



# Memorandum

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

**Date:** November 2, 2010

**To:** R. M. Seeley, Regional Director, Southwest Region

**From:** Gene Roberson, General Engineer

**Subject:** **Incident Report:** Explorer Pipeline  
**OPID:** 4805 **Unit No.:** 2494  
**Date of incident:** August 17, 2009  
**Atoka County, OK.**  
**NRC Report #** 915209  
**ODES Report #** 20090261

**Summary:**

At approximately 5:45 pm CST, August 17, 2009, Explorer Pipeline Company (Explorer) identified a product release on their Greenville, TX – Glenpool, OK 28-inch OD pipeline in Atoka County, OK. Explorer’s aerial patrol observed an area of dead vegetation at Mile Post (MP) 398.7 on the ROW, and ground crews confirmed the indication of a release from the odor of petroleum products in the area. The pipeline was shut in immediately, and crews mobilized to excavate the pipeline for confirmation of the release and repair of the pipeline. The section of the pipeline where the release occurred has an MOP of 751 psig and was operating at 129 psig when the release was confirmed. Records indicate the highest operating pressure for the previous 30 days was 682 psig. Upon excavation a 2% dent with metal loss was found on the bottom of the pipe (6 o’clock position) with product being released. Explorer made a temporary repair of the location by installing a PLIDCO Repair Sleeve over the area until a permanent repair could be made. The pipeline was returned to service at a reduced pressure, pending scheduling of a shutdown to allow a permanent repair to be completed. Fifty (50) barrels (bbls) of diesel fuel were estimated to have been released as a result of this accident, and none was recovered.

During the week of October 26, 2009 the pipeline was shut in, and a permanent repair was made by installing a section of new pipe in the area of the release. A 10-foot section of pipe containing the failure was then transported to the DNV Columbus Inc. laboratory facility in Dublin, Ohio, for a metallurgical failure investigation. The pipe section in which the release occurred is 28-inch OD, 0.281-inch nominal wall thickness (wt), API 5L X52 line pipe with double submerged arc welded (DSAW) longitudinal seams. The pipe was manufactured in 1971 by STELCO Corporation. The metallurgical analysis determined the probable cause of the release to be through wall cracking consistent with near-neutral pH stress corrosion cracking (SCC).

At the time of the release, Explorer was in the process of re-evaluating previous in-line inspection tool (ILI) log run data from 2007 and 2008 ILI runs and performing 58 additional verification digs associated with this segment of pipeline, and no SCC was identified in these excavations. Specifically, there were 4 additional locations that had ILI data characteristics similar to the anomaly at the release location, and these 4 “dent-like” locations were excavated and examined. None of the 4 additional excavation sites contained SCC.

As a result of the accident, Explorer hired vendors to support additional data analysis, excavations, and inspections. In all previous excavations on this pipeline segment, SCC has only been identified in the presence of deformation anomalies (dents); therefore, post accident activities were tailored to address SCC within dents. Explorer’s program for identifying sites of possible SCC in dents had focused on dents > 2% OD in depth, but the dent at the failure site was less than 2%. Therefore, ILI tool data was analyzed for all areas where dents were present in areas of metal loss. The analysis identified 328 locations for evaluation, and 15 sites were identified for further examination. The excavations performed did not reveal any additional locations with SCC present.

**Background:**

The PHMSA inspection unit in which the release occurred (SMART # 2494) has a history of failures due to SCC in 2004 and in 2007 resulting in a Corrective Action Order (CAO) being issued to Explorer (CPF 4-2007-5021H). CPF 4-2007-5021H was closed on 09/01/2009.

