

Study on Burial of Submerged Pipelines

Prepared For:

The Pipeline Hazardous Materials and Safety Administration (PHMSA)

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Table of Contents

PURPOSE..... 1

BACKGROUND 1

METHODOLOGY..... 5

RESULTS 6

CONCLUSIONS..... 9

Appendices

Appendix A: NTSB LETTER

Appendix B: TABLES

Appendix C: MAPS

Appendix D: BIBLIOGRAPHY

Appendix E: EXTENDED METHODOLOGY

Purpose

The Pipeline Hazardous Materials and Safety Administration (PHMSA)¹ has taken a number of actions towards ensuring the safe burial of submerged pipelines in areas subject to damage by surface vessels and their operations. Significant actions include the following:

- 03/98, Texas A&M University report, Analysis of Pipeline Burial Surveys in the Gulf of Mexico
- 12/00, Final Rule to require integrity management programs for large hazardous liquid pipelines (65 FR 75377)
- 01/02, Final Rule to require integrity management programs for smaller hazardous liquid pipelines (67 FR 2136)
- 08/02, Final Rule defining HCAs for gas transmission (67 FR 50824)
- 12/02, NPRM to require integrity management programs for gas transmission pipelines in high consequence areas (HCAs)
- 12/03, NPRM to require all operators to have procedures for periodic inspections of pipelines in navigable waters (68 FR 69368)
- 8/04, Final Rule to require procedures for periodic inspections of gas and hazardous liquid pipelines in the Gulf of Mexico and its inlets in waters less than 15 feet deep (69 FR 48400)

This study was initiated to respond to a recommendation from the NTSB to collect and analyze available data on the risks of exposed pipelines and possible hazards to navigation in offshore waters less than 15 feet deep *other than the Gulf of Mexico (GOM) and its inlets*. As described below, the scope of the study area was later expanded to include certain inland waters.

Background

In July 1987, while working in shallow coastal waters off the Louisiana coast, the SEA CHIEF struck and ruptured an 8-inch natural gas liquids pipeline. The resulting explosion killed two crew members. According to the accident investigation, only 6 inches out of the original 3 feet of pipe was covered with mud. Another similar accident occurred in October 1989. The vessel NORTHUMBERLAND struck a 16-inch gas pipeline in shallow water near Sabine Pass, Texas. The vessel caught fire and 11 of the 14 crew members died.

¹ The Pipeline and Hazardous Materials Safety Administration (PHMSA) was created under the Norman Y. Mineta Research and Special Programs Improvement Act (P.L. 108-426) of 2004 and replaced the Research and Special Programs Administration."

Study for NTSB Recommendation P-90-29

In their investigation of the NORTHUMBERLAND accident, the National Transportation Safety Board (NTSB) found the struck pipeline, installed in 1974 with 8 to 10 feet of cover, lying uncovered on the underwater bottom. The NTSB concluded that the probable cause of the accident was the failure of the pipeline operator to maintain the pipeline at the burial depth to which it was initially installed. NTSB also concluded that the failure of PHMSA to require pipeline operators to inspect and maintain submerged pipelines in a protected condition contributed to the accident. The NTSB subsequently issued Safety Recommendation P-90-29, which directed PHMSA to "develop and implement with the assistance of the Mineral Management Service (MMS), the United States Coast Guard (USCG), and the United States Army Corp of Engineers (USACE), effective methods and requirements to bury, protect, inspect the burial depth of and maintain all submerged pipelines in areas subject to damage by surface vessels and their operations."

In November 1990, Congress addressed hazards of underwater pipelines through amendments to the Hazardous Liquid Pipeline Safety Act of 1979 and the Natural Gas Pipeline Safety Act of 1968 (Pub. L. 101-599). These amendments, in part, required the operators of offshore pipeline facilities in the Gulf of Mexico and its inlets to conduct an underwater depth-of-burial inspection of the pipeline facility and to report to the Secretary of Transportation any exposed portion or any portion of the pipeline facility that posed a hazard to navigation. The 1990 amendments also required the Secretary of Transportation to establish a mandatory, systematic and, where appropriate, periodic inspection program of all offshore pipeline facilities and any other pipeline facility crossing under, over, or through navigable waters (as defined by the Secretary) if the Secretary decides that the location of the facility in those navigable waters could pose a hazard to navigation or public safety².

In response to the NTSB recommendation and the Congressional mandates, PHMSA formed a multi-agency task force on offshore pipelines to study the issue. The task force consisted of representatives from PHMSA, USCG, MMS, the Department of Commerce, the National Oceanic and Atmospheric Administration/National Oceans Service, the USACE, the Louisiana Office of Conservation, and the Texas Railroad Commission. The task force reviewed information, views, and concerns provided by the government and the marine and pipeline industries. The assessment focused on the extent and adequacy of Federal regulations, the technology for determining pipeline location and cover, the availability of maps and charts depicting the location of pipelines, and possible government initiatives to enhance safety. In November 1990, the task force issued a report, "Joint Task Force Report on Offshore Pipelines"³. The report concluded that exposed pipelines pose a potential risk to navigation safety, especially for mariners operating in shallow, near-shore waters. The task force also concluded that underwater

² See 49 U.S.C. 60108(c)(2)(A)

³ "Joint Task Force Report on Offshore Pipelines" can be found in Document Number RSPA-1997-3001-41 at the following Department of Transportation (DOT) Docket Management System (DMS) website: <http://dms.dot.gov/>

inspections for depth-of-burial of those pipelines were not being performed despite a requirement to place pipelines below the sea floor in shallow water.

To reduce the likelihood of further casualties, the report recommended that operators inspect these pipelines at regular intervals and rebury exposed pipelines. On December 5, 1991, PHMSA published regulations requiring an operator to conduct inspections of its underwater pipelines in the Gulf of Mexico and its inlets in waters less than 15 feet (4.6 meters) deep as measured from mean low water (56 FR 63764). The regulations required that these inspections be completed before November 16, 1992, and that the results be submitted to PHMSA. The regulations also established a course of action for the operator to follow if, as a result of the inspection or upon notification by any person, the operator discovers that a pipeline is exposed or a hazard to navigation.

In 1994, to gain further information on the risks posed by underwater pipelines, PHMSA, in conjunction with other Federal agencies, requested that the Marine Board of the National Research Council (NRC) conduct an interdisciplinary review and assessment of the many technical, regulatory, and jurisdictional issues that affect the safety of the marine pipelines in the United States' offshore waters. The Marine Board's interdisciplinary Committee on the Safety of Marine Pipelines reviewed the causes of past pipeline failures, the potential for future failures, and the means of preventing or mitigating these failures. The NRC issued a report in 1994, "Improving the Safety of Marine Pipelines"⁴. The NRC determined that the marine pipeline network does not present an extraordinary threat to human life. Pipeline accidents involving deaths or injuries are rare. The most widespread risks posed by pipelines are due to oil pollution — mainly from pipelines damaged by vessels and their gear. The NRC concluded that the risks generally could be managed with currently available technology and without major new regulations if enforcement of some current regulations is improved.

PHMSA required operators to submit a report within 60 days of completion of the depth of burial surveys. In June 1997, PHMSA contracted with Texas Transportation Institute (TTI) for a comprehensive study of the reports. TTI also collected information on the available technology to conduct underwater depth-of-burial inspections and made recommendations for risk analysis, inspection intervals, and establishment of a definition of underwater natural bottom.

PHMSA addressed many of the issues identified in these reports in a Notice of Proposed Rulemaking (NPRM) with request for comment issued on December 12, 2003 (68 FR 69368). The NPRM proposed to require operators of hazardous liquid and natural gas pipelines to prepare and follow a procedure to conduct periodic underwater inspections of their pipelines offshore or crossing under commercially navigable waterways in waters less than 15-feet deep to ensure that the pipelines are not exposed or present hazards to navigation. Based on the public comments received and the results of the inspections of

⁴ "Improving the Safety of Marine Pipelines" can be found in Document Number RSPA-1997-3001-11 at the following Department of Transportation's (DOT) Docket Management System website: <http://dms.dot.gov/>

underwater pipelines in the Gulf of Mexico and its inlets as required by the 1991 regulations, PHMSA limited the proposed underwater periodic inspection requirement to the Gulf of Mexico and its inlets because there was not sufficient evidence to demonstrate that the rule should include underwater pipelines in other offshore and inland waters.

PHMSA also believed that hazards to navigation in areas outside the Gulf of Mexico are already being adequately managed by application of the regulations in 49 CFR Parts 192 and 195. These regulations incorporate by reference the latest editions of consensus technical standards on the use of current technology, materials and practices. In addition to pipeline burial standards prescribed in the regulations, the American Society of Mechanical Engineers (ASME) Codes B31.4 and B31.8, incorporated by Parts 192 and 195, specify pipeline operation and maintenance practices that include periodic inspections of underwater pipelines.⁵ In August 2004 PHMSA published a Final Rule on Periodic Underwater Inspections (69 FR 48400) to amend the pipeline safety regulations to require periodic inspections of pipeline facilities in the Gulf of Mexico and its inlets in waters less than 15-feet deep.

