NPMS Operator Workshop
November 18, 2015

Welcome, callers. Your lines will be muted except for designated Q&A periods which will occur approximately every 30 minutes.
Safety and Logistics

• Emergency Exits
• Restrooms
• 15 minute break in the morning and afternoon, lunch will be 12:00-1:00
Need for Workshop

• Operators use different systems and methods to prepare their NPMS submissions
• Operators are concerned about the size of their submissions becoming unmanageable if additional data is collected by the NPMS in the future
• PHMSA needs to gather information about operators’ data which will help us design our internal systems and processes most effectively
Need for Workshop

- PHMSA staff and operators need to discuss the details of Appendix D: submitting NPMS data in LRS format
- A dialogue about “predominant” as it relates to NPMS data is needed
Overview

Discussion format

Morning
• Introduction, goals, and desired outcomes
  • NPMS innovation showcase
• Geospatial data format and LRS submissions
  • LRS 101 for those unfamiliar with the technology

Lunch 12:00-1:00

Afternoon
• Segmentation in geospatial data
• Generalizing values (predominance)
• Q&A and wrap-up
Discussion Leaders

- Amy Nelson, PHMSA GIS Manager
- Leigha Gooding, PHMSA GIS Specialist
- Katie Field, Michael Baker International
- Bellinda Monge, Michael Baker International
- Ron Brush, New Century Software
- Chuck Wright, New Century Software
Boundaries

• Discussion will be limited to technical aspects of preparing operators’ data for current or future NPMS submissions
• This is not the forum to discuss any of the proposed attributes or standards in the NPMS Information Collection
  • Comment period was extended until 11/25
• OK for onsite participants to ask questions at any time, but we have to keep the callers to designated slots to reduce background noise
Goals and Outcomes

• Understand how operators are storing data and preparing their NPMS submissions
• PHMSA gathers information about operators who use LRS; Operators gain a better understanding of how LRS format submissions could be prepared
• Understand how operators segment pipelines and
• Gain a better understanding as to whether collecting “predominant” values is feasible or useful
Q&A regarding introduction (Questions from the room will be taken first, then phone lines will be open)
NPMS Technology Showcase

Leigha Gooding (PHMSA) & Chuck Wright (New Century Software)

• 30-minute showcase of select NPMS projects in order to:
  • Illustrate how we address existing data challenges
  • Foster transparency and trust by explaining what we do with operator data submissions
  • Help operators understand the reasoning behind NPMS requirements and the questions we ask while processing operator data submissions
Unique NPMS Challenges

- Must standardize information from many different sources INTO LRS
- We don’t know what you know...so we need to be detectives
  - Your company’s pipeline operations
  - Your company’s asset sales
  - Your company’s asset construction
  - Your company’s asset data
- Must produce pipe centric information – not just operator centric
- Data from nearly 1,200 different operators
  - 520,000 miles
    - Gas – 313,000
    - Liquid – 207,000
- Analysis and Cartography with 1 million pipe segments
- Dissemination of information
  - Website – Average around 18,000 unique visitors per month
  - Public Map Viewer – Average around 20,000 user sessions per month
  - PIMMA – Average around 900 users sessions per month
  - GIS data requests- Average around 40 fulfilled deliveries per month
Submission Automation...to an extent

Assumption: NCL = No
Based on Prod_Load_Type
(Note: user’s can change the Prod_Load_Type, how do you want to handle that?)

We will only do this for the first year IU migration.