**System description:**

Explorer Pipeline Company owns and operates a 1400-mile pipeline system transporting primarily gasoline, fuel oil and jet fuel from Gulf Coast refineries and import facilities in Texas and Louisiana into the Midwestern United States. The system was constructed in 1971. The main line pipe size is 28-inch OD from Port Arthur, Texas, to Glenpool, Oklahoma (southern line segment) and 24-inch OD from Glenpool to Hammond, Indiana (northern line segment). There are 20 pump stations located throughout the system, which has a current total line capacity of 560,000 barrels per day on the southern segment and 350,000 barrels per day on the northern segment. Explorer's pipeline operations are monitored and controlled from the Explorer Control Center located in the Tulsa Headquarters office.

The release occurred in PHMSA Inspection Unit 2494 – Central District. The pipeline unit travels from Greenville, TX to Glenpool, OK, to the OK-MO State line near Joplin, MO and consists of 31 tanks and 432 miles of pipeline. The main line was installed in 1971 consisting of 28-inch OD, 0.280/0.312-inch wt, API 5L X-52, DSAW longitudinal seam line pipe from STELCO. The line has coal tar enamel external coating.

**Findings:**

The line pipe in which the release occurred was evaluated during the installation of the PLIDCO sleeve. Evidence of a dent with metal loss was present but no further details were obtainable at that time. On October 26, 2009 the section of pipe containing the probable leak was removed from the Explorer system and transported to DNV Columbus for metallurgical analysis. The metallurgical analysis determined the probable cause of the release to be through wall cracking consistent with near-neutral pH SCC.

**Conclusions:**

Stress corrosion cracking in the Greenville to Glenpool segment of pipeline has only been found to date in conjunction with external dents/deformation of the pipe.

**Appendices:**

- **Appendix A – NRC # 915209**
- **Appendix B – PHMSA F 7000.1 - ODES #20090261**
- **Appendix C – DNV Metallurgical Report ENAUS813BPADG**  
*Privileged and Confidential*
- **Appendix D – DNV Incident Summary ANEUS822TARP**  
*Privileged and Confidential*

Appendix A

NRC Report

915209

NATIONAL RESPONSE CENTER 1-800-424-8802

\*\*\* For Public Use \*\*\*

Information released to a third party shall comply with any applicable federal and/or state Freedom of Information and Privacy Laws

Incident Report # 915209

INCIDENT DESCRIPTION

\*Report taken at 18:58 on 17-AUG-09

Incident Type: PIPELINE

Incident Cause: UNKNOWN

Affected Area:

The incident was discovered on 17-AUG-09 at 17:45 local time.

Affected Medium: SOIL SOIL

SUSPECTED RESPONSIBLE PARTY

Organization: EXPLORER PIPELINE  
TULSA , OK 74101

Type of Organization: PRIVATE ENTERPRISE

INCIDENT LOCATION

1/2 MILE NORTH 1/2 MILE WEST County: ATOKA

INTERSECTION OF OVERLAND TRAIL AND

BUTTERFIELD

City: CANEY, OKLAHOMA State: OK

Distance from City: 10.5 MILES

Direction from City: WNW

Latitude: 34° 17' 34" N

Longitude: 096° 20' 50" W

Section: 15 Township: 3S Range: 9E MP 398.8 GREENVILLE TO GLENPOOL 28 NE/4 SW/4  
S15 R3S T9E ATOKA COUNTY,

RELEASED MATERIAL(S)

CHRIS Code: ODS Official Material Name: OIL: DIESEL

Also Known As: FUEL OIL - DIESEL 2

Qty Released: 0 UNKNOWN AMOUNT

DESCRIPTION OF INCIDENT

REPORTING A PIPELINE RELEASE. NO FREE PRODUCT AT THIS TIME. NO IMPACT TO WATER. DEAD VEGETATION ON ROW AND SMELL OF PETROLEUM PRODUCT IN SOIL. EXCAVATION AND ENVIRONMENTAL CONTRACTORS ON SITE IN ADDITION TO COMPANY PERSONNEL. WILL BEGIN EXCAVATION TONIGHT TO DETERMINE THE EXTENT OF OF INCIDENT. REPORTING AT THIS TIME DUE TO COSTS EXPECTED TO EXCEED \$50,000. NO VOLUME ESTIMATE AVAILABLE.

