mitigate weaknesses in operator IM programs.

Declining IM Inspections May Impact PHMSA’s Ability To Enforce Program Requirements

In recent years, the number of IM inspections has declined, due in part to the Agency’s shift in priorities to other inspection types. Yet, inspections are PHMSA’s principal means of identifying program areas needing improvement. As such, they are also the Agency’s principal means of ensuring compliance with IM requirements through various enforcement actions, such as Warning Letters, Notice of Potential Violations, and Civil

Penalties. As figure 3 shows, the number of IM inspections performed declined significantly between 2005 and 2010—from 30 inspections to 12. Therefore, PHMSA’s opportunity to both identify and correct IM program deficiencies may have been limited. Additionally, PHMSA’s transition to integrated inspections has

Figure 3. Hazardous Liquid Integrity Management Inspections and Related Enforcement Cases



Source: OIG analysis of PHMSA data

²⁴ PHMSA determined that the probable cause of the accident was an electrical arc from a nearby transfer station that created a hole in the pipeline.

the potential to further reduce the number of IM-related inspections and corresponding enforcement actions unless this program is identified as a risk area.

LESS STRINGENT IM REQUIREMENTS LIMIT PHMSA'S OVERSIGHT OF NON-LINE PIPE FACILITIES

Although over half of all hazardous liquid accidents occur at non-line pipe facilities²⁵ (see figure 4), PHMSA's IM requirements for such facilities are insufficient. In contrast to operator line pipes, the Agency does not require that operators conduct baseline and recurring assessments of these facilities. When PHMSA drafted IM requirements in 2000, the existing assessment technologies provided little benefit for inspecting non-line pipe facilities. Over the last decade, however, various methodologies and technologies have been developed that could be used to assess these facilities. Despite these advances, PHMSA has not yet updated its IM requirements to include regular and consistent operator assessments of non-line pipe facilities.

Figure 4. Piping at Facility Pump Station



Source: Used by permission of the American Petroleum Institute

Non-Line Pipe Facilities Comprise a Large Share of All Hazardous Liquid Accidents but Face Fewer IM Requirements

In its 2009 advisory on facilities piping,²⁶ the American Petroleum Institute (API) reported that over half of all accidents (both significant and non-significant) occurred at facilities. Likewise, PHMSA's 2010 operator data indicated that facilities comprised nearly 63 percent of all hazardous liquid accidents, of which 34 percent were considered significant. This correlates to our sample of significant accidents, in which 11 of the 31 accidents that we reviewed occurred at facilities. These accidents were caused by various factors, including internal corrosion, material weld failure, and improper operations. Moreover, while the overall number of hazardous liquid pipeline accidents has declined over the last 10 years, the rate of decline for facilities has been far less.²⁷

²⁵ Non-line pipe facilities include valves, pumping units, metering and delivery stations and fabricated assemblies, and breakout tanks.

²⁶ API, PPTS ADVISORY 2009-5, "New Findings on Releases from Facilities Piping," October 2009.

²⁷ In 2009, API reported that the number of non-line pipe facility releases since 2001 (within and outside HCAs, significant and non-significant), declined 21 percent as compared to a decrease in line pipe releases of 62 percent.

Non-line pipe facility releases are generally small and contained within operator property; however, the consequences can be significant. For example, one 2008 accident near San Antonio, TX, released approximately 530 barrels of diesel into the ground, resulting in more than \$750,000 in product loss, accident response, and environmental remediation costs.²⁸

Despite the higher number of accidents at non-line pipe facilities, PHMSA's IM inspection requirements are less stringent for facilities than for line pipe. For line pipe, PHMSA's hazardous liquid IM rule requires that operators conduct baseline assessments and periodic re-assessments²⁹ (every 5 years) of their pipeline systems that potentially could affect HCAs in the event of an accident. Most operators perform these assessments using ILI tools, hydrostatic testing, or external corrosion inspections.

Moreover, PHMSA's hazardous liquid IM rule does not require baseline and recurring assessments of non-line pipe facilities. PHMSA exempted operators from performing these non-line assessments in part because the existing assessment technologies were of little benefit when examining such facilities. For example, non-line pipe facilities often include piping and equipment that do not accommodate ILI tools and are poor candidates for hydrostatic testing.³⁰ During the IM rulemaking, PHMSA agreed with an industry suggestion to limit the rule to line pipe and address integrity issues for other pipeline facilities in a separate rulemaking. However, the Agency has not yet developed a separate rule for facilities. As a result of PHMSA's lack of assessment requirements for non-line pipe facilities, operators may not have sufficient integrity data to determine accident risks and to identify needed repairs.

In contrast, API has issued supplementary guidance to the pipeline industry on ways to strengthen operator oversight of facilities. In June 2011, API recommended that operators complete a baseline evaluation of piping in terminal facilities³¹ within 5 years, which correlates with current IM requirements for line pipe.³² In contrast, several operators told us that their normal practice is to assess their facilities every 10 years. Yet, since API's guidance consists only of voluntary best practices, not binding requirements, there is no guarantee that the industry will consistently implement API's recommendation.

²⁸ The leak was caused by a valve gasket failure on a non-line pipe bolted flange, and the apparent cause was poor construction procedures when the valve was placed in service in 2006.

²⁹ An IM assessment consists of the actions that an operator performs to determine the condition of the pipe.

