

DOT US Department of Transportation
PHMSA Pipelines and Hazardous Materials Safety Administration
OPS Office of Pipeline Safety
Central Region

Principal Investigator James Bunn/Karen Butler
Region Director Ivan Huntoon (Prior RD)
Date of Report 1/14/2015
Subject Failure Investigation Report – Marathon Pipe Line LLC – Material Failure, Rupture

Operator, Location, & Consequences

Date of Failure 09/03/2008
Commodity Released Hazardous Liquid (Refined Products, Diesel)
City/County & State Ashmore / Coles, Illinois
OpID & Operator Name 32147 Marathon Pipe Line LLC
Unit # & Unit Name 3703 Wabash System
SMART Activity # 122652
Milepost / Location MP 41.7 / 100 yards downstream of Ashmore Pump Station
Type of Failure Material Failure, Rupture - Crack in a dent, Deformation from poor construction practice
Fatalities 0
Injuries 0
Description of Area impacted Rural farmland, non-High Consequence Area (HCA)
Total Costs \$2,936,068

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Executive Summary

At approximately 9:43 a.m. CDT¹ on September 3, 2008, a 12-inch diameter refined products pipeline operated by Marathon Pipe Line Company LLC (Marathon) ruptured downstream of the Ashmore pumping station located in Coles County, Illinois. Marathon's Findlay Operations Center received suction and discharge pressure deviation alarms from the Ashmore Pump Station at 9:43. At 9:44 a.m. the Operations Center received a CPM leak alarm, and the Wabash Pipeline System (12 inch) was shut down. Marathon personnel were dispatched to locate the accident site. The National Response Center (NRC) was contacted at 12:58 p.m. (report number 882609). The rupture was confirmed at 5:12 p.m. to be located approximately 100 yards downstream of the Ashmore Pump Station on the Robinson to Champaign section of the pipeline known as the East Leg. The pressure at the time of the failure was 1,158 psig with a maximum operating pressure (MOP) of 1,211 psig. A second NRC report was filed (report number #882650) at 6:08 p.m., which increased the reported spill volume and provided additional details on the location. No fatalities, injuries, fire, explosion, or evacuations resulted from the rupture, and it did not occur in a High Consequence Area (HCA). Surface water was impacted (1 barrel). Approximately 770 barrels of low sulfur diesel fuel were released as a result of the rupture, and an estimated 2,902 cubic yards of soil was contaminated. There were no service interruptions or supply impacts as a result of the rupture. The total cost estimated by the operator as a result of the release was \$2,936,068.

The pipeline was constructed in 1958 and was composed of 12-inch nominal diameter, 0.250-inch wall-thickness, low frequency electric resistance welded (LF ERW), X46 pipe made by Republic Steel. Prior to the failure, the East Leg had experienced six hydrostatic tests in addition to that at original construction (starting in 1964 and ending in 2004). These six additional hydrostatic tests resulted in 26 ruptures and six leaks.

At the rupture location, a deformation was present from original construction. Coating damage and approximately 5 percent through-wall external corrosion was identified at the center of a deformation. After the metallurgical report was completed, the operator engaged two additional subject matter experts to review the failure and metallurgical analysis. Three subject matter experts arrived at a "consensus that the failure was caused by a crack located in a deformation. The deformation was centered adjacent to the longitudinal ERW seam. Part of the deformation intersected the ERW seam. The deformation likely occurred prior to the original commissioning of the pipeline. The shear crack formed on the outside diameter of the pipe due to a partial re-rounding of the deformation anomaly. Early hydrotests may have imparted compressive stresses in the area of the crack that retarded subsequent fatigue crack growth during operation. The fracture surfaces between the beach marks do not look like those typical of high-cycle fatigue from operating pressure cycles. The apparent crack advancement is indicative of low-cycle fatigue. The crack grew by tearing in one or more of the multiple hydrostatic tests between 1958 and 2004. The crack eventually grew to a large enough size that operational pressure continued to advance the crack to the point of failure."²

System Details

Marathon Pipe Line Company LLC operates over 5,000 miles of hazardous liquid pipelines in 15 States.

¹ All times reference Central Daylight Time unless otherwise specifically noted.

² Information provided by Marathon during the follow-up from recommendations identified during the internal failure investigation.

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The Wabash 12-inch Products Pipeline System originates at two points, Robinson, Illinois and Wood River, Illinois. The Wabash System terminates in Hammond, Indiana. The West Leg is 129.9 miles long and is located between Wood River, Illinois, and Champaign, Illinois. The North Leg is 128.4 miles long with a 109.8 mile section located between Champaign, Illinois, and Griffith, Indiana, and another section that is 18.6 miles long located between Griffith, Indiana, and Hammond, Indiana. The East Leg is 85.1 miles long and located between Champaign, Illinois, and Robinson, Illinois. This rupture occurred on the East Leg of the system. The East Leg has pumping stations at Robinson, Martinsville, and Ashmore. Product from Robinson, Illinois, can go into tankage at Champaign or can bypass Campaign and continue on to Hammond, Indiana.

The East Leg was constructed with 12-inch nominal diameter pipe with a wall thickness of 0.250 inches. The pipe was manufactured in 1958 by Republic Steel Corporation and is LF ERW, API 5LX, grade X-46 line pipe. The pipeline was joined using the shielded metal arc welding process, and the welds were inspected by radiography. The pipe is coated with coal tar enamel, and the pipeline has been under cathodic protection since 1958. The pipeline was hydrostatically tested originally in 1958. A hydrostatic test program was developed to manage the threat of manufacturing defects associated with the longitudinal weld seam, and additional tests were performed in 1964, 1974, 1987, 1995, 1999, and 2004. The MOP at the time of the failure was established as 1,211 psig and based on 80 percent of test pressure. The pipeline was inspected with a High Resolution MFL and Geometry tool in 2002. There were no anomalies identified at the failure location during this ILI inspection. The pipeline was inspected by PHMSA in 2006.

