PIPELINES IN MICHIGAN

Tip of the Mitt Watershed Council
Ice Breaker series
February 6, 2013
GAS TRANSMISSION AND HAZARDOUS LIQUID PIPELINES IN THE US

Blue – Gas Transmission lines. Red – Hazardous liquids pipelines
(Source: US Department of Transportation Pipeline and Hazardous Materials Safety Administration - PHMSA)
• 2.6 million miles of fuel pipelines in the U.S.
• 182,000 miles of hazardous liquid lines
• 325,000 miles of gas transmission lines
• 2.1 million miles of gas distribution lines

Pipeline Mileage 2,620,642

- 7% Hazardous Liquid
- 12% Gas Transmission and Gathering
- 81% Gas Distribution
MICHIGAN OIL AND GAS PIPELINES

- 69,416 total
  - 3,177 Hazardous Liquid Lines
  - 9,180 Gas Transmission Lines
  - 896 Gas Gathering Lines
  - 51,163 Natural Gas Distribution Lines

Image: Bradford Gordon
FUEL PIPELINE CATEGORIES

- Hazardous Liquid
  - Crude oil
  - Refined petroleum products (gasoline, diesel, jet fuel, home heating oil)
  - Highly volatile liquids/natural gas liquids (butane, ethane, propone)
  - Carbon Dioxide
  - Anhydrous Ammonia

- Natural Gas
# TYPES OF PIPELINES

<table>
<thead>
<tr>
<th>Types</th>
<th>Gathering Lines</th>
<th>Transmission Lines</th>
<th>Distribution Lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types</td>
<td>Transport raw materials from production wells to</td>
<td>Large lines that move product long distances across county</td>
<td>Service lines that deliver product to homes or businesses</td>
</tr>
<tr>
<td></td>
<td>processing facility, refinery, or transmission line</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Products</td>
<td>Natural gas, crude oil, and NGLs</td>
<td>Natural gas, crude oil, and NGLs</td>
<td>Natural Gas</td>
</tr>
<tr>
<td>Diameter</td>
<td>4-12 inches</td>
<td>4-48 inches</td>
<td>½ - 6 inches</td>
</tr>
</tbody>
</table>
AGING PIPELINES IN THE US

- Gas Transmission and Gathering
  - Pre 40s: 4%
  - 00s: 9%
  - 10s: 11%
  - 20s: 11%
  - 30s: 24%
  - Gas Distribution
    - Pre 40s: 5%
    - 00s: 19%
    - 10s: 9%
    - 20s: 60%
    - 30s: 15%
  - Hazardous Liquid
    - Pre 40s: 7%
    - 00s: 8%
    - 10s: 11%
    - 20s: 8%

Image: PHMSA
PIPELINE REGULATIONS
Pipeline Safety Act – found in Title 49 of the US Code, section 60601-60603

Industry standards are adopted by reference AND many of these standards have to be purchased to be reviewed.

Oil Pollution Act – spill response plans

Other laws may apply: CWA, NPDES, CZM, Endangered Species, Historic Preservation
Pipeline and Hazardous Materials Safety Administration (PHMSA) – regulates pipeline safety

President/Department of State (DOS) – determines whether a border crossing is in the “national interest” and its size and location

The Federal Energy Regulatory Commission (FERC) – Approves pipeline tariffs (cost of using pipelines) and siting of interstate natural gas pipelines

OHSA – worker safety

Other agencies (EPA, USACE, USFWS, USCG etc.) – land use/environment and spill response/cleanup
States authorized to enter into certifications or agreements to assume:

- All or part of the intrastate regulatory and enforcement program as long as all federal minimum safety requirements are met
- Inspect and regulate, but NOT enforce interstate lines

Michigan inspects and enforces pipeline safety for intrastate gas pipelines and inspects interstate gas pipelines

Work performed by Michigan Public Service Commission
STATE REGULATIONS

- Public Act 69 of 1929: Applications for Certificate of Public Conveniences and Necessity for franchises
- Public Act 9 of 1929: Construction of natural gas pipelines
- Public Act 16 of 1929: Construction of hazardous liquid pipelines
- Public Act 165 of 1969 - Pipeline Safety

- Others:
  - Inland Lakes and Streams
  - Wetlands
  - Great Lakes Submerged Lands
PIPELINE SAFETY
CONSTRUCTION AND OPERATION