³⁰ Hydrostatic testing increases the likelihood of corrosion by introducing water into the facility.

³¹ Terminal facilities store and distribute refined hydrocarbon products such as gasoline, heating oil, and/or aviation fuel.

³² API RP 2611, "Terminal Piping Inspection - Inspection of In-Service Terminal Piping Systems," June 2011.

IM Requirements for Non-Line Pipe Facilities Do Not Incorporate Technology Advancements

The development of methodologies and technologies to assess non-line pipe facilities has lagged behind that of line pipe. This is due in part to the fact that the majority of PHMSA's pipeline accident prevention research has focused on improving ILI assessments and leak detection systems, which are not easily applied to facilities.

However, over the last decade, methodologies and technologies have been developed that could be used to assess facilities much like smart pigs assess line pipe. One device, which is smaller than conventional ILI tools, uses acoustical sensors to identify small leaks. Another device uses ultrasonic guided waves to inspect facility piping for corrosion and pipeline dents.³³ Despite these advancements, PHMSA has not updated the IM regulation to require operators to assess non-line pipe facilities.

PHMSA FACES SIGNIFICANT DATA PROBLEMS THAT HINDER ITS OVERSIGHT AND ANALYSIS CAPABILITIES

PHMSA's ability to identify hazardous liquid pipeline safety risks and oversee the IM program is limited by shortcomings in the management, quality, and analysis of the Agency's available data. Although PHMSA is aware of these shortcomings and has initiated some corrective measures, it is too soon to determine whether those actions will result in more reliable data. In addition, PHMSA has not used data analysis opportunities to improve its oversight of operator IM programs, nor developed useful performance measures to assess the overall program's effectiveness in improving the safety of hazardous liquid pipelines.

Shortcomings in PHMSA Data Management and Quality Limit the Usefulness of Accident and Annual Report Data

PHMSA collects and maintains important data from its inspections and enforcement actions, as well as from accident and annual reports filed by pipeline operators, to facilitate its oversight of hazardous liquid pipelines. However, we identified several problems with the data provided through these reports. PHMSA has taken a number of steps to address these problems, but these steps will take several years to implement. Examples of data control and quality issues include the following:

- Data Management. PHMSA's electronic accident report database contained records that had not been adequately managed. PHMSA uses this database to

³³ PHMSA has already approved this testing method for use by some operators on line pipes under the "Other Technology" provision of the IM rule.

track accidents and their causes for safety oversight. However, 9 of the 51 (18 percent) most severe hazardous liquid pipeline accidents³⁴ in the database showed “Unknown” as the accident cause. When asked why this causal information was not more definitive, PHMSA officials were only able to provide specific causes for six of the nine accidents from other sources outside its accident report database. PHMSA officials were not able to explain why the causal data for these six accidents were not already in the database.

Another data management example involves PHMSA’s handling of operator information on break-out tanks. Prior to 2010, PHMSA allowed operators to list their tank inventory numbers in either the National Pipeline Mapping System or in operator annual reports. However, PHMSA did not have a process to confirm whether operators were entering data into either system and thus never reconciled the two inventories. Until it changed reporting requirements in 2010 (requiring operators to report their break-out tanks inventories to just one system), the Agency was unable to determine what tanks actually existed and their size. Despite this fix, PHMSA will have difficulty using pre-2010 break-out tank data and will need several years of additional information before any trend analyses can be performed.

- Data Quality. PHMSA’s data quality control procedures failed to identify a number of significant errors. In more than 100 cases (i.e., 19 percent of hazardous liquid operators), operator annual reports showed identical shipment volumes from one year to the next, indicating an inaccuracy, since it is highly unlikely that shipment volumes would be exactly the same from year to year. In another example, over a 5-year period, one operator under-reported 6 trillion barrel-miles of transported commodity, which represents 22 percent of all hazardous liquid pipeline shipments. These data quality errors occurred because PHMSA lacks a method to detect duplicate reporting of annual shipment volume figures from one year to the next. Further, these two examples raise questions about the adequacy of PHMSA’s data quality procedures as well as the accuracy of the other statistics (e.g., pipeline mileage, age, inspections, and repairs) included in operator annual reports.

PHMSA has identified some of the above problems as well as other deficiencies in its information systems, data management and quality control, and analysis through multiple studies it conducted. In the latest of these studies, the November 2010 Data Quality and Analysis Improvement Plan, PHMSA established a list of action items.³⁵ However, the plan does not resolve all of PHMSA’s IM-related

³⁴ The most severe are significant accidents with IM-detectable causes, and either a fatality, injury requiring hospitalization, 3,000 or more barrels of liquid released, or \$5 million or more in property damage.

³⁵ Before issuing this plan, PHMSA addressed other data deficiencies by updating its 2010 annual and accident reporting requirements. However, the Agency will need several years of data collection to establish trends for newly required data elements and will have difficulty developing trend analyses that span the pre- and post-2010 changes.

data problems, nor has the Agency prepared required status reports for tracking the plan's progress. Moreover, PHMSA officials state that it will take several years to fully implement the plan due to staffing and funding issues.