Events Leading up to the Failure

Just prior to the incident, the East Leg was delivering an 80,000 bbl batch of ultra low sulfur diesel to the Champaign Terminal. The Hammond Terminal Headgate Valve was opened in preparation for a turn into the North Leg out of the Champaign Terminal. Following the completion of the Champaign batch, the East Leg was turned out of the Champaign Terminal northward toward the Hammond Terminal by opening the Champaign Bypass Valve. At this time, Robinson, Martinsville, and Ashmore pump stations had one unit running at each location. After turning northward out of the Champaign Terminal, units were started at Champaign, Buckley, and St. Anne pump stations (Buckley and St. Anne are on the North Leg).

The hydrostatic test pressure in 2004 was 1,562 psig with a spike test at 1,727 psig. The high pressure shutdown on discharge pressure was recorded as set at 1,220 psig for Ashmore station. The pressure at the time of failure on the discharge of Ashmore pump station was approximately 1,158 psig. Spike tests were used in the hydrostatic test program starting in 1995 and were 30 minutes long at approximately 95 percent SMYS. As the years progressed, hydrostatic tests were performed in smaller sections of pipeline on the East Leg in an effort to help locate releases or leaks. Each test starting in 1964 had more than one failure in the Robinson to Champaign section. The six additional hydrotests starting in 1964 resulted in 26 ruptures and six leaks and are summarized as follows:

In 1964 – Two ruptures occurred. This test was conducted with fuel oil but later water was used to complete the test.

In 1974 – Six ruptures and one leak occurred.

In 1987 – Three ruptures occurred.

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In 1995 – Four ruptures occurred during the spike test. No failures occurred during the 8-hour test.

In 1999 – Six ruptures occurred on the spike test, and one leak occurred during the 8-hour test. The causes of these failures were three hook cracks and four lack of fusion defects.

In 2004 – Five ruptures occurred on the spike test (three lack of fusion and two hook cracks) and four leaks during the 8-hour test (associated with the longitudinal seams and repaired with Type B sleeves).

A backpressure control valve did not exist at Champaign for the Robinson to Champaign segment. Backpressure control methods (check valves or control valves) were also not available at several other locations on the North Leg (Ashkum Junction did not have a check valve; there was no backpressure control valve was available at Hammond).

Emergency Response

The Operations Center received a CPM leak alarm at 9:44 a.m. on September 3, 2008, and the Operations Center initiated shut down activities for the entire Wabash System within 47 seconds according to report details. Field personnel were notified and dispatched to investigate. Information regarding the incident was reported by Marathon to the National Response Center (NRC) on September 3, 2008, at 12:58 p.m. (Report No. 882609) even though detailed location information was not available and identified two creeks as possible locations for product (Deer Creek and Greasy Creek). At approximately 5:12 p.m. on September 3, 2008, field personnel reported that a rupture was discovered approximately 100 yards downstream of the Ashmore Pump Station. Additional time was required to locate the leak as it was in a cornfield and the release could not be easily identified from the air. Field personnel walked the right-of-way. Marathon filed a second NRC report on September 3, 2008, at 6:08 p.m. (Report No. 882650) providing additional information on the location of the release and an estimated spill volume of 900 barrels. This NRC report also stated that only soil was impacted. Marathon personnel immediately took steps to contain the product in the area where the release occurred. A series of interceptor trenches were dug in the cornfield at the release location, booms were deployed, and the product was contained by 8:00 p.m. The remote control valves upstream and downstream of the leak were closed. The length of the segment that was isolated was 79,200 feet (15 miles). The only emergency responders active at the response scene were Marathon employees.

No fatalities, injuries, fire, explosion, or evacuations resulted from the rupture, and it did not occur in a High Consequence Area (HCA). No significant road closures were reported. Surface water (1 barrel) was impacted and approximately 2,902 cubic yards of soil were contaminated. There were no service interruptions or supply impacts as a result of the rupture.

Summary of Return to Service

After the location of the release was confirmed and the area made safe, the failure site was excavated and the origin of the rupture was identified. The section of pipe that contained the origin was removed and protected, then shipped to a metallurgical laboratory for examination. A new section of pre-tested pipe (51 feet long) was installed in the line where the rupture occurred and the line was returned to service at 3:39 p.m. on September 4, 2008, with a 20 percent pressure reduction.

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Clean-up efforts continued at the site and soil continued to be remediated.

Investigation Details

At approximately 9:43 a.m. on September 3, 2008, Marathon Pipe Line Company LLC's Findlay Operations Center received suction and discharge pressure deviation alarms from its Ashmore Pump Station located in Coles County, Illinois. At 9:44 a.m. the Operations Center received a CPM leak alarm and the Wabash Pipeline System was shut down and Marathon personnel were dispatched to locate the incident site. Control Center personnel responded to the events within 36 seconds according to report data, and within 47 seconds, flow was stopped on the pipeline. Marathon personnel discovered the rupture location at 5:12 p.m. as the pipeline right-of-way was walked downstream of the Ashmore Pump Station. The rupture occurred on the pipeline right-of-way approximately 100 yards downstream of the pump station at Survey Station Number 2207+54, MP 41.7.

The rupture was reported as 70 inches long with an opening approximately 3.0 inches in width at the 5:30 circumferential position. The deformation measured approximately 0.150 inches deep (1.2 percent of pipe OD at the deepest location). Coating damage and approximately 5 percent through-wall external corrosion was present at the center of the deformation. No indications of internal corrosion, stress corrosion cracking, or other outside force damage were identified during metallurgical analysis. Residual stresses when the pipeline was cut were reported to be negligible.