In addition to the August 2004 Final Rule, four other final rules issued by PHMSA from 2000 to 2003 require operators of hazardous liquid and natural gas transmission pipelines to develop Integrity Management Programs (IMPs). These regulations require hazardous liquid pipeline operators to identify their pipelines in or where a release could affect high consequence areas (HCAs) and to assess and ensure the integrity of these pipelines to protect the HCAs. HCAs include drinking water resources, ecological-resource areas, urbanized and other high-density and frequently populated areas, and commercially navigable waterway crossings throughout the nation.

Under IMPs, operators must gather and analyze comprehensive information about their pipelines that have the potential to affect HCAs. This includes determining locations of pipelines and collecting and reviewing information on risks such as corrosion, threats from outside force damage, exposed line sections, threats from third-party damage, and right-of-way encroachments. Operators categorize and repair or mitigate identified threats to their pipelines' integrity within specified schedules and report these threats to PHMSA. IMPs also include continuing integrity assessments and evaluations. PHMSA oversees IMP implementation through its integrity management inspection program. Under this program, PHMSA can direct operators to take corrective actions when PHMSA finds violations.

⁵ ASME B31.4-2002, Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids, Chapter VII, Operations and Maintenance Procedures, and Chapter IX, Offshore Liquid Pipeline Systems, outline code requirements for periodic inspections of underwater crossings, including those in shallow waters, and corrective actions. ASME B31.8-2003, Gas Transmission and Distribution Piping Systems, Chapter V, Operating and Maintenance Procedures, and Chapter VIII, Offshore Gas Transmission, outline code requirements for periodic pipeline patrol programs to observe conditions on and adjacent to each pipeline right-of-way for the purpose of maintaining pipeline integrity.

Study for NTSB Recommendation P-90-29

These regulatory initiatives undertaken by PHMSA over the years narrowed the remaining recommended action in the NTSB Safety Recommendation P-90-29 to the conduct of a study to collect data on the risks of exposed pipelines and possible hazards to navigation in offshore waters other than the Gulf of Mexico and its inlets. NTSB made this determination in their written response to PHMSA's updated response to the recommendation in August 2004⁶.

On November 1, 2006, PHMSA met informally with representatives of the NTSB staff to summarize the current study effort and identify other possible areas of investigation for the study. While no other data sources were identified at that meeting, NTSB representatives requested that the study go beyond offshore waters to include inland waters subject to tidal influence. This would include navigable parts of inlets, bays, sounds and rivers that would otherwise have not been included in the study. As a result, PHMSA asked PCCI to identify and include inland waters subject to tidal influence in the study effort.

Methodology

The study involved four areas of investigation:

- (1) Coastal states were queried for information on incidents in their states involving vessels striking pipelines;
- (2) Coastal Zone Management Programs and the USACE permitting process were reviewed for the applicability of requirements to inspect underwater pipelines;
- (3) Six data sources within PHMSA and the USCG were investigated for incidents involving pipeline hazards to navigation and pipeline incidents involving vessels or their equipment; and
- (4) Determining the applicable area of the study was a significant effort in itself, including determining the 15-foot depth contour offshore and the inland extent of tidal influence.

Defining the study area included calculating the mileage of pipelines within the area of concern. For each area of investigation, the existing regulatory requirements, defining location and size, were applied. The location must lie within the study area, (i.e. between offshore waters of 15-foot depth and inland navigable waters subject to tidal influence). Liquid pipeline size must not be 4 ½ inches or less nominal diameter. All gas pipelines are included, but incidents involving water or sewage pipelines were excluded.

An extended description of the methodology for each area of investigation is described in Appendix E.

⁶ NTSB Letter to Mr. Samuel G. Bonasso, Deputy Administrator, RSPA, U.S. DOT, December 20, 2004.

Results

Coastal State Queries

No incidents were reported as a result of the inquiries.

Coastal Zone Management and USACE Permitting

Coastal Zone Management Programs

The federal Coastal Zone Management Act of 1972 (16 USC 1451-1464) provides for voluntary federal-state partnerships to manage state coastal resources. Generally speaking, the objective of the Coastal Zone Management Program is to balance competing land and water issues in the coastal zone, and to “preserve, protect, develop, and where possible, to restore or enhance the resources of the nation’s coastal zone.

Thirty four states and territories have approved coastal management programs. Outside the Gulf of Mexico and Great Lakes, 19 states have approved programs. The majority of these state coastal programs do not include specific provisions detailing offshore gas pipeline burial or inspection requirements. However, such provisions do appear to be within each state’s authority. The CZM Program regulations, in 15 CFR 923.13, establish a planning process for developing energy facilities in the coastal zone. This section authorizes the states to articulate and identify “enforceable State policies, authorities, and techniques for managing energy facilities and their impacts.” Two state programs, for Alaska and New Jersey, do include provisions requiring the burial of offshore gas pipelines. In addition, three state programs (South Carolina, New Hampshire, and California) include provisions that *may* authorize the states to establish pipeline burial requirements. These coastal management provisions indicate that states may establish pipeline burial and inspection requirements, or other design, maintenance, and operation requirements, through their approved CZM Programs. These CZM Programs also interact with and influence Army Corps of Engineers permitting for activities in navigable waters, which is discussed in the following section.

Army Corps of Engineers Permitting

The Rivers and Harbors Acts of 1890 (superseded) and 1899 (33 USC 401, et seq.) grants the Army Corps of Engineers authority to regulate projects and activities in navigable waters of the United States. One permit mechanism under these laws is the Nationwide Permit Program (33 CFR Part 330). Nationwide Permits (NWP) are a type of general permit designed to regulate with little, if any, delay or paperwork certain activities having minimal impacts. In states with a Federally-approved Coastal Management Program, however, the Coastal Zone Management Act requires the Corps to deem an activity consistent with the state’s coastal management provisions. In other words, a state’s CZM provisions must be applied to any Corps permitted activity in that state’s waters. Furthermore, if activity outside that state’s waters will affect the land, water uses, or natural resources of the state, the same coastal zone management provisions also apply. Two Nationwide Permits appear to be of interest to this study: NWP 8 (Oil and Gas Structures) and NWP 12 (Utility Line Activities). To the extent that

Study for NTSB Recommendation P-90-29

OCS oil or gas pipelines could impact a state's waters or natural resources, it is possible a state CZM program could impose additional requirements on a proposed pipeline permitted under NWP 8. NWP 12 applies to activities required for the construction, maintenance, or repair of utility lines and associated structures in waters of the US, which include gas pipelines. Any specific state requirement for pipeline construction, design, operation, or maintenance established in a CZM Program would apply to any utility line activity permitted by the Corps.

Pipeline Hazards to Navigation and Pipeline Incidents Involving Vessels or Their Equipment.

The table showing results of pipeline strikes by a vessel or anchor, as well as the number of uncovered pipelines reported is provided in Appendix B, Table B-1. The databases that were investigated had overlapping data and the columns cannot be summed without introducing duplications. The single, most complete database of incidents and uncovered pipeline reports on a national level is the Coast Guard NRC data.

Incidents: Coast Guard data since 1990 shows 59 reported instances of a vessel or its equipment striking a pipeline. Of those incidents, 58 were in the Gulf of Mexico and 1 was in other waters.

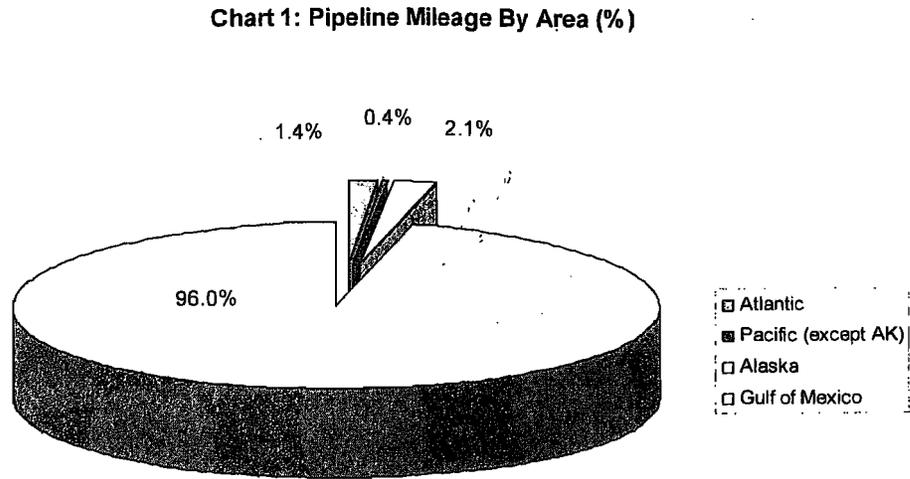
Uncovered Pipelines: Coast Guard data also shows that 64 pipelines were reported to be uncovered or a hazard to navigation. All of those pipelines were in the Gulf of Mexico.

The DOT Accident Reports and Coast Guard casualty and pollution reports were intended to support regulatory programs and did not include data fields that allowed typical inclusion of extraordinary circumstances like a vessel's striking a pipeline. Not surprisingly, these databases did not provide useful information for this study.

