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

Principal Investigator: Joe Elmer  
Senior Accident Investigator: Karen Butler  
Region Director: David Barrett / Allan Beshore  
Date of Report: 8/10/2015  
Subject: Failure Investigation Report – Magellan Pipeline Company, LP – Other Accident Cause

### Operator, Location, & Consequences

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of Failure</td>
<td>11/22/2012</td>
</tr>
<tr>
<td>Commodity Released</td>
<td>Gasoline</td>
</tr>
<tr>
<td>City/County &amp; State</td>
<td>Coralville / Johnson, Iowa</td>
</tr>
<tr>
<td>OpID &amp; Operator Name</td>
<td>22610 Magellan Pipeline Company, LP</td>
</tr>
<tr>
<td>Unit # &amp; Unit Name</td>
<td>3953 (WPL) CHICAGO UNIT</td>
</tr>
<tr>
<td>SMART Activity #</td>
<td>144161</td>
</tr>
<tr>
<td>Milepost / Location</td>
<td>0+00, Iowa City Station &amp; Terminal</td>
</tr>
<tr>
<td>Type of Failure</td>
<td>Leak</td>
</tr>
<tr>
<td>Fatalities</td>
<td>0</td>
</tr>
<tr>
<td>Injuries</td>
<td>0</td>
</tr>
<tr>
<td>Description of area impacted</td>
<td>Terminal Facility (HCA)</td>
</tr>
<tr>
<td>Total Costs</td>
<td>$158,100</td>
</tr>
</tbody>
</table>
Executive Summary

On November 22, 2012 at approximately 9:25 am CST, Magellan Pipeline Company, L.P. local operating personnel discovered Tank 1390 leaking during the filling of the tank after an API 653 inspection was completed. 10.52 barrels of gasoline were released. Metallurgical analysis determined the cause to be either internal corrosion or damage caused by grit blasting of the floor. No fatalities or injuries resulted from the failure. There were no service interruption or supply impacts as a result of the failure. The release did occur in an HCA. The total cost of the failure, emergency response, tank repair and environmental cleanup is estimated at $158,100.

System Details

The Magellan hazardous liquid pipeline system includes approximately 9,400 miles of pipeline and 600 storage tanks in 13 different states. Magellan operates the Iowa City Station and Terminal in Coralville, Iowa for the storage and transportation of refined products. The facility is served by three pipelines and provides refined products to the eastern Iowa and Chicago markets. The facility contains 23 break out tanks. Among these is Tank 1390, which developed the leak. Tank #1390 is an 85-foot diameter by 40-foot tall cone roof tank with an aluminum internal floating roof. The tank was constructed by Graver Tank in 1955. The tank capacity is 36,868 barrels.

Events Leading up to the Failure

Prior to the leak, an API 653 inspection was completed on October 11, 2012 by Tank Consultants, Inc. The following repairs were completed after the inspection: Two pinholes located in the internal corner weld were repaired, a pad plate was installed on the tank bottom for the level gauge guide wire bracket, a seal welded pad plate had been installed under the ant-rotation cable bracket, a 12-inch by 12-inch pad plate was installed over a hole on plate 37 and all top side pits .125 inches deep. The tank was then re-inspected on November 5, 2012.

On November 21, 2012 tank was filled starting at approximately 12:00 pm and was stopped at 8 feet at around 4:00 pm. Tank 1390 was filled via a mainline-split process where the incoming product stream is split between multiple tanks to ensure a slower fill rate into those tanks. At approximately 4:21 pm the local operators walked around the tank to check for leaks and to hand line gauge the tank to ensure the accuracy of the side liquid level gauge.

The leak was discovered by local operators at approximately 9:25 am on November 22, 2012 during routine tank farm inspections. A product level of 8 feet in Tank 1390 is equivalent to 8000 barrels of product in the tank. It is unlikely that the small leakage volume would have been identified using electronic gauging.
Emergency Response

Magellan had local personnel on site during the filling of the tank. On November 22, 2012 at approximately 11:47 am Magellan Pipeline Company notified the National Response Center of the release (NRC # 1031325). Excavation activities were immediately initiated to remove the soil and gravel adjacent to the tank that was impacted by the release.

On November 22, 2012 Apex Companies, LLC (APEX) was retained for cleanup of the spill. On November 23, 2012, Apex mobilized to the site to assess the impacted soil and conduct additional excavation activities. A photoionization detector (PID) was utilized to field screen the soil and gravel during excavation activities to determine the amount of material to be removed. The excavation surrounding the south perimeter of the tank had an approximate 12 – 18 inches below grade surface. The excavation depth was based on visual observations and PID readings. All excavated soil and gravel was placed on plastic and covered with plastic awaiting analytical analysis for proper disposal. On November 23, 2012 at approximately 5:00 am the product was completely transferred out of the tank. Approximately 7.9 barrels of product was recovered during excavation. Approximately 20 cubic yards of impacted soil were excavated and were transported to Johnson County Landfill in Iowa City, Iowa for proper disposal.

On November 24, 2014 the tank floor was cleaned and a through wall hole was discovered in the bottom of the tank. The hole was located near the south entrance.

Summary of Return-to-Service

On November 28, 2012, Tank Consultants, Inc. performed a magnetic flux exclusion (MFE) scan on the entire floor. No additional through bottom holes were identified.

On November 29, 2012, HMT Inc. performed a vacuum test on all bottom and corner welds. No additional through bottom holes were identified. A 20-inch by 20-inch section was cutout that contained the hole in the floor and the section was sent to Kiefner and Associates for analysis. The damaged section of floor was repaired in accordance with API 653 and inspected by an API 653 inspector.