The second NRC volume estimating 900 barrels would later be determined to be an estimated 770 barrels of low-sulfur diesel.

Initially after the failure, the pressure setpoints were lowered on all three legs of the Wabash system. The pressure de-rates remained in place while the operator ran ILI tools and completed the associated rehabilitation work.

After the metallurgical analysis was completed, Marathon also completed an internal failure investigation, which resulted in three recommendations: 1) utilize ILI technology to identify other potential dents in the vicinity of the ERW seam and remediate any deformations as appropriate, 2) collaborate with Scheduling and Hydraulics to perform an evaluation of potential changes to operating procedures and/or engineering controls that would reduce the frequency and magnitude of pressure cycles, and 3) employ additional independent resources to obtain a second opinion on the metallurgical findings.³

Beginning in October of 2008 (10/26), deformation ILI assessments were completed on the North, East and West Legs. The results of these caliper runs were overlaid with circumferential MFL data in order to identify any deformation at the long seam that might be similar to the release location. As a result, a total of 66 repairs were performed, 35 of which were on this same section (East Leg of the pipeline).

An additional hydrostatic test was completed in November of 2008 on a portion of the North Leg (Champaign to Griffith).

The operator hired two additional Subject Matter Experts (SMEs) to review the metallurgical analysis. The three SMEs agreed that "the failure was caused by a crack located in a deformation. The

³ Identified in the Marathon investigation summary report.

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deformation was centered adjacent to the longitudinal ERW seam. Part of the deformation intersected the ERW seam. The deformation likely occurred prior to the original commissioning of the pipeline. The shear crack formed on the outside diameter of the pipe due to a partial re-rounding of the deformation anomaly. Early hydrotests may have imparted compressive stresses in the area of the crack that retarded subsequent fatigue crack growth during operation. The fracture surfaces between the beach marks do not look like those typical of high-cycle fatigue from operating pressure cycles. The apparent crack advancement is indicative of low-cycle fatigue. The crack grew by tearing in one or more of the multiple hydrostatic tests between 1958 and 2004. The crack eventually grew to a large enough size that operational pressure continued to advance the crack to the point of failure.”⁴

A pressure trending review did identify higher pressures at the Ashmore pump station versus other stations in the East line section just prior to the failure, which may indicate that the changes in operations that occurred at Champaign caused pressure to back into the Ashmore pump station operations even though the maximum MOP was not exceeded. Marathon conducted a detailed review of potential operational changes that could be made through scheduling similar batches of like product together in an effort to minimize starts and stops (reducing potential pressure cycles) and also determined that several control enhancements could assist in the reduction of amplitude regarding pressure cycles. Suggested control revisions included replacement of the Griffith backpressure control valve, a new check valve downstream of the Ashkum Junction, and new valves added at Hammond and Champaign on the East Leg. Pressure setpoints were also reviewed for possible changes.

The operator purchased the property that this rupture occurred on, both for clean-up efforts with continued soil remediation and for future ease of access.

Findings & Contributing Factors

The metallurgical analysis determined that the fracture originated in a deformation in the pipe wall near the longitudinal seam. The deformation occurred during the original construction of the pipeline. A shear crack formed on the outside diameter of the pipe due to re-rounding of the deformation, which likely occurred during the initial pressure test.

Three SMEs agreed that “early hydrotests may have imparted compressive stresses in the area of the crack that retarded subsequent fatigue crack growth during operation. The fracture surfaces between the beach marks did not look like those typical of high-cycle fatigue from operating pressure cycles. The apparent crack advancement is indicative of low-cycle fatigue. The crack grew by tearing in one or more of the multiple hydrostatic tests between 1958 and 2004. The crack eventually grew to a large enough size that operational pressure continued to advance the crack to the point of failure.”⁵

The lack of adequate back pressure controls may have been a contributing factor, and Marathon’s internal failure investigation provided recommendations to minimize this potential and reduce pressure cycles.

As a result of additional ILI assessments, a total of 66 repairs were performed where deformation and longitudinal seams may have overlapped, 35 of which were on this same segment.

⁴ Marathon follow-up recommendations identified during the internal failure investigation.

⁵ Information provided by Marathon during the follow-up from recommendations identified during the internal failure investigation.

