## ACCIDENT REPORT - HAZARDOUS LIQUID PIPELINE SYSTEMS

A federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with a collection of information subject to the requirements of the Paperwork Reduction Act unless that collection of information displays a current valid OMB Control Number. The OMB Control Number for this information collection is 2137-0047. Public reporting for this collection of information is estimated to be approximately 10 hours per response (5 hours for a small release), including the time for reviewing instructions, gathering the data needed, and completing and reviewing the collection of information. All responses to this collection of information are mandatory. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to: Information Collection Clearance Officer, PHMSA, Office of Pipeline Safety (PHP-30) 1200 New Jersey Avenue, SE, Washington, D.C. 20590.

**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 PHMSA Pipeline Safety Community Web Page at [http://www.phmsa.dot.gov/pipeline](http://www.phmsa.dot.gov/pipeline).

## PART A - KEY REPORT INFORMATION

<table>
<thead>
<tr>
<th>Report Type: (select all that apply)</th>
<th>Original:</th>
<th>Supplemental:</th>
<th>Final:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last Revision Date:</td>
<td>11/02/2011</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Operator’s OPS-issued Operator Identification Number (OPID):</td>
<td>32334</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Name of Operator:</td>
<td>TC OIL PIPELINE OPERATIONS INC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Address of Operator:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3a. Street Address</td>
<td>717 TEXAS AVE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3b. City</td>
<td>HOUSTON</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3c. State</td>
<td>Texas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3d. Zip Code</td>
<td>77002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Local time (24-hr clock) and date of the Accident:</td>
<td>05/07/2011 06:20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Location of Accident:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latitude:</td>
<td>45.95307</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Longitude:</td>
<td>-97.9057</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. National Response Center Report Number (if applicable):</td>
<td>975573</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Local time (24-hr clock) and date of initial telephonic report to the National Response Center (if applicable):</td>
<td>05/07/2011 09:55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Commodity released: (select only one, based on predominant volume released):</td>
<td>Crude Oil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Specify Commodity Subtype:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- If “Other” Subtype, Describe:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- If Biofuel/Alternative Fuel and Commodity Subtype is Ethanol Blend, then % Ethanol Blend:</td>
<td>%:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- If Biofuel/Alternative Fuel and Commodity Subtype is Biodiesel, then Biodiesel Blend (e.g. B2, B20, B100):</td>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Estimated volume of commodity released unintentionally (Barrels):</td>
<td>400.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Estimated volume of intentional and/or controlled release/blowdown (Barrels):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Estimated volume of commodity recovered (Barrels):</td>
<td>400.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Were there fatalities? No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- If Yes, specify the number in each category:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12a. Operator employees</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12b. Contractor employees working for the Operator</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12c. Non-Operator emergency responders</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12d. Workers working on the right-of-way, but NOT associated with this Operator</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12e. General public</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12f. Total fatalities (sum of above)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Were there injuries requiring inpatient hospitalization? No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- If Yes, specify the number in each category:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13a. Operator employees</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13b. Contractor employees working for the Operator</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13c. Non-Operator emergency responders</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Form PHMSA F 7000.1 (Rev. 12-2012)
### Part A - Basic Information

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>13d. Workers working on the right-of-way, but NOT associated with this Operator</td>
<td></td>
</tr>
<tr>
<td>13e. General public</td>
<td></td>
</tr>
<tr>
<td>13f. Total injuries (sum of above)</td>
<td></td>
</tr>
<tr>
<td>14. Was the pipeline/facility shut down due to the Accident?</td>
<td>No</td>
</tr>
<tr>
<td>- If No, Explain:</td>
<td></td>
</tr>
<tr>
<td>- If Yes, complete Questions 14a and 14b: <em>(use local time, 24-hr clock)</em></td>
<td></td>
</tr>
<tr>
<td>14a. Local time and date of shutdown:</td>
<td>05/07/2011 09:00</td>
</tr>
<tr>
<td>14b. Local time pipeline/facility restarted:</td>
<td></td>
</tr>
<tr>
<td>- Still shut down? (<em>Supplemental Report Required</em>)</td>
<td></td>
</tr>
<tr>
<td>15. Did the commodity ignite?</td>
<td>No</td>
</tr>
<tr>
<td>16. Did the commodity explode?</td>
<td>No</td>
</tr>
<tr>
<td>17. Number of general public evacuated:</td>
<td>0</td>
</tr>
<tr>
<td>18. Time sequence <em>(use local time, 24-hour clock)</em>:</td>
<td></td>
</tr>
<tr>
<td>18a. Local time Operator identified Accident:</td>
<td>05/07/2011 09:00</td>
</tr>
<tr>
<td>18b. Local time Operator resources arrived on site:</td>
<td>05/07/2011 09:00</td>
</tr>
</tbody>
</table>