On December 7, 2012 the tank was filled to approximately 4-feet and inspected for leaks. The tank was then filled to a level of 8-feet and allowed to sit idle overnight.

After the tank was inspected for leaks it was returned to service on December 8, 2012 at approximately 8:14 am

Investigation Details

On November 23, 2012, PHMSA Central Region began following up on NRC Report #1031325. An inspector did not respond to the accident site.

On January 4, 2013, PHMSA Central Region conducted a teleconference with Magellan concerning the leak.

PHMSA Central Region requested and reviewed the following documents:

- Monthly External Tank Inspection Forms (Form 07-Form-0077) (July – December 2012)
- Monthly Overfill Protection System and Water Draw Inspection (July – December 2012)
Findings and Contributing Factors

The failure analysis performed by Kiefner and Associates did not identify a specific cause of the hole in the bottom of the tank. While conclusive evidence does not exist to determine the exact cause of the hole, it is strongly suspected that a leak at the coupling joint in the abrasive blasting equipment hose caused grooving in the floor in three areas and created the hole that caused the leak.

Corrective action taken: The internal epoxy lining specification has been updated to include wording that requires a protective sleeve be installed over all blast hose connections that come in contact with the blast surface. The specification requires that the fittings and protective sleeve be inspected before and after blasting activities to ensure the connection(s) are intact. If damage is found to the protective sleeve or hose connections that would be indicative of an abrasive leak, the blast surface will be visually inspected for damage.

Appendices

Appendix A - Map and Photographs
Appendix B - NRC Report
Appendix C - Operator’s Report
Appendix D - Metallurgical Report
Map of accident location
Appendix A - Map and Photographs

Visual indication of the through-bottom hole, 11/26/2012
(Magellan provided the photograph)

Visual indication of defect in close proximity to the hole, 11/26/2012
(Magellan provided the photograph)
Visual indication of hole and the defect in close proximity to the hole, 11/29/2012. The patch was installed as part of an OOS inspection in 1997. (Magellan provided the photograph)

Example of vacuum box testing of the bottom welds conducted on 11/28/2012. (Magellan provided the photograph)
Example of MFE scanning on 11/28/2012. (Magellan provided the photograph)
Incident Report # 1031325

INCIDENT DESCRIPTION

*Report taken at 11:47 on 22-NOV-12
Incident Type: STORAGE TANK
Incident Cause: UNKNOWN
Affected Area: The incident was discovered on 22-NOV-12 at 09:40 local time.
Affected Medium: LAND  EARTHEN CONTAINMENT

SUSPECTED RESPONSIBLE PARTY

Organization: MAGELLAN PIPELINE CO
URBANDALE, IA 50322
Type of Organization: PRIVATE ENTERPRISE

INCIDENT LOCATION

912 FIRST AVE County: JOHNSON
City: CORALVILLE State: IA Zip: 52241

RELEASED MATERIAL(S)

CHRIS Code: GAS  Official Material Name: GASOLINE: AUTOMOTIVE (UNLEADED)
Also Known As: 
Qty Released: 800 GALLON(S)

DESCRIPTION OF INCIDENT

CALLER IS REPORTING A SPILL OF ABOUT 800 GALLONS OF GASOLINE POOLED ON THE GROUND DURING ROUNDS. THE TANK WAS JUST PUT BACK INTO SERVICE YESTERDAY.

INCIDENT DETAILS

Description of Tank: FLOATING TOP TANK
Tank Above/Below Ground: ABOVE
Transportable Container: NO
Tank Regulated: UNKNOWN
Tank Regulated By: 
Tank ID: 1390
Capacity of Tank: 
Actual Amount: 8000 BARREL(S)

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: NO

Closure Type  Description of Closure  Length of Closure  Direction of Closure
Air: N  
Road: N  Major Artery: N
Waterway: N  
Track: N  

Page 1 of 2
Passengers Transferred: NO
Environmental Impact: UNKNOWN
Media Interest: NONE Community Impact due to Material:

REMEDIAL ACTIONS
TRANSFERRING PRODUCT TO ANOTHER TANK. LOOKING FOR THE LEAK LOCATION. CLEAN UP IS UNDERWAY. RESPONSE CONTRACTORS ARE EN ROUTE.
Release Secured: NO
Release Rate:
Estimated Release Duration:

WEATHER

ADDITIONAL AGENCIES NOTIFIED

Federal:
State/Local: IDNR, FIRE CHIEF, LOCAL EMA
State/Local On Scene:
State Agency Number:

NOTIFICATIONS BY NRC
ATLANTIC STRIKE TEAM (MAIN OFFICE)
22-NOV-12 11:53
CGIS RAO ST. LOUIS (COMMAND CENTER)
22-NOV-12 11:53
DOT CRISIS MANAGEMENT CENTER (MAIN OFFICE)
22-NOV-12 11:53
U.S. EPA VII (MAIN OFFICE)
22-NOV-12 12:04
U.S. EPA VII (CRIMINAL INVESTIGATION DIVISION)
22-NOV-12 11:53
FEMA REGION 7 (COORDINATION CENTER)
22-NOV-12 11:53
IOWA DEPT OF PUBLIC HEALTH (COMMAND CENTER)
22-NOV-12 11:53
IA U.S. ATTORNEY’S OFFICE (INTELLIGENCE OFFICER)
22-NOV-12 11:53
NATIONAL INFRASTRUCTURE COORD CTR (MAIN OFFICE)
22-NOV-12 11:53
NOAA RPTS FOR IA (MAIN OFFICE)
22-NOV-12 11:53
NATIONAL RESPONSE CENTER HQ (AUTOMATIC REPORTS)
22-NOV-12 11:53
NTSB PIPELINE (MAIN OFFICE)
22-NOV-12 11:53
IA DEPT NAT RES ATTN: DUTY OFFICER (MAIN OFFICE)
22-NOV-12 11:53
DOI/OEPC DENVER (MAIN OFFICE)
22-NOV-12 11:53
USCG DISTRICT 8 (MAIN OFFICE)
22-NOV-12 11:53