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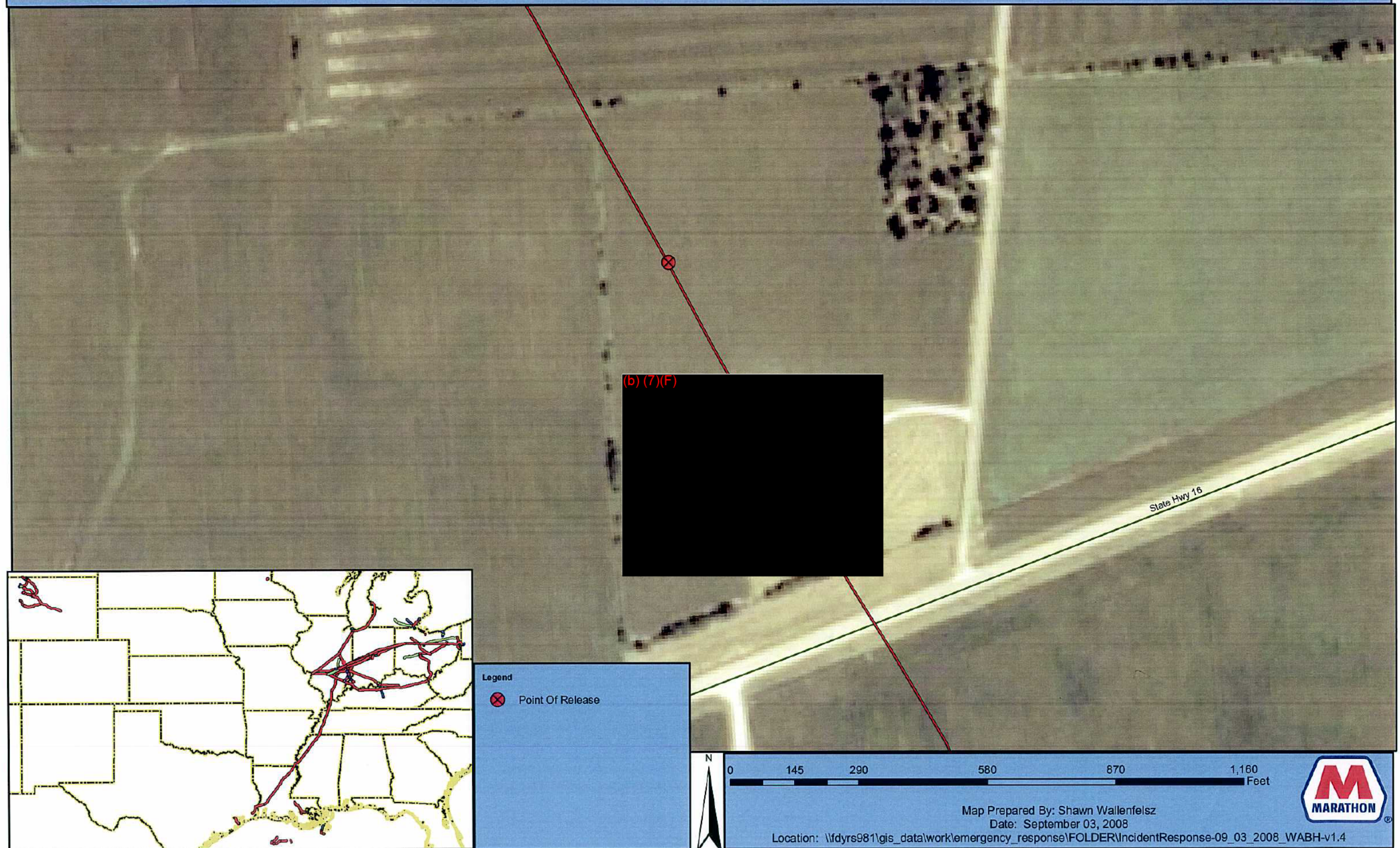
An additional hydrostatic test was completed in 2008.

The six hydrostatic tests occurring in 1964 through 2004 resulted in 26 ruptures and six leaks. The operator's management program involving hydrostatic tests removed defects from the pipeline, which also could have resulted in additional safety and environmental consequences.

Appendices

- A Maps and Photographs
- B NRC Reports
- C Operator's Accident Report
- D Metallurgical Analysis