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

To Protect People and the Environment From the Risks of Hazardous Materials Transportation
Creating Pipeline History

• Challenge: Record history of pipeline changes when NPMS data is replaced on a yearly basis.
  – Acquired or divested
  – Changes in status
  – Change in commodity
  – Improved spatial location or re-routes

• Solution: Change Detection
  – Custom tool
  – On a per-segment basis, matches this year’s submission to pipelines in the NPMS national layer
  – Matches by a combination of spatial location and attribute values
Change Detection Matching

- Submission feature is buffered to determine what NPMS features are nearby.
  - Buffer is iteratively increased if no NPMS features are found.
- 14 use case (UC) scenarios are used to identify if there is a match or not.
  - For all submission segments
  - For all NPMS national layer segments for that OPID
- Each UC has an associated confidence level
  - Green: high confidence; no analyst interaction needed
  - Yellow: fairly certain but requires analyst confirmation
  - Red: low confidence or no match; analyst interaction needed
# Example Use Cases

<table>
<thead>
<tr>
<th>ID</th>
<th>Scenario Description</th>
<th>Flag</th>
<th>Load Instruction Returned by Detection Engine</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>UC1</td>
<td>Submission segment and production segment match 1:1</td>
<td>Green</td>
<td>Update</td>
<td>Analysts take no action unless another action determines that the match is incorrect (such as a UC18).</td>
</tr>
<tr>
<td></td>
<td>OPID of submission and production segment match exactly</td>
<td></td>
<td></td>
<td>Revision codes of &quot;I&quot; or &quot;C&quot; are not correct if segment matches existing production segment. Analyst determines if submitted pipeline is a match to the existing production feature; analyst may need to contact the operator for clarification.</td>
</tr>
<tr>
<td></td>
<td>REMS_CD of submission is NOT &quot;I&quot; or &quot;C&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>STATUS_CD of production segment is not &quot;B&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UC2</td>
<td>Submission segment and production segment match 1:1</td>
<td>Red</td>
<td>Update</td>
<td>Revision codes of &quot;I&quot; or &quot;C&quot; are not correct if segment matches existing production segment. Analyst determines if submitted pipeline is a match to the existing production feature; analyst may need to contact the operator for clarification.</td>
</tr>
<tr>
<td></td>
<td>OPID of submission and production segment match exactly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>REMS_CD of submission is NOT &quot;I&quot; or &quot;C&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>STATUS_CD of production segment is not &quot;B&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UC3</td>
<td>Submission segment has no 1:1 match found in production for any OPID</td>
<td>Yellow</td>
<td>Create</td>
<td>Analysts confirm submission feature does not match an existing production feature (e.g., submission feature is so different spatially that it was not considered a match).</td>
</tr>
<tr>
<td></td>
<td>OPID of submission is NOT &quot;I&quot; or &quot;C&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>REMS_CD of submission is NOT &quot;I&quot; or &quot;C&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>STATUS_CD of production segment is nor &quot;B&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UC4</td>
<td>Submission segment has no 1:1 match found in production for any OPID</td>
<td>Red</td>
<td>Create</td>
<td>Analysts confirm submission feature does not match an existing production feature (e.g., submission feature is so different spatially that it was not considered a match).</td>
</tr>
<tr>
<td></td>
<td>OPID of submission is NOT &quot;I&quot; or &quot;C&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>REMS_CD of submission is NOT &quot;I&quot; or &quot;C&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>STATUS_CD of production segment is not &quot;B&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UC5</td>
<td>Production segment with current OPID has no 1:1 match found in submission data.</td>
<td>Red</td>
<td>Change to Sold</td>
<td>Analysts will follow up with operator to confirm. Line might have been sold, removed, or re-jurisdictioned.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UC6</td>
<td>Submission segment and production segment match 1:1</td>
<td>Red</td>
<td>Update</td>
<td>Incoming solid lines only match a different OPID in production (e.g., trying to sell somebody else's lines). Analysts confirm submission operator has rights to mark lines as sold.</td>
</tr>
<tr>
<td></td>
<td>OPID of submission is 98888; OPID of production does not match the OPID of submission</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>data being processed. Operator Name field of submission segment is &quot;SOLD&quot;.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UC7</td>
<td>Submission segment and production segment match 1:1</td>
<td>Red</td>
<td>Change to Sold</td>
<td>Line apparently sold; because OPID of production segment matches, detection engine can assume analysts notified before data was added to database and the pipeline was updated.</td>
</tr>
<tr>
<td></td>
<td>OPID of submission is 88888; OPID of production</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Change Detection Example

No Match in National Layer – New Construction?