PHMSA Has Not Taken Advantage of Data Analysis Opportunities To Identify At-Risk Pipelines and Improve Performance and Safety

PHMSA is not taking advantage of immediate and long-term opportunities to use data to improve the IM program and identify safety risks. For example, PHMSA lacks a program for conducting systematic analyses of readily available pipeline accident and annual report data.³⁶ These analyses would enable the Agency to better assess current and emerging safety risks, identify industry trends, and better allocate limited inspection resources. PHMSA has conducted only four national-level studies that evaluated safety trends and conditions between 2007 and 2011, and those studies were not part of an overarching data analysis program. The Agency recognizes the need for such near-term efforts and, according to its Data Quality and Analysis Improvement Plan, PHMSA intends to develop and implement an “analytical agenda” that defines what analyses are needed to make key management decisions affecting pipeline safety.³⁷

In addition, PHMSA has a longer-term data analysis opportunity to improve its identification of at-risk pipelines. Currently, PHMSA has broken down large pipeline systems into smaller geographic units and can assess their risk based on the operational performance of the units (e.g. number of accidents, inspections, and enforcements). However, PHMSA's analyses do not consider the pipeline's physical characteristics (such as size, age, or material), because PHMSA does not collect data on or track these characteristics by where the pipeline is geographically located. Linking these physical attributes with accident, inspection, and enforcement information would create a pipeline-based information system that would enable PHMSA to monitor the safety of specific pipelines and multiple pipelines of similar characteristics over their lifetime.

PHMSA also recognizes the need to develop a pipeline-based information system and has taken initial steps that could lead to such a system. A more robust capability for risk assessments such as this will be especially crucial as PHMSA moves towards its integrated inspections model and limits its IM inspections to areas that are most at-risk. However, full implementation is still years away, as PHMSA will need to develop a data collection regulation and computer software to process the data. Moreover, the regulation must receive approval from the Office of Management and Budget and undergo the DOT rulemaking process.

³⁶ Accident reports, which are required for any spill of five or more gallons of hazardous liquid, include such information as location, cause, cost of damages, and whether the spill occurred in or could affect an HCA. Annual reports include information such as miles of pipeline (with miles affecting HCAs), diameter, material and age of pipeline, miles inspected, and anomalies detected and repaired.

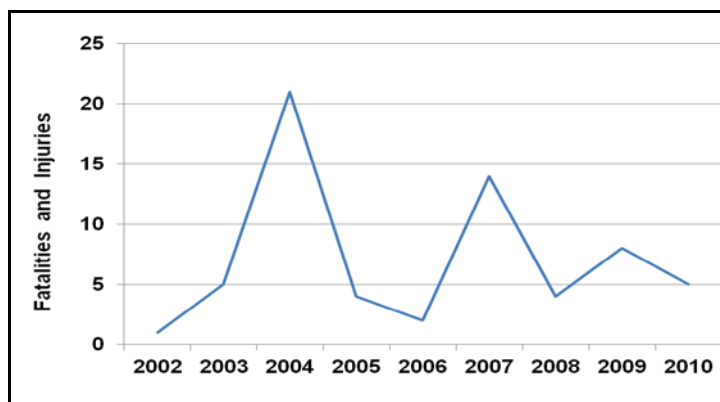
³⁷ PHMSA is currently developing the analytical agenda and anticipates completing it in 2012.

PHMSA Lacks Performance Measures To Assess the Impact of the IM Program

PHMSA lacks specific performance measures for tracking the IM program's overall effectiveness, even though the program has existed for more than 10 years. GAO³⁸ (as well as PHMSA) has cited a need for establishing specific measures to evaluate the performance and oversight of PHMSA's IM program. And yet, PHMSA relies only on general pipeline safety statistics (e.g., total number of accidents and fatalities) that are not targeted towards evaluating the IM program. For example, as figure 5 demonstrates, overall fatalities and injuries due to hazardous liquid accidents from all causes are very low, with recent trends showing a decline (especially since 2004). However, these statistics provide no specific picture of the impact of the IM program. As a result, PHMSA does not know whether or to what extent the IM program has improved pipeline safety.

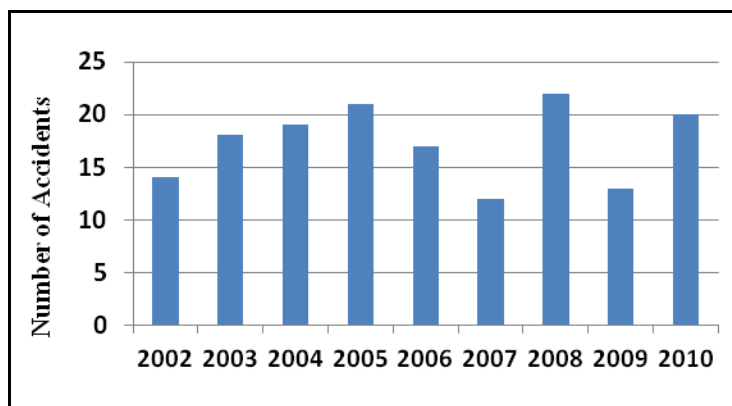
In contrast, we analyzed PHMSA's accident data through the lens of the IM program by identifying accidents that were caused by factors that could have been detected through the IM program, such as corrosion, pipeline failure, and faulty welds. As figure 6 illustrates, significant IM-detectable line pipe accidents in

Figure 5. Hazardous Liquid Pipeline Fatalities and Injuries, 2002–2010



Source: PHMSA

Figure 6. IM-Detectable, Significant Accidents on Line Pipe in HCAs, 2002–2010



Source: OIG analysis of PHMSA data

³⁸ GAO Report No. GAO-02-785, "PIPELINE SAFETY AND SECURITY: Improved Workforce Planning and Communication Needed," August 2002.