Wabash 9-3-2008

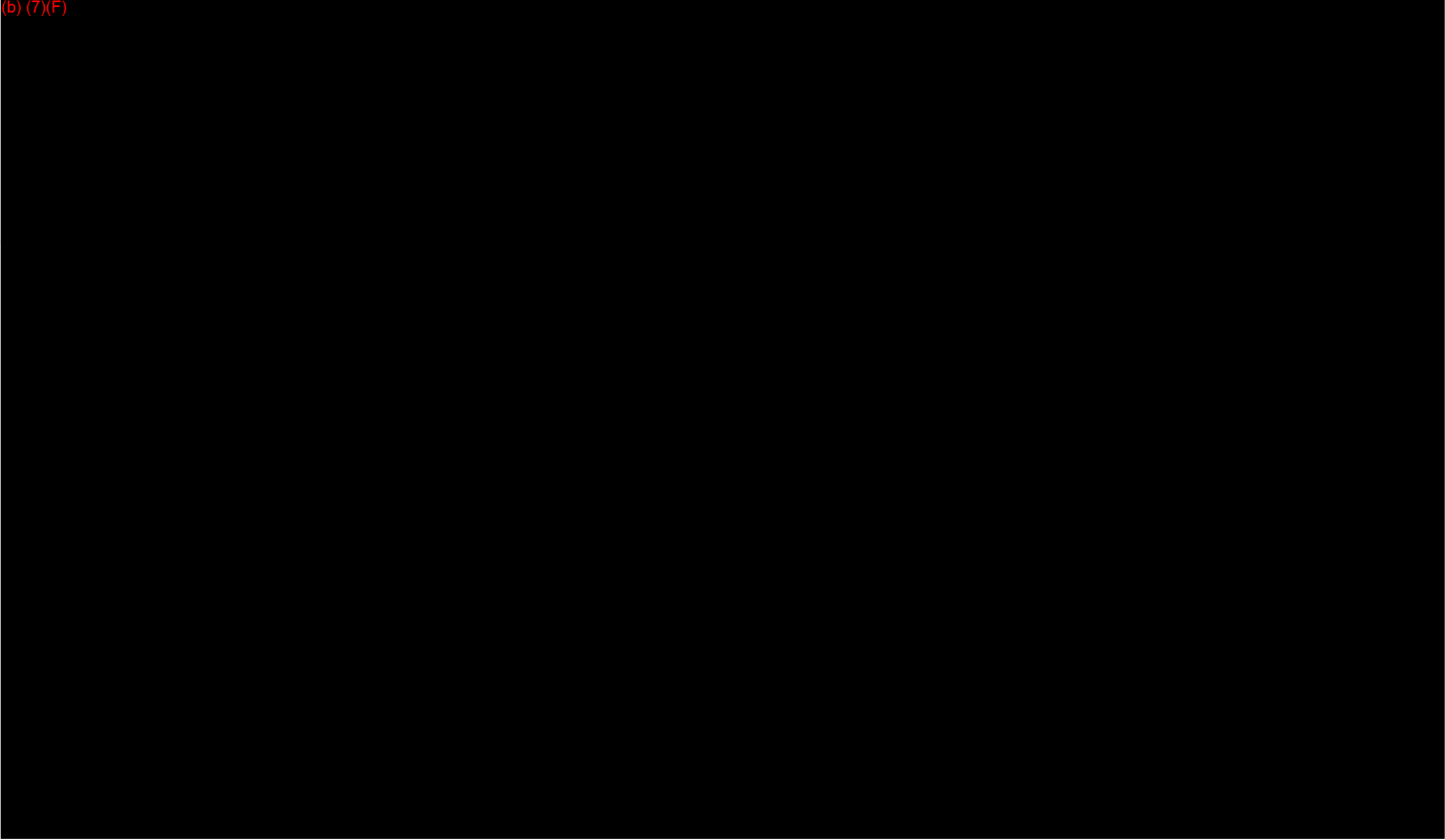




OPERATOR MAP

Ashmore Incident Response Map 09-03-2008

(b) (7)(F)



Failed Pipeline Joint



Appendix A - Maps and Photographs

Close-up photo showing rupture site



Field, north side of Ashmore station (provided by operator)



Internal view of removed pipe (provided by operator)

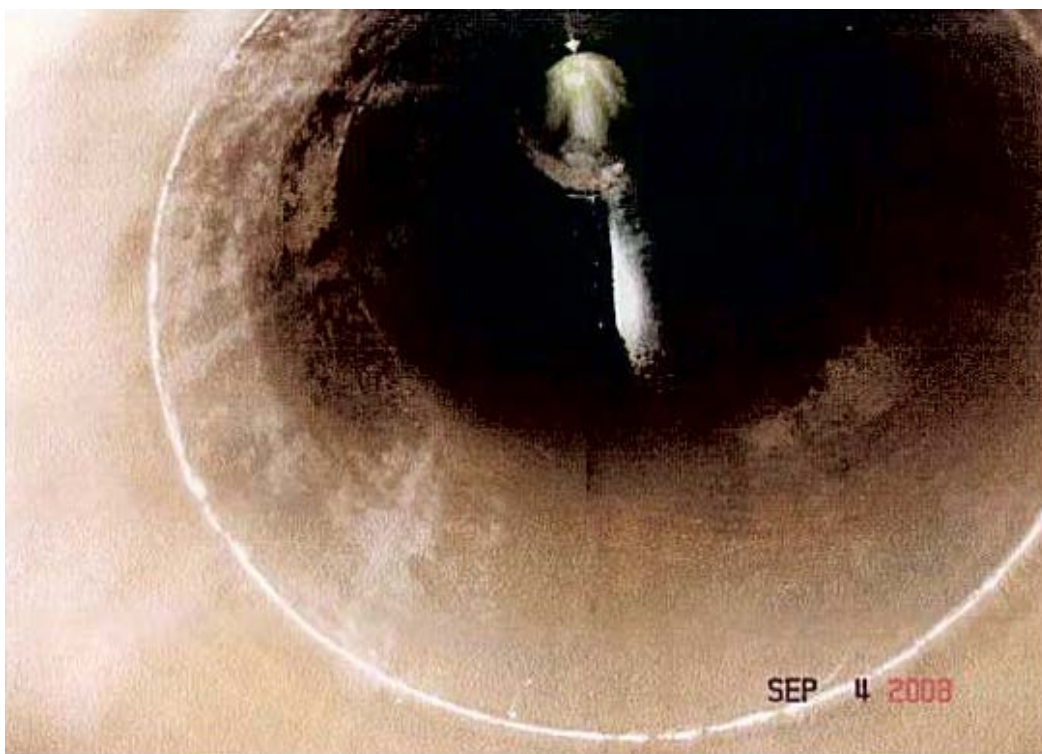


Image of tie-in (provided by operator)





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NRC Number: 882609
Call Date: 09/03/2008

Call Time: 13:58:00

Caller Information

First Name: LAURA Last Name: PERRON
Company Name: MARATHON PIPELINE
Address: 539 S. MAIN ST.
City: FINDLAY State: OH
Country: USA Zip: 45840
Phone 1: 2172511885 Phone 2:
Organization Type: PRIVATE Is caller the spiller? ☒ Yes ☐ No ☐ No Response
Confidential: ☐ Yes ☒ No ☐ No Response

Discharger Information

First Name: LAURA Last Name: PERRON
Company Name: MARATHON PIPELINE
Address: 539 S. MAIN ST.
City: FINDLAY State: OH
Country: USA Zip: 45840
Phone 1: 2172511885 Phone 2:
Organization Type: PRIVATE

Spill Information

State: IL County: COLES
Nearest City: OAKLAND Zip Code:

Location

Spill Date: 09/03/2008 (mm/dd/yyyy) Spill Time: 09:45:00 (24hr mm:ss)
DTG Type: <- Select DTG Type ->
Incident Type: ALL Reported Incident Type: PIPELINE

Description

THE CALLER IS REPORTING A POTENTIAL RELEASE OF ULTRA LOW SULFUR DIESEL FUEL FROM AN UNDERGROUND 12 INCH FLOW LINE. THE POTENTIAL WAS CAUSED BY A DROP IN PIPELINE PRESSURE. THE LINE HAS BEEN SHUT DOWN AND EMPLOYEES ARE CURRENTLY ATTEMPTING TO LOCATE ANY POSSIBLE LEAKS.