No Match in New Submission – Sold?

Perfect Match to your OPID

Match to Another Operator’s Pipe – Purchase?
Change Detection Example

- **UC 1 - Segment match**
  - Submission segment and NPMS segment match 1:1
  - OPIDs match exactly
  - REVIS_CD of submission is NOT "J" or "C"
  - STATUS_CD of NPMS segment is not "B".

- **UC 3 – New construction**
  - Submission segment has no 1:1 match found in the NPMS for any OPID
  - REVIS_CD of submission is "J" or "C"
  - STATUS_CD of NPMS segment is not "B".

- **UC 5 – No match; Change to sold**
  - NPMS segment with same OPID has no 1:1 match found in submission data.

- **UC 10 – Segment match; Different OPID**
  - Submission segment and NPMS segment match 1:1
  - OPIDs DO NOT MATCH
  - REVIS_CD of submission is NOT "J" or "C"
  - STATUS_CD of NPMS segment is not "B".
Change Detection Interface
Impact of Change Detection Matching

• When the submission data is loaded to our LRS-production environment, an unique ID is transferred from the existing feature to the matching submission feature.

• Resulting in spatial and attribute History on the pipeline
  – Allows PHMSA to look back in time to see how...
    • The spatial location has changed
    • The attributes have changed (OPID, commodity, status, etc.)
  – Support’s PHMSA’s goal of being pipe-centric, rather than OPID-centric
Inspection Unit Assignment

Purpose – Link inspection records to NPMS pipes

• Tag every pipeline with the correct Inspection Unit ID (event along centerline)
• Enable spatial visualization and analysis of inspection information
• Support inspection planning and risk ranking
Inspection Unit Assignment Challenges

• Operator could not submit this attribute
• NPMS could not rely on consistent geometry, attributes or segment IDs year after year
• Similar parallel or intersecting pipes can belong to different inspection units
• 1 centerline can belong to many inspection units
• Inspection Unit boundaries change
Inspection Unit Assignment

Old IU Events → Tool builds Archives → Tool Compares archives and New Pipe Centerlines

Archive ▶ Compare ▶ Assign ▶ Analyst-Review ▶ Commit

To Protect People and the Environment From the Risks of Hazardous Materials Transportation
Inspection Unit Assignment

Tool Assigns potential Inspection Units with confidence levels to each pipe centerline using available attributes, locations and use cases.
Inspection Unit Assignment

Analyst Reviews report and interacts with map to finalize inspection unit assignments and boundary points on each pipe centerline.
Commit final unit assignments and event boundaries to production database
Inspection Unit Modification Tool

Purpose

• Capture and communicate spatial changes to unit boundaries

Challenge

• Inspection personnel define and change inspection unit boundaries from field office locations across the country, many with little to no GIS experience

• The NPMS database is only edited by GIS personnel at headquarters
Inspection Unit Modification Tool
Gas and Liquid Incident Association Tool

- Link incidents to pipelines
- Build history of incidents for a pipe, not only an operator
  - Pipe centric data
- Tool accommodates initial data production and maintenance after change detection on new submissions every year
PIMMA +

- Open GIS, Google base maps, dynamic search box and right-click menus
- View and query pipe history, inspection unit and accident association data
- Queries allow for multiple user-defined criteria
- Incorporates information from inspection databases
PIMMA +

- PIMMA+ on DOT network for internal use by PHMSA
- Updating PIMMA on NPMS website with similar technology and select data and query access in Spring 2016
- Also planning a mobile application
Typical projects using data from nearly 1200 operators:

- Hotspot analysis to identify best locations for new inspectors and PHMSA offices
- Estimated dwelling and population counts near pipelines
- Analysis to support rulemakings and engineering research
- Highway, railway and waterway analysis
- Accident and natural disaster preparedness and response mapping
- Risk ranking and inspection planning
Questions?