**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: North Dakota
  3. Zip Code: 58017
  4. City: Brampton
  5. County or Parish: Sargent
  6. Operator-designated location: Milepost/Valve Station
     - Specify: MP ND 216.7
  7. Pipeline/Facility name: Ludden Pump Station
  8. Segment name/ID: Glacial Lakes
  9. Was Accident on Federal land, other than the Outer Continental Shelf (OCS)? No
  10. Location of Accident: Originated on Operator-controlled property, but then flowed or migrated off the property
     - Specify: Typical aboveground facility piping or appurtenance
     - If Other, Describe: Depth-of-Cover (in):
  11. Area of Accident (as found): Aboveground
  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 Pump/Meter Station Equipment and Piping
   - If Onshore Breakout Tank or Storage Vessel, Including Attached Appurtenances, specify:
3. Item involved in Accident: Relief Line
   - 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:
     3h. Pipeline coating type at point of Accident, specify:
       - If Weld, including heat-affected zone, specify:
       - If Other, Describe:
     3i. Manufactured by:
     3j. Year of manufacture:
   - If Tank/Vessel, specify:
     - If Other - Describe:
   - If Other, describe:
4. Year item involved in Accident was installed: 2009
5. Material involved in Accident: Carbon Steel
6. Type of Accident Involved: Leak
   - If Mechanical Puncture – Specify Approx. size:
     in. (axial) by in. (circumferential)
   - If Leak - Select Type:
     Connection Failure
   - If Rupture - Select Orientation:
     - If Other, Describe:
     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: No
4. Anticipated remediation: Yes
   4a. If Yes, specify all that apply:
     - Surface water Yes
     - Groundwater
     - Soil Yes
     - Vegetation
     - Wildlife
5. Water contamination: Yes
   5a. If Yes, specify all that apply:
     - Ocean/Seawater
     - Surface Yes
     - Groundwater
     - Drinking water: (Select one or both)
       - Private Well
       - Public Water Intake
   5b. Estimated amount released in or reaching water (Barrels): 5.00
   5c. Name of body of water, if commonly known:
       Unknown, swamp area in close proximity to the pump station
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? No
7. Did the released commodity reach or occur in one or more High Consequence Area (HCA)? No
   7a. If Yes, specify HCA type(s): (Select all that apply)
**Commercially Navigable Waterway:**

Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program?

**High Population Area:**

Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program?

**Other Populated Area**

Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program?

**Unusually Sensitive Area (USA) - Drinking Water**

Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program?

**Unusually Sensitive Area (USA) - Ecological**

Was this HCA identified in the "could affect" determination for this Accident site in the Operator's Integrity Management Program?

**8. Estimated Property Damage:**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>8a. Estimated cost of public and non-Operator private property damage</td>
<td>$1,000</td>
</tr>
<tr>
<td>8b. Estimated cost of commodity lost</td>
<td>$40,000</td>
</tr>
<tr>
<td>8c. Estimated cost of Operator's property damage &amp; repairs</td>
<td>$25,000</td>
</tr>
<tr>
<td>8d. Estimated cost of Operator's emergency response</td>
<td>$250,000</td>
</tr>
<tr>
<td>8e. Estimated cost of Operator's environmental remediation</td>
<td>$750,000</td>
</tr>
<tr>
<td>8f. Estimated other costs</td>
<td>$250,000</td>
</tr>
<tr>
<td>8g. Total estimated property damage (sum of above)</td>
<td>$1,316,000</td>
</tr>
</tbody>
</table>

**PART E - ADDITIONAL OPERATING INFORMATION**

1. Estimated pressure at the point and time of the Accident (psig): 1,097.00
2. Maximum Operating Pressure (MOP) at the point and time of the Accident (psig): 1,440.00
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 4.a and 4.b 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?
- 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:

5f. Function of pipeline system:

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? **Yes**
     6d. Did SCADA-based information (such as alarm(s), alert(s), event(s), and/or volume calculations) assist with the confirmation of the Accident? **Yes**

7. Was a CPM leak detection system in place on the pipeline or facility involved in the Accident? **Yes**
   - If Yes:
     7a. Was it operating at the time of the Accident? **Yes**
     7b. Was it fully functional at the time of the Accident? **Yes**
     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? **Yes**
     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? **Yes**

8. How was the Accident initially identified for the Operator? **Controller**
   - 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 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**
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?  
   No
   - If Yes:
     1a. Specify how many were tested:
     1b. Specify how many failed:

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?  
   No
   - If Yes:
     2a. Specify how many were tested:
     2b. Specify how many failed:

**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>G6 - Equipment Failure</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:
    4d. Was the failed item externally coated or painted?
  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
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?

**Complete the following if any Corrosion Failure sub-cause is selected AND the "Item Involved in Accident" (from PART C, Question 3) is Tank/Vessel.**

14. List the year of the most recent inspections:
   - API Std 653 Out-of-Service Inspection
     - No Out-of-Service Inspection completed
   - API Std 653 In-Service Inspection
     - No In-Service Inspection completed

**Complete the following if any Corrosion Failure sub-cause is selected AND the "Item Involved in Accident" (from PART C, Question 3) is Pipe or Weld.**

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
       - Most recent year:
     - Ultrasound
       - Most recent year:
     - Geometry
       - Most recent year:
     - Caliper
       - Most recent year:
     - Crack
       - Most recent year:
     - Hard Spot
       - Most recent year:
     - Combination Tool
       - Most recent year:
     - Transverse Field/Triaxial
       - Most recent year:
     - Other
       - Most recent year:
   Describe:

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
     - 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:
G2 - Natural Force Damage - only one sub-cause can be picked from shaded left-handed column

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

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

<table>
<thead>
<tr>
<th>Excavation Damage – Sub-Cause:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- If Excavation Damage by Operator (First Party):</td>
</tr>
<tr>
<td>- If Excavation Damage by Operator’s Contractor (Second Party):</td>
</tr>
<tr>
<td>- If Excavation Damage by Third Party:</td>
</tr>
<tr>
<td>- If Previous Damage due to Excavation Activity:</td>
</tr>
</tbody>
</table>

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

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

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
  - If “Public”, Specify:
- Private
  - If “Private”, Specify:
- 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
     - Ultrasonic
     - Geometry
     - Caliper
     - Crack
     - Hard Spot
     - Combination Tool
     - Transverse Field/Triaxial
     - Other

     Most recent year conducted:

     Describe:

  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
     - Guided Wave Ultrasonic
     - Handheld Ultrasonic Tool
     - Wet Magnetic Particle Test
     - Dry Magnetic Particle Test
     - 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."