- Corrosion protection
  - External coating
  - Cathodic protection
- Operating Pressure
- Welding
- Valves
- Leak Detection
MONITORING AND MAINTENANCE
INTEGRITY MANAGEMENT

- Requires operators to identify, prioritize, assess, evaluate, repair, and validate the integrity of pipelines.
- New beginning in early 2000’s
- Reassessment – 5 years for hazardous liquid, 7 years for gas transmission
- High Consequence Areas (HCAs)
  - Hazardous liquid – defined by densities of populated areas, unusually sensitive areas, drinking water supply, or commercially navigable waterways
  - Gas -defined by population and building density
- Outside HCA’s – identification of threats and repairs left up to operator
- Only applies to 44% of hazardous liquid pipelines and 6% of gas transmission pipelines
Emergency plans

- Required for both types of pipelines
- How to train and respond to releases, who in the company has responsibilities, and how a company educates and involves emergency responders in their planning.

Spill response or facility response plan

- Only for hazardous liquid pipelines that may discharge into waters of the US
- More detailed – where equipment and personnel are available
- Based on Worst-Case Scenario

Plans only worthwhile is actually followed....
CAUSE OF PIPELINE INCIDENTS

All Reported Incident Cause Breakdown
National, All Pipeline Systems, 1993-2012

- CORROSION: 18.7%
- EXCAVATION DAMAGE: 18.4%
- INCORRECT OPERATION: 7.3%
- MAT'L/WELD/EQUIP FAILURE: 6.8%
- NATURAL FORCE DAMAGE: 27.0%
- OTHER OUTSIDE FORCE DAMAGE: 7.1%
- ALL OTHER CAUSES: 14.7%

Source: PHMSA Significant Incidents Files, Dec 31, 2013
Significant Onshore Pipeline Incidents: Great Lakes Region

Data Source: PHMSA Flagged Incidents Files - June 29, 2012
# Great Lakes Region Incidents

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Illinois</td>
<td>7,423</td>
<td>86</td>
<td>974,946</td>
<td>$79,763,406</td>
</tr>
<tr>
<td>Indiana</td>
<td>3,718</td>
<td>32</td>
<td>134,148</td>
<td>$17,745,556</td>
</tr>
<tr>
<td>Michigan</td>
<td>2,784</td>
<td>27</td>
<td>1,334,718</td>
<td>$743,315,319</td>
</tr>
<tr>
<td>Minnesota</td>
<td>5,006</td>
<td>39</td>
<td>502,152</td>
<td>$10,699,821</td>
</tr>
<tr>
<td>New York</td>
<td>1,042</td>
<td>10</td>
<td>313,068</td>
<td>$15,401,391</td>
</tr>
<tr>
<td>Ohio</td>
<td>3,416</td>
<td>37</td>
<td>145,572</td>
<td>$14,845,314</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>2,763</td>
<td>24</td>
<td>188,622</td>
<td>$9,368,291</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>2,682</td>
<td>23</td>
<td>279,594</td>
<td>$7,141,005</td>
</tr>
<tr>
<td>Great Lakes State Totals</td>
<td>28,834</td>
<td>278</td>
<td>3,872,820</td>
<td>$898,280,103</td>
</tr>
<tr>
<td>Entire U.S.</td>
<td>~175,000</td>
<td>1,743</td>
<td>23,770,614</td>
<td>$1,410,880,684*</td>
</tr>
</tbody>
</table>

Data Source: PHMSA Hazardous Liquid Flagged Incidents File - June 29, 2012

*Significant incidents only*
Average Significant Incidents Per Mile of Onshore Pipeline 2002-2011

<table>
<thead>
<tr>
<th></th>
<th>Hazardous Liquid</th>
<th>Gas Distribution</th>
<th>Gas Transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.</td>
<td>0.000666</td>
<td>0.000029</td>
<td>0.000184</td>
</tr>
<tr>
<td>Great Lakes States</td>
<td>0.000762</td>
<td>0.000071</td>
<td>0.000205</td>
</tr>
<tr>
<td>Illinois</td>
<td>0.000943</td>
<td>0.000066</td>
<td>0.000212</td>
</tr>
<tr>
<td>Michigan</td>
<td>0.000718</td>
<td>0.000054</td>
<td>0.000219</td>
</tr>
<tr>
<td>New York</td>
<td>0.000960</td>
<td>0.000063</td>
<td>0.000229</td>
</tr>
</tbody>
</table>