HCAAs have been fairly constant, ranging from a low of 12 to a high of 22 between 2002 and 2010. The lack of any measurable reduction in the number of IM-detectable significant accidents raises questions about the overall effectiveness of the IM program.

As our analysis of IM-detectable accidents demonstrates, PHMSA's current method of assessing program performance—only reviewing overarching pipeline safety statistics—does not address the effectiveness of the IM program. Only more detailed, program-specific measures can help answer these questions. Moreover, without such measures, PHMSA is unable to fully determine specific areas in need of improvement and set performance targets accordingly.

CONCLUSION

PHMSA's IM program plays a significant role in its efforts to ensure the safety of the Nation's hazardous liquid pipelines and facilities. And yet, while the program has led to the identification and repair of thousands of pipeline defects, it has not resulted in a noticeable reduction in significant accidents in HCAs. To better address its competing priorities, PHMSA has many initiatives underway to transform its current IM program, including its decision to transition to a risk-based integrated inspection approach and increase inspector staffing levels. However, the Agency is still implementing these initiatives, and their impact on PHMSA's ability to fulfill IM program requirements remains unknown. Further steps are needed to strengthen PHMSA's program management and oversight to ensure that operators are adequately identifying and mitigating the risks of IM-detectable hazardous liquid spills. Moreover, without effective performance measures, PHMSA will remain unable to fully measure the benefits of its various program initiatives, the true impact of the overall IM program, and the Agency's role in reducing the number, rate, and impact of serious pipeline accidents.

RECOMMENDATIONS

To further improve PHMSA's oversight of operators' IM programs, we recommend that the Administrator:

1. Categorize IM requirements as a high priority within the Agency's integrated inspection and enforcement program.
2. Establish target dates for resolving remaining data system and risk analysis issues affecting PHMSA's inspection program.
3. Implement a pilot program to determine whether the IM Field Implementation Directive provides sufficient onsite field testing of operator's IM program implementation.

4. Expand accident investigation criteria to conduct more Agency onsite reviews of significant accidents potentially involving IM-detectable causes.
5. Update IM requirements to mandate baseline and recurring assessments for non-line pipe facilities, given the availability of new assessment technologies and methodologies.
6. Establish additional quality assurance procedures to verify the accuracy of operator annual reports and accident data.
7. Develop and implement a program of systematic analyses to better assess pipeline risks, identify safety trends, and focus oversight activities.
8. Create a database of pipeline physical characteristics, accidents, and inspections—including geographic location—of individual pipeline units in order to identify and monitor at-risk pipelines.
9. Develop and implement specific performance measures to assess the impact of the IM program and its individual components on pipeline safety.

AGENCY COMMENTS AND OFFICE OF INSPECTOR GENERAL RESPONSE

We provided PHMSA with our draft report on April 13, 2012 and received its formal response on May 11, 2012. We included PHMSA's response in its entirety as an appendix to this report. In its response, PHMSA concurred with seven recommendations and partially concurred with two. Overall, PHMSA's response meets the intent of recommendations 3, 5, and 9, and we consider these recommendations resolved but open pending completion of the Agency's planned actions. For recommendations 1, 2, 4, 6, 7, and 8, PHMSA's response and planned actions only partially met or did not meet the intent of our recommendations. We request that the Agency reconsider its responses and provide additional information, as detailed below.

For recommendation 1, PHMSA partially concurred, stating that IM-related factors are already part of its risk algorithm—the Risk Ranking Index Model (RRIM)—a methodology for prioritizing integrated inspections. While RRIM does assign risk values based on various factors—including the number of pipeline-related injuries, fatalities, and enforcement actions—it does not include other important factors related to IM requirements, such as changes in senior pipeline operator personnel and how often operators conduct in-line inspections. Therefore, we request that the Agency include additional IM-specific factors in its RRIM as part of its planned update later this year and provide us a copy.

For recommendation 2, PHMSA concurred, stating that all integrated inspections will be recorded in the Inspection Assistant tool in 2013 and provided a December 2012 target date for connecting the Pipeline Data Mart and the Inspection Assistant databases. However, these actions are only partially responsive since they do not address the other data system issues identified in our report, such as developing the National Pipeline Registry System and improving documentation requirements and processes for the Inspection Assistant. Therefore, we request that PHMSA provide us target dates for completing the National Pipeline Registry System and implementing improvements to the Inspection Assistant.

For recommendation 7, PHMSA concurred but did not fully address the intent of the recommendation—to develop a strategic program for conducting analytical studies on a national level. Instead, the Agency reiterated that it continuously improves its data and analysis capabilities, as exemplified by the recent deployment of RRIM. PHMSA also stated that its actions in response to other recommendations in our report are responsive to the “broad concepts” of this particular recommendation. While these efforts represent positive steps, they do not address the need for a broader analytical program. In fact, as we note in our report, PHMSA is currently developing an “analytical agenda” as called for in its Data Quality and Analysis Improvement Plan. Therefore, we request that PHMSA provide us with a copy of this agenda once finalized.

Finally, for recommendations 4, 6, and 8, PHMSA concurred or partially concurred, but stated that completion of its proposed actions would depend on the approval of its FY 2013 budget request and completion of a rulemaking. However, recognizing the uncertainty associated with obtaining the requested funding and completing the rulemaking, we request that the Agency provide us alternative plans for these recommendations in the absence of the requested funding and/or completion of the rule.