Materials Involved

Material / Chris Name	Chris Code	Total Qty.	Water Qty.
<p>Medium Type: <- Select Medium -></p> <p>Additional Medium Information:</p> <p>POTENTIAL RELEASE TO THE SOIL, DEER CREEK AND GREASY CREEK</p>			

Medium Type: <- Select Medium ->

Additional Medium Information

POTENTIAL RELEASE TO THE SOIL, DEER CREEK AND GREASY CREEK

Injuries:
Evacuations: ☐ Yes ☒ No ☐ Unknown
Damages: ☐ Yes ☒ No ☐ Unknown

Fatalities:
No. of Evacuations:
Damage Amount:

Federal Agency Notified: ☐ Yes ☐ No ☒ Unknown
Other Agency Notified: ☐ Yes ☐ No ☒ Unknown

State Agency Notified: ☐ Yes ☐ No ☒ Unknown

Remedial Actions

EMPLOYEES ARE IN THE PROCESS OF SEARCHING THE LINE FOR ANY SIGNS OF A RELEASE

Additional Info

NONE

Latitude

Degrees

Minutes

Seconds

Quadrant

Longitude

Degrees

Minutes

Seconds

Quadrant

Distance from City

Direction

Township

Milepost

Section

Range

☐ Rescinded

Comments (max 250 characters)

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HMIS->INCIDENTS->TELEPHONICS

[Rules of Behavior](#)[Home](#)[Logout](#)[Menu](#)[\[Return to Search\]](#)NRC Number: 882650
Call Date: 09/03/2008

Call Time: 19:08:59

Caller Information

First Name: LAURA Last Name: PERRON
Company Name: MARATHON PIPELINE
Address: 539 S. MAIN ST.
City: FINDLAY State: OH
Country: USA Zip: 45840
Phone 1: 2172511885 Phone 2:
Organization Type: PRIVATE Is caller the spiller? ☒ Yes ☐ No ☐ No Response
Confidential: ☐ Yes ☒ No ☐ No Response

Discharger Information

First Name: LAURA Last Name: PERRON
Company Name: MARATHON PIPELINE
Address: 539 S. MAIN ST.
City: FINDLAY State: OH
Country: USA Zip: 45840
Phone 1: 2172511885 Phone 2:
Organization Type: PRIVATE

Spill Information

State: IL County: COLES
Nearest City: ASHMOORE Zip Code:
Location:
10151 NORTH COUNTY ROAD 2170 E

Spill Date: 09/03/2008 (mm/dd/yyyy) Spill Time: 15 00 00 (24hr mm ss)
DTG Type: <- Select DTG Type ->
Incident Type: ALL Reported Incident Type: PIPELINE

Description:
CALLER IS REPORTING A DISCHARGE OF ULTRA LOW SULFUR DIESEL FROM A PIPELINE DUE TO UNKNOWN CAUSES.

Materials Involved:
Material / Chris Name: OIL DIESEL Chris Code: DDS Total Qty.: 900 BARREL(S) Water Qty.:

Medium Type: <- Select Medium ->
Additional Medium Information:
SOIL

Injuries: Fatalities:
Evacuations: ☐ Yes ☒ No ☐ Unknown No. of Evacuations:
Damages: ☐ Yes ☒ No ☐ Unknown Damage Amount:
Federal Agency Notified: ☐ Yes ☐ No ☒ Unknown State Agency Notified: ☐ Yes ☐ No ☒ Unknown
Other Agency Notified: ☐ Yes ☐ No ☒ Unknown

Remedial Actions

CAUSE OF DISCHARGE IS UNDER INVESTIGATION. BEGINNING CLEANUP OPERATIONS. LINE WAS SHUT IN.

Additional Info

CALLER HAD NO ADDITIONAL INFORMATION

Latitude

Degrees

Minutes

Seconds

Quadrant

Longitude

Degrees

Minutes

Seconds

Quadrant

Distance from City

Direction

Township

Milepost

Section

Range

☐ Recinded


Comments (max 250 charaders)

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Appendix C - Operator's Accident Report

 <p>U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration</p>	ACCIDENT REPORT – HAZARDOUS LIQUID PIPELINE SYSTEMS	Original Report Date	October 03, 2008
	Report format corresponds to Form PHMSA F 7000-1 (01-2001)	No.	20080292 - 14467

PART A – GENERAL INFORMATION					
N	Original Report	Y	Supplemental Report	Y	Final Report
Last Revision Date			01/14/2015		
1. Operator Name and Address					
a. Operator's 5-digit Identification Number			32147		
b. If Operator does not own the pipeline, enter Owner's OPS 5-digit Identification Number (if known)					
c. Name of Operator			MARATHON PIPE LINE LLC		
d. Operator street address			539 SOUTH MAIN STREET		
e. Operator address			City FINDLAY		
			County or Parish HANCOCK		
			State OH		
			Zip code 45840		
2. Time and date of the accident					
			Hour 09:44		
			Date of the accident 09/03/2008		
3. Location of accident					
a. Latitude			39.523801		
Longitude			-88.070495		
b. City			ASHMORE		
County or Parish			COLES		
c. State			IL		
Zip Code			61912		
d. Mile Post/Valve Station					
Survey Station No			2207+54		
4. Telephone Report					
NRC Report Number			882609		
Date			09/03/2008		
5. Losses (Estimated)					
Public/Community Losses reimbursed by operator					
Public/private property damage			\$	118,587	
Cost of emergency response phase			\$	2,543,148	
Cost of environmental remediation			\$	38,875	
Other Costs			\$	0	
Describe					
Operator Losses					
Value of product lost			\$	81,620	
Value of operator property damage			\$	99,802	
Other Costs			\$	54,036	
Describe			LAND PURCHASE SUPPORT		
Total Costs			\$	2,936,068	
6. Commodity Spilled					
Commodity spilled (yes/no)			Y		
a. Name of commodity spilled			ULTRA LOW SULFUR DIESEL		
b. Classification of commodity spilled			GASOLINE, DIESEL, FUEL OIL OR OTHER PETROLEUM PRODUCT WHICH IS A LIQUID AT AMBIENT CONDITIONS		
c. Estimated amount of commodity involved					
Unit of Measure			BARRELS		
Amount Spilled			770.00		
Amount Recovered			770.00		
CAUSES FOR SMALL SPILLS			NO DATA		
PART B – PREPARER AND AUTHORIZED SIGNATURE					