INCIDENT DETAILS

Pipeline Type: TRANSMISSION

DOT Regulated: YES

Pipeline Above/Below Ground: BELOW

Exposed or Under Water: NO

Pipeline Covered: UNKNOWN

DAMAGES

Fire Involved: NO Fire Extinguished: UNKNOWN

INJURIES: NO Hospitalized: Empl/Crew: Passenger:

FATALITIES: NO Empl/Crew: Passenger: Occupant:

EVACUATIONS: NO Who Evacuated: Radius/Area:

Damages: YES \$50000

Closure Type	Description of Closure	Length of Closure	Direction of Closure

Air: N  
Road: N  
Waterway: N  
Track: N

Major Artery: N

Passengers Transferred: NO  
Environmental Impact: YES/VEGETATION  
Media Interest: NONE Community Impact due to Material:

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REMEDIAL ACTIONS

EXCAVATION AND ENVIRONMENTAL CONTRACTORS ON-SITE.  
Release Secured: YES  
Release Rate:  
Estimated Release Duration:

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WEATHER

Weather: PARTLY CLOUDY, 90°F Wind speed: 15 MPH Wind direct

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ADDITIONAL AGENCIES NOTIFIED

Federal: N/A  
State/Local: OKLAHOMA CORPORATION COMMISSION  
State/Local On Scene: N/A  
State Agency Number: N/A

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NOTIFICATIONS BY NRC

USCG ICC (ICC ONI)  
17-AUG-09 19:34  
COLORADO INFO ANALYSIS CENTER (FUSION CENTER)  
17-AUG-09 19:34  
DOT CRISIS MANAGEMENT CENTER (MAIN OFFICE)  
17-AUG-09 19:34  
U.S. EPA VI (MAIN OFFICE)  
17-AUG-09 19:38  
NATIONAL INFRASTRUCTURE COORD CTR (MAIN OFFICE)  
17-AUG-09 19:34  
NOAA RPTS FOR OK (MAIN OFFICE)  
17-AUG-09 19:34  
OFC OF ENV SVC CHEROKEE NATIONS OK (MAIN OFFICE)  
17-AUG-09 19:34  
PIPELINE & HAZMAT SAFETY ADMIN (OFFICE OF PIPELINE SAFETY (AUTO))  
17-AUG-09 19:34  
PIPELINE & HAZMAT SAFETY ADMIN (OFFICE OF PIPELINE SAFETY WEEKDAYS (VERBAL))  
17-AUG-09 19:39  
DEQ OKLAHOMA (MAIN OFFICE)  
17-AUG-09 19:34  
WEB REPORT (WEB REPORT SUBMITTER)  
17-AUG-09 19:34

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ADDITIONAL INFORMATION

////////WEB REPORT////////

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\*\*\* END INCIDENT REPORT # 915209 \*\*\*

Appendix B  
ODES Report  
2009 0261



U.S. Department of Transportation  
Research and Special Programs  
Administration

## ACCIDENT REPORT – HAZARDOUS LIQUID PIPELINE SYSTEMS

Report Date \_\_\_\_\_

No. \_\_\_\_\_  
(DOT Use Only)

### INSTRUCTIONS

**Important:** Please read the separate instructions for completing this form before you begin. They clarify the information requested and provide specific examples. If you do not have a copy of the instructions, you can obtain one from the Office Of Pipeline Safety Web Page at <http://ops.dot.gov>.