ACTIONS REQUIRED

PHMSA’s planned actions for recommendations 3, 5, and 9 are responsive and we consider these recommendations resolved but open pending receipt of documentary evidence that appropriate corrective actions are complete. However, with respect to recommendation 5, we request that PHMSA provide a target action date. Moreover, in accordance with DOT Order 8000.1C, we request that the Agency provide our office, within 30 days of this report, with additional data and plans—as well as target action dates—for recommendations 1, 2, 4, 6, 7, and 8. Accordingly, we consider those recommendations open and unresolved pending receipt of this information.

We appreciate the courtesies and cooperation of PHMSA representatives during this audit. If you have any questions concerning this report, please call me at (202) 366-0500 or Darren L. Murphy, Program Director, at (206) 220-6503.

#

cc: Martin Gertel, OST, M-1
Karen Raschke, PHMSA, PH-4

EXHIBIT A. SCOPE AND METHODOLOGY

We conducted this performance audit in accordance with generally accepted Government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objective. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions. We conducted the audit between January 2011 and April 2012 and included such tests of procedures and records as we considered necessary, including those providing reasonable assurance of detecting abuse and illegal acts.

To determine that the hazardous liquid accident data used during the audit were reliable, we performed a data reliability assessment. Our assessment examined such items as duplicate records, missing data in key fields, and illogical data relationships. Although we found problems in areas such as inconsistency in format of latitude and longitude and lack of required information for small accidents, we found the data to be reliable for the limited purposes of our audit.

To help assess the effectiveness of PHMSA's oversight of hazardous liquid pipeline operators' IM programs, we reviewed planning and policy documents and inspection reports from a statistical sample of 31 IM-detectable accidents. To select this sample, we used data from 2005 through 2010 for hazardous liquid accidents identified as occurring within or could affect a high consequence area (HCA). Out of a population of 284 such accidents, a sample of 56 and 10 substitute accidents were selected at random. We then calculated the number of accidents that could be attributed to causes identifiable by IM procedures using PHMSA's definition of IM-detectable accident causes. Out of our sample of 56 and 10 substitute accidents, we identified 31 IM-detectable accidents.

To determine the impact of IM programs on significant IM-detectable accidents, we reviewed planning and policy documents and inspection reports, and interviewed officials from operators representing the 31 IM-detectable accidents. We examined accident reports and accident investigations for root causes to determine whether some element of an IM plan affected or could have affected the outcome of the accident.

To assess PHMSA's inspection activities, we interviewed PHMSA headquarters and regional officials responsible for inspection planning and operations, pipeline operator IM personnel, and trade association representatives. To determine the universe of pipeline operators that had not had an IM inspection within the past 5 years (since 2004), we compared PHMSA's inventory of federally regulated hazardous liquid operators and associated inspection records.

To assess PHMA's enforcement activities, we interviewed PHMSA headquarters and regional personnel. We then reviewed data from PHMSA's Safety Monitoring and Reporting Tool database to determine the number of enforcement actions associated with all hazardous liquid IM inspections from 2005 through 2010. We analyzed these data to determine the number of each type of enforcement resulting from those inspections.

To evaluate IM requirements addressing non-line pipe facilities, we interviewed officials from PHMSA headquarters, regions, and research and development department; the American Petroleum Institute (API); and pipeline operators. We then reviewed legislation, API recommended practices, and API facility studies to determine the extent to which IM requirements apply to non-line pipe facilities. To determine the impact of accidents at non-line pipe facilities, we reviewed the 11 IM-detectable accidents (from our sample of 31) that occurred at such facilities.

To determine PHMSA's data management and analysis capabilities, we interviewed Agency management responsible for data policies, collection, and application. We also reviewed internal reports and studies on data needs, quality assessment, and improvement plans. To evaluate the content, control, and quality of operator data, we analyzed databases of operator-submitted accident and annual report data for inconsistencies, missing data, and repetitive reporting of identical data. We also examined PHMSA's data verification testing logic and interviewed senior Agency managers and the database manager.

EXHIBIT B. ORGANIZATIONS VISITED OR CONTACTED

PHMSA

- Headquarters (DC)
 - Associate Administrator of Pipeline Safety
 - Deputy Associate Administrator, Policy & Programs
 - Deputy Associate Administrator, Field Operations
 - National Field Coordinator
 - Senior Policy Advisor
 - Office of Program Development
 - Office of Enforcement
 - Office of State Programs
 - Office of Engineering & Research
- Regional offices
 - Eastern Region (NJ/PA)
 - Western Region (CO)
 - Southwestern Region (TX)

PHSMA State Partner

- California State Fire Marshall, Pipeline Safety Division

Hazardous Liquid Pipeline Operators

- Visited
 - Buckeye Partner L.P. (PA)
 - Enterprise Products (TX)
 - Crimson Pipeline L.P. (CA)
- Contacted
 - Koch Pipeline Company L.P. (KS)
 - Kinder Morgan Energy Partners L.P. (TX)
 - BP Pipelines N.A. (IL)
 - Sunoco Pipeline (PA)
 - Magellan (OK)
 - Shell Pipeline Company (TX)
 - Explorer Pipeline Company (OK)
 - Colonial Pipeline Company (GA)