Appendix C - Operator's Accident Report

Preparer's Name		JENNIFER RADER	
Area Code and Telephone Number		4194214631	
Preparer's E-mail Address		JERADER@MARATHONOIL.COM	
Area Code and Facsimile Number		4194213917	
PART C – ORIGIN OF THE ACCIDENT			
1. Additional location information			
a. Line segment name or ID		ASHMORE-CHAMPAIGN 12	
b. Accident on Federal Land other than Outer Continental Shelf		NO	
c. Is pipeline Interstate		Y	
Offshore		N	
d. Area			
Block #			
State			
Outer Continental Shelf		N	
2. Location of system involved			
Operator's Property		NO	
Pipeline Right of Way		Y	
High Consequence Area (HCA)		N	
Describe HCA			
3. Part of system involved in accident		ONSHORE PIPELINE, INCLUDING VALVE SITES	
Other (specify)			
If failure occurred on Pipeline, complete items a-g			
a. Leak or Rupture		RUPTURE	
Type of Leak			
- Puncture, diameter (<i>inches</i>)			
Type of Rupture		LONGITUDINAL-TEAR/CRACK	
- Tear/Crack, length (<i>inches</i>)		3	
- Propagation Length, total, both sides (<i>feet</i>)		6	
Other (specify)			
b. Type of block valve used for isolation immediate section			
Upstream			
Manual		NO	
Automatic		NO	
Remote Control		YES	
Check Valve		NO	
Downstream			
Manual		NO	
Automatic		NO	
Remote Control		YES	
Check Valve		NO	
c. Length of segment isolated (ft)		79200	
d. Distance between valves (ft)		316800	
e. Is segment configured for internal inspection tools?		YES	
f. Had there been an in-line inspection device run at the point of failure?		YES	
g. If Yes, type of device run			
High Resolution Magnetic Flux tool	YES	Year run	2002
Low Resolution Magnetic Flux tool	NO	Year run	
UT tool	NO	Year run	
Geometry tool	YES	Year run	2002
Caliper tool	NO	Year run	
Crack tool	NO	Year run	
Hard Spot tool	NO	Year run	
Other tool	NO	Year run	
4. Failure occurred on		PIPE SEAM	
Other (specify)			
Year the component that failed was installed		1958	
5. Maximum operating pressure (MOP)			

Appendix C - Operator's Accident Report

a. Estimated pressure at point and time of accident (PSIG)	1158	
b. MOP at time of accident (PSIG)	1211.00	
c. Did an over pressurization occur relating to the accident?	N	
PART D – MATERIAL SPECIFICATION		
1. Nominal pipe size (NPS) (inches)	12.75	
2. Wall thickness (inches)	.25	
3. Specification	API 5L	
	SMYS	46000
4. Seam type	ERW LOW FREQUENCY	
5. Valve type	N/A	
6. Manufactured by	REPUBLIC STEEL	
	in year	1958
PART E - ENVIRONMENT		
1. Area of accident	UNDER GROUND	
Other (specify)		
2. Depth of cover (inches)	4	
PART F - CONSEQUENCES		
1. Consequences	Fatalities	Injuries
a. Number of operator employees	0	0
Contractor employees working for operator	0	0
General public	0	0
Totals	0	0
b. Was pipeline/segment shutdown due to leak?	Y	
If Yes, how long?	Days	1
	Hours	5
	Minutes	22
c. Product ignited	Gas did not Ignite	
d. Explosion	NO EXPLOSION	
e. Evacuation (<i>general public only</i>)	N	
	Number of people	
Reason for Evacuation		
f. Elapsed time until area was made safe		
	Hours	
	Minutes	
2. Environmental Impact		
a. Wildlife Impact		
Fish/aquatic	N	
Birds	N	
Terrestrial	N	
b. Soil Contamination	Y	
If Yes, estimated number of cubic yards	2902	
c. Long term impact assessment performed	N	
d. Anticipated remediation	Y	
If Yes, check all that apply		
Surface Water	N	
Groundwater	N	
Soil	Y	
Vegetation	Y	
Wildlife	N	
e. Water Contamination	Y	
Amount in water (barrels)	1	
Ocean/Seawater	N	
Surface	Y	
Groundwater	N	
Drinking water	N	
Drinking water source		
PART G – LEAK DETECTION INFORMATION		
1. Computer based leak detection capability in place?	Y	
2. Was the release initially detected by?	CPM/SCADA-BASED SYSTEM WITH LEAK DETECTION	

Appendix C - Operator's Accident Report

Other (specify)	
3. Estimated leak duration	Days 0
	Hours 1
PART H – APPARENT CAUSE	
H1 – CORROSION	
1. External Corrosion	
2. Internal Corrosion	
Complete items a-e where applicable	
a. Pipe Coating	
b. Visual Examination	
Other (specify)	
c. Cause of Corrosion	
Other (specify)	
d. Was corroded part of pipeline considered to be under cathodic protection prior to discovering accident?	
Year Protection Started	
e. Was pipe previously damaged in the area of corrosion?	
Estimated time prior to accident	Years
	Months
H2 – NATURAL FORCES	
3. Earth Movement	
Description	
Other (specify)	
4. Lightning	
5. Heavy Rains/Floods	
Description	
Other (specify)	
6. Temperature	
Description	
Other (specify)	
7. High Winds	
H3 – EXCAVATION DAMAGE	
8. Operator Excavation Damage (including their contractors / Not Third Party)	
9. Third Party	
a. Excavator group	
b. Type	
Other (specify)	
c. Excavation was	
d. Excavation was ongoing activity (Month or longer)	
If Yes, Date of last contact	
e. Did operator get prior notification of excavation activity?	
If Yes; Date received	null
Notification received from	
f. Was pipeline marked?	
i. Temporary markings	
ii. Permanent markings	
iii. Marks were	
iv. Were marks made within required time?	
H4 – OTHER OUTSIDE FORCE DAMAGE	
10. Fire/Explosion as primary cause of failure	
Fire/Explosion cause	
11. Car, truck or other vehicle not relating to excavation activity damaging pipe	
12. Rupture of Previously Damaged Pipe	
13. Vandalism	
H5 – MATERIAL AND/OR WELD FAILURES	
Material	
14. Body of Pipe	