*Phone lines will be open after taking questions from the room*

*A 15-minute break will follow the question period*
Overview of Pipeline Linear Referencing

Ron Brush
New Century Software
Goals

• Define common terminology
  – Line, Route, Measure, Continuous Station, Engineering Stationing, Station Equation, Piggable Segment
  – Same definitions as PODS; familiar terms

• Linear referenced Pipe Centerline

• Point and Linear Events (not time-based events)

• Examples
  – PODS Relational
  – PODS Spatial
  – APDM
  – UPDM
Linear Referencing

- One master Centerline is used to identify the geographic and linear referenced location of the pipeline
- Point and linear features are positioned on the centerline using the linear referenced location
- Used to determine relative linear position of features along a centerline

http://www.upstatenyroads.com/signshop58.shtml
http://resources.arcgis.com/EN/HELP/MAIN/10.1/index.html#/What_is_linear_referencing/00390000000100000000/
Line

- A pipeline as defined by the business
- Unique pipeline id, unique name
  - Line 100 – ML to Windsor TB
- Independent of attributes: diameter, product type, material, etc.
- 2’ to 1000 miles long
- May pass through multiple facilities, Counties and States

PODS Relational: Line
PODS Spatial: Logical LineLoop
APDM: Logical LineLoop
- One or more Routes make up a Line
- Often Launcher to Receiver – Piggable Segment
- Compressor Station to Compressor Station
- Also a lateral, take-off, an interconnect
- Continuous, non-branching run of pipe
- Independent of any pipe attributes
Common Linear Referencing Methods

• As-built Engineering Stationing
• Milepost
• Continuous Stationing
**Engineering Station Example**

*Original As-built stationing*

<table>
<thead>
<tr>
<th>Line</th>
<th>Route</th>
<th>Series</th>
<th>Stationing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>99</td>
<td>100</td>
<td>0+00 to 17+00</td>
<td>(Active pipe)</td>
</tr>
<tr>
<td>AB</td>
<td>99</td>
<td>200</td>
<td>15+00 to 20+00</td>
<td>(Active pipe)</td>
</tr>
<tr>
<td>AB</td>
<td>100</td>
<td>9000</td>
<td>5+00 to 15+00</td>
<td>(Abandoned pipe)</td>
</tr>
</tbody>
</table>

Station Equation:
- Back 17+00
- Ahead 15+00

Δ 200’ Reroute
## Continuous Station Example

True 3-D length of pipe Route from beginning *(in Orange)*

<table>
<thead>
<tr>
<th>Line</th>
<th>Route</th>
<th>Series</th>
<th>Stationing</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>99</td>
<td>100</td>
<td>0+00 to 17+00 (Active pipe)</td>
<td>0 to 1700</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1700 to 2200</td>
</tr>
<tr>
<td>AB</td>
<td>99</td>
<td>200</td>
<td>15+00 to 20+00 (Active pipe)</td>
<td></td>
</tr>
</tbody>
</table>

Station Equation
- Back 17+00
- Ahead 15+00

Pipe Length:
- 10+00 (1000)
- 15+00 (1500)
- 17+00 (1700)

200’ Reroute

0+00 (0)
5+00 (500)
15+00 (1700)
20+00 (2200)
• Centerline = Route
• Unique Route ID
• Each Centerline Vertex has 3 coordinates (PolylineM) (Latitude, Longitude, Measure) or (X, Y, M)
• Measures must be monotonic increasing
• No multi-part features

Route_ID = 99

(x,y,0) (x,y,500) (x,y,1700) (x,y,2200)