Study for NTSB Recommendation P-90-29

Study Area and Pipeline Mileage

The table showing pipeline mileage by area is provided in Appendix B, Table B-2. The following chart represents the results of that table – over 96 percent of all pipelines mileage, offshore from the 15-foot ocean depth contour to the onshore limit of tidal influence are located in the Gulf of Mexico:



Note that these percentages do not add to 100.0% due to rounding of the data.

Table 2: Vessel-Pipeline Incidents within Gulf of Mexico and Other Areas, 1990-2005

Area	Number of Incidents	Number of Pipeline Miles
Gulf of Mexico	35	7,370.3
Other Areas	1	304.7

Conclusions

The number of pipeline miles in the Gulf of Mexico area is far greater than the number of pipeline miles in the study area outside the Gulf of Mexico. This study also found no incidents of pipeline strikes by vessels or their equipment in offshore waters less than 15-foot deep outside the Gulf of Mexico area. In the expanded area of the study that included inland waters less than 15-foot deep and subject to tidal influence, the study found 1 incident and no reports of exposed pipelines. As discussed in the background section, pipeline operators are now required to develop an Integrity Management Program to assess and ensure the integrity of pipelines to protect the High Consequence Areas, which include crossings of inland navigable waters throughout the nation.

Appendix A: NTSB Letter

1. NTSB Letter to Mr. Samuel G. Bonasso, Deputy Administrator, RSPA, U.S. DOT, December 20, 2004.

Appendix B: Tables

The databases that were investigated had overlapping data and the columns cannot be summed without introducing duplications. The single, most complete database of incidents and uncovered pipeline reports on a national level is the Coast Guard NRC data.

Table B-1

	Vessel/Anchor – Pipeline Strikes Reported		Uncovered Pipelines Reported	
	GOM	Other	GOM	Other
PHSMA Safety-Related Condition Reports, 1991-2005	1	0	n/a	n/a
DOT Telephone Notifications, 1991-2001*	22	1	60	0
DOT Accident Reports for Gas Transmission, Gas Distribution and Liquid Pipelines	0**	0**	n/a	n/a
Coast Guard Marine Casualty and Pollution Reports (MISLE), 1991-Sept. 2006	0**	0**	n/a	n/a
National Response Center Reports, 1990-2005	35	1	61	0
Coast Guard Local Notices to Mariners, 1995-2005 (excludes Great Lakes and inland rivers)	n/a	n/a	64	0

* DOT Telephone Notifications end in 2001 because notification and record maintenance are now performed by the National Response Center.

** The DOT Accident Reports and Coast Guard Marine Casualty & Pollution Reports were designed to collect information for typical incidents. They did not yield data relevant to this study.

Table B-2

Area ↓	Offshore Pipeline Miles within 15-ft Contour (mi.)	Inland Pipeline Miles Subject to Tidal Influence (mi.)	Sum by Area (mi.)	Percentage by Area (%)
Atlantic	53.6	57.1	110.7	1.4
Pacific (ex. AK)	6.6	26.5	33.1	0.4
Alaska	159.6	1.3	160.9	2.1
GOM	6394.1	976.2	7370.3	96.0
TOTAL	6613.9	1061.1	7675.0	100.0

Appendix C: Maps

1. New England Region
2. Chesapeake Bay Area
3. Gulf of Mexico
4. Southern California
5. Cook Inlet Watershed and Prudhoe Bay

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Study for NTSB Recommendation P-90-29

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*Appendix E: Extended Methodology*Coastal State Queries

PCCI tallied responses to PHMSA's email queries to 24 coastal state pipeline liaisons for information on incidents involving pipelines and vessels in waters subject to the tide and less than 15-feet deep.

Coastal Zone Management and USACE Permitting*Coastal Zone Management Programs*

PCCI conducted background research on the coastal zone management programs in the 19 non-Gulf of Mexico, non-Great Lakes coastal states. This research consisted of examining the Coastal Zone Management Plans, enforceable policies, and authorizing statutes, legislation, or executive orders for each coastal program. Information on these programs was compiled into a Microsoft Excel spreadsheet. Each program was studied to identify any specific program provisions that address energy facilities or pipelines. Particular attention was paid to provisions establishing requirements for pipeline burial, inspection, design, maintenance, or operation.

Army Corps of Engineers Permitting

Background research was also conducted in the regulatory functions performed by the Army Corps of Engineers. This focused on examining the Corps' permitting authority, particularly under the Nationwide Permit Program (33 CFR Part 330). The current nationwide permits for Oil and Gas Structures (NWP 8) and Utility Line Activation (NWP 12) were researched. Provisions of those nationwide permits that would allow the Corps to collect details of pipeline construction, design, or operation were of interest in this study. The interaction between the Corps permitting authority and state Coastal Zone Management was also explored.

Reports of Pipeline Hazards to Navigation and Incidents Involving Vessels

The major purpose of this study is to collect information on pipeline incidents involving strikes by vessels or their equipment in navigable waters under investigation. Part of this collection included information in reports of exposed pipelines, even if there were no incidents reported. There is no single, comprehensive repository of this information.

Because there is no single, comprehensive repository of information on accidents involving pipeline hazards to navigation and pipeline incidents involving vessels or their equipment, PCCI looked at a number of sources for data within PHMSA and the Coast Guard.

Three PHMSA databases were investigated:

- PHMSA Safety-Related Condition Reports;
- DOT Telephone Notifications; and
- DOT Accident Reports for Gas Transmission, Gas Distribution and Liquid Pipelines.

Study for NTSB Recommendation P-90-29

Three Coast Guard databases were investigated:

- Marine Casualty and Pollution Incident Investigations;
- National Response Center Reports; and
- Local Notices to Mariners.

PHMSA Safety-Related Condition Reports.

PHMSA Safety-Related Condition Reports for the years 1990 to present were downloaded from the PHMSA website⁷. Each of these annual PDF files was searched for keywords related to the study. Condition reports that contained keywords were read for content, to identify if the cause of the incident involved a vessel and if the pipeline size and incident location were relevant to the study.

DOT Telephone Notifications.

DOT Telephone Notification data is available for 1991 through 1994 and from 1995 through 2001⁸. The data was first filtered to include only reports for the 24 coastal states. That data was searched for keywords 'vessel', 'tug', 'boat', 'ship', 'barge', 'rig', 'hit by', 'struck by', and 'fish'. Reports containing any of those words were printed and reviewed for cause and location. The coastal state data was also searched for keywords 'uncovered' and 'exposed' and then reviewed for reports of uncovered or exposed pipelines containing gas or hazardous liquid.

DOT Accident Reports for Gas Transmission, Gas Distribution and Liquid Pipelines.

The following data files for DOT Accident Reports were downloaded from the PHMSA website:

- Hazardous Liquid Accident Data - January/2002 to Present
- Hazardous Liquid Accident Data - 1986 to January/2002
- Natural Gas Distribution Incident Data - March 2004 to Present
- Natural Gas Distribution Incident Data - mid 1984 to February 2004
- Natural Gas Transmission Incident Data - 2002 to Present
- Natural Gas Transmission Incident Data - mid 1984 to 2001

The PHMSA website where these files are located is the FOIA Online Library at the following location:

<http://ops.dot.gov/stats/IA98.htm>

⁷ The PHMSA Safety-Related Condition Reports for 1990 through 2005 were used and can be found at the following FOIA On-Line Library: <http://ops.dot.gov/library/saferep/saferep.htm>.

⁸ PHMSA Office of Pipeline Safety Telephonic Incident Notifications can be found in the FOIS On-Line Library at the following link: <http://ops.dot.gov/library/phonic.htm>

Study for NTSB Recommendation P-90-29

The database files were imported to MS Access 2003 database and the database records filtered by location, cause and state. Years of the incidents were identifiable either from a year, a date field, or a sequence number that contained the year; pre-1990 data was not reviewed. Cause and other records were printed out from the filtered data and read for indications that the incident involved some type of vessel.

Marine Casualty and Pollution Incident Investigations

Coast Guard makes certain incident investigation reports available online through an online archive database. These reports provide information on maritime incidents investigated by the U.S. Coast Guard under Part D of Title 46 of the U.S. Code. These online reports are limited to reportable marine casualties⁹ that were closed after October 2002. Investigations online are found at:

<http://cgmix.uscg.mil/IIR/Default.aspx>

The online database searches the 'name' field only, and not any other fields such as 'cause'. Both because of the limited fields searched and because the data online covered only from 2002, PCCI elected to search the Coast Guard's archived investigations, available through the National Technical Information Service (NTIS) as Marine Casualty and Pollution Database (NTIS Order Number: SUB-5441)¹⁰. For this study, the Marine Casualty and Pollution Database archive was used. In both the online archive and the NTIS data, only completed investigations are reported.

The only results examined from the online search were investigations where 'pipeline' was part of a vessel's name or the operator's name.

National Response Center Reports

National Response Center report data was collected for years 1990 through 2005¹¹. The data was first filtered to include only reports for the 24 coastal states. That data was searched for types of incidents involving vessels, pipelines, collisions and allisions. Vessel, collision and allision incident reports containing 'pipeline' were printed and reviewed for cause and location. Similarly, pipeline incident reports containing keywords 'vessel', 'tug', 'boat', 'ship', 'barge', 'rig', or 'fish' were printed and reviewed for cause and location. The coastal state data was also searched for keywords 'uncovered' and 'exposed' and then reviewed for reports of uncovered or exposed pipelines containing gas or hazardous liquid.