ADDITIONAL INFORMATION

*** END INCIDENT REPORT # 1031325 ***
PART A - KEY REPORT INFORMATION

Report Type: (select all that apply)  
Original: Yes  |  Supplemental: Yes  |  Final: Yes

- If “Other” Subtype, Describe:

- If Biofuel/Alternative Fuel and Commodity Subtype is Ethanol Blend, then % Ethanol Blend: 

- If Biofuel/Alternative Fuel and Commodity Subtype is Biodiesel, then Biodiesel Blend (e.g. B2, B20, B100): 

9. Estimated volume of commodity released unintentionally (Barrels):  

10. Estimated volume of intentional and/or controlled release/blowdown (Barrels): 

11. Estimated volume of commodity recovered (Barrels):  

12. Were there fatalities? No  

13. Were there injuries requiring inpatient hospitalization? No  

Form PHMSA F 7000.1 (Rev. 12-2012)
13d. Workers working on the right-of-way, but NOT associated with this Operator
13e. General public
13f. Total injuries (sum of above)
14. Was the pipeline/facility shut down due to the Accident? Yes
   - If Yes, Explain:
      - If Yes, complete Questions 14a and 14b; (use local time, 24-hr clock)
14a. Local time and date of shutdown: 11/22/2012 10:00
14b. Local time pipeline/facility restarted: 12/08/2012 08:14
   - Still shut down? (* Supplemental Report Required)
15. Did the commodity ignite? No
16. Did the commodity explode? No
17. Number of general public evacuated:
18. Time sequence (use local time, 24-hour clock):
   18a. Local time Operator identified Accident: 11/22/2012 09:25
   18b. Local time Operator resources arrived on site: 11/22/2012 09:50

PART B - ADDITIONAL LOCATION INFORMATION
1. Was the origin of Accident onshore? Yes
   - If Yes, Complete Questions (2-12)
   - If No, Complete Questions (13-15)
   - If Onshore:
2. State: Iowa
3. Zip Code: 52241
4. City: Coralville
5. County or Parish: Johnson
6. Operator-designated location: Milepost/Valve Station Specify: 0+00
7. Pipeline/Facility name: Iowa City Station & Terminal
8. Segment name/ID: Station #610
9. Was Accident on Federal land, other than the Outer Continental Shelf (OCS)? No
10. Location of Accident: Totally contained on Operator-controlled property
   - If Other, Describe:
   Depth-of-Cover (in):
11. Area of Accident (as found): Tank, including attached appurtenances
   - If Offshore:
12. Did Accident occur in a crossing? No
   - If Yes, specify below:
      - If Bridge crossing –
      - Cased/ Uncased:
      - If Railroad crossing –
      - Cased/ ‘Uncased’ Bored/drilled
      - If Road crossing –
      - Cased/ ‘Uncased’ Bored/drilled
      - If Water crossing –
      - Cased/ Uncased
      - Name of body of water, if commonly known:
      - Approx. water depth (ft) at the point of the Accident:
      - Select:
13. Approximate water depth (ft) at the point of the Accident:
14. Origin of Accident:
   - In State waters - Specify:
      - State:
      - Area:
      - Block/Tract #:
      - Nearest County/Parish:
   - On the Outer Continental Shelf (OCS) - Specify:
      - Area:
      - Block #:
15. Area of Accident:

PART C - ADDITIONAL FACILITY INFORMATION
1. Is the pipeline or facility: Interstate
2. Part of system involved in Accident: Onshore Breakout Tank or Storage Vessel, including Attached Appurtenances
   - If Onshore Breakout Tank or Storage Vessel, Including Attached Appurtenances, specify: Atmospheric or Low Pressure

Form PHMSA F 7000.1 (Rev. 12-2012)
3. Item involved in Accident: Tank/Vessel
   - If Pipe, specify:
     3a. Nominal diameter of pipe (in):
     3b. Wall thickness (in):
     3c. SMYS (Specified Minimum Yield Strength) of pipe (psi):
     3d. Pipe specification:
     3e. Pipe Seam, specify:
        - If Other, Describe:
     3f. Pipe manufacturer:
     3g. Year of manufacture:
     - If Weld, including heat-affected zone, specify:
        - If Other, Describe:
     - If Valve, specify:
        - If Mainline, specify:
        - If Other, Describe:
     3i. Manufactured by:
     3j. Year of manufacture:
     - If Tank/Vessel, specify: Single Bottom System
        - If Other - Describe:
     - If Other, describe:

4. Year item involved in Accident was installed: 1955

5. Material involved in Accident: Carbon Steel
   - If Material other than Carbon Steel, specify:

6. Type of Accident Involved: Leak
   - If Mechanical Puncture – Specify Approx. size:
     in. (axial) by in. (circumferential)
   - If Leak - Select Type: Pinhole
   - If Other, Describe:
   - If Rupture - Select Orientation:
     Approx. size: in. (widest opening) by in. (length circumferentially or axially)
   - If Other – Describe:

PART D - ADDITIONAL CONSEQUENCE INFORMATION

1. Wildlife impact: No
   1a. If Yes, specify all that apply:
      - Fish/aquatic
      - Birds
      - Terrestrial

2. Soil contamination: Yes

3. Long term impact assessment performed or planned: Yes

4. Anticipated remediation: No
   4a. If Yes, specify all that apply:
      - Surface water
      - Groundwater
      - Soil
      - Vegetation
      - Wildlife

5. Water contamination: No
   5a. If Yes, specify all that apply:
      - Ocean/Seawater
      - Surface
      - Groundwater
      - Drinking water: (Select one or both)
        - Private Well
        - Public Water Intake
   5b. Estimated amount released in or reaching water (Barrels):

5c. Name of body of water, if commonly known:

6. At the location of this Accident, had the pipeline segment or facility been identified as one that "could affect" a High Consequence Area (HCA) as determined in the Operator's Integrity Management Program? Yes

7. Did the released commodity reach or occur in one or more High Consequence Area (HCA)? Yes

7a. If Yes, specify HCA type(s): (Select all that apply)
    - Commercially Navigable Waterway:
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Was this HCA identified in the “could affect” determination for this Accident site in the Operator’s Integrity Management Program?</td>
<td>Yes</td>
</tr>
<tr>
<td>- High Population Area:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td>- Other Populated Area</td>
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<td></td>
<td></td>
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<tr>
<td>- Unusually Sensitive Area (USA) - Drinking Water</td>
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<td></td>
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<tr>
<td>- Unusually Sensitive Area (USA) - Ecological</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>8. Estimated Property Damage:</td>
<td></td>
</tr>
<tr>
<td>8a. Estimated cost of public and non-Operator private property damage</td>
<td>$0</td>
</tr>
<tr>
<td>8b. Estimated cost of commodity lost</td>
<td>$1,100</td>
</tr>
<tr>
<td>8c. Estimated cost of Operator’s property damage &amp; repairs</td>
<td>$80,000</td>
</tr>
<tr>
<td>8d. Estimated cost of Operator’s emergency response</td>
<td>$12,000</td>
</tr>
<tr>
<td>8e. Estimated cost of Operator’s environmental remediation</td>
<td>$60,000</td>
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<td>8f. Estimated other costs</td>
<td>$5,000</td>
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<tr>
<td></td>
<td>$158,100</td>
</tr>
</tbody>
</table>

**PART E - ADDITIONAL OPERATING INFORMATION**

1. Estimated pressure at the point and time of the Accident (psig): 
   
   Pressure did not exceed MOP

2. Maximum Operating Pressure (MOP) at the point and time of the Accident (psig): 
   
   .00

3. Describe the pressure on the system or facility relating to the Accident (psig): 
   
   Pressure did not exceed MOP

4. Not including pressure reductions required by PHMSA regulations (such as for repairs and pipe movement), was the system or facility relating to the Accident operating under an established pressure restriction with pressure limits below those normally allowed by the MOP? 
   
   No

   - If Yes, Complete 4a and 4b below:
     
     4a. Did the pressure exceed this established pressure restriction? 
     
     4b. Was this pressure restriction mandated by PHMSA or the State? 

5. Was “Onshore Pipeline, Including Valve Sites” OR “Offshore Pipeline, Including Riser and Riser Bend” selected in PART C, Question 2? 
   
   No

   - If Yes - (Complete 5a. – 5e. below)
     
     5a. Type of upstream valve used to initially isolate release source: 
     
     5b. Type of downstream valve used to initially isolate release source: 
     
     5c. Length of segment isolated between valves (ft): 
     
     5d. Is the pipeline configured to accommodate internal inspection tools? 
     
     - If No, Which physical features limit tool accommodation? (select all that apply) 
       
       - Changes in line pipe diameter 
       
       - Presence of unsuitable mainline valves 
       
       - Tight or mitered pipe bends 
       
       - Other passage restrictions (i.e. unbarred tee’s, projecting instrumentation, etc.) 
       
       - Extra thick pipe wall (applicable only for magnetic flux leakage internal inspection tools) 
       
       - Other - 
     
     - If Other, Describe: 
     
     5e. For this pipeline, are there operational factors which significantly complicate the execution of an internal inspection tool run? (select all that apply)

   - If Yes, Which operational factors complicate execution? (select all that apply)
- Excessive debris or scale, wax, or other wall buildup
- Low operating pressure(s)
- Low flow or absence of flow
- Incompatible commodity
- Other:
  - If Other, Describe:

5. Function of pipeline system: <= 20% SMYS Regulated Gathering

6. Was a Supervisory Control and Data Acquisition (SCADA)-based system in place on the pipeline or facility involved in the Accident? Yes
   - If Yes -
   6a. Was it operating at the time of the Accident? Yes
   6b. Was it fully functional at the time of the Accident? Yes
   6c. Did SCADA-based information (such as alarm(s), alert(s), event(s), and/or volume calculations) assist with the detection of the Accident? No
   6d. Did SCADA-based information (such as alarm(s), alert(s), event(s), and/or volume calculations) assist with the confirmation of the Accident? No

7. Was a CPM leak detection system in place on the pipeline or facility involved in the Accident? No
   - If Yes:
   7a. Was it operating at the time of the Accident? 
   7b. Was it fully functional at the time of the Accident? 
   7c. Did CPM leak detection system information (such as alarm(s), alert(s), event(s), and/or volume calculations) assist with the detection of the Accident? 
   7d. Did CPM leak detection system information (such as alarm(s), alert(s), event(s), and/or volume calculations) assist with the confirmation of the Accident? 