### Material Failure of Pipe or Weld – Sub-Cause:

1. The sub-cause selected below is based on the following: (select all that apply)
   - Field Examination
   - Determined by Metallurgical Analysis
   - Other Analysis
   - If "Other Analysis", Describe:

   - Sub-cause is Tentative or Suspected; Still Under Investigation
     (Supplemental Report required)

2. List contributing factors: (select all that apply)
   - Fatigue or Vibration-related
   - Mechanical Stress:
   - Other
   - If Other, Describe:

3. If Construction, Installation, or Fabrication-related:
   - Fatigue or Vibration-related
   - Mechanical Stress:
   - Other
   - If Other, Describe:

4. If Original Manufacturing-related (NOT girth weld or other welds formed in the field):
   - Fatigue or Vibration-related
   - Mechanical Stress:
   - Other
   - If Other, Describe:

5. If Environmental Cracking-related:
   - Fatigue or Vibration-related
   - Mechanical Stress:
   - Other
   - If Other, Describe:

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?
   5a. 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

Form PHMSA F 7000.1 (Rev. 12-2012)
### G6 – Equipment Failure

- **Equipment Failure** – Sub-Cause: Threaded Connection/Coupling Failure

- **If Malfunction of Control/Relief Equipment:**
  1. Specify: (select all that apply)
     - Control Valve
     - Instrumentation
     - SCADA
     - Communications
     - Block Valve
     - Check Valve
     - Relief Valve
     - Power Failure
     - Stopple/Control Fitting
     - ESD System Failure
     - Other
     - If Other – Describe:

- **If Pump or Pump-related Equipment:**
  2. Specify:
     - If Other – Describe:

- **If Threaded Connection/Coupling Failure:**
  3. Specify: Threaded Fitting
     - If Other – Describe:

- **If Non-threaded Connection Failure:**
  4. Specify:
     - If Other – Describe:

- **If Defective or Loose Tubing or Fitting:**

- **If Failure of Equipment Body (except Pump), Tank Plate, or other Material:**

- **If Other Equipment Failure:**
  5. Describe:

---

- Combination Tool
  - Most recent year run:

- Transverse Field/Triaxial
  - Most recent year run:

- Other
  - Most recent year run:

Describe:

6. 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):

7. 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:

8. Has one or more non-destructive examination(s) been conducted at the point of the Accident since January 1, 2002?
   8a. 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:
     - If Other – Describe:

---

Form PHMSA F 7000.1 (Rev. 12-2012)
### 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

<table>
<thead>
<tr>
<th>Incorrect Operation – Sub-Cause:</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>
</tr>
<tr>
<td>Tank, Vessel, or Sump/Separator Allowed or Caused to Overfill or Overflow</td>
</tr>
<tr>
<td>1. Specify:</td>
</tr>
<tr>
<td>- If Other, Describe:</td>
</tr>
<tr>
<td>Valve Left or Placed in Wrong Position, but NOT Resulting in a Tank, Vessel, or Sump/Separator Overflow or Facility Overpressure</td>
</tr>
<tr>
<td>Pipeline or Equipment Overpressured</td>
</tr>
<tr>
<td>Equipment Not Installed Properly</td>
</tr>
<tr>
<td>Wrong Equipment Specified or Installed</td>
</tr>
<tr>
<td>Other Incorrect Operation</td>
</tr>
</tbody>
</table>

2. Describe:

### Complete the following if any Incorrect Operation sub-cause is selected.

3. Was this Accident related to *(select all that apply)*: -

- Inadequate procedure
- No procedure established
- Failure to follow procedure
- Other:

- If Other, Describe:

4. What category type was the activity that caused the Accident?

5. Was the task(s) that led to the Accident identified as a covered task in your Operator Qualification Program?

5a. If Yes, were the individuals performing the task(s) qualified for the task(s)?

### G8 - Other Accident Cause - only one sub-cause can be selected from the shaded left-hand column

<table>
<thead>
<tr>
<th>Other Accident Cause – Sub-Cause:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- If Miscellaneous:</td>
</tr>
<tr>
<td>1. Describe:</td>
</tr>
<tr>
<td>- If Unknown:</td>
</tr>
</tbody>
</table>
A release occurred at the Ludden Pump Station on the ¾" pipe nipple under the thermal relief valve located on the facility discharge piping. A root cause analysis has been conducted and the failed fitting investigation performed. The fatigue failure of the 3/4" pipe nipple occurred as a result of excessive vibration. Results have been provided to PHMSA.

Preparer's Name: Daniel C Cerkoney
Preparer's Title: Compliance Engineer
Preparer's Telephone Number: 701-483-1434
Preparer's E-mail Address: dan_cerkoney@transcanada.com
Preparer's Facsimile Number: 701-483-1431
Authorized Signature's Name: Daniel C Cerkoney
Authorized Signature Title: Compliance Engineer
Authorized Signature Telephone Number: 701-290-1176
Authorized Signature Email: dan_cerkoney@transcanada.com
Date: 11/02/2011
November 18, 2011

Mr. Kris Roberts
North Dakota Department of Health
918 E. Divide Avenue, 4th Floor
Bismarck, North Dakota 58501-1947

Subject: Release Progress Report – Ludden Pump Station
     TransCanada – Keystone Pipeline, LP
     Brampton, North Dakota

Dear Mr. Roberts:

This report transmits the results of the October 2011 sampling of the land farmed area and surface water in the wetlands at the TransCanada Keystone Pipeline, LP Ludden Pump Station site near Brampton, North Dakota. This report is submitted in reference to your October 26, 2011 correspondence and the finalization of cleanup actions by TransCanada at this site.

**Sampling and Analysis Results**

**Soil Sampling**

The land farmed area was resampled on October 20, 2011. The sample locations are shown on Figure 1 and the results are summarized on Table 1. Analytical results continued to show total extractable hydrocarbon (TEH) concentrations in soils below North Dakota Department of Health (NDDH) clean-up levels at all sampling locations.

**Water Sampling**

The majority of the wetlands previously sampled were found to have no standing water on October 20, 2011, with the exception of the background sample location ¼ mile north of the pump station. The sample location is shown on Figure 2 and the results are summarized on Table 2.

**Observed Site Conditions**

The crops in the farmed area had been destroyed prior to the October 20, 2011 site visit and the field had been tilled. See attached aerial photograph from October 5, 2011 (Figure 3) showing site and land farm restoration condition.