⁹ Reportable marine casualties are defined in Section 4.05 of Title 46 of the Code of Federal Regulations.

¹⁰ Archives of Local Notices to Mariners (LNMs) are maintained at the Coast Guard Navigation Center in Alexandria, Virginia. They are available online at: <http://www.navcen.uscg.gov/lnm/archives.htm>.

¹¹ The NRC yearly data files were downloaded and imported into a larger Access database. The files are available at the following website: <http://www.nrc.uscg.mil/download.html>

Study for NTSB Recommendation P-90-29*Local Notices to Mariners*

On a national level, Coast Guard has archived Local Notices to Mariners (LNMs) beginning with calendar year 1995. The 1995 archive is incomplete, as are some Coast Guard district files for 1996, most notably files for the entire 1996 year for the 8th, 11th and 14th Districts.

The LNM archive files for 1995 through 2005 are available in text (*.txt), document (*.doc) files, and Acrobat® (*.PDF) formats. To search for exposed pipelines in the 1995 – 1997 archives, the text and MSWord files were scanned using the operating system's advanced search option. This 'search option' feature examines the text of documents contained in a specified folder for a specified word or phrase. The feature returns documents that contain the search string anywhere in the text. Folders for the years 1995 through 2000 were searched in this way and the files containing the search string were identified and converted to PDF. Resulting PDF files were again searched by calendar year using the string "exposed pipeline", reporting in a total number of files and number of occurrences for the search string.

In order to locate all references to "exposed pipelines" in the Local Notices to Mariners, the following protocol was implemented. First all Local Notices to Mariners between the years 1995-2005 were obtained from the United States Coast Guard (USCG) for each of the following districts (D1, 5, 7, 8G, 11, 13, 14, 17). These particular districts were isolated for the study because they include the coastal waters of the U.S. (9th USCG district was excluded). The Local Notices to Mariners were received for each of the study districts as PDF (portable document format) files¹². The PDF files were searched using the Adobe Acrobat Reader Version 7.0 search function to locate all instances of the phrase "exposed pipeline" within the documents. The number of documents that contained the search phrase and the number of references to the search phrase within those documents were then recorded in an excel spreadsheet.

Because one paragraph in the NTM may mention "exposed pipeline" more than once and because the same exposed pipeline may be reported in multiple LNMs, an additional step was followed. LNMs were investigated to find out if the same exposed pipeline was reported more than once. The number of total exposed pipelines were adjusted to report only the number of unique occurrences.

Study Area and Pipeline Mileage

Mileages of both offshore pipelines located within the 15-foot ocean depth contour and onshore pipelines in navigable waters subject to tidal influence were delineated using ArcView 9.0. The geographic coordinate system (i.e., horizontal reference datum) used in ArcView is the North American Datum 1983 projected in the North American Equidistant Conic Projection. References for data sources used in the processes described below are found in Appendix D.

¹² Data for the years 1995-1998 was obtained in either word document format or text format.

Study for NTSB Recommendation P-90-29

The bathymetric data was retrieved from NOAA through the GEODAS Grid Translator. The vertical datums for the bathymetric data are mean low water (89% of the surveys) and mean lower low water (11% of the surveys). For the continental U.S. and Hawaii, the 15 to 20 foot ocean depth region was isolated by reclassifying the data. For Alaska, NOAA Nautical Charts from MAPTECH were georeferenced to the spatial parameters of the map in ArcView. Then, the 15-foot depth contour was created based on the depth measurements (soundings) from the spatially referenced nautical charts.

To calculate offshore pipeline mileage, offshore Gulf of Mexico (GOM) pipeline data beyond the 15-foot depth contour was excluded using the clipping tool in ArcView. This resulted in a new set of data displaying only offshore pipelines in the Gulf of Mexico that are within the 15-foot ocean depth contour. This data set was used to calculate the total length in miles of offshore pipeline segments. Similarly, outside of the GOM, offshore pipeline data beyond the 15-foot depth contour was excluded using the clipping tool. The United States boundary layer was used to define offshore pipelines within the 15-foot depth contour, and the mileage of these pipelines was totaled. For the California coast, offshore pipelines were manually measured from imported ASCII data retrieved from the MMS Pacific Region website. To ensure that all offshore pipelines were captured, multiple coastal state government websites were reviewed, namely Coastal Zone Management sites and Marine Fisheries Department sites.

The inland extent of tidal influence on river systems had to be determined to calculate onshore pipeline mileages that cross navigable waters subject to tidal influence. EPA (EMAP) environmental monitoring data, specifically salinity data, were used to estimate the extent of tidal influence. Monitoring stations for each region with observed salinity values greater than 0.1 parts per thousand (ppt) were mapped. This study assumes the extent of tidal influence is characterized by the lowest observed salinity values from the available monitoring data. The maps in Appendix C display the monitoring stations marking the inward extent of tidal influence on the river system. Onshore pipelines of interest in this study were between this tidal influence boundary and the coastline.

ArcView was used to tabulate latitude and longitude coordinates where each pipeline crossed a river segment subject to tidal influence. Pipeline mileage was measured within the river systems through DeLORME TopoUSA Topographic Mapping Software using the geographic coordinates to delineate the pipeline.

In the Cook Inlet Basin, there are four rivers crossed by pipelines within the line of inland tidal influence - the Chakachatna, Beluga, Susitna, and Matanuska Rivers. No EPA EMAP monitoring stations exist in the state of Alaska, so other sources of environmental data were needed to determine the extent of tidal influence. The extent and effects of saline and freshwater mixing within the inlet are complex and not completely understood. Given the 30-foot diurnal tidal range from NOAA's Anchorage, Knik Arm Station and the oceanographic dynamics of the area, the four crossings were included in the final results of the study. Such dynamics include timing, location, force of waves, the counter clockwise direction of water flow within the inlet, seasonal discharge of fresh water and coastal upwelling. For example, as water upwells at the tip of the Kenai Peninsula, the warmer surface waters from the Gulf of Alaska are diverted offshore to the west. Many

miles of Cook Inlet shorelines have intertidal zones that are several miles wide. Given the high degree of variability in Cook Inlet tidal conditions, PCCI included rather than excluded pipeline mileage where tidal influence was uncertain.

There are three pipelines that intersect rivers around Prudhoe Bay, North Slope, AK. The three intersected rivers are the Colville River, the Kuparuk River, and the Sagavanirtok River. The pipeline segments that cross these rivers collectively account for approximately 0.74 miles (3,883 feet) of pipeline. No salinity data was available for the isolated region of Prudhoe Bay. These mileages were not included in the study as it is extremely unlikely they are subject to tidal influence. The North Slope is a tundra ecoregion with winter temperatures averaging 17 below zero, and accordingly is harsh and barren. The bay is blocked by ice for most of the year. All three locations where pipelines cross rivers occur at a distance of greater than 9.8 miles from the coastline. The tidal range in Prudhoe Bay is typically less than one foot. A tidal range of this size is unlikely to extend anywhere near 10 miles inland from the coast. Due to the combination of these factors the inland three crossings were excluded from the study.



U.S. Department
of Transportation
**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Ave., S.E.
Washington, DC 20590

JUL 31 2007

The Honorable Mark V. Rosenker
Chairman
National Transportation Safety Board
490 L'Enfant Plaza East, S.W.
Washington, DC 20594

Dear Chairman Rosenker:

The enclosed document provides a brief update on the status of open hazardous materials and pipeline safety recommendations to the Pipeline and Hazardous Materials Safety Administration (PHMSA). PHMSA takes all recommendations given by the National Transportation Safety Board seriously and is working diligently to address them. PHMSA will send you individual responses during fiscal year 2007, either seeking closure or providing further updates on several recommendations.

If you have any questions, concerns, or comments, please feel free to contact me at (202) 366-4433.

Sincerely,

Stacey L. Gerard
Assistant Administrator/Chief Safety Officer

Enclosures

**PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION
(PHMSA)
STATUS OF OPEN NATIONAL TRANSPORTATION SAFETY BOARD (NTSB)
RECOMMENDATIONS**

PIPELINE SAFETY RECOMMENDATIONS

P-90-29: The NTSB recommended that PHMSA develop and implement, with the assistance of Minerals Management Service, the U.S. Coast Guard, and the U.S. Army Corps of Engineers, effective methods and requirements to bury, protect, and inspect the burial depth of submerged pipelines in areas subject to damage by surface vessels and their operations.

PHMSA Update: In 2004, PHMSA published a final rule requiring periodic underwater inspection on August 10, 2004. PHMSA submitted a letter to NTSB requesting closure. NTSB responded by encouraging PHMSA to conduct further studies on risks associated with offshore areas. PHMSA recently completed a study on the risks of exposed pipelines and possible hazards to navigation in offshore waters other than the Gulf of Mexico and its inlets. The results show 58 reported instances of a vessel or its equipment striking a pipeline offshore since 1990. All incidents were in the Gulf of Mexico, where regulation requires the periodic underwater inspections program. On April 30, PHMSA issued a 30-day notice seeking public comment on the adequacy of the study and received no comments. We will submit a closure letter to the NTSB within the next 60-90 days.