8. How was the Accident initially identified for the Operator? Local Operating Personnel, including contractors
   - If Other, Specify:

9. Was an investigation initiated into whether or not the controller(s) or control room issues were the cause of or a contributing factor to the Accident? No, the Operator did not find that an investigation of the controller(s) actions or control room issues was necessary due to: (provide an explanation for why the Operator did not investigate)
   - If No, the Operator did not find that an investigation of the controller(s) actions or control room issues was necessary due to: While Operations Control can detect tank levels via SCADA, there is NO CPM monitoring of the tank. The release was not detected by the SCADA system. Pressure, temps and flow rate were within normal ranges at the time the release was discovered. Under the circumstances, it was concluded that neither Operations Control nor the Controller on duty caused or contributed to the release.
   - If Yes, specify investigation result(s): (select all that apply)
     - Investigation reviewed work schedule rotations, continuous hours of service (while working for the Operator), and other factors associated with fatigue
     - Investigation did NOT review work schedule rotations, continuous hours of service (while working for the Operator), and other factors associated with fatigue
     - Provide an explanation for why not:
       - Investigation identified no control room issues
       - Investigation identified no controller issues
       - Investigation identified incorrect controller action or controller error
       - Investigation identified that fatigue may have affected the controller(s) involved or impacted the involved controller(s) response
       - Investigation identified incorrect procedures
       - Investigation identified incorrect control room equipment operation
       - Investigation identified maintenance activities that affected control room operations, procedures, and/or controller response
       - Investigation identified areas other than those above:
         Describe:

PART F - DRUG & ALCOHOL TESTING INFORMATION

Form PHMSA F 7000.1 (Rev. 12-2012)
1. As a result of this Accident, were any Operator employees tested under the post-accident drug and alcohol testing requirements of DOT’s Drug & Alcohol Testing regulations?  
   - If Yes:  
     1a. Specify how many were tested:  
     1b. Specify how many failed:  
   - If No:  

2. As a result of this Accident, were any Operator contractor employees tested under the post-accident drug and alcohol testing requirements of DOT’s Drug & Alcohol Testing regulations?  
   - If Yes:  
     2a. Specify how many were tested:  
     2b. Specify how many failed:  
   - If No:  

### PART G – APPARENT CAUSE

Select only one box from PART G in shaded column on left representing the APPARENT Cause of the Accident, and answer the questions on the right. Describe secondary, contributing or root causes of the Accident in the narrative (PART H).

<table>
<thead>
<tr>
<th>Apparent Cause:</th>
<th>G8 - Other Incident Cause</th>
</tr>
</thead>
</table>

**G1 - Corrosion Failure** - only one sub-cause can be picked from shaded left-hand column

**External Corrosion:**

**Internal Corrosion:**

- If External Corrosion:
  1. Results of visual examination:  
  - If Other, Describe:  
  2. Type of corrosion: (select all that apply)  
    - Galvanic  
    - Atmospheric  
    - Stray Current  
    - Microbiological  
    - Selective Seam  
    - Other:  
  - If Other, Describe:  
  3. The type(s) of corrosion selected in Question 2 is based on the following: (select all that apply)  
    - Field examination  
    - Determined by metallurgical analysis  
    - Other:  
  - If Other, Describe:  
  4. Was the failed item buried under the ground?  
   - If Yes:  
     4a. Was failed item considered to be under cathodic protection at the time of the Accident?  
        - If Yes - Year protection started:  
     4b. Was shielding, tenting, or disbonding of coating evident at the point of the Accident?  
     4c. Has one or more Cathodic Protection Survey been conducted at the point of the Accident?  
        - If “Yes, CP Annual Survey” – Most recent year conducted:  
        - If “Yes, Close Interval Survey” – Most recent year conducted:  
        - If “Yes, Other CP Survey” – Most recent year conducted:  
   - If No:  
  5. Was there observable damage to the coating or paint in the vicinity of the corrosion?  
   - If Internal Corrosion:
  6. Results of visual examination:  
   - Other:  
  7. Type of corrosion: (select all that apply):  
    - Corrosive Commodity  
    - Water drop-out/Acid  
    - Microbiological  
    - Erosion  
    - Other:  
  - If Other, Describe:  
  8. The cause(s) of corrosion selected in Question 7 is based on the following: (select all that apply):  
    - Field examination  
    - Determined by metallurgical analysis
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
</table>
| 9. Location of corrosion (select all that apply): | - Low point in pipe  
- Elbow  
- Other:  
- If Other, Describe: |
| 10. Was the commodity treated with corrosion inhibitors or biocides? | |
| 11. Was the interior coated or lined with protective coating? | |
| 12. Were cleaning/dewatering pigs (or other operations) routinely utilized? | |
| 13. Were corrosion coupons routinely utilized? | |
| 14. List the year of the most recent inspections: |  
14a. API Std 653 Out-of-Service Inspection  
- No Out-of-Service Inspection completed  
14b. API Std 653 In-Service Inspection  
- No In-Service Inspection completed |
| 15. Has one or more internal inspection tool collected data at the point of the Accident? |  
15a. If Yes, for each tool used, select type of internal inspection tool and indicate most recent year run:  
- Magnetic Flux Leakage Tool  
- Ultrasonic  
- Geometry  
- Caliper  
- Crack  
- Hard Spot  
- Combination Tool  
- Transverse Field/Triaxial  
- Other  
- Most recent year: |
| 16. Has one or more hydrotest or other pressure test been conducted since original construction at the point of the Accident? |  
If Yes -  
Most recent year tested:  
Test pressure: |
| 17. Has one or more Direct Assessment been conducted on this segment? |  
- If Yes, and an investigative dig was conducted at the point of the Accident:  
Most recent year conducted:  
- If Yes, but the point of the Accident was not identified as a dig site:  
Most recent year conducted: |
| 18. Has one or more non-destructive examination been conducted at the point of the Accident since January 1, 2002? |  
18a. If Yes, for each examination conducted since January 1, 2002, select type of non-destructive examination and indicate most recent year the examination was conducted:  
- Radiography  
- Guided Wave Ultrasonic  
- Handheld Ultrasonic Tool  
- Wet Magnetic Particle Test  
- Dry Magnetic Particle Test  
- Other  
- Most recent year conducted:  
Describe: |
G2 - Natural Force Damage - only one sub-cause can be picked from shaded left-handed column