Trade Associations

- Association of Pipe Line Operators (AOPL)
- American Petroleum Institute (API)
- Pipeline Research Council International (PRCI)

Other Stakeholders

- National Transportation Safety Board (NTSB)
- Accufacts Inc.
- Pipeline Safety Trust

EXHIBIT C. MAJOR CONTRIBUTORS TO THIS REPORT

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Darren Murphy	Program Director
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Greggory Bond	Senior Analyst
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Curtis Dow	Analyst
Michael Dunn	Auditor
Henning Thiel	Analyst
Petra Swartzlander	Statistician
Sandra DeLost	Information Technology Specialist
Audre Azuolas	Writer-Editor



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Pipeline and Hazardous
Material Safety
Administration

MAY 11 2012

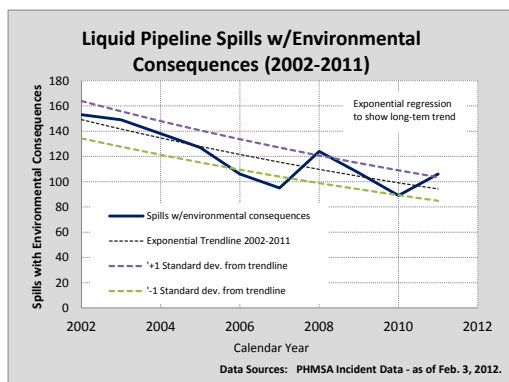
**ACTION MEMORANDUM TO THE ASSISTANT INSPECTOR
GENERAL FOR AVIATION AND SPECIAL PROGRAM AUDITS**

From: Cynthia L. Quarterman
x6-4433

Prepared by: Jeffrey D. Wiese
Associate Administrator for Pipeline Safety
x6-2036

Subject: **ACTION:** Comments on OIG Draft Report Regarding PHMSA’s
Hazardous Liquid Pipeline Operators’ Integrity Management Programs

Hazardous Liquid Integrity Management Programs Have Strengthened Pipeline Safety



The Pipeline and Hazardous Materials Safety Administration’s (PHMSA) design and implementation of the Integrity Management (IM) program for hazardous liquid pipelines has been successful at both improving safety and creating a more safety-oriented mindset among pipeline operators. We appreciate the OIG report’s recognition of PHMSA’s significant accomplishments within the pipeline inspection and enforcement program. Since the program was adopted, the number of miles of regulated hazardous liquid pipelines has increased, but the number of spills with

environmental consequences has consistently decreased. There is little doubt that the more than 40,000 pipeline repairs completed during the IM program in high consequence areas, including over 7,300 repairs requiring immediate action, contributed significantly to these improved outcomes.

While PHMSA’s IM Program has achieved considerable progress, we are working to further improve our programmatic capabilities to provide effective oversight and pipeline safety in general. To that end, PHMSA has a pending rule to improve the hazardous liquid IM program

and is working on regulations to vastly improve data collection.^a PHMSA also has several internal initiatives to improve pipeline safety data quality and analysis. While PHMSA has achieved considerable progress through the IM program with current resources, several key areas identified both by the Agency, and discussed within the OIG report, would greatly benefit from the investment of additional resources. PHMSA's FY13 Budget Request, if enacted, would support all the areas identified as needing more resources in this review. For example, the budget requests 120 additional PHMSA inspection and enforcement personnel and additional funding to increase state inspection and enforcement personnel as well. These increases would make it possible to address the myriad of new inspection demands, including increased pipeline construction and new regulatory requirements such as control room management. The budget also increases personnel and funding to improve PHMSA's data collection, quality assurance, integration, and analysis as well as creating a dedicated accident investigation unit. Without those new resources, many of PHMSA's planned improvements will be delayed or remain unimplemented.

PHMSA Continues to Improve Analytical Basis for Inspections with Available Resources

PHMSA implements a risk ranking algorithm to identify and prioritize pipelines for inspection. This algorithm uses data derived from previous inspections to identify key risk areas of focus. Updated most recently in 2011, the algorithm is subject to continuous improvement using more refined data and risk factors as they become available. The most recent version employs a wide array of information obtained from inspections, accident reports, enforcement actions, and Geographic Information System (GIS) data about the environment traversed by pipelines.

These data not only enhance the risk ranking algorithm, they also guide inspectors during inspection planning. Traditionally, PHMSA pipeline inspections have been divided into several different types based on a predetermined set of regulations, for example, operations and maintenance, operator qualifications, integrity management, and control room management. Each new set of regulations generated a different inspection type that was layered upon the existing types and operators were inspected simply because the operator was due for an inspection of that type. This approach has led to a recent backlog in IM inspections as resources have been redirected to fulfill other inspection needs. PHMSA has been moving away from that layered inspection approach toward risk-based, integrated inspections that include all types of inspections. With integrated inspections, the same data used in the risk ranking algorithm is made available to inspectors as they plan the scope of a specific inspection. By using data during both risk ranking and inspection planning, PHMSA has begun inspecting pipelines with increased risk factors in areas that correlate to the increased risk, making the best possible use of limited inspector time and resources.

^a This rulemaking was initiated, in part, in response to the Marshall, Michigan spill in July 2010. We would note that incident is still subject to investigation by PHMSA in conjunction with the NTSB. Until that investigation is complete, it is not appropriate to conclude that the incident was IM-detectable as the first paragraph of the OIG Report asserts.