P-98-02: The NTSB recommended that PHMSA determine the extent of the susceptibility to premature brittle-like cracking of older plastic piping that remains in use for gas service nationwide.

PHMSA Update: The Plastic Pipe Database Committee includes representatives from PHMSA, NTSB, American Gas Association, American Public Gas Association, Plastics Pipe Institute, Gas Research Institute, industry, and State regulators. The committee recently completed collecting data for in-service plastic piping material failures, and is now creating a table documenting the results. The committee plans to complete this table by April 2007. Additionally, the Gas Distribution Integrity Management Program Report found need for the American Society for Testing and Materials (ASTM) to consider enhancing performance testing for plastic pipe fittings. ASTM is currently addressing these issues. PHMSA plans to seek comments on some plastic pipe issues in its gas distribution integrity management rulemaking, which it plans to issue this fall. PHMSA has developed an advisory bulletin to address vintage plastic pipes that it plans to issue later this summer.

P-99-12: The NTSB recommended that PHMSA establish within 2 years scientifically based hours-of-service regulations that set limits on hours of service provide predictable work and rest schedules, and consider circadian rhythms and human sleep and rest requirements.

PHMSA Update: PHMSA continues its assessment of human fatigue in pipeline operations in various research and standards efforts. PHMSA earlier issued an advisory bulletin (70 FR

46917) to owners and operators of natural gas and hazardous liquid pipelines and liquefied natural gas facilities. The purpose of the advisory was to help operators ensure controllers are not assigned to shift duties while fatigued, to advise pipeline operators on considerations which could cause a reduction of mental alertness or decision making ability, and to encourage safe management practices. PHMSA also recently completed a controller certification project (CCERT) that covered a variety of human factor control room issues, including fatigue. In a January 2007 report to Congress on CCERT, PHMSA identified shift length, schedule rotation, and education in fatigue mitigation strategies as fruitful areas for addressing fatigue. The Pipeline Inspection, Protection, Enforcement, and Safety Act of 2006 (PIPES Act) requires regulations for each operator of a gas or hazardous liquid pipeline to develop and submit a plan to reduce pipeline system risk associated with human factors, including fatigue. The Act also requires PHMSA to amend its forms for operators to report gas and hazardous liquid pipeline accidents by December 31, 2007. PHMSA is working with the Department's Human Factors Coordinating Committee on a holistic approach to addressing fatigue issues throughout the workforce. We plan to include this approach within our developing "Prevention Through People" regulatory initiative. This regulatory initiative also will address NTSB Recommendations P-05-01-03, which is one of PHMSA's Top 10 regulatory initiatives. PHMSA held a workshop on May 23, 2007 that addressed best practices in this area. PHMSA is currently reviewing the workshop data and plans to issue a rulemaking proposal later this year.

P-01-02: The NTSB recommended that PHMSA require excess flow valve installation in all new and renewed gas service lines, regardless of a customer's classification, when the operating conditions are compatible with readily available valves.

PHMSA Update: The PIPES Act requires PHMSA to prescribe minimum distribution integrity management standards by December 31, 2007. The Act also includes a requirement for gas distribution operators to install EFVs on lines serving single-family residences installed or entirely replaced beginning June 1, 2008. This is another one of PHMSA's Top 10 regulatory initiatives. PHMSA has developed an NPRM, which we plan to issue this fall. This distribution integrity management NPRM will include mandatory installation of EFV on new or replaced service lines on single residents as specified by the Act and recommended by NTSB.

P-03-01: The NTSB recommended that PHMSA revise 49 Code of Federal Regulations Part 192 to require that new or replaced pipelines be designed and constructed with features to mitigate internal corrosion. At a minimum, such pipelines should (1) be configured to reduce the opportunity for liquids to accumulate, (2) be equipped with effective liquid removal features, and (3) be able to accommodate corrosion monitoring devices at locations with the greatest potential for internal corrosion.

PHMSA Update: PHMSA published an NPRM on December 15, 2005 (70 FR 74262). The Notice proposed a performance-based requirement to design and construct pipelines with internal corrosion in mind. The Technical Pipeline Safety Standards Committees held a public meeting June 26-28, 2006 to discuss this issue. On August 24, 2006 the Technical Pipeline Safety Standards Committees voted to support the Internal Corrosion for Natural

Appendix B

Gas Transmission Lines NPRM. PHMSA issued a final rule directly addressing NTSB concerns on April 23, 2007 (72 FR 20055), and is requesting closure of this recommendation.

P-04-01-03: The NTSB made the following three recommendations regarding transportation of pipe:

1. Remove the exemption in 49 *Code of Federal Regulations* § 192.65 (b) that permits pipe to be placed in natural gas service after pressure testing when the pipe can not be verified to have been transported in accordance with the American Petroleum Institute's (API) recommended practice RP 5L1.
2. Amend 49 *Code of Federal Regulations* to require that natural gas pipeline operators (Part 192) and hazardous liquid pipeline operators (Part 195) follow the American Petroleum Institute's (API) recommended practice RP 5LW for transportation of pipe on marine vessels.
3. Evaluate the need for a truck transportation standard to prevent damage to pipe, and, if needed, develop the standard and incorporate it in 49 *Code of Federal Regulations* Parts 192 and 195 for both natural gas and hazardous liquid line pipe.

PHMSA Update: PHMSA intends to address incorporating API RP 5LW in its miscellaneous amendments proposal, which it plans to issue late this year. The Pipeline Research Council International (PRCI) is conducting research on the impact truck transportation of pipe. PRCI has a working draft which they are expected to complete by the end of 2007. Since it now appears that PRCI's work will not address rail transportation of gas pipelines, PHMSA is considering publishing a notice seeking information of the existing inventions of pre-1970 pipe being kept for repairs.

P-05-01-05: The NTSB made the following five recommendations on Control Room Management:

1. Require operators of hazardous liquid pipelines to follow the American Petroleum Institute's Recommended Practice 1165 for the use of graphics on the Supervisory Control and Data Acquisition (SCADA) screens;
2. Require pipeline companies to have a policy for the review/audit of alarms;
3. Require controller training to include simulator or non-computerized simulations for controller recognition of abnormal operating conditions, in particular, leak events;
4. Change the liquid accident reporting form (PHMSA F 7000-1) and require operators to provide data related to controller fatigue; and
5. Require operators to install computer-based leak detection systems on all lines unless engineering analysis determines that such a system is not necessary.

PHMSA Update: PHMSA has completed our CCERT project, discussed above in response to P-99-12, which covered various human factor control room issues. In January 2007, PHMSA submitted a report to Congress on the project that identified several areas for enhancing safety including improved graphics on SCADA screens, alarms, and training. The Pipeline Inspection, Protection, Enforcement, and Safety Act of 2006 (Act) requires PHMSA to issue regulations by June 1, 2008 that require operators to use the American Petroleum Institute's Recommended Practice 1165, to review and audit alarm systems, and to develop training standards that include the recognition of abnormal operating conditions. The Act

Appendix B

also requires PHMSA to submit a report to Congress on leak detection systems used by operators of hazardous liquid pipelines by December 31, 2007. We are actively working on this report and intend to meet this deadline. PHMSA plans to include control room issues in a "Prevention Through People" regulatory effort that will incorporate the concepts of integrity management programs into risk-based regulations addressing human factors. PHMSA has begun work on this regulatory effort and expects to complete it this year. It will address both the Congressional direction and NTSB recommendations on use of graphics, review of alarms, controlling training, and fatigue. On May 23, 2007 PHMSA held a public workshop that addressed best practices in addressing fatigue, man-machine interface, and qualifications and training and we are currently reviewing the workshop data. PHMSA has also begun work on a project to add data elements to accident reporting forms to capture information regarding the impact of fatigue on safety. PHMSA has consistently pushed the hazardous liquid operators through integrity management to shore up the adequacy of their leak detection capabilities.

**PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION
(PHMSA)
STATUS OF OPEN NATIONAL TRANSPORTATION SAFETY BOARD (NTSB)
RECOMMENDATIONS**

HAZARDOUS MATERIALS RECOMMENDATIONS

A-99-80: In cooperation with FAA, evaluate the fire hazards posed by lithium batteries in an air transportation environment and require that appropriate safety measures be taken to protect aircraft and occupants. The evaluation should consider the testing requirements for lithium batteries in the United Nations' Transport of Dangerous Goods Manual of Tests and Criteria, the involvement of packages containing large quantities of tightly packed batteries in a cargo compartment fire, and the possible exposure of batteries to rough handling in an air transportation environment, including being crushed or abraded open.

A-99-82: Require packages containing lithium batteries to be identified as hazardous materials, including appropriate marking and labeling of the packages and proper identification in shipping documents, when transported on aircraft.