(x,y,852) (x,y,1520)
Linear Event Example

<table>
<thead>
<tr>
<th>Line_ID</th>
<th>Route_ID</th>
<th>Begin Measure</th>
<th>End Measure</th>
<th>DIAMETER</th>
<th>WALL TH</th>
<th>PIPE JOIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>99</td>
<td>0</td>
<td>1000</td>
<td>20”</td>
<td>0.281”</td>
<td>W</td>
</tr>
<tr>
<td>1</td>
<td>99</td>
<td>1000</td>
<td>2000</td>
<td>20”</td>
<td>0.312”</td>
<td>W</td>
</tr>
<tr>
<td>1</td>
<td>99</td>
<td>2000</td>
<td>2200</td>
<td>20”</td>
<td>0.281”</td>
<td>W</td>
</tr>
</tbody>
</table>

Point Event at 100
(x,y,852)  (x,y,1520)

Linear Event from 1000 to 2000

(x,y,0)  (x,y,500)  (x,y,1700)  (x,y,2200)
LRS Events

Point and Linear Events

- Linear Events cannot span routes
- Begin Measure < End Measure
- Only the centerline is spatial (PolylineM)
- NPMS Event tables are non-spatial
Data Models used in the Pipeline Industry
About PODS

• Not for profit industry trade association
• 60+ Operator members
• 95 Vendor members
• 2 Models
  – PODS Relational
  – PODS Spatial

www.pods.org
PODS Relational 6.0

- Usually “Spatialized”
- LRS Data Model
- Point and Linear Event tables
- DB Transactions
- Widely used in US
PODS Spatial 6.0

- Uses APDM Core tables
- LRS Data Model
- Point and Linear Event tables
- Esri Geodatabase
The ArcGIS Pipeline Data Model (APDM v6.0)

- LRS Data Model
- Point and Linear Event tables
- Esri Geodatabase
• Utilities & Pipelines
• Brand new model
• LRS Data Model
• Point and Linear Event tables
• Esri Geodatabase
NPMS Uses PODS

- Implemented in 2011
- 520k miles of US regulated pipelines
- Standard PODS 4.02 Relational (Spatial)
- PODS Events are GDB Feature Classes
- NPMS is Linear Referenced
- Spatial History of all submissions
- Custom Event tables added for NPMS
- Uses DynSeg (Derived Layers) to distribute data within PHMSA
How operators prepare NPMS submissions

• Which GIS or other software packages (ESRI, CAD, and data models such as PODS and APDM) are you using now?
• Are you using custom-designed tools to prepare your NPMS submission?
• Which would you use in the future once the Information Collection becomes final?
• How much time do you spend preparing a submission and who else is involved?
• Do you prepare the Annual Reports at the same time?
• Do you extract the data on 12/31 or do you wait until all backlogged data has been entered?

*Open phones after onsite attendees speak*
Proposed Information Collection

NPMS Submission Formats
Traditional Submission Format (Non-LRS)
(Appendix A)

- One table
- Spatial
- No Linear referencing
- Highly segmented
New LRS Submission Format (Appendix D)

- New optional format
- One Parent Table
- One Spatial Centerline
- Nine event tables
- Linear referencing
- Easier if you have an LRS model
- 33 attributes
- More tables – Less segmented
## Template