Natural Force Damage – Sub-Cause:
- If Earth Movement, NOT due to Heavy Rains/Floods:
  1. Specify:
     - If Other, Describe:
- If Heavy Rains/Floods:
  2. Specify:
     - If Other, Describe:
- If Lightning:
  3. Specify:
- If Temperature:
  4. Specify:
     - If Other, Describe:
- If High Winds:
- If Other Natural Force Damage:
  5. Describe:

Complete the following if any Natural Force Damage sub-cause is selected.

6. Were the natural forces causing the Accident generated in conjunction with an extreme weather event?
   6a. If Yes, specify: (select all that apply)
       - Hurricane
       - Tropical Storm
       - Tornado
       - Other
       - If Other, Describe:

G3 - Excavation Damage - only one sub-cause can be picked from shaded left-hand column

Excavation Damage – Sub-Cause:
- If Excavation Damage by Operator (First Party):
- If Excavation Damage by Operator’s Contractor (Second Party):
- If Excavation Damage by Third Party:
- If Previous Damage due to Excavation Activity:

Complete Questions 1-5 ONLY IF the “Item Involved in Accident” (from PART C, Question 3) is Pipe or Weld.

1. Has one or more internal inspection tool collected data at the point of the Accident?
   1a. If Yes, for each tool used, select type of internal inspection tool and indicate most recent year run:
      - Magnetic Flux Leakage
      - Ultrasonic
      - Geometry
      - Caliper
      - Crack
      - Hard Spot
      - Combination Tool
      - Transverse Field/Triaxial
      - Other

Describe:

2. Do you have reason to believe that the internal inspection was completed BEFORE the damage was sustained?

3. Has one or more hydrotest or other pressure test been conducted since original construction at the point of the Accident?
   - If Yes:
     Most recent year tested:
     Test pressure (psig):
4. Has one or more Direct Assessment been conducted on the pipeline segment?
   - If Yes, and an investigative dig was conducted at the point of the Accident:
     Most recent year conducted:
   - If Yes, but the point of the Accident was not identified as a dig site:
     Most recent year conducted:

5. Has one or more non-destructive examination been conducted at the point of the Accident since January 1, 2002?
   5a. If Yes, for each examination, conducted since January 1, 2002, select type of non-destructive examination and indicate most recent year the examination was conducted:
      - Radiography
        Most recent year conducted:
      - Guided Wave Ultrasonic
        Most recent year conducted:
      - Handheld Ultrasonic Tool
        Most recent year conducted:
      - Wet Magnetic Particle Test
        Most recent year conducted:
      - Dry Magnetic Particle Test
        Most recent year conducted:
      - Other
        Most recent year conducted:

Describe:

Complete the following if Excavation Damage by Third Party is selected as the sub-cause.

6. Did the operator get prior notification of the excavation activity?
   6a. If Yes, Notification received from: (select all that apply)
      - One-Call System
      - Excavator
      - Contractor
      - Landowner

Complete the following mandatory CGA-DIRT Program questions if any Excavation Damage sub-cause is selected.

7. Do you want PHMSA to upload the following information to CGA-DIRT (www.cga-dirt.com)?
8. Right-of-Way where event occurred: (select all that apply)
   - Public
   - Private
   - Pipeline Property/Easement
   - Power/Transmission Line
   - Railroad
   - Dedicated Public Utility Easement
   - Federal Land
   - Data not collected
   - Unknown/Other

9. Type of excavator:
10. Type of excavation equipment:
11. Type of work performed:
12. Was the One-Call Center notified?
   12a. If Yes, specify ticket number:
12b. If this is a State where more than a single One-Call Center exists, list the name of the One-Call Center notified:
13. Type of Locator:
14. Were facility locate marks visible in the area of excavation?
15. Were facilities marked correctly?
16. Did the damage cause an interruption in service?
   16a. If Yes, specify duration of the interruption (hours)
17. Description of the CGA-DIRT Root Cause (select only the one predominant first level CGA-DIRT Root Cause and then, where available as a choice, the one predominant second level CGA-DIRT Root Cause as well):
   Root Cause:
      - If One-Call Notification Practices Not Sufficient, specify:
      - If Locating Practices Not Sufficient, specify:
      - If Excavation Practices Not Sufficient, specify:
      - If Other/None of the Above, explain:

G4 - Other Outside Force Damage - only one sub-cause can be selected from the shaded left-hand column

Other Outside Force Damage – Sub-Cause:
- If Nearby Industrial, Man-made, or Other Fire/Explosion as Primary Cause of Incident:

- If Damage by Car, Truck, or Other Motorized Vehicle/Equipment NOT Engaged in Excavation:

1. Vehicle/Equipment operated by:

- If Damage by Boats, Barges, Drilling Rigs, or Other Maritime Equipment or Vessels Set Adrift or Which Have Otherwise Lost Their Mooring:

2. Select one or more of the following IF an extreme weather event was a factor:

   - Hurricane
   - Tropical Storm
   - Tornado
   - Heavy Rains/Flood
   - Other

   - If Other, Describe:

- If Routine or Normal Fishing or Other Maritime Activity NOT Engaged in Excavation:

- If Electrical Arcing from Other Equipment or Facility:

- If Previous Mechanical Damage NOT Related to Excavation:

Complete Questions 3-7 ONLY IF the "Item Involved in Accident" (from PART C, Question 3) is Pipe or Weld.