**Recommendation**

Based on current conditions at the TransCanada Ludden Pump Station site and your correspondence dated October 26, 2011, we request that no further investigation or remediation be required and that the site be considered for closure.
If you have any questions, please contact Robert Baumgartner of TransCanada Keystone Pipeline at (832) 320-5538 or myself at (612) 373-6849.

Sincerely,

Bruce R. Galer, PG
Senior Geologist

cc: Robert Baumgartner, TransCanada Keystone Pipeline
<table>
<thead>
<tr>
<th>Location Units</th>
<th>WTLD-25</th>
<th>WTLD-26-N</th>
<th>WTLD-26-S</th>
<th>WTLD-026-Trench</th>
<th>WTLD-027</th>
<th>1/2 Mi-WILD</th>
<th>1/4 Mi-N-WTLD</th>
<th>PS-ADJ-WTLD</th>
<th>Human Health Limit Class III Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Date</td>
<td>10/20/11</td>
<td>10/20/11</td>
<td>10/20/11</td>
<td>10/20/11</td>
<td>10/20/11</td>
<td>10/20/11</td>
<td>10/20/11</td>
<td>10/20/11</td>
<td>10/20/11</td>
</tr>
<tr>
<td>Type</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Background-Grab</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

**Table 1**

Summary of Laboratory Analysis-Wetland Water Samples

Ludden Pump Station, Brampton, ND-October 20, 2011

### Analyte

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Units</th>
<th>WTLD-25</th>
<th>WTLD-26-N</th>
<th>WTLD-26-S</th>
<th>WTLD-026-Trench</th>
<th>WTLD-027</th>
<th>1/2 Mi-WILD</th>
<th>1/4 Mi-N-WTLD</th>
<th>PS-ADJ-WTLD</th>
<th>Human Health Limit Class III Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEH(C09-C40) mg/L</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>0.11</td>
<td>NA</td>
<td>---</td>
</tr>
<tr>
<td>TEM (C09-C40) mg/L</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>0.11</td>
<td>NA</td>
<td>---</td>
</tr>
<tr>
<td>Benzene µg/L</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>&lt;1</td>
<td>NA</td>
<td>71</td>
</tr>
<tr>
<td>Ethylbenzene µg/L</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>&lt;1</td>
<td>NA</td>
<td>2,900</td>
</tr>
<tr>
<td>Toluene µg/L</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>&lt;1</td>
<td>NA</td>
<td>200,000</td>
</tr>
<tr>
<td>Xylene (Total) µg/L</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>&lt;3</td>
<td>NA</td>
<td>10,000</td>
</tr>
</tbody>
</table>

Notes:

- mg/L = Milligrams per liter
- µg/L = Micrograms per liter
- <x = Not detected to reporting limits of x
- TEM = Total extractable range hydrocarbons without silica gel preparation
- TEH = Total extractable range hydrocarbons with silica gel preparation
- * None listed for Class III water, value represents Class II water, wetlands unlisted are considered Class III waters
- --- = No applicable standard
- NA = No surface water present at sample location

<table>
<thead>
<tr>
<th>Location Units</th>
<th>WTLD-25</th>
<th>WTLD-26-N</th>
<th>WTLD-26-S</th>
<th>WTLD-026-Trench</th>
<th>WTLD-027</th>
<th>1/2 Mi-WILD</th>
<th>1/4 Mi-N-WTLD</th>
<th>PS-ADJ-WTLD</th>
<th>Aquatic Life Value Acute</th>
<th>Aquatic Life Value Chronic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Date</td>
<td>10/20/11</td>
<td>10/20/11</td>
<td>10/20/11</td>
<td>10/20/11</td>
<td>10/20/11</td>
<td>10/20/11</td>
<td>10/20/11</td>
<td>10/20/11</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Type</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Background-Grab</td>
<td>NA</td>
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<td>---</td>
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</tbody>
</table>

**Analysis**

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Units</th>
<th>WTLD-25</th>
<th>WTLD-26-N</th>
<th>WTLD-26-S</th>
<th>WTLD-026-Trench</th>
<th>WTLD-027</th>
<th>1/2 Mi-WILD</th>
<th>1/4 Mi-N-WTLD</th>
<th>PS-ADJ-WTLD</th>
<th>Human Health Limit Class III Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum, dissolved µg/L</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>&lt;200</td>
<td>NA</td>
<td>---</td>
</tr>
<tr>
<td>Antimony, dissolved µg/L</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>&lt;10</td>
<td>NA</td>
<td>---</td>
</tr>
<tr>
<td>Arsenic, dissolved µg/L</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>&lt;10</td>
<td>NA</td>
<td>340</td>
</tr>
<tr>
<td>Barium, dissolved µg/L</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>56.5</td>
<td>NA</td>
<td>---</td>
</tr>
<tr>
<td>Beryllium, dissolved µg/L</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>&lt;5.0</td>
<td>NA</td>
<td>---</td>
</tr>
<tr>
<td>Boron, dissolved µg/L</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>&lt;150</td>
<td>NA</td>
<td>---</td>
</tr>
<tr>
<td>Cadmium, dissolved µg/L</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>&lt;1</td>
<td>NA</td>
<td>2.1</td>
</tr>
<tr>
<td>Chromium, dissolved µg/L</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>&lt;10</td>
<td>NA</td>
<td>1,800</td>
</tr>
<tr>
<td>Copper, dissolved µg/L</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>&lt;10</td>
<td>NA</td>
<td>14.0</td>
</tr>
<tr>
<td>Lead, dissolved µg/L</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>&lt;3</td>
<td>NA</td>
<td>82</td>
</tr>
<tr>
<td>Nickel, dissolved µg/L</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>&lt;20</td>
<td>NA</td>
<td>470</td>
</tr>
<tr>
<td>Selenium, dissolved µg/L</td>
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<td>NA</td>
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<td>&lt;15</td>
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<td>Silver, dissolved µg/L</td>
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<td>NA</td>
<td>0.13</td>
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Notes:

- mg/L = Milligrams per liter
- µg/L = Micrograms per liter
- <x = Not detected to reporting limits of x
- * None listed for Class III water, value represents Class II water, wetlands unlisted are considered Class III waters
- --- = No applicable standard
- NA = No surface water present at sample location
## May 15, 2011

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<th>LF-C</th>
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<td>%</td>
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<td>228</td>
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<td>143</td>
<td>3.0</td>
<td>3.5</td>
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<td>Std. Units</td>
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<td>9.4</td>
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<th>LF-D</th>
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<td>6.8</td>
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<td>mg/kg</td>
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<td>9.1</td>
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<td>Std. Units</td>
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<td>5.2</td>
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<td>mg/kg</td>
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## October 20, 2011

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<th>LF-C</th>
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<tr>
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<td>%</td>
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<td>74.2</td>
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<td>5.6</td>
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<td>Std. Units</td>
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<td>5.0</td>
<td>6.3</td>
<td>6.0</td>
<td>8.3</td>
<td>7.9</td>
<td></td>
</tr>
<tr>
<td>Nitrate as N</td>
<td>mg/kg</td>
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<td>10.2</td>
<td>31.2</td>
<td>12.4</td>
<td>6.7</td>
<td>4.3</td>
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<tr>
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<td>mg/kg</td>
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<td>344</td>
<td>363</td>
<td>327</td>
<td>406</td>
<td>348</td>
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<td>8030</td>
<td>7040</td>
<td>5640</td>
<td>7100</td>
<td>6690</td>
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</table>

**NOTES:**
- TEM=total extractable range hydrocarbons without silica gel preparation
- TEH=total extractable range hydrocarbons with silica gel preparation
- In August 2 sampling, the portion of the field that was scraped to remove surficial oil was separated from sample areas LF-A and LF-B and sampled as sample LF-E.
TransCanada Ludden Pump Station

Figure 1. Land Farm Sample Locations - October 20, 2011

Data: SCAT areas collected by GPS in May 2011.

Projection: NAD83 UTM Zone 14N
TransCanada Ludden Pump Station

Figure 2. Off-Site Water Sampling Locations - October 20, 2011

Data:
SCAT areas collected by GPS in May 2011.

Projection:
NAD83 UTM Zone 14N
TransCanada Ludden Pump Station

Figure 3. Site Restoration as of October 5, 2011
Environmental Incident Report

This report has been submitted.

North Dakota Department of Health
Environmental Health Section
1.701.328.5210 or 1.701.328.5166

North Dakota Department of Emergency Services
1.701.328.8100
1.800.472.2121 State Radio 24-Hour Hotline

If this is an emergency, or for additional assistance, please call the Health or Emergency Services Department at the numbers shown above

This form is NOT for RCRA-exempt oilfield related incidents
(for RCRA-exempt oilfield incidents click here)
(if you are not sure which form to use click here)

Fill out information as completely as possible
Error messages appear to the right of the field
Use the Tab key or mouse to move between fields
Pressing the Enter key while in the form will submit the report
Required fields are shown in Red

Location Information:

County: Sargent
Township: 129
Range: 58
Section: 26
Quarter: 
QQSection: 
QQQSection: 

Location Description (911 address or location from nearest town)
10075 119th Ave SE
Brampton, ND 58017

Distance to Nearest Residence or Occupied Building 1.3 Miles

Incident Information:

Date: 5/7/2011
(mm/dd/yyyy) If unknown, enter date of discovery


5/17/2011
0605

hhmm 24-hour time, no colon

Type Other (fill in box) ☐

Pipeline Pump Station Equipment

Estimated Duration 30 Minutes
Estimated Volume 500 Barrels

Substance released or of concern (include trade and/or chemical name if applicable)
Crude Oil

Agriculture Related? No ☐
Is this substance on EPA's Extremely Hazardous Substance list? No ☐
To find out if this substance is on the EHS list, Click Here

Describe Cause
Small diameter piping failure.

Action Taken and Recommended/Planned Future Action
(how spill was contained, soil excavated, emergency approval to burn contaminant, evacuation of nearby personnel, etc.)

Pipeline system shutdown and pump station isolated.
Company and contractor spill response crews mobilized to the facility.
Oil contained and controlled onsite by earthen berm. Offsite oil mist delineated. Absorbent boom and earthen dam were used to collect sheen and control flow from ponded water on adjacent property to the

Where will recovered wastes be disposed?
Recovered crude oil/water mix transported to LePier Oil, Fosston, MN for recycling.
Excavated oil impacted gravel/soil will be transported to Veolia LF, Buffalo MN

Impact Information:
Fatalities 0
Injuries 0
Medium affected 04 - water and soil

Immediate Risk Evaluation (explosive atmosphere, immediate health hazards, etc.)
NA - work conditions were monitored throughout response/cleanup activities.

Potential Environmental Impacts
Soils - oil saturated soils were excavated as described above. Residual oil impacts will be treated using in situ landfarming techniques.
Surface water - oil sheen was collected utilizing absorbent boom. Potential dissolved impacts are being monitored.