PHMSA Update: In December 2004, we issued an interim final rule (IFR) to ban the transportation of primary or non-rechargeable lithium batteries as cargo on passenger aircraft. In addition, in a notice of proposed rulemaking published in April 2002, we proposed to tighten other standards for the testing, handling, and packaging of lithium batteries, in each case to reduce the likelihood or consequence of a lithium battery-related fire in transportation. We hope to finalize the proposals in the April 2002 NPRM and the provisions of the December 2004 IFR by the end of this year. A final rule to accomplish this was transmitted to OMB for review and approval in early May. We continue to evaluate the fire hazards posed by the transportation of secondary or rechargeable lithium batteries; with FAA, we are currently evaluating a report on this issue prepared by FAA's Technical Center. We are also working with the United Nations Sub-Committee of Experts on the Transport of Dangerous Goods and the International Civil Aviation Organization to develop additional enhanced safety measures for the transportation of lithium batteries.

More generally, we have initiated a comprehensive strategy aimed at reducing the transportation risks posed by batteries of all types. This strategy reflects an approach we call "Enterprise Government" – bringing together public and private sector stakeholders on all sides of an issue to identify and advance governmental and private sector solutions. Together we identified a series of immediate and longer-term actions that participants in this enterprise are taking or will take to enhance safety. These actions will include comprehensive reporting and investigation of battery-related incidents; improved battery, consumer product, and software design; development and implementation of a technical standards agenda; consideration and implementation of improved regulatory standards; focused enforcement; and development and implementation of a public outreach and education campaign. For example, PHMSA is co-hosting a meeting with national standards organizations (UL, IEC, IEEE) on May 24-25, 2007 in Herndon, VA to review current lithium battery standards work

Appendix B

and stimulate discussions on actions that can be taken to enhance safety. Through an integrated and cooperative approach, we can be most successful in reducing incidents, enhancing safety, and protecting the public.

I-02-01: Develop, with the assistance of the Environmental Protection Agency and Occupational Safety and Health Administration, safety requirements that apply to the loading and unloading of railroad tank cars, highway cargo tanks, and other bulk containers that address the inspection and maintenance of cargo transfer equipment, emergency shutdown measures, and personal protection requirements.

I-02-02: Implement, after the adoption of safety requirements developed in response to Safety Recommendation I-02-1, an oversight program to ensure compliance with these requirements.

R-04-10: In cooperation with the Occupational Safety and Health Administration and the Environmental Protection Agency, develop regulations that require safe operating procedures to be established before hazardous materials are heated in a railroad tank car for unloading; at a minimum, the procedures should include monitoring internal tank pressure and cargo temperature.

PHMSA Update: PHMSA is using an enterprise approach to examine the bulk loading and unloading issue and the range of potential actions to reduce hazardous materials transportation risks. This initiative is based on the increasing realization that bulk loading and unloading poses significant hazardous materials transportation risk. PHMSA has analyzed the risk due to bulk loading and unloading operations over the past decade and has concluded that roughly one quarter to one half of the overall hazardous materials transportation risk may be attributable to loading and unloading operations. That is a basis for our interest in new approaches to the subject.

We are hosting a facilitated technical workshop in June as the next step. The workshop focuses on the role of loading and unloading procedures, including the nature of current requirements and guidelines, the degree of coverage, the opportunity to improve safety with "best practices" or consensus standards, the adequacy of industry proposed strawman operating practices, and the extent of government and industry monitoring and compliance that occurs or should occur. PHMSA has reconsidered the value of a safety advisory notice in response to NTSB recommendation R-04-10 in light of the proposed operating practices and is hopeful publication of the operating practices will have a better safety result. Other topics or approaches to consider in addressing the issue will be solicited. This process may lead to regulatory changes in early 2008.

We are discussing our plans for this workshop with key stakeholders in industry, government, and the emergency response community to determine the proper structure for this activity and the appropriate expertise to include. The workshop will be open to the public and will lead to a process whereby the public has the opportunity to comment on outcomes. Advice is being sought from the Occupational Safety and Health Administration

and the Environmental Protection Agency on how best to proceed. We are also seeking NTSB participation in and support for this effort.

H-04-023: Require periodic nondestructive testing to be conducted on nurse tanks to identify material flaws that could develop and grow during a tank's service and result in tank failure.

PHMSA Update: PHMSA reviewed the incident data and other information concerning the safety performance of nurse tanks. We agree that additional requirements, including periodic testing, should be considered. PHMSA is currently considering alternatives for specific measures to improve the safety of nurse tanks, including the costs and benefits of such measures. Industry has inspected more than 1,000 tanks for inclusion in the inspection and testing program authorized by a special permit. We plan to meet with the Fertilizer Institute and other stakeholders to discuss the safety problems identified by NTSB and alternatives for addressing those problems.

H-02-23: Modify 49 CFR 173.301 to clearly require that valves, piping, and fittings for cylinders that are horizontally mounted and used to transport hazardous materials are protected from multi-directional forces that are likely to occur during accident, including rollovers.

H-02-24: Require that cylinders that transport hazardous materials and are horizontally mounted on a semi-trailer to be protected from impact with the roadway or terrain to reduce the likelihood of their being fractured and ejected during a rollover accident.

PHMSA Update: In a notice of proposed rulemaking that will be published in April 2007, we will propose to incorporate the requirements of the Compressed Gas Association Technical Bulletin 25 (TB-25 Design Considerations for Tube Trailers) into the HMR. TB-25 defines basic design considerations for tube trailers to maintain structural integrity during handling and transport. Designs must be able to withstand static, dynamic, and thermal loads found during handling and transport. Designs must address the mounting of individual tubes in tube bundles; attachment of tube bundles to the motor vehicle chassis; and accident damage protection for pressure retaining equipment.

H-98-27: Prohibit the carrying of hazardous materials in external piping of cargo tanks, such as loading lines, that may be vulnerable to failure in an accident.

PHMSA Update: On December 30, 2004, the Pipeline and Hazardous Materials Safety Administration (PHMSA) published a notice of proposed rulemaking (NPRM) to prohibit flammable liquids from being transported in unprotected piping on all newly constructed and existing DOT specification cargo tank motor vehicles. On the basis of comments received and additional data and analysis, we concluded further regulation would not produce the level of benefits originally expected and the quantifiable benefits of the proposed regulatory approaches would not justify corresponding costs. Accordingly, on June 7, 2006 PHMSA published a notice withdrawing the December 30, 2004 NPRM and terminating the rulemaking proceeding. Through cooperation, collaboration, and coordination with the cargo tank industry and the major emergency response organizations, PHMSA developed a

Appendix B

comprehensive national wetlines outreach awareness program to enhance public safety and assist those who respond to transportation emergencies. Our industry outreach efforts are focused on identifying "best practices" for fueling operations, maintenance procedures, and safeguards measures. Working with stakeholders, we will continue to explore ways to refine our current data on the safety performance of vehicles equipped with wetlines. We will also encourage the industry to continue voluntary efforts to develop and implement technologies that will limit the safety risks associated with the transportation of flammable liquids in wetlines.

H-92-1: Provide cargo tank manufacturers specific written guidance about (a) the factors and assumptions that must be considered when calculating the loads on cargo tank rollover protection devices in determining compliance with existing DOT performance standards and (b) acceptable means to shield and protect the top-mounted closure fittings on all bulk liquid cargo tanks.

PHMSA Response: The Truck Trailer Manufacturers has revised Recommended Practice 87-92: "DOT 406, DOT 407 and DOT 412 Cargo Tank Rollover Accident Damage Protection." PHMSA and FMCSA plan to review it and may incorporate it into the hazardous materials regulations. In addition, FMCSA is conducting a study of the causes of tank truck rollovers and measure that could reduce occurrences. A draft report of the study is currently under review by PHMSA and FMCSA. We will work with FMCSA to expedite completion of the study and evaluate alternative regulatory approaches. In addition to assessing the costs and benefits of damage protection devices to protect a cargo tank and its fittings in a rollover accident, we are also considering stability control systems and other methods to prevent rollover accidents from occurring.

R-01-02, 03: With the assistance of the Association of American Railroads (AAR) and the Railway Progress Institute, evaluate the deterioration of pressure relief devices through normal service and then develop inspection criteria to ensure that the pressure relief devices remain functional between regular inspection intervals. Incorporate these inspection criteria into the DOT hazardous materials regulations.

PHMSA Response: AAR established a task force to review and evaluate inspection reports on pressure relief devices. PHMSA will consider regulatory changes once the tank car committee completes its review of the data. In April 2005, language was adopted in the AAR Manual for root cause analysis by the valve manufacturer when cracked pressure relief valve stems or springs are found. The AAR task force has data on over 5,000 pressure relief valve inspections and expects to make recommendations to the AAR Tank Car Committee later this year. We will work with FRA to expedite completion of the AAR analysis and facilitate a decision on regulatory revisions.

R-89-48, 53: Assist and cooperate in amending regulations to require that closure fittings on hazardous materials rail tanks be designed to maintain their integrity in accidents that are typically survivable by the rail tank.

PHMSA Response: PHMSA, FRA, and the industry continue to work together to implement this recommendation. FRA is reviewing a final research report on structural strength of various tank-car fittings and the need for fitting protection devices to reduce the probability of loss of lading. We will work with FRA to expedite completion of the research project and facilitate a decision on regulatory revisions.