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Description	
Other (specify)	
15. Component	
Description	
Other (specify)	
16. Joint	
Description	
Other (specify)	
Weld	
17. Butt	
Description	
Other (specify)	
18. Fillet	
Description	
Other (specify)	
19. Pipe Seam	Yes
Description	LF ERV
Other (specify)	
Complete a-g if you indicate any cause in part H5	
a. Type of failure	
Construction Defect	N
Description	POOR WORKMANSHIP
Material Defect	Y
b. Was failure due to pipe damage sustained in transportation to the construction or fabrication site?	N
c. Was part which leaked pressure tested before accident occurred?	Y
d. Date of test	
Year	2004
Month	10
Day	12
e. Test medium	WATER
Other (specify)	
f. Time held at test pressure (hr)	8
g. Estimated test pressure at point of incident (PSIG)	1514
H6 – EQUIPMENT	
20. Malfunction of Control/Relief Equipment	
Description	
Other (specify)	
21. Threads Stripped, Broken Pipe Coupling	
Description	
Other (specify)	
22. Seal Failure	
Description	
Other (specify)	
H7 – INCORRECT OPERATION	
23. Incorrect Operation	
a. Type	
Other (specify)	
b. Number of employees involved who failed a post-accident test	
Drug test	
Alcohol test	
H8 - OTHER	
24. Miscellaneous	
Describe	
25. Unknown	
Describe	
PART I – NARRATIVE DESCRIPTION OF FACTORS CONTRIBUTING TO THE EVENT	
THE FINDLAY OPERATIONS CENTER RECEIVED A SUCTION AND DISCHARGE PRESSURE DEVIATION ALARMS AT ASHMORE STATION. A CPM LEAK ALARM FOLLOWED SHORTLY AFTER AND THE WABASH SYSTEM WAS IMMEDIATELY SHUTDOWN. SHUTDOWN OF THE SYSTEM WAS	

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INITIATED 36 SECONDS AFTER CPM ALARM AND FLOW WAS STOPPED 11 SECONDS LATER. THE WABASH EXPERIENCED A FAILURE 100 YARDS DOWNSTREAM OF ASHMORE STATION. THE LINE WAS TURNED FROM CHAMPAIGN TO HAMMOND IMMEDIATELY PRIOR TO FAILURE. ANALYSIS OF THE PIPE REVEALED THAT THE FAILURE MECHANISM WAS A DEFORMATION ANOMALY THAT WAS CENTERED ADJACENT TO THE LONGITUDINAL ERW SEAM WITH A SHEAR CRACK THAT FORMED ON THE OUTSIDE DIAMETER OF THE PIPE DUE TO RE-ROUNDING OF THE DEFORMATION. A LONGITUDINAL SEAM SPLIT DID OCCUR, AND WAS THE PRIMARY CONTRIBUTOR TO THE VOLUME RELEASED; HOWEVER, THE SEAM SPLIT WAS SECONDARY TO THE DEFORMATION ANOMALY CENTERED ADJACENT TO THE LONGITUDINAL ERW SEAM. A REVISED FINAL REPORT IS BEING SUBMITTED THIS 23RD DAY OF MARCH, 2010 CHANGING THE CAUSE FROM MISCELLANEOUS TO RUPTURE, LONGITUDINAL SEAM SPLIT. THE DEFORMATION IS BELIEVED TO HAVE OCCURRED DURING THE ORIGINAL COMMISSIONING HYDROSTATIC PRESSURE TEST. THEREFORE, CONSTRUCTION DEFECT WAS SELECTED THOUGH NEITHER OPTION AVAILABLE IS TRULY REPRESENTATIVE OF THE SITUATION. POOR WORKMANSHIP WAS SELECTED AS THE SPECIFIC CONSTRUCTION DEFECT SINCE THE DEFORMATION OCCURRED DURING THE ORIGINAL CONSTRUCTION AND THE CRACKING PROPAGATION OCCURRED FROM REROUNDING DURING HYDROSTATIC PRESSURE TESTS. BECAUSE THIS REPORTING FORM DOES NOT ALLOW FOR REPORTING OF MINUTES IN QUESTION G3, THE DATA HAS BEEN INPUT AS LEAK DURATION OF 1 HOUR. HOWEVER, AS NOTED IN THIS NARRATIVE, THE LINE WAS SHUTDOWN UPON THE ALARM SIGNALING A FAILURE. WATER CONTAMINATION IS ESTIMATED AT LESS THAN A BARREL, BUT DUE TO THE CONSTRAINTS OF THE FORM, IT IS LOGGED AS 1 BARREL. RUPTURE PROPOGATION LENGTH WAS DETERMINED TO BE 70 INCHES, WHICH IS 5.8 FEET. DUE TO CONSTRAINTS ON THE FORM, PROPOGATION LENGTH WAS ROUNDED UP TO 6 FEET. MARATHON REPORTED A SECOND NRC REPORT (#882650) UPDATING SPILL VOLUME.

Appendix D

Metallurgical Analysis

This document is on file at PHMSA