<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>aPipelineSystem</td>
<td>File Geodatabase Table</td>
</tr>
<tr>
<td>BreakoutTank</td>
<td>File Geodatabase Feature Class</td>
</tr>
<tr>
<td>Centerline</td>
<td>File Geodatabase Feature Class</td>
</tr>
<tr>
<td>CenterlineAccuracy</td>
<td>File Geodatabase Table</td>
</tr>
<tr>
<td>FacResponsePlan</td>
<td>File Geodatabase Table</td>
</tr>
<tr>
<td>GasClassHCA</td>
<td>File Geodatabase Table</td>
</tr>
<tr>
<td>GasPlant</td>
<td>File Geodatabase Feature Class</td>
</tr>
<tr>
<td>GasStorageField</td>
<td>File Geodatabase Feature Class</td>
</tr>
<tr>
<td>ILL_DA</td>
<td>File Geodatabase Table</td>
</tr>
<tr>
<td>InstallationMethod</td>
<td>File Geodatabase Table</td>
</tr>
<tr>
<td>LeakDetectMethod</td>
<td>File Geodatabase Table</td>
</tr>
<tr>
<td>LiquidHCA</td>
<td>File Geodatabase Table</td>
</tr>
<tr>
<td>LNGExclusionZone</td>
<td>File Geodatabase Feature Class</td>
</tr>
<tr>
<td>LNGImpoundment</td>
<td>File Geodatabase Feature Class</td>
</tr>
<tr>
<td>LNGPlant</td>
<td>File Geodatabase Feature Class</td>
</tr>
<tr>
<td>MAOP</td>
<td>File Geodatabase Table</td>
</tr>
<tr>
<td>OperatorContact</td>
<td>File Geodatabase Table</td>
</tr>
<tr>
<td>Pipe_Segment</td>
<td>File Geodatabase Table</td>
</tr>
<tr>
<td>PipeCoating</td>
<td>File Geodatabase Table</td>
</tr>
<tr>
<td>PressureTest</td>
<td>File Geodatabase Table</td>
</tr>
<tr>
<td>PumpComp</td>
<td>File Geodatabase Feature Class</td>
</tr>
<tr>
<td>Refinery</td>
<td>File Geodatabase Feature Class</td>
</tr>
<tr>
<td>SpecialPermit</td>
<td>File Geodatabase Table</td>
</tr>
<tr>
<td>Valve</td>
<td>File Geodatabase Feature Class</td>
</tr>
</tbody>
</table>
How to prepare a traditional submission (if you do not have LRS)

• Take snapshot of data
• Prepare as you do now, with all 33 attributes (overlay/intersect/merge)
• QC Review
• Package and Submit
How to prepare a traditional submission (if you have LRS)

• Take snapshot of GIS
• Select all required attributes
• Combine by Dynamic Segmentation
  — Perform field calculations as needed
  — Export Spatial representation (GDB file)
• QC Review
• Package and Submit
# Dynamic Segmentation

<table>
<thead>
<tr>
<th>Diameter</th>
<th>20”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall Thickness</td>
<td>0.281”, 0.312”, 0.281”</td>
</tr>
<tr>
<td>Coating</td>
<td>FBE, CTE</td>
</tr>
<tr>
<td>Class Location</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>Gas HCA</td>
<td>No, Yes, No</td>
</tr>
<tr>
<td>MAOP</td>
<td>1052, 877, 1123, 877, 731</td>
</tr>
</tbody>
</table>

20” x .281 FBE Class 2, Not in HCA, MAOP 877 Last Corrosion Insp 2012
## Dynamic Segmentation

<table>
<thead>
<tr>
<th>Diameter</th>
<th>20”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall Thickness</td>
<td>0.281”</td>
</tr>
<tr>
<td>Coating</td>
<td>FBE</td>
</tr>
<tr>
<td>Class Location</td>
<td>1</td>
</tr>
<tr>
<td>Gas HCA</td>
<td>No</td>
</tr>
<tr>
<td>MAOP</td>
<td>1052</td>
</tr>
</tbody>
</table>

### Result

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

20” x .281 FBE Class 2, Not in HCA, MAOP 877 Last Corrosion Insp 2012
How to prepare an LRS submission

• Take snapshot of GIS
• Export attributes from event table views
  – Use Route and Measure, not Engineering Station
  – Perform field calculations as needed
• Export centerline (GDB file)
• QC review
• Package and Submit
Example table mapping PODS to NPMS