Data Sources: PHMSA Flagged Incidents Files - June 29, 2012, Annual Reports
### Table 6: Comparative Statistics for Petroleum Incident Rates: Onshore Transmission Pipelines vs. Road and Railway (2005-09)

<table>
<thead>
<tr>
<th>Mode</th>
<th>Avg. Billions Ton-Miles Shipment Per Year</th>
<th>Avg. Incidents Per Year</th>
<th>Incidents Per Billion Ton-Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road*</td>
<td>34.8</td>
<td>695.2</td>
<td>19.95</td>
</tr>
<tr>
<td>Railway*</td>
<td>23.9</td>
<td>49.6</td>
<td>2.08</td>
</tr>
<tr>
<td>Hazardous Liquid Pipeline</td>
<td>584.1</td>
<td>339.6</td>
<td>0.58</td>
</tr>
<tr>
<td>Natural Gas Pipeline</td>
<td>338.5</td>
<td>299.2</td>
<td>0.89</td>
</tr>
</tbody>
</table>

*Only incidents involving and ton-mileage carrying those products carried by pipeline (petroleum products, liquid natural gas, etc.) are counted for road and railway.

Data: Manhattan Institute
## Table 9: Comparative Statistics for Petroleum Product Release Rates: Onshore Transmission Pipelines vs. Road and Railway (2005-09)

<table>
<thead>
<tr>
<th>Mode</th>
<th>Avg. Product Release Per Year (gallons)</th>
<th>Release Per Incident (gallons)</th>
<th>Release Per Billion Ton-Miles (gallons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road*</td>
<td>477,558</td>
<td>687</td>
<td>13,707</td>
</tr>
<tr>
<td>Railway*</td>
<td>83,745</td>
<td>1,688</td>
<td>3,504</td>
</tr>
<tr>
<td>Hazardous Liquid Pipeline</td>
<td>6,592,366</td>
<td>19,412</td>
<td>11,286</td>
</tr>
<tr>
<td>Natural Gas Pipeline**</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*Only incidents involving and ton-mileage carrying those products carried by pipeline (petroleum products, liquid natural gas, etc.) are counted for road and railway

**No release volume data are available for gas pipeline in the PHMSA incident database

Data: Manhattan Institute
Chance of a pipeline failing in any specific location is extremely small...

But the consequences can be disastrous when it does occur...
THE MARSHALL SPILL
MARSHALL SPILL

ENBRIDGE LINE 6B
ENBRIDGE AND LINE 5
ENBRIDGE LINE 5

- Constructed between 1950-1953
- Runs 645 miles from Superior, WI to Sarnia, Ontario
- 30 inch pipe (exception through the Straits)
- 70% light to medium crude oil and 30% NGL
- Capacity:
  - 87,096 cubic meters per day
  - 540,000 barrels per day
  - 22.7 million gallons per day
- Straits of Mackinac
- Indian River
- Little Sturgeon River
- Pigeon River and tributaries
- Sauders Creek (Upper Black River)
# ENBRIDGE SAFETY RECORD

## REPORTABLE COMMODITY SPILLS—COMPANY-WIDE: 2012 CONSOLIDATED DATA

<table>
<thead>
<tr>
<th>Onsite</th>
<th>Offsite</th>
<th>Sub-total</th>
</tr>
</thead>
<tbody>
<tr>
<td>44</td>
<td>8</td>
<td>52</td>
</tr>
<tr>
<td>11</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