3. Has one or more internal inspection tool collected data at the point of the Accident?

3a. If Yes, for each tool used, select type of internal inspection tool and indicate most recent year run:

   - Magnetic Flux Leakage
     Most recent year conducted:
   - Ultrasonic
     Most recent year conducted:
   - Geometry
     Most recent year conducted:
   - Caliper
     Most recent year conducted:
   - Crack
     Most recent year conducted:
   - Hard Spot
     Most recent year conducted:
   - Combination Tool
     Most recent year conducted:
   - Transverse Field/Triaxial
     Most recent year conducted:
   - Other
     Most recent year conducted:

4. Do you have reason to believe that the internal inspection was completed BEFORE the damage was sustained?

5. Has one or more hydrotest or other pressure test been conducted since original construction at the point of the Accident?

   - If Yes:
     Most recent year tested:
     Test pressure (psig):

6. Has one or more Direct Assessment been conducted on the pipeline segment?

   - If Yes, and an investigative dig was conducted at the point of the Accident:
     Most recent year conducted:
   - If Yes, but the point of the Accident was not identified as a dig site:
     Most recent year conducted:

7. Has one or more non-destructive examination been conducted at the point of the Accident since January 1, 2002?

7a. If Yes, for each examination conducted since January 1, 2002, select type of non-destructive examination and indicate most recent year the examination was conducted:

   - Radiography
     Most recent year conducted:
   - Guided Wave Ultrasonic
     Most recent year conducted:
   - Handheld Ultrasonic Tool
     Most recent year conducted:
   - Wet Magnetic Particle Test
     Most recent year conducted:
   - Dry Magnetic Particle Test
     Most recent year conducted:
   - Other
     Most recent year conducted:
### Describe:

- If Intentional Damage:
  
  8. Specify:
    - If Other, Describe:

- If Other Outside Force Damage:
  
  9. Describe:

#### G5 - Material Failure of Pipe or Weld

- only one sub-cause can be selected from the shaded left-hand column

Use this section to report material failures ONLY IF the “Item Involved in Accident” (from PART C, Question 3) is “Pipe” or “Weld.”

<table>
<thead>
<tr>
<th>Material Failure of Pipe or Weld – Sub-Cause:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The sub-cause selected below is based on the following: (select all that apply)</td>
</tr>
<tr>
<td>- Field Examination</td>
</tr>
<tr>
<td>- Determined by Metallurgical Analysis</td>
</tr>
<tr>
<td>- Other Analysis</td>
</tr>
<tr>
<td>- If “Other Analysis”, Describe:</td>
</tr>
<tr>
<td>- Sub-cause is Tentative or Suspected; Still Under Investigation (Supplemental Report required)</td>
</tr>
</tbody>
</table>

#### - If Construction, Installation, or Fabrication-related:

<table>
<thead>
<tr>
<th>List contributing factors: (select all that apply)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Fatigue or Vibration-related</td>
</tr>
<tr>
<td>Specify:</td>
</tr>
<tr>
<td>- If Other, Describe:</td>
</tr>
<tr>
<td>- Mechanical Stress:</td>
</tr>
<tr>
<td>- Other</td>
</tr>
<tr>
<td>- If Other, Describe:</td>
</tr>
</tbody>
</table>

#### - If Original Manufacturing-related (NOT girth weld or other welds formed in the field):

<table>
<thead>
<tr>
<th>List contributing factors: (select all that apply)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Fatigue or Vibration-related:</td>
</tr>
<tr>
<td>Specify:</td>
</tr>
<tr>
<td>- If Other, Describe:</td>
</tr>
<tr>
<td>- Mechanical Stress:</td>
</tr>
<tr>
<td>- Other</td>
</tr>
<tr>
<td>- If Other, Describe:</td>
</tr>
</tbody>
</table>

#### - If Environmental Cracking-related:

<table>
<thead>
<tr>
<th>Specify:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Other - Describe:</td>
</tr>
</tbody>
</table>

Complete the following if any Material Failure of Pipe or Weld sub-cause is selected.