### PART A – GENERAL REPORT INFORMATION

Check one or more boxes as appropriate:

**Original Report    Supplemental Report    Final Report**

1. a. Operator's OPS 5-digit Identification Number (if known) \_\_\_\_\_ / \_\_\_\_\_ /
2. b. If Operator does not own the pipeline, enter Owner's OPS 5-digit Identification Number (if known) / \_\_\_\_\_ /
- c. Name of Operator \_\_\_\_\_
- d. Operator street address \_\_\_\_\_
- e. Operator address \_\_\_\_\_  
City, County, State and Zip Code \_\_\_\_\_

**IMPORTANT: IF THE SPILL IS SMALL, THAT IS, THE AMOUNT IS AT LEAST 5 GALLONS BUT IS LESS THAN 5 BARRELS, COMPLETE THIS PAGE ONLY, UNLESS THE SPILL IS TO WATER AS DESCRIBED IN 49 CFR §195.52(A)(4) OR IS OTHERWISE REPORTABLE UNDER §195.50 AS REVISED IN CY 2001.**

2. Time and date of the accident  
 \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_  
 hr.                      month                      day                      year

3. Location of accident  
(If offshore, do not complete a through d. See Part C.1)
  - a. Latitude: \_\_\_\_\_ Longitude: \_\_\_\_\_  
(if not available, see instructions for how to provide specific location)
  - b. \_\_\_\_\_  
City, and County or Parish
  - c. \_\_\_\_\_  
State and Zip Code
  - d. Mile post/valve station      or survey station no.  
(whichever gives more accurate location)  
\_\_\_\_\_

4. Telephone report  
 \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_  
 NRC Report Number                      month                      day                      year

5. Losses (Estimated)
 

**Public/Community Losses reimbursed by operator:**

Public/private property damage      \$ \_\_\_\_\_

Cost of emergency response phase      \$ \_\_\_\_\_

Cost of environmental remediation      \$ \_\_\_\_\_

Other Costs      \$ \_\_\_\_\_  
(describe) \_\_\_\_\_

**Operator Losses:**

Value of product lost      \$ \_\_\_\_\_

Value of operator property damage      \$ \_\_\_\_\_

Other Costs      \$ \_\_\_\_\_  
(describe) \_\_\_\_\_

**Total Costs      \$ \_\_\_\_\_**

6. Commodity Spilled      Yes      No  
(If Yes, complete Parts a through c where applicable)
  - a. Name of commodity spilled \_\_\_\_\_
  - b. Classification of commodity spilled:  
 HVLs /other flammable or toxic fluid which is a gas at ambient conditions  
 CO<sub>2</sub> or other non-flammable, non-toxic fluid which is a gas at ambient conditions  
 Gasoline, diesel, fuel oil or other petroleum product which is a liquid at ambient conditions  
 Crude oil

- c. Estimated amount of commodity involved :  
**Barrels**  
**Gallons (check only if spill is less than one barrel)**

**Amounts:**  
**Spilled :** \_\_\_\_\_  
**Recovered:** \_\_\_\_\_

### CAUSES FOR SMALL SPILLS ONLY (5 gallons to under 5 barrels) :

(For large spills [5 barrels or greater] see Part H)

Corrosion	Natural Forces	Excavation Damage	Other Outside Force Damage
Material and/or Weld Failures	Equipment	Incorrect Operation	Other

### PART B – PREPARER AND AUTHORIZED SIGNATURE

_____ (type or print) Preparer's Name and Title	_____ Area Code and Telephone Number
_____ Preparer's E-mail Address	_____ Area Code and Facsimile Number
_____ Authorized Signature	_____ Area Code and Telephone Number

**PART C – ORIGIN OF THE ACCIDENT (Check all that apply)**

1. Additional location information  
 a. Line segment name or ID \_\_\_\_\_  
 b. Accident on Federal land other than Outer Continental Shelf Yes No  
 c. Is pipeline interstate? Yes No

Offshore: Yes No (complete d if offshore)  
 d. Area \_\_\_\_\_ Block # \_\_\_\_\_  
 State /\_\_\_\_\_/ or Outer Continental Shelf

2. Location of system involved (check all that apply)  
 Operator's Property  
 Pipeline Right of Way  
 High Consequence Area (HCA)?  
 Describe HCA \_\_\_\_\_

3. Part of system involved in accident  
 Above Ground Storage Tank  
 Cavern or other below ground storage facility  
 Pump/meter station; terminal/tank farm piping and equipment, including sumps  
 Other Specify: \_\_\_\_\_