R-92-22, 23: Develop and promulgate requirements for the periodic testing and inspection of rail tank cars that help to ensure the detection of cracks before they expand to critical length by establishing inspection intervals based on the defect size detectable by the inspection method used the stress level, and the crack propagation characteristics of the structural component.

PHMSA Update: PHMSA published a final rule on September 21, 1995, to increase the frequency of required testing and inspections of rail tank cars based on accumulated and average mileage. To address damage tolerance, FRA has sponsored two research projects, currently nearing completion. We will work with FRA to expedite completion of the research projects and facilitate a decision on regulatory revisions.



U.S. Department
of Transportation

**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Avenue, SE
Washington, D.C. 20590

OCT 23 2007

The Honorable Mark V. Rosenker
Chairman
National Transportation Safety Board
490 L'Enfant Plaza East, S.W.
Washington, DC 20594

Dear Chairman Rosenker:

This is in response to the National Transportation Safety Board (NTSB) Safety recommendations emerging from the October 27, 2004 hazardous liquid pipeline rupture that occurred near Kingman, Kansas. The NTSB issued three safety recommendations to the Pipeline and Hazardous Materials Safety Administration (PHMSA).

The NTSB recommended that PHMSA modify 49 CFR § 195.52 of the hazardous liquid regulations to require pipeline operators to have a procedure to calculate and provide a reasonable initial estimate of released product in the telephonic report to the National Response Center (NRC) (NTSB Safety Recommendation P-07-07). It also recommended that the regulations require pipeline operators to provide an additional telephonic report to the NRC if significant new information becomes available during the emergency response (NTSB Safety Recommendation P-07-08). The NTSB also recommended that PHMSA require operators to revise their pipeline risk assessment plans whenever they have failed to consider one or more risk factors that could affect pipeline integrity (NTSB Safety Recommendation P-07-09).

PHMSA takes the NTSB's recommendations seriously, and we are working diligently to address them. Regarding NTSB Safety Recommendations P-07-07 and P-07-08, PHMSA is examining possible solutions to obtain more accurate and timely information. PHMSA regulations now require operators to notify PHMSA in writing about significant changes in accidents they have reported. PHMSA is exploring the feasibility of having operators provide both initial and updated estimates of released product in telephonic reports to the NRC. This approach would require us to first modify our contract and funding arrangements with the NRC. Another approach PHMSA is considering would be to require submission of updated information on the estimated amount of released product through PHMSA's telephonic notification management system, which builds on the initial telephonic reports to the NRC. PHMSA is still considering the logistical and regulatory challenges of these approaches and looking for other solutions to address NTSB's recommendations. PHMSA anticipates providing a more detailed response in the near future.

Regarding NTSB Safety Recommendation P-07-09, PHMSA reviewed its current regulations to ensure that they are adequate. The Federal pipeline safety regulations require operators to develop a comprehensive risk analysis process and consider all relevant risk factors (49 CFR § 195.452(e)). During our integrity management inspections for hazardous liquid operators, we found that 37 percent of the operators failed to adequately develop a comprehensive risk analysis, and where appropriate, we have addressed deficiencies through enforcement actions. PHMSA also reviewed its inspection protocols for adequacy, and found that they contain explicit risk analysis criteria. Based on the NTSB recommendation, however, PHMSA is considering modifying the language in its enforcement actions to explicitly require the operator to ensure that it addresses all risk factors.

We will update you on the status of these initiatives this fall. Meanwhile, if you have any questions or comments, please feel free to contact me at (202) 366-4433.

Sincerely,

A handwritten signature in black ink, appearing to read "Stacey Gerard", written in a cursive style.

Stacey L. Gerard
Assistant Administrator/Chief Safety Officer



U.S. Department
of Transportation

Federal Railroad
Administration

Administrator

1120 Vermont Ave., NW.
Washington, DC 20590

OCT 24 2006

The Honorable Mark V. Rosenker
Chairman
National Transportation Safety Board
490 L'Enfant Plaza East, SW
Washington, DC 20594

Dear Mr. Rosenker:

Thank you for your letter to the Federal Railroad Administration (FRA) concerning the issuance of National Transportation Safety Board's (NTSB) Safety Recommendations R-06-14 and R-06-15; along with the reiteration of Recommendations R-04-4 through -7 and R-05-16 and -17. These new recommendations and the reiteration of the previous recommendations arose from the NTSB's investigation of the side collision between a westbound Union Pacific Railroad (UP) freight train and an eastbound BNSF Railway Company (BNSF) freight train, near Macedonia, Texas, on June 28, 2004.

The FRA has reviewed these two new recommendations and the reiterated recommendations. FRA offers the following responses to the two new recommendations:

In Recommendation R-06-14, the NTSB recommends that the FRA:

"Require railroads to use scientifically based principles when assigning work schedules for train crewmembers, which consider factors that impact sleep needs, to reduce the effects of fatigue."

In Recommendation R-06-15, the NTSB recommends that the FRA:

"Establish requirements that limit train crewmember limbo time to address fatigue."

These two recommendations would involve FRA implementing requirements relating to fatigue. FRA currently lacks rulemaking authority over duty hours, which precludes FRA from making use of almost a century of scientific learning on the issue of sleep-wake cycles and fatigue-induced performance failures. Therefore, FRA lacks the statutory authority to adopt the requirements contemplated by either of these recommendations.

The FRA has statutory authority to "prescribe regulations and issue orders for every area of railroad safety supplementing laws and regulations in effect on October 16, 1970." 49 U.S.C. § 20103(a). The hours of service law, 49 U.S.C. § 21101 *et seq.* (HSL) was originally enacted in 1907, and was last amended as to "train employees," employees engaged in or connected with

the movement of a train, in 1969. See 49 U.S.C. § 21103. FRA cannot alter the specific maximum on-duty periods and minimum off-duty periods provided in this section. Any requirement that the railroads use scientifically based principles in assigning work schedules to reduce the effects of fatigue would almost certainly require that they not comply with the periods established by the HSL, which are not based on science related to fatigue.

Thus, such requirements are outside the scope of FRA's statutory authority, and FRA is unable to comply with Recommendation R-06-14.

The FRA is also constrained by a lack of statutory authority with regard to Recommendation R-06-15, because the HSL specifically states that time spent in deadhead transportation from a duty assignment to the place of final release is neither time on duty nor time off duty. See 49 U.S.C. § 21103(b) (4). FRA commonly refers to such time as "limbo time." In addition, the United States Supreme Court has held that time spent awaiting deadhead transportation to the place of final release is of the same character as the time spent in the deadhead transportation itself, and is therefore neither time on duty nor time off duty. *Brotherhood of Locomotive Engineers v. Atchison, Topeka and Santa Fe R.R. Co.*, 516 U.S. 152, 116 S. Ct. 595 (1996). FRA lacks authority to adopt regulatory requirements related to these periods, which are provided under the HSL.

The FRA supports efforts to address the fatigue experienced by railroad operating employees, and acknowledges that the existing HSL is not designed to address the causes of fatigue. Also, any requirements that FRA might implement to address fatigue would result in conflict with the provisions of the HSL, therefore exceeding FRA's existing statutory authority.

FRA respectfully requests that the NTSB reconsider these safety recommendations, and consider classifying Safety Recommendations R-06-14 and R-06-15 as "Closed-Reconsidered."

NTSB's reiterated Recommendations R-04-04 through R-04-07 are as follows:

NTSB Safety Recommendation R-04-04:

"Conduct a comprehensive analysis to determine the impact resistance of the steels in the shells of pressure tank cars constructed before 1989. At a minimum, the safety analysis should include the results of dynamic fracture toughness tests and/or the results of nondestructive testing techniques that provide information on material ductility and fracture toughness. The data should come from samples of steel from the tank shells from original manufacturing or from a statistically representative sampling of the shells of the pre-1989 pressure tank car fleet."

Appendix B

NTSB Safety Recommendation R-04-05:

"Based on the Federal Railroad Administration's comprehensive analysis to determine the impact resistance of the steels in the shells of pressure tank cars constructed before 1989, as addressed in safety Recommendation R-04-04, establish a program to rank those cars according to their risk of catastrophic fracture and separation and implement measures to eliminate or mitigate this risk. This ranking should take into consideration operating temperatures, pressures, and maximum train speeds."

NTSB Safety Recommendation R-04-06:

"Validate the predictive model the federal railroad Administration is developing to quantify the maximum dynamic forces acting on railroad tank cars under accident conditions."

NTSB Safety Recommendation R-04-07:

"Develop and implement tank car design-specific fracture toughness standards, such as a minimum average Charpy value, for steels and other materials of construction for pressure tank cars used for the transportation of U.S. Department of Transportation class 2 hazardous materials, including those in "low temperature" service. The performance criteria must apply to the material orientation with the minimum impact resistance and take into account the entire range of operating temperatures of the tank car."

The FRA offers the following response to the reiteration of these four recommendations: FRA respectfully requests that the NTSB reference the FRA's written response to the NTSB dated August 9, 2004 (Enclosure 1).

Furthermore, because of the long-term nature for completing the aforementioned recommendations, FRA respectfully requests that NTSB consider retaining the classifications for Safety Recommendations R-04-05 and R-04-06 as "Open-Acceptable Response" and reconsider classifying Recommendations R-04-04 and R-04-07 as "Open-Acceptable Response."