PHMSA is evaluating further improvements to its risk analysis capabilities. For example, PHMSA is preparing a rulemaking proposing to collect pipeline risk attributes by GIS segment. The increased precision offered by GIS has the potential to dramatically improve our ability to focus on specific risks.

Another key input to the risk ranking algorithm is accident reports submitted by pipeline operators. Through our data quality assurance process, each hazardous liquid accident report is reviewed by pipeline inspectors to determine if the report is complete and accurate. If not, we contact the operator to elicit a supplemental report. While this work is beneficial to our ability to target risk, it has also reduced the time available for conducting inspections. In order to provide our inspectors with more time to conduct inspections and spend less time doing data analysis, early in 2012, we established a Data Management Specialist position in each pipeline Region. In this way, we intend to combine the quantitative analytical skills of the data specialists with the specific technical expertise of our inspector workforce to further strengthen our focus on both specific risks and technical prowess.

PHMSA has also been working to increase our inspection and enforcement workforce to the full extent of resource availability. As a result, PHMSA has approximately 35 percent more inspection and enforcement personnel on board at the end of calendar year 2011, than at the end of calendar year 2008, but more are needed. The additional resources requested for FY13 would help relieve these resource challenges. PHMSA will continue to do everything within its power to recruit and retain new pipeline safety inspectors. We are in the process of updating our recruiting plan and preparing a request for direct hire authority in order to fill any new inspector positions as soon as possible.

RECOMMENDATIONS AND RESPONSE

Recommendation 1: Categorize IM requirements as a high priority within the Agency's integrated inspection and enforcement program.

Response: Concur in part. PHMSA's integrated inspections are risk-based and data driven using its continually refined risk algorithm. Identified risks are weighted and pipeline systems are prioritized for inspection. However, the weighting system within the algorithm is more complex than "high" and "low." IM-related risks are part of the algorithm and prioritized according to the data analysis. Risk-related weighting, including IM performance, will be adjusted to the extent supported, as we gain access to additional data over time. As a result, no further action is planned on this recommendation at this time.

Recommendation 2: Establish target dates for resolving remaining data system and risk analysis issues affecting PHMSA's inspection program.

Response: Concur. PHMSA continually assesses its systems to improve the quality of its data. During 2013, the majority of PHMSA pipeline safety inspections, including all of the hazardous liquid IM inspections will be documented in the Inspection Assistant software. PHMSA's Pipeline Data Mart software was recently upgraded to improve inspector access to operator-submitted data, which makes it easier to review and identify data system and quality issues.

With the completion of a data connection between these two software programs, which is currently scheduled for December 31, 2012, action on this recommendation will be complete.

Recommendation 3: Implement a pilot program to determine whether the IM Field Implementation Directive provides sufficient onsite field testing of operator's IM program implementation.

Response: Concur. The Hazardous Liquid IM Field Implementation directive is being designed by experienced inspection personnel using their technical expertise and combined experience in conducting pipeline inspections. Pipelines are somewhat unique as compared to other modes of transportation in that evidence of a problem is rarely visible through onsite inspections. Instead, the most constructive activity often involves detailed reviews of records, documentation, and test results; not direct onsite observation of operations or testing.

Accordingly, the field implementation directive will balance the appropriate amount of onsite activity with other inspection activity to provide the best possible use of our inspection resources. This new directive will be used beginning in calendar year 2013. To ensure that the appropriate balance has been achieved, PHMSA will solicit feedback from inspectors using the directive during 2013. PHMSA expects to report on the results by March 31, 2014.

Recommendation 4: Expand accident investigation criteria to conduct more Agency onsite reviews of significant accidents potentially involving IM-detectable causes.

Response: Concur. The PHMSA pipeline failure investigation policy includes five tiers of investigation, ranging from follow-up on immediate notifications received from the National Response Center to multi-Region root cause investigations. This policy establishes the criteria used to determine whether to send inspectors to the failure site to begin an investigation. These criteria seek to balance the severity of the accident with the availability of PHMSA inspector resources for onsite investigation. PHMSA requested a total of 150 additional positions as part of its FY 2013 budget request. That request included resources to establish a new nationwide accident investigation group comprised of five new investigators. This group would enable PHMSA to expand its capability to conduct immediate, onsite investigation of accidents. However, without those additional resources, it is unlikely that PHMSA would be able to expand its current accident investigation capabilities.

Recommendation 5: Update IM requirements to mandate baseline and recurring assessments for non-line pipe facilities, given the availability of new assessment technologies and methodologies.

Response: Concur. Current PHMSA regulations require operators to implement several elements of IM for non-line pipe at facilities such as pump stations and tank farms. While the regulations do not require integrity assessments for non-line pipe, operators are required to identify non-line pipe that could affect a high consequence area, integrate and analyze all available information about integrity, analyze the consequences of a non-line pipe failure, and implement measures to prevent and mitigate the consequences of a non-line pipe failure. As your report notes, technology adequate to address these non-line pipe facilities did not exist at the time the original IM rule was issued. Since then, technological advancements have occurred

that might provide the capability to assess the integrity of these non-line pipe facilities. PHMSA data analysis indicates that while hazardous liquid accidents have decreased overall, those non-line pipe facilities, though often far from the public, now account for the majority of all hazardous liquid accidents. Accordingly, on October 18, 2010, PHMSA published an Advanced Notice of Proposed Rulemaking (ANPRM), regarding the safety of onshore hazardous liquid pipelines in docket PHMSA-2010-0229. The ANPRM raises the issue of requiring baseline and periodic assessments for non-line pipe based on the availability of new assessment technology. PHMSA plans to proceed by publishing a Notice of Proposed Rulemaking early in calendar year 2013. As conducting rulemaking activities are necessarily lengthy and time consuming processes, we cannot predict when we will complete a final rule on this subject.

