EERC Gathering Pipeline Study Status

Briefing to the NDPC Annual Meeting
Fargo, North Dakota
Tuesday, September 22, 2015

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Senior Research Manager
• Project is focused on conducting analysis of crude oil and produced water (gathering) pipelines including:
  – Construction standards
  – Depths
  – Pressures
  – Monitoring systems
  – Maintenance
  – Types of materials used in the pipeline backfill.
  – Analysis of the ratio of spills and leaks occurring in this state in comparison to other large oil and gas-producing states with substantial volumes of produced water
HB 1358 Goals & Objectives

• Project is focused on conducting analysis of crude oil and produced water (gathering) pipelines
  – Phase I -- Study
    ♦ Analyze the existing regulations on construction and monitoring of crude oil and produced water pipelines
    ♦ Determine the feasibility and cost-effectiveness of requiring leak detection and monitoring technology on new and existing pipeline systems
    ♦ Provide a report with recommendations to the NDIC and the EDTC by December 1
  – Phase II -- Demonstration
    ♦ Pilot project to evaluate a pipeline leak detection and monitoring system

$1.5M in state funding covers both phases.
Pipeline Study Topics Covered

- Construction/Installation/Abandonment
- Regulations
- Spills/Leaks History
- Maintenance
- Pipeline Materials
- Processes
- Monitoring Systems
Progress Report

• Work began in May, NDIC contracting complete July 1
• Work status:
  – Discovery work complete
  – Stakeholder meetings hosted
  – Data collection, conference calls, site visits
  – Evaluation of economics of leak detection applied to gathering lines complete
• Draft report ready for internal review by state and industry stakeholders October 1
  – Stakeholders and DMR will review and comment on draft report before report submittal on December 1
• We have begun recruiting demonstration partners, and have formulated preliminary demonstration plans
Stakeholder Input

• The EERC has solicited input from:
  – ND Department of Mineral Resources
  – ND Public Service Commission
  – ND Pipeline Authority
  – Northwest Landowners Association
  – Three Affiliated Tribes
  – Industry
  – Office of the Governor
Project Schedule – Two Phases

- Project Kickoff
- Discovery work
- Economic analysis
- Due date for study final report
- Ongoing support to State
- Demonstration project
- Final report on demonstration

- May 2015
- May-August 2015
- September 2015
- December 1, 2015
- All of 2016
- Q1 - Q3 2016
- December 2016

All Schedule Dates Driven by January 2017 Legislature Start
Gathering Systems Are Large, Dynamic, and Complex
Overview of Produced Fluid Transport

Study Focus: Pipelines that transport liquids (crude oil, produced water, or mixtures) from a wellsite to aggregation points such as a crude oil refinery or pipeline terminal or water treatment/disposal sites.
### Gathering Pipeline Infrastructure Statistics

<table>
<thead>
<tr>
<th>Fluid Type</th>
<th>Steel</th>
<th>HDPE</th>
<th>Reinforced</th>
<th>Fiberglass</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Oil</td>
<td>2344</td>
<td>1</td>
<td>73</td>
<td>19</td>
<td>2436</td>
</tr>
<tr>
<td>Brine</td>
<td>2</td>
<td>841</td>
<td>332</td>
<td>0</td>
<td>1176</td>
</tr>
<tr>
<td>Mixed Fluid</td>
<td>56</td>
<td>13</td>
<td>140</td>
<td>0</td>
<td>209</td>
</tr>
<tr>
<td>Freshwater</td>
<td>5</td>
<td>247</td>
<td>28</td>
<td>0</td>
<td>281</td>
</tr>
</tbody>
</table>

- More than 23,000 miles of gathering pipeline installed in North Dakota
- 4,000 miles of liquids gathering lines installed since Aug2011 in DMR database
The focus of this study is to inform the State on opportunities to improve the safety and reliability of gathering pipelines carrying crude oil and produced water.

The challenges of pipelines need to be evaluated within context:

- Pipelines reduce truck traffic and associated road congestion, road dust, and traffic-related accidents.
- Incidents such as leaks and spills are less frequent (on an incident/volume basis) from pipelines than from trucks.
Early Conclusions

• Overall: industry has made significant strides in past 2-3 years
  – Many pipeline spills stem from rushed work done during peak of Bakken activity (2007-2014)
  – Most operators are moving from manual monitoring to SCADA without regulation … improvement in-progress

• Leak detection (vs. system monitoring) on complex gathering line systems is not a mature science or market
  – Report will discuss what it takes to evolve SCADA to active leak detection
Early Conclusions (Cont’d)

• Report will discuss ND spill statistics vs. other states, and offer some reasons why those numbers differ

• Report will balance recommendations on how the state can improve oversight with how industry can improve installation and monitoring

• Report will contain recommendations for both industry and state entities

• Report will not prescribe best pipeline materials
  – Will emphasize that all are likely satisfactory, **IF AND ONLY IF** very rigid adherence to prescribed installation procedures and inspections is executed

Source: NDDH and DMR.
Brine Spill Volume, bbl/ Oil Production, MMbbl

Barrels Spilled per Million Barrels Produced

Year
2008 2009 2010 2011 2012 2013 2014

Alaska California North Dakota New Mexico

In 2014, approximately 396,000,000 bbl of oil produced; 20,000 bbl of oil spilled (0.005%).

In 2014, approximately 432,000,000 bbl of brine produced; 71,000 bbl of brine spilled (0.01%).

Source: NDDH and DMR.
• Upon completion and submittal of study report, work will begin on demonstration project planning

• Demonstration project will validate conclusions of study
  – Demonstrate applicability of leak detection to gathering pipelines (or not)
  – Demonstrate expected costs of installation and operation of leak detection on gathering pipelines

• Multiple partners likely
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