**Responsible Party Information:**

<table>
<thead>
<tr>
<th>Responsible Party</th>
<th>TransCanada</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address (Line 1)</td>
<td>13710 FNB Parkway</td>
</tr>
<tr>
<td>Address (Line 2)</td>
<td>Suite 300</td>
</tr>
<tr>
<td>City</td>
<td>Omaha</td>
</tr>
<tr>
<td>State/Province</td>
<td>NE - Nebraska</td>
</tr>
<tr>
<td>Zip</td>
<td>68154</td>
</tr>
<tr>
<td>Contact First Name</td>
<td>Robert</td>
</tr>
<tr>
<td>Contact Last Name</td>
<td>Baumgartner</td>
</tr>
<tr>
<td>Contact Telephone</td>
<td>832-320-5538</td>
</tr>
<tr>
<td>Contact Email</td>
<td><a href="mailto:robert_baumgartner@transcanada.com">robert_baumgartner@transcanada.com</a></td>
</tr>
</tbody>
</table>

**Property Owner if not the Responsible Party**

Has or will the incident be reported to property owner? **Unknown**

**Reporting Information:**

<table>
<thead>
<tr>
<th>First Name</th>
<th>Robert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last Name</td>
<td>Baumgartner</td>
</tr>
<tr>
<td>Date Reported</td>
<td>5/7/2011</td>
</tr>
<tr>
<td>Time Reported</td>
<td>1015 hhmm 24-hour time, no colon</td>
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Other agencies that have or will be notified

- [ ] NDDES
- [ ] State Fire Marshal
- [ ] State Highway Patrol
- [x] Local Fire Department
- [x] Local Law Enforcement
- [x] Local Emergency Manager
- [ ] Other

To see if this incident is required to be reported to the National Response Center (NRC) Click Here
Has or will the incident be reported to the NRC? 1-800-424-8802  Yes [ ]

Additional E-Mail Recipients to send report to
robert_baumgartner@transcanada

----------------------------------

State Agency Person Who Received Call
First Name
Last Name

Department of Emergency Services Incident Number

Send this email to Department of Mineral Resources  No [ ]

Pressing the submit button will send an E-Mail version of this completed Environmental Incident Report to NDDH Environmental Health Section and ND Dept. of Emergency Services personnel

Submit
TransCanada Ludden Pump Station

Figure 7. Land Farm Areas

Data:
SCAT areas collected by GPS in May 2011.

Projection:
NAD83 UTM Zone 14N

---

Legend:
- Fence
- Toe of Slope
- Pond
- Misted Areas
  - Continuous = 91-100% coverage
  - Broken = 51-90% coverage
  - Patchy = 11-50% coverage
  - Sporadic-High = 6-10% coverage
  - Sporadic-Low = 1-5% coverage
  - Trace = <1% coverage
TransCanada Ludden Pump Station

Figure 6. Off-Site Water Sampling Locations

Data:
SCAT areas collected by GPS in May 2011.

Projection:
NAD83 UTM Zone 14N
TransCanada Ludden Pump Station

Figure 5. Off-Site Soil Excavation

Data:
SCAT areas collected by GPS in May 2011.

Projection:
NAD83 UTM Zone 14N
TransCanada Ludden Pump Station

Figure 4. Oil Misted Areas

- Fence
- Toe of Slope
- Pond

Misted Areas:
- Continuous = 91-100% coverage
- Broken = 51-90% coverage
- Patchy = 11-50% coverage
- Sporadic-High = 6-10% coverage
- Sporadic-Low = 1-5% coverage
- Trace = <1% coverage

Data:
SCAT areas collected by GPS in May 2011.

Projection:
NAD83 UTM Zone 14N
TransCanada Ludden Pump Station

Figure 3. On-Site Excavation Extent
TransCanada Ludden Pump Station

Figure 2. Site Plan with Pump Station

Data:
SCAT areas collected by GPS in May 2011.

Projection:
NAD83 UTM Zone 14N
Figure 8. Land Farm Sample Locations

TransCanada Ludden Pump Station

Data: SCAT areas collected by GPS in May 2011.

Projection: NAD83 UTM Zone 14N
RELEASE PROGRESS REPORT
Ludden Pump Station
Brampton, ND

Prepared For: TransCanada
Keystone Pipeline, LP

Date: September 20, 2011

URS Project No. 31810958
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  Figure 5 Off-Site Soil Excavation
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  Appendix A Oil and Water Recycling Manifests
  Appendix B Soil Disposal Manifests and Scale Tickets
  Appendix C Analytical Reports
1.0 INTRODUCTION

1.1 Overview

TransCanada Keystone Pipeline, LP (TransCanada) has prepared this Release Progress Report (Report) in response to a May 7, 2011 crude oil spill at its Ludden Pump Station near Brampton, North Dakota. The objective of this Report is to communicate TransCanada’s interim actions to mitigate residual on-site crude oil impacts and off-site crude oil impacts to agricultural property located directly south of the Ludden Pump Station.

1.2 Site History

On Saturday, May 7, 2011, at 6:05 am local time, TransCanada oil control centre detected a drop in pressure at Ludden pump station in Sargent County, approximately six miles southwest of Brampton, North Dakota. Shortly after an initial investigation began, TransCanada received a call from a nearby resident indicating there was an incident at the pump station. Within minutes, TransCanada isolated the pump station by remotely closing the valves both up and downstream from the site. The first technician on site reported back that there was a release of oil from the pump station and the majority of it was contained on TransCanada’s property. Some mist travelled outside of the TransCanada site and settled on neighboring agricultural land.

1.3 Site Description

The Ludden Pump Station site is located on 119th Avenue SE, Cogswell, North Dakota (Figure 1). The location is T129N, R58W, Section 26, SE Quarter.

The pump station is an approximate 8 acre facility utilized to pump crude oil through the Keystone Pipeline in a southerly direction. The pump station was constructed in 2009 and is equipped with secondary containment structures and remote control and shutdown capabilities. The location of the release was from a pressure relief valve fitting on the western side of the facility. The site plan is shown in Figure 2.

1.4 General Area Environment

The site is located in a very low population density area of southeastern North Dakota. The nearest residence to the site is over 1.3 miles to the north-northwest. Primary land use in the area is agricultural production to include hay, corn, soybean, and grazing. Primary land types include agriculture and wetlands. The nearest major surface water body is Lake Taayer approximately 12 miles from the site (Figure 1).
2.0 ON-SITE RESPONSE ACTIONS

2.1 Oil Recovery

The bulk of the released oil was contained by earthen dikes located on the southern, western, and northern perimeters of the pump station property. Between May 7 and 16, 2011, vac trucks and a hydrovac were used to recover 345 barrels of crude oil and 24 barrels of oil/water mixture. All oil and water were recycled with LePier Oil Company in Fosston, Minnesota. Manifests are included in Appendix A.