Recommendation 6: Establish additional quality assurance procedures to verify the accuracy of operator annual reports and accident data.

Response: Concur in Part. In January 2010, PHMSA created a Data Quality and Analysis Improvement Plan. Since the creation of this plan, PHMSA has implemented many improvements in its pipeline safety data systems. By December 31, 2012, PHMSA plans to establish a formal data management plan for annual reports submitted by hazardous liquid pipeline operators.

With respect to accident data, PHMSA began implementing strong and effective data quality procedures in 2002. This process requires each of the hazardous liquid accident reports to be reviewed by an inspector to determine if the report is complete and accurate. Accident data is updated as investigations proceed and after they are completed. This iterative approach to collecting and validating accident data ensures the most current data is available to both PHMSA and the public. Nonetheless, PHMSA has significant staffing and funding needs to make further improvements. As set forth above, PHMSA's FY13 Budget Request would provide additional resources to help achieve these goals.

The following chart shows the number of significant hazardous liquid accidents by cause:

Hazardous Liquid
Time run: 4/26/2012 6:53:49 AM

ODES - Data as of 04/25/2012
SMART - Data as of 04/25/2012
EIA - Data as of 04/25/2012

Oversight Region: (All Column Values)
Region:(All Column Values) State: (All Column Values)

Incident Cause Type	SIGNIFICANT						Total
	2006	2007	2008	2009	2010	2011	
ALL OTHER CAUSES	11	7	6	4	7	10	45
CORROSION	32	27	31	23	25	37	175
EXCAVATION DAMAGE	13	17	18	16	13	16	93
INCORRECT OPERATION	7	9	16	13	14	11	70
MATERIAL/WELD/EQUIP FAILURE	32	35	41	39	49	55	251
NATURAL FORCE DAMAGE	5	9	7	9	8	4	42
OTHER OUTSIDE FORCE DAMAGE	6	4	2	2	5	6	25
Grand Total	106	108	121	106	121	139	701

Many initial accident reports to PHMSA are submitted as “Under Investigation,” which falls into the “All Other Causes” category in the table on the previous page. The percentage of accident reports in this category is usually less than 10%. The numbers of accidents in this category since 2009 will likely decline as accident investigations are completed.

Recommendation 7: Develop and implement a program of systematic analyses to better assess pipeline risks, identify safety trends, and focus oversight activities.

Response: Concur. PHMSA has a solid track record of continuously improving its data and analysis and will continue to make the best possible use of available data. PHMSA has traditionally used a risk-ranking algorithm using all available data plus inspector knowledge to schedule unit inspections. In 2011, PHMSA deployed the Risk Ranking Index Model (RRIM) that for the first time used GIS data corresponding to the pipeline units. These advancements are critical to our transition to integrated inspections. Since the broad concepts set forth in this recommendation are specifically addressed in response to other recommendations included in this report, we suggest that this recommendation be closed. Specific actions that will further enhance PHMSA’s risk-based, data driven approach to pipeline safety oversight can be tracked under the remaining recommendations.

Recommendation 8: Create a database of pipeline physical characteristics, accidents, and inspections—including geographic location—of individual pipeline units in order to identify and monitor at-risk pipelines.

Response: Concur. In recent years, PHMSA has upgraded its GIS software capability to enable the collection of pipeline risk attributes for individual GIS pipeline segments. In its FY 2013 Budget Request, PHMSA seeks increased funding to continue improving its GIS system. As recognized in the OIG draft report, receiving pipeline risk attributes at the GIS segment level would dramatically improve PHMSA’s ability to track risks and focus inspections. PHMSA requested authority to pursue this initiative in the Administration’s pipeline safety reauthorization proposal. That provision was enacted in the final bill. As mentioned above, PHMSA has begun preparing a rulemaking proposing the submittal of pipeline risk attributes by GIS segment. Creating a database of pipeline risk factors by GIS segment is contingent upon successfully completing the rulemaking and the availability of sufficient resources. Once these conditions are met, we can begin using refined GIS segment data. However, if these requirements are delayed, so will be our implementation.

Recommendation 9: Develop and implement specific performance measures to assess the impact of the IM program and its individual components on pipeline safety.

Response: Concur. For many years, PHMSA has collected IM performance measures from operators and made them publicly available. The current website for this data is: <http://primis.phmsa.dot.gov/iim/perfmeasures.htm>. This website includes a national view of the performance data and access to individual operator data. PHMSA has also received a similar recommendation from the NTSB regarding performance measures for gas transmission IM, but neither the OIG nor the NTSB has offered alternatives to the current performance measures. Nonetheless, PHMSA plans to sponsor a data workshop in October 2012 to solicit public input on meaningful performance measures from all stakeholders. Decisions concerning the

modification of performance measures will be made subsequent to that session, but no later than June 2013.

If you have any questions, please contact Alan Mayberry, Deputy Associate Administrator for Field Operations at Alan.Mayberry@dot.gov or (202) 366-5124.