Onshore **pipeline**, including valve sites  
 Offshore **pipeline**, including platforms

If failure occurred on **Pipeline**, complete items a - g:

4. Failure occurred on  
 Body of Pipe Pipe Seam Scraper Trap  
 Pump Sump Joint  
 Component Valve Metering Facility  
 Repair Sleeve Welded Fitting Bolted Fitting  
 Girth Weld  
 Other (specify) \_\_\_\_\_

Year the component that failed was installed: /\_\_\_\_\_/

5. Maximum operating pressure (MOP)  
 a. Estimated pressure at point and time of accident: \_\_\_\_\_ PSIG  
 b. MOP at time of accident: \_\_\_\_\_ PSIG  
 c. Did an overpressurization occur relating to the accident?  
 Yes No

a. Type of leak or rupture  
 Leak: Pinhole Connection Failure (complete sec. H5)  
 Puncture, diameter (inches) \_\_\_\_\_  
 Rupture: Circumferential – Separation  
 Longitudinal – Tear/Crack, length (inches) \_\_\_\_\_  
 Propagation Length, total, both sides (feet) \_\_\_\_\_  
 N/A  
 Other \_\_\_\_\_

b. Type of block valve used for isolation of immediate section:  
 Upstream: Manual Automatic Remote Control  
 Check Valve  
 Downstream: Manual Automatic Remote Control  
 Check Valve

c. Length of segment isolated \_\_\_\_\_ ft  
 d. Distance between valves \_\_\_\_\_ ft  
 e. Is segment configured for internal inspection tools? Yes No  
 f. Had there been an in-line inspection device run at the point of failure? Yes No Don't Know  
 Not Possible due to physical constraints in the system  
 g. If Yes, type of device run (check all that apply)  
 High Resolution Magnetic Flux tool Year run: \_\_\_\_\_  
 Low Resolution Magnetic Flux tool Year run: \_\_\_\_\_  
 UT tool Year run: \_\_\_\_\_  
 Geometry tool Year run: \_\_\_\_\_  
 Caliper tool Year run: \_\_\_\_\_  
 Crack tool Year run: \_\_\_\_\_  
 Hard Spot tool Year run: \_\_\_\_\_  
 Other tool Year run: \_\_\_\_\_

**PART D – MATERIAL SPECIFICATION**

1. Nominal pipe size (NPS) \_\_\_\_\_ / in.  
 2. Wall thickness \_\_\_\_\_ / in.  
 3. Specification \_\_\_\_\_ SMYS \_\_\_\_\_  
 4. Seam type \_\_\_\_\_  
 5. Valve type \_\_\_\_\_  
 6. Manufactured by \_\_\_\_\_ in year /\_\_\_\_\_/

**PART E – ENVIRONMENT**

1. Area of accident In open ditch  
 Under pavement Above ground  
 Underground Under water  
 Inside/under building Other \_\_\_\_\_

2. Depth of cover: \_\_\_\_\_ inches

**PART F – CONSEQUENCES**

1. Consequences (check and complete all that apply)  
 a. Fatalities Injuries  
 Number of operator employees: \_\_\_\_\_  
 Contractor employees working for operator: \_\_\_\_\_  
 General public: \_\_\_\_\_  
 Totals: \_\_\_\_\_  
 b. Was pipeline/segment shutdown due to leak? Yes No  
 If Yes, how long? \_\_\_\_\_ days \_\_\_\_\_ hours \_\_\_\_\_ minutes  
 c. Product ignited Yes No  
 d. Explosion Yes No  
 e. Evacuation (general public only) \_\_\_\_\_ / people  
 Reason for Evacuation:  
 Precautionary by company  
 Evacuation required or initiated by public official  
 f. Elapsed time until area was made safe:  
 \_\_\_\_\_ / hr. \_\_\_\_\_ / min.