Between May 9 and 16, 2011, Seneca Companies cleaned pump station piping with Citrol (citrus cleaner and degreaser) and absorbents. Spent absorbents were contained in garbage bags and placed in a lined roll off dumpster. Approximately 100 linear feet of chain link fencing, barb wire fence, and fence posts that were partially covered with misted crude oil were removed and placed in a lined roll off dumpster.

2.2 Soil Excavation

Between May 11 and 16, 2011, a backhoe and hydrovacs were utilized to excavate approximately 1,250 tons of site gravel/soil from the pump station property within the area shown in Figure 3. Excavation limits were typically less than one foot deep, except in areas with underground piping. In those areas, excavation depths ranged from three to eight feet below grade. In addition to visual inspection, soil was screened with a photoionization detector (PID) with a 10.6 eV lamp to segregate impacted soil and determine limits of excavation. The limited to no availability of sample media, because pump station surface cover material is gravel, prohibited the collection of confirmation soil samples from the pump station property. Crude oil impacts, both visual and those detected with the PID, were excavated, with the exception of a residual amount of minor oil stained gravel that could not be removed from the sidewalls beneath a concrete pad to avoid undermining the pad.

Excavated soil was stored within a bermed area lined and covered with visqueen at the southwest corner of the pump station property.

Spent absorbents from pipe cleaning, oil-coated fencing, absorbent booms used in wetlands (discussed below), excavated off-site soil (discussed below), and excavated on-site soil were combined, for a total of 1,441 tons. The combined waste was transferred to the Veolia Environmental Services – Rolling Hills Landfill, Inc. in Buffalo, Minnesota on July 25-29, 2011. Manifests and scale tickets are included in Appendix B.

Pump station restoration was completed in August 2011.
3.0 OFF-SITE RESPONSE ACTIONS

The off-site area has been designated as the farmed agricultural property to the south of the pump station which was impacted by residual oil mist from the release (Figure 4).

3.1 Absorbents and Sheen Recovery

During the initial response on May 7, 2011, absorbent boom was used to contain the sheen on the ponded water in the wetland to the south of the pump station from a drainage trench dug by the property owner. Additional boom was placed further downstream in the trench as secondary and tertiary containment measures. The drainage trench was blocked with permission of the property owner to further contain sheen in the event of heavy rain. After the drainage trench was blocked and with a prevailing wind from the south, absorbent boom was pulled across the ponded water from south to north to contain sheen to the north end of the pond, adjacent to the pump station. Additional boom was used to replace the boom at the south end of the wetland. The absorbent boom was inspected and replaced as needed on May 23, June 1, June 16, June 30, July 14, and July 28.

On June 1, 2011, to reduce scattered petroleum sheen, DeAngelo Brothers, Inc. applied a 10 percent solution of Micro-Blaze® Emergency Liquid Spill Control (Micro-Blaze) at a rate of one gallon of concentrate per 10 cubic yards to the water surface of the wetland south of the pump station. Follow-up applications of Micro-Blaze were used to periodically spot treat scattered sheen observed during absorbent boom inspections. After the initial application of Micro-Blaze, a silvery sheen was occasionally observed in an area at the north end of the wetland varying from 100 to 500 square feet. Micro-Blaze was applied to spot treat the sheen on June 16 (one gallon of concentrate with three gallons of water, June 30 (two gallons of concentrate in two gallons of water), and July 14 (2.5 gallons of concentrate in 1.5 gallons of water).

3.2 Soil Excavation

During the initial response, on May 13 and 15, 2011, a backhoe was used to remove a two inch layer of soil in the field to the south of the pump station that was covered with crude oil (Figure 5). The excavation resulted in the removal of approximately 175 tons of oily soil. A narrow trench was also dug in the bottom of the excavation in an area where there was rainbow sheen observed and shallow pooling of oil in a relic tracker track.

A total of nine confirmation samples were collected and analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) and Total Extractable Materials (TEM). Two of the confirmation samples were also analyzed for Total Extractable Hydrocarbons (TEH). All analytical results are summarized in Table 1 and complete analytical reports are provided in Appendix C. All analytical results were below regulatory action levels.
3.3 SCAT Assessment

On May 11, 2011, a modified application of the National Oceanic and Atmospheric Administration (NOAA) Shoreline Clean-Up Assessment Technique (SCAT) outlined in the *Shoreline Assessment Manual, Third Edition* (NOAA, 2000) was used to delineate the degrees of oil coverage in the off-site agricultural land that was sprayed with oil.

<table>
<thead>
<tr>
<th>SCAT Category</th>
<th>Percent Oil Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous</td>
<td>91-100</td>
</tr>
<tr>
<td>Broken</td>
<td>51-90</td>
</tr>
<tr>
<td>Patchy</td>
<td>11-50</td>
</tr>
<tr>
<td>Sporadic-High</td>
<td>6-10</td>
</tr>
<tr>
<td>Sporadic-Low</td>
<td>1-5</td>
</tr>
<tr>
<td>Trace</td>
<td>&lt;1</td>
</tr>
</tbody>
</table>

The term “Sporadic” as used by NOAA covers a percentage range from 1 to 10 percent. For the purposes of this project, “Sporadic” was split into “Sporadic-Low” (1-5%) and “Sporadic-High” (6-10%). The results of the SCAT Assessment are presented in **Figure 4**.