Total 85

## REPORTABLE COMMODITY SPILLS—COMPANY-WIDE: FIVE-YEAR CONSOLIDATED DATA

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Number of Spills</th>
<th>Total Spills Volume (bbls)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>85</td>
<td>10,224^2</td>
</tr>
<tr>
<td>2011</td>
<td>94</td>
<td>2,366</td>
</tr>
<tr>
<td>2010</td>
<td>91</td>
<td>34,258</td>
</tr>
<tr>
<td>2009</td>
<td>103</td>
<td>8,441</td>
</tr>
<tr>
<td>2008</td>
<td>92^3</td>
<td>2,842</td>
</tr>
<tr>
<td>Year</td>
<td>Total Number of Spills (Onsite / Offsite)</td>
<td>Total Spills Volume (bbls) (Onsite / Offsite)</td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------------</td>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>2012(^2)</td>
<td>77 (65/12)</td>
<td>10,178 (6,939 / 3,239)</td>
</tr>
<tr>
<td>2011</td>
<td>58 (50/8)</td>
<td>2,284 (637 / 1,646)</td>
</tr>
<tr>
<td>2010</td>
<td>80 (61/19)</td>
<td>34,122 (2,710 / 31,412)</td>
</tr>
<tr>
<td>2009</td>
<td>89 (83/6)</td>
<td>8,353 (6,524 / 1,829)</td>
</tr>
<tr>
<td>2008</td>
<td>80 (72/8)</td>
<td>2,681 (2,587 / 94)</td>
</tr>
<tr>
<td>2007</td>
<td>59 (52/7)</td>
<td>13,756 (902 / 12,854)</td>
</tr>
<tr>
<td>2006</td>
<td>62 (54/8)</td>
<td>5,434 (3,177 / 2,258)</td>
</tr>
<tr>
<td>2005</td>
<td>70 (63/7)</td>
<td>9,825 (9,448 / 377)</td>
</tr>
<tr>
<td>2004</td>
<td>64 (45/19)</td>
<td>3,114 (318 / 2,796)</td>
</tr>
<tr>
<td>2003</td>
<td>58 (41/17)</td>
<td>6,377 (6,142 / 235)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>697 (586 / 111)</td>
<td>96,124 (39,384 / 56,740)</td>
</tr>
</tbody>
</table>
PREVENTING THE NEXT DISASTER
MISS DIG will mark the approximate location of their underground utility lines at no charge.

You must call 3 full working days (72 hours) before you dig (Michigan law – some other states 48 hours)

MISS DIG System at 811 or 800-482-7171.
HOW TO RECOGNIZE A LEAK

- You might hear a roaring, blowing or hissing sound.
- You might see:
  - Dirt being blown or appearing to be thrown into the air
  - A white vapor stream or mist-like cloud over the pipeline
  - Unexpected frost or ice on the ground
  - Continuous bubbling in wet or flooded areas
  - Dead or dying vegetation in an otherwise green area
  - Discolored snow or vegetation
  - A dry area in a wet field
  - Flames coming from the ground or appearing to burn above ground
  - Liquid on the ground
  - Oily sheen on water surfaces
- You might smell an unusual skunk or rotten egg odor.
IN THE EVENT OF AN EMERGENCY

To Report Spills Call:
National Response Center
(800) 424-8802
and
Michigan Pollution Emergency Alert System (PEAS)
(800) 292-4706 (within Michigan)
(517) 373-7660 (outside Michigan)

ENBRIDGE 24-HOUR EMERGENCY PHONE NUMBER
800-858-5253
IN THE EVENT OF AN EMERGENCY

- Call 911 (and any other emergency numbers)
- Move far away from leak
- Do not touch any liquid or vapor
- Do not light a match
- Do not turn on or off anything that may create a spark
- Do not operate valves

All pipeline markers provide the name of the operator, the emergency number and the product being transported.
WHAT WE ARE DOING

- Pipeline sensitivity mapping
- Prevention measures
- Emergency response and spill planning
- Education and Outreach
- Policy recommendations
POLICY RECOMMENDATIONS

- State of Michigan certified to regulate interstate oil pipelines and participate in oversight and inspection of interstate oil pipelines
- Require more stringent spill response planning by the state
- Mandate quantitative spill threshold reporting requirements
- Require leak detection systems on pipelines
- Require automatic shutoff / remote controlled valves
- Require additional pressure testing
- Mandate spacing requirements for placement of EFRDs
- Expand IM program to include all pipeline miles
- Specify timeline for repairs outside of HCAs
- Develop approval process, including public participation, to change product transported to a heavy crude (dilbit)
- Eliminate all cast or wrought iron and bare steel pipelines in state
THANK YOU

Tip of the Mitt Watershed Council
426 Bay Street. Petoskey. Michigan. 49770
231.347.1181
www.watershedcouncil.org