2. Environmental Impact  
 a. Wildlife Impact: Fish/aquatic Yes No  
 Birds Yes No  
 Terrestrial Yes No  
 b. Soil Contamination Yes No  
 If Yes, estimated number of cubic yards: \_\_\_\_\_  
 c. Long term impact assessment performed: Yes No  
 d. Anticipated remediation Yes No  
 If Yes, check all that apply: Surface water Groundwater Soil Vegetation Wildlife  
 e. Water Contamination: Yes No (If Yes, provide the following)  
 Amount in water \_\_\_\_\_ barrels  
 Ocean/Seawater No Yes  
 Surface No Yes  
 Groundwater No Yes  
 Drinking water No Yes (If Yes, check below.)  
 Private well Public water intake

**PART G – LEAK DETECTION INFORMATION**

1. Computer based leak detection capability in place? Yes No
2. Was the release initially detected by? (check one):  
 CPM/SCADA-based system with leak detection  
 Static shut-in test or other pressure or leak test  
 Local operating personnel, procedures or equipment  
 Remote operating personnel, including controllers  
 Air patrol or ground surveillance  
 A third party Other (specify) \_\_\_\_\_
3. Estimated leak duration days \_\_\_\_ hours \_\_\_\_

**PART H – APPARENT CAUSE**

**Important:** There are 25 numbered causes in this Part H. Check the box corresponding to the primary cause of the accident. Check one circle in each of the supplemental categories corresponding to the cause you indicate. See the instructions for guidance.

**H1 – CORROSION**

- |  |                                   |  |   |
|--|-----------------------------------|--|---|
| 1. External Corrosion<br><br>2. Internal Corrosion<br><br>(Complete items a – e where applicable.) | a. Pipe Coating<br>Bare<br>Coated | b. Visual Examination<br>Localized Pitting<br>General Corrosion<br>Other _____ | c. Cause of Corrosion<br>Galvanic Atmospheric<br>Stray Current Microbiological<br>Cathodic Protection Disrupted<br>Stress Corrosion Cracking<br>Selective Seam Corrosion<br>Other _____ |
|--|-----------------------------------|--|---|
- d. Was corroded part of pipeline considered to be under cathodic protection prior to discovering accident?  
 No Yes, Year Protection Started: \_\_\_\_\_
- e. Was pipe previously damaged in the area of corrosion?  
 No Yes => Estimated time prior to accident: / \_\_\_\_\_ / years / \_\_\_\_\_ / months Unknown

**H2 – NATURAL FORCES**

3. Earth Movement => Earthquake Subsidence Landslide Other \_\_\_\_\_
4. Lightning
5. Heavy Rains/Floods => Washouts Flotation Mudslide Scouring Other \_\_\_\_\_
6. Temperature => Thermal stress Frost heave Frozen components Other \_\_\_\_\_
7. High Winds

**H3 – EXCAVATION DAMAGE**

8. Operator Excavation Damage (including their contractors/Not Third Party)
9. Third Party (complete a-f)
- a. Excavator group  
 General Public Government Excavator other than Operator/subcontractor
- b. Type: Road Work Pipeline Water Electric Sewer Phone/Cable  
 Landowner-not farming related Farming Railroad  
 Other liquid or gas transmission pipeline operator or their contractor  
 Nautical Operations Other \_\_\_\_\_
- c. Excavation was: Open Trench Sub-strata (boring, directional drilling, etc...)
- d. Excavation was an ongoing activity (Month or longer) Yes No If Yes, Date of last contact / \_\_\_\_\_ /
- e. Did operator get prior notification of excavation activity?  
 Yes; Date received: / \_\_\_\_\_ / mo. / \_\_\_\_\_ / day / \_\_\_\_\_ / yr. No  
 Notification received from: One Call System Excavator Contractor Landowner
- f. Was pipeline marked as result of location request for excavation? No Yes (If Yes, check applicable items i - iv)
- i. Temporary markings: Flags Stakes Paint
- ii. Permanent markings:
- iii. Marks were (check one) : Accurate Not Accurate
- iv. Were marks made within required time? Yes No