3.4 Wetland Surface Water Sampling

Surface water samples were collected from three downwind wetlands and two potential downstream drainage locations on May 13, 2011 for BTEX and TEM. The same locations were resampled on May 16, 2011 for ammonia nitrogen and a suite of metals requested by North Dakota Department of Health (NDDoH), which included aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, chromium, copper, lead, nickel, selenium, silver, thallium, and zinc (Metals Suite). Two upwind wetlands were also sampled for background purposes on May 16, 2011 for BTEX, TEM, ammonia nitrogen, and the Metals Suite. All sample locations are presented in **Figure 6**. The wetland immediately south of the pump station that received oil misting was also sampled for total suspended solids, pH, and total phosphorus. All surface water sample locations were resampled on June 30, 2011 and August 2, 2011 for BTEX, TEH, TEM, and the Metals Suite. All detections were below applicable Human Health Limits for Class III Waters or Aquatic Life Values (Acute).

3.5 Off-Site In-Situ Land Farm

In accordance with the May 19, 2011 *Draft Interim Off-Site Area Clean-up Plan* (URS, 2011), the portions of the agricultural field to the south of the pump station property that were lightly impacted by crude oil mist on the soil surface were treated as an in-situ land farm. Following NDDH guidance documents, the volume of impacted soil was calculated, nutrient needs were calculated, initial soil samples were collected and analyzed, soil amendments were applied, tillng occurred (with minor adjustments), and follow-up monitoring was conducted.
For treatment calculations, the off-site area is divided into three areas as shown in Figure 7. Areas 1 and 3 are the non-flooded areas that have oil impacts and decreasing amounts of oil toward the south of Area 3. Area 2 is impacted and ponded water exists in this lower wetland area of the south field. Area 2 is included for in-situ treatment of the water. Based on the areas outlined in Figure 7 the following are the associated contaminated volumes assuming a 2 inch depth for Area #1 and 1 inch depth for Areas #2 and #3:

- Area #1 - 93 cubic yards (CY)
- Area #2 - 217 CY
- Area #3 - 1,509 CY

Based on total volume, the land farm area was divided into four parts (Figure 8) and sampled on May 15, 2011 for TEH, TEM, pH, nitrate nitrogen, total phosphorus, and total organic carbon. For the May 15, 2011 land farm soil samples, the excavated area that is labeled as Area E in Figure 8 was divided equally between Areas A and D. Two background area samples were also collected. Each area included four to six discrete samples that were composited to represent each area. Analytical results are summarized in Table 3 and complete analytical results are included in Appendix C.

Based on nitrate nitrogen and TEM results, Area A required the application of nine pounds per acre of nitrogen and Area D required the application of eight pounds per acre. Areas B and C contained sufficient nitrate nitrogen in the soil for treatment of the levels of TEM present.

On May 31-June 1, 2011, DeAngelo Bros. Inc. applied a 10 percent solution of Micro-Blaze to the land farm area at a rate of one gallon of concentrate per 10 cubic yards of impacted soil. Prior to this application, the dry portions of Areas C and D were tilled and planted in corn and fertilized with anhydrous ammonia at planting time. On June 1, Kris Roberts with NDDH toured the site and recommended that the vegetated areas around the wetland, that were too wet to till, did not need to be tilled after the Micro-Blaze was applied.

During a June 16, 2011 site visit with the property owner, it was determined that the accessible portions of Areas A and B had been planted in narrow row soybeans with no-till methods. After speaking with the land owner, it was determined that his contracts with Natural Resource Conservation Service (NRCS) require minimum till in the soil types present in Areas A and B due to soil types present are listed as NRCS Wind Erodibility Group 1 and 2. As such, tilling is not recommended. The soybeans would also be a nitrogen fixing crop, so additional fertilizer was not applied to this area.

On July 1, 2011, the area labeled as Area E on Figure 8 was fertilized with 20-0-0 lawn fertilizer at a rate of 1.2 pounds per 1,000 square feet and tilled using a rear tine garden tiller.

On August 2, 2011, the land farm and background locations were resampled for TEH, TEM, pH, nitrate nitrogen, total phosphorus, and total organic carbon. Soil samples were collected from a depth of four to six inches in the treatment area using NDDH “Procedures for the collection of soil samples at underground storage tank (UST) sites”. The results are summarized in Table 3 and complete analytical report is provided in Appendix C. The TEH and TEM results are below the regulatory limit of 100 mg/kg.
4.0 SUMMARY AND RECOMMENDATIONS

On May 7, 2011, a crude oil release occurred on the TransCanada Keystone Pipeline at the Ludden Pump Station near Brampton, North Dakota. The majority of the release was contained on the Ludden Pump Station property. Some mist travelled outside of the TransCanada site and settled on neighboring agricultural land. Liquid recovery consisted of 345 barrels of crude oil and 24 barrels of oil/water mixture. Soil excavation resulted in the removal and disposal of 1,441 tons of crude oil impacted site gravel/soil, absorbent boom, and fencing. Prior to in-situ treatment, TEM results of soil samples collected from the agricultural field to the south of the Ludden Pump Station property exceeded the 100 part per million (ppm) clean-up goal. The agricultural field and wetland to the south of the Ludden Pump Station property were treated with Micro-Blaze® Emergency Liquid Spill Control on May 31 and June 1, 2011. Spot treatments to control a small area of silvery sheen occurred in June and July. The agricultural field was treated as an in-situ land farm and resampled on August 2, 2011. All soil sample results for TEM were below the 100 ppm clean-up goal.

Surface water samples were collected on May 13-16, June 30, and August 2, 2011 from wetlands that were upwind (background) and downwind at the time of the release. All detections are below applicable regulatory limits. Absorbent booms have been maintained on the wetland to the south of the Ludden Pump Station property since the release as a protective measure.

Based on current conditions at the TransCanada Ludden Pump Station site, the following activities are planned in October:
- Remove all remaining absorbent booms.
- Re-sample wetland surface water.
- Re-sample land farm.
- Neighboring property owner will till under cover crops.

Analytical results from the above activities will be forwarded to the NDDH, along with a request for closure.
5.0 REFERENCES