#### 4. Additional factors: (select all that apply):

- Dent
- Gouge
- Pipe Bend
- Arc Burn
- Crack
- Lack of Fusion
- Lamination
- Buckle
- Wrinkle
- Misalignment
- Burnt Steel
- Other:
  - If Other, Describe:

#### 5. Has one or more internal inspection tool collected data at the point of the Accident?

<table>
<thead>
<tr>
<th>If Yes, for each tool used, select type of internal inspection tool and indicate most recent year run:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Magnetic Flux Leakage</td>
</tr>
<tr>
<td>Most recent year run:</td>
</tr>
<tr>
<td>- Ultrasonic</td>
</tr>
<tr>
<td>Most recent year run:</td>
</tr>
<tr>
<td>- Geometry</td>
</tr>
<tr>
<td>Most recent year run:</td>
</tr>
<tr>
<td>- Caliper</td>
</tr>
<tr>
<td>Most recent year run:</td>
</tr>
<tr>
<td>- Crack</td>
</tr>
<tr>
<td>Most recent year run:</td>
</tr>
<tr>
<td>- Hard Spot</td>
</tr>
<tr>
<td>Most recent year run:</td>
</tr>
<tr>
<td>Equipment Failure – Sub-Cause:</td>
</tr>
<tr>
<td>--------------------------------</td>
</tr>
<tr>
<td>- If Malfunction of Control/Relief Equipment:</td>
</tr>
<tr>
<td>1. Specify: (select all that apply) -</td>
</tr>
<tr>
<td>- Control Valve</td>
</tr>
<tr>
<td>- Instrumentation</td>
</tr>
<tr>
<td>- SCADA</td>
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<tr>
<td>- Communications</td>
</tr>
<tr>
<td>- Block Valve</td>
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<tr>
<td>- Check Valve</td>
</tr>
<tr>
<td>- Relief Valve</td>
</tr>
<tr>
<td>- Power Failure</td>
</tr>
<tr>
<td>- Stopple/Control Fitting</td>
</tr>
<tr>
<td>- ESD System Failure</td>
</tr>
<tr>
<td>- Other</td>
</tr>
<tr>
<td>- If Other – Describe:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>- If Pump or Pump-related Equipment:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Specify: - If Other – Describe:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>- If Threaded Connection/Coupling Failure:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Specify: - If Other – Describe:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>- If Non-threaded Connection Failure:</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Specify: - If Other – Describe:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>- If Defective or Loose Tubing or Fitting:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>- If Failure of Equipment Body (except Pump), Tank Plate, or other Material:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- If Other Equipment Failure:</td>
</tr>
<tr>
<td>5. Describe:</td>
</tr>
</tbody>
</table>

G6 – Equipment Failure - only one sub-cause can be selected from the shaded left-hand column
Complete the following if any Equipment Failure sub-cause is selected.

6. Additional factors that contributed to the equipment failure: (select all that apply)
   - Excessive vibration
   - Overpressurization
   - No support or loss of support
   - Manufacturing defect
   - Loss of electricity
   - Improper installation
   - Mismatched items (different manufacturer for tubing and tubing fittings)
   - Dissimilar metals
   - Breakdown of soft goods due to compatibility issues with transported commodity
   - Valve vault or valve can contributed to the release
   - Alarm/status failure
   - Misalignment
   - Thermal stress
   - Other
     - If Other, Describe:

G7 - Incorrect Operation - only one sub-cause can be selected from the shaded left-hand column

Incorrect Operation – Sub-Cause:

<table>
<thead>
<tr>
<th>Sub-Cause</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damage by Operator or Operator’s Contractor NOT Related to Excavation and NOT due to Motorized Vehicle/Equipment Damage</td>
<td>No</td>
</tr>
<tr>
<td>Tank, Vessel, or Sump/Separator Allowed or Caused to Overfill or Overflow</td>
<td>No</td>
</tr>
<tr>
<td>1. Specify:</td>
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<tr>
<td>Valve Left or Placed in Wrong Position, but NOT Resulting in a Tank, Vessel, or Sump/Separator Overflow or Facility Overpressure</td>
<td>No</td>
</tr>
<tr>
<td>Pipeline or Equipment Overpressured</td>
<td>No</td>
</tr>
<tr>
<td>Equipment Not Installed Properly</td>
<td>No</td>
</tr>
<tr>
<td>Wrong Equipment Specified or Installed</td>
<td>No</td>
</tr>
<tr>
<td>Other Incorrect Operation</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Describe:</td>
<td></td>
</tr>
<tr>
<td>Complete the following if any Incorrect Operation sub-cause is selected.</td>
<td></td>
</tr>
<tr>
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<tr>
<td>3. Was this Accident related to (select all that apply):</td>
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G8 - Other Accident Cause - only one sub-cause can be selected from the shaded left-hand column

Other Accident Cause – Sub-Cause: Unknown

- If Miscellaneous: 1. Describe: 2. If Unknown:
PART H - NARRATIVE DESCRIPTION OF THE ACCIDENT

Following the completion of an API 653 Out of Service Tank Inspection and Repairs, product was found on the ground next to the tank chime during the re-filling of the tank. Subsequent inspection indicated the presence of a pinhole in the floor of the tank, resulting in the release. The tank was repaired by Qualified personnel following API 653 and returned to service. The section of the floor containing the pinhole was removed and sent to a metallurgical lab for analysis, which indicated the cause may have been due to corrosion, but it may also have been caused by a damaged blasting hose. The report concluded that the debris adjacent to the leak site between the epoxy coating and the floor had the appearance of blasting grit, and the metal loss may have been due to corrosion, but it may have also been caused by a damaged blasting hose used to clean the floor in preparation for applying an epoxy floor coating.

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Preparer's Title: Sr. Compliance Coordinator
Preparer's Telephone Number: 918-574-7315
Preparer's E-mail Address: ken.lybarger@magellanlp.com
Preparer's Facsimile Number: 918-574-7246
Authorized Signature's Name: Kenneth L. Lybarger
Authorized Signature Title: Sr. Compliance Coordinator
Authorized Signature Telephone Number: 918-574-7315
Authorized Signature Email: ken.lybarger@magellanlp.com
Date: 02/28/2013
Appendix D

Metallurgical Report

This document is on file at PHMSA