**H4 – OTHER OUTSIDE FORCE DAMAGE**

10. Fire/Explosion as primary cause of failure => Fire/Explosion cause: Man made Natural
11. Car, truck or other vehicle not relating to excavation activity damaging pipe
12. Rupture of Previously Damaged Pipe
13. Vandalism

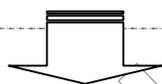
**H5 – MATERIAL AND/OR WELD FAILURES**

**Material**

- 14. Body of Pipe => Dent Gouge Bend Arc Burn Other \_\_\_\_\_
- 15. Component => Valve Fitting Vessel Extruded Outlet Other \_\_\_\_\_
- 16. Joint => Gasket O-Ring Threads Other \_\_\_\_\_

**Weld**

- 17. Butt => Pipe Fabrication Other \_\_\_\_\_
- 18. Fillet => Branch Hot Tap Fitting Repair Sleeve Other \_\_\_\_\_
- 19. Pipe Seam => LF ERW DSAW Seamless Flash Weld Other \_\_\_\_\_  
HF ERW SAW Spiral



Complete a-g if you indicate **any** cause in part H5.

- a. Type of failure:
  - Construction Defect => Poor Workmanship Procedure not followed Poor Construction Procedures
  - Material Defect
- b. Was failure due to pipe damage sustained in transportation to the construction or fabrication site? Yes No
- c. Was part which leaked pressure tested before accident occurred? Yes, complete d-g No
- d. Date of test: \_\_\_\_\_ / yr. \_\_\_\_\_ / mo. \_\_\_\_\_ / day
- e. Test medium: Water Inert Gas Other \_\_\_\_\_
- f. Time held at test pressure: \_\_\_\_\_ / hr.
- g. Estimated test pressure at point of accident: \_\_\_\_\_ PSIG

**H6 – EQUIPMENT**

- 20. Malfunction of Control/Relief Equipment => Control-valve Instrumentation SCADA Communications  
Block valve Relief valve Power failure Other \_\_\_\_\_
- 21. Threads Stripped, Broken Pipe Coupling => Nipples Valve Threads Dresser Couplings Other \_\_\_\_\_
- 22. Seal Failure => Gasket O-Ring Seal/Pump Packing Other \_\_\_\_\_

**H7 – INCORRECT OPERATION**

- 23. Incorrect Operation
  - a. Type: Inadequate Procedures Inadequate Safety Practices Failure to Follow Procedures  
Other \_\_\_\_\_
  - b. Number of employees involved who failed a post-accident test: drug test: \_\_\_\_\_ / alcohol test: \_\_\_\_\_ /

**H8 – OTHER**

- 24. Miscellaneous, describe: \_\_\_\_\_
- 25. Unknown  
Investigation Complete Still Under Investigation (submit a supplemental report when investigation is complete)

**PART I – NARRATIVE DESCRIPTION OF FACTORS CONTRIBUTING TO THE EVENT** (Attach additional sheets as necessary)

*(This area is intentionally left blank for the narrative description of factors contributing to the event.)*

## Appendix C

### Metallurgical Report

*Privileged and Confidential*



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**DET NORSKE VERITAS**

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**Final Report**  
**Metallurgical Analysis of 28-Inch**  
**Diameter Double Submerged**  
**Arc-Welded Longitudinal Seam**

Explorer Pipeline Company  
Tulsa, Oklahoma

Report No./DNV Reg No.: ENAUS813BPADG (EP008510)

December 31, 2009

Privileged and Confidential

Appendix D  
Incident Summary  
*Privileged and Confidential*



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**Det Norske Veritas**

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**Final Report**

**Atoka MP 398 Incident Summary**

**Explorer Pipeline Company  
Tulsa, Oklahoma**

Report No./DNV Reg. No.: ANEUS822TARP (20100728) – Version 1  
August 02, 2010  
*Privileged and Confidential*