The reiterate of NTSB's Recommendations R-05-16 and R-05-17 are as follows:

NTSB Safety Recommendation R-05-16:

"Require railroads to implement operating measures, such as positioning tank cars toward the rear of trains and reducing speeds through populated areas, to minimize impact forces from accidents and reduce the vulnerability of tank cars transporting chlorine, anhydrous ammonia, and other liquefied gases designated as poisonous by inhalation."

NTSB Safety Recommendation R-05-17:

“Determine the most effective methods of providing emergency escape breathing apparatus for all crewmembers on freight trains carrying hazardous materials that would pose an inhalation hazard in the event of unintentional release, and then require railroads to provide these breathing apparatus to their crewmembers along with appropriate training.”

The FRA offers the following response to the reiteration of these two recommendations: FRA respectfully requests that the NTSB reference the FRA's written response to the NTSB, dated June 30, 2006. (Enclosure 2 and 3).

The FRA is awaiting a response from NTSB as to the classification of Safety Recommendations R-05-16 and R-05-17; thus FRA respectfully reiterates its request that the NTSB classify Safety Recommendations R-05-16 and R-05-17 as “Open-Acceptable Action.”

Sincerely,



Joseph H. Boardman
Administrator

Enclosures



U.S. Department
of Transportation
**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Ave., S.E.
Washington, DC 20590

JAN 22 2008

The Honorable Mark V. Rosenker
Chairman
National Transportation Safety Board
490 L'Enfant Plaza, SW
Washington, DC 20594

Dear Chairman Rosenker:

This letter is a follow-up to our correspondence on August 9, concerning Safety Recommendations R-07-4 and R-07-5 issued to the Pipeline and Hazardous Materials Safety Administration (PHMSA). These recommendations were issued following the National Transportation Safety Board's (NTSB) investigation of a rail incident on July 10, 2005, in Anding, Mississippi. The head-on collision of two trains resulted in the derailment of 6 locomotives and 17 rail cars. Seven residue tank cars containing hazardous materials were among the cars that derailed. Approximately 15,000 gallons of diesel fuel were released from the locomotives and resulted in a fire that burned for 15 hours. Two crewmembers were on each train; all four were killed. The recommendations state:

R-07-4

With the assistance of the Federal Railroad Administration (FRA), require that railroads immediately provide to emergency responders accurate, real-time information regarding the identity and location of all hazardous materials on a train.

We agree that timely and accurate information concerning the identity and locations of all hazardous materials on a train is critical to effective emergency response. The Hazardous Materials Regulations (HMR) require railroads to maintain hazardous materials information on-board trains reflecting the position of cars in the train, and hazard information regarding the commodities transported in specific rail cars.

In response to several recent accidents, FRA approached the Association of American Railroads (AAR) to ask for its assistance in developing additional strategies and mechanisms to ensure that detailed and specific hazardous materials information, including the position of cars in the train, is readily available to emergency responders even when crew members are disabled or otherwise unable to contact responders at the scene. FRA conducted two meetings with AAR, various railroads, and emergency response organizations to discuss enhancements to the emergency response system that would ensure emergency responders have access to necessary information during accidents.

As a result of these meetings and based on a recommendation from FRA, in March 2005, AAR amended its Recommended Operating Practices Circular No. OT-55 G to establish procedures for rail carriers to provide local emergency response agencies with a ranked listing of the top 25 hazardous materials transported by rail through their communities. This information assists emergency responders to plan and train for specific chemical releases.

In addition, in July 2005, CSX Transportation (CSX) and CHEMTREC, the chemical industry's 24-hour emergency response hotline, initiated a pilot project to test improvements to the emergency response communication system. The pilot project allows CHEMTREC to immediately access specific train information, including hazardous materials documentation, from CSX's computer system. The system enables emergency responders to obtain virtually real-time information, either verbally or via electronic means, almost immediately after receiving notification of an incident or accident. The system relies in part on train position information on locomotives equipped with Global Positioning System (GPS) receivers.

In December 2006, CHEMTREC implemented a second pilot project to evaluate the utility for emergency response of Railinc Corporation's Freightscope™ service, which provides a web-based, interactive dashboard of near-real-time rail shipment location information for North America. The Freightscope™ system improved CHEMTREC's ability to provide real-time hazardous materials information about shipments on short line and regional railroads.

Also in 2006, Dow Chemical Company and CHEMTREC began a demonstration project intended to improve the visibility of rail shipments of materials that are poisonous by inhalation (PIH) materials. Dow has equipped about 800 tank cars used to transport PIH materials with GPS hardware and sensors. The sensors are designed to monitor changes to the condition of the dome on the tank car, chemical leaks, and car accelerations and to generate an alert when the sensor is triggered. The alert is sent to CHEMTREC, which then contacts the rail carrier or customer to address the condition identified by the alert.

FRA and PHMSA will continue to monitor the results of these pilot projects and will consider ways to encourage more widespread use of the tested technologies by railroads and emergency response agencies.

In addition to the emergency response demonstration projects, FRA and PHMSA are also examining ways to improve the accident survivability of rail tank cars used to transport PIH materials. We are considering both tank car design and operational factors that affect rail tank car safety and crashworthiness. We expect to publish a notice of proposed rulemaking early in 2008.

R-07-5

Require and verify that States and their communities that receive funds through the Hazardous Materials Emergency Preparedness grant program conduct training exercises and drills with the joint participation of railroads and other transporters of hazardous materials operating within their jurisdictions as a means of evaluating State, regional, and local emergency hazardous materials response plans.

PHMSA's Hazardous Materials Emergency Preparedness (HMEP) grants program provides Federal financial and technical assistance to States, Territories and Indian tribes to "develop, improve, and carry out emergency plans" within the National Response System and the Emergency Planning and Community Right-To-Know Act of 1986 (EPCRA, Title III), 42 U.S.C. 11001 et seq. The HMEP grants program is funded by registration fees collected from persons who offer for transportation or transport certain hazardous materials in intrastate, interstate, or foreign commerce. Registration fees fund training and planning grants, monitoring and technical assistance, publication and distribution of the Emergency Response Guidebook (ERG), curriculum development, and staff costs to administer the program.

The planning grants are to be used for: 1) developing, improving, and implementing emergency plans under Title III to include conducting exercises and drills; 2) performing commodity flow studies; and 3) determining the need for regional hazardous material response. Training grants are to be used for training public sector employees to respond safely and efficiently to accidents and incidents involving the transportation of hazardous materials. The HMEP grants program provides grantees considerable flexibility in choosing eligible funding activities, and in reporting their planning, training, and grant use data. This flexibility helps grantees focus on planning and training activities best suited to their needs.

Grantees conducted 1,170 exercises using HMEP grant funds in fiscal year 2006. HMEP grant funds have been used to help fund emergency responders attendance at a Transportation Community Awareness and Emergency Response (TRANSCAER) whistle stop tour and safety train activities in Nebraska in fiscal year 2007. TRANSCAER is a voluntary national outreach effort sponsored by several industry trade associations that focuses on assisting communities prepare for and respond to a possible hazardous material transportation incident. The TRANSCAER whistle stop training tour in Nebraska focused on the production, packaging and shipping of ethanol and provided hands-on training using actual rail and motor carrier equipment. Next year, HMEP grant funds will be used to fund similar activity in Iowa.

In addition, PHMSA staff has participated, and continues to actively participate in TRANSCAER program activities nationally. We also provide training and outreach materials for this important outreach initiative. We are exploring additional areas for cooperation. For example, we believe that certain renewable fuels present unique emergency response problems that could be addressed through specialized training and drills. PHMSA continues its close coordination with the Renewable Fuels Association to ensure emergency problems are identified and resolved. PHMSA is also working with the International Association of Fire Chiefs' Hazmat Committee to further explore methods to communicate hazards and identify exercise opportunities.

In response to NTSB recommendations as well as our efforts to better align grantee's performance with our hazardous materials performance goals, PHMSA plans to review a sample of drills and exercises to determine their effectiveness as means of evaluating State, regional, and local emergency hazardous materials response plans. Based upon the findings of the review, PHMSA will then issue guidance and/or rules to address the NTSB recommendations.

Appendix B

Finally, the National Response Team (NRT) Training and Curriculum Subcommittee, co-chaired by PHMSA and the Federal Emergency Management Agency's United States Fire Administration provides a forum for resolution of interagency hazmat planning and training issues. We placed the issues raised in your recommendation on the Subcommittee agenda and moderated a thorough discussion of the recommendation and possible actions to address it. The NRT Subcommittee will assist PHMSA with reviewing a sample of drills and exercises and is currently considering protocols for local responders to use when working with the rail industry.

Based upon the on-going activities that PHMSA is currently conducting, we request that you classify recommendation R-07-4 and R-07-5 as "Open-Acceptable Action." We thank you for your consideration of our request.

If you have any questions, please contact me at (202) 366-4433.

Sincerely,

A handwritten signature in black ink, appearing to read "Stacey L. Getard". The signature is fluid and cursive, written over the printed name.

Stacey L. Getard
Assistant Administrator/Chief Safety Officer