<table>
<thead>
<tr>
<th>PODS Event Table</th>
<th>NPMS LRS Event Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe_Segment</td>
<td>PipeSegment</td>
</tr>
<tr>
<td>MAOP_Rating</td>
<td>MAOP</td>
</tr>
<tr>
<td>DOT_Class</td>
<td>GasClassHCA</td>
</tr>
<tr>
<td>HCA_CA_Boundary</td>
<td>LiquidHCA</td>
</tr>
<tr>
<td>ILI_Inspection</td>
<td>ILI</td>
</tr>
<tr>
<td>External_Coating</td>
<td>PipeCoating</td>
</tr>
<tr>
<td>Test_Pressure</td>
<td>HydroTest</td>
</tr>
<tr>
<td>Additional Attributes</td>
<td>NPMS Table</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>New positional accuracy standard</td>
<td>CenterlineAccuracy</td>
</tr>
<tr>
<td>Diameter becomes mandatory</td>
<td>PipeSegment</td>
</tr>
<tr>
<td>Commodity detail</td>
<td>apiPipelineSystem</td>
</tr>
<tr>
<td>Pipe material (e.g. cast iron, steel)</td>
<td>PipeSegment</td>
</tr>
<tr>
<td>Pipe grade</td>
<td>PipeSegment</td>
</tr>
<tr>
<td>Highest percent operating SMYS</td>
<td>PipeSegment</td>
</tr>
<tr>
<td>MAOP or MOP</td>
<td>MAOP</td>
</tr>
<tr>
<td>Seam type</td>
<td>PipeSegment</td>
</tr>
<tr>
<td>Year of installation (predominant=90%)</td>
<td>PipeSegment</td>
</tr>
<tr>
<td>Wall thickness</td>
<td>PipeSegment</td>
</tr>
<tr>
<td>Pipe joining method</td>
<td>PipeSegment</td>
</tr>
<tr>
<td>Pipe status code</td>
<td>PipeSegment</td>
</tr>
<tr>
<td>Onshore/offshore</td>
<td>PipeSegment</td>
</tr>
<tr>
<td>Hazardous Liquid Low Stress (&lt;20%)</td>
<td>PipeSegment</td>
</tr>
<tr>
<td>Piggable? (inline Inspection)</td>
<td>PipeSegment</td>
</tr>
<tr>
<td>Class location</td>
<td>GasClassHCA</td>
</tr>
<tr>
<td>Gas HCA Segment y/n</td>
<td>LiquidHCA</td>
</tr>
<tr>
<td>Segment &quot;could affect&quot; an HCA - Populated Area</td>
<td>LiquidHCA</td>
</tr>
<tr>
<td>Segment &quot;could affect&quot; an HCA - Ecologically Sensitive Area</td>
<td>LiquidHCA</td>
</tr>
<tr>
<td>Segment &quot;could affect&quot; an HCA - Drinking Water</td>
<td>LiquidHCA</td>
</tr>
<tr>
<td>Segment &quot;could affect&quot; an HCA - Commercially Navigable Waterway</td>
<td>LiquidHCA</td>
</tr>
<tr>
<td>Year of last corrosion ILI inspection</td>
<td>Ili</td>
</tr>
<tr>
<td>Year of last dent ILI inspection</td>
<td>Ili</td>
</tr>
<tr>
<td>Year of last crack ILI inspection</td>
<td>Ili</td>
</tr>
<tr>
<td>Year of last other ILI inspection</td>
<td>Ili</td>
</tr>
<tr>
<td>Coated/uncoated &amp; cathodic protection</td>
<td>PipeCoating</td>
</tr>
<tr>
<td>Type of coating</td>
<td>PipeCoating</td>
</tr>
<tr>
<td>FRP control number, if applicable</td>
<td>FacResponsePlan</td>
</tr>
<tr>
<td>FRP sequence number, if applicable</td>
<td>FacResponsePlan</td>
</tr>
<tr>
<td>Year of original pressure test</td>
<td>HydroTest</td>
</tr>
<tr>
<td>Original pressure test pressure</td>
<td>HydroTest</td>
</tr>
<tr>
<td>Year of last pressure test</td>
<td>HydroTest</td>
</tr>
<tr>
<td>Last pressure test pressure</td>
<td>HydroTest</td>
</tr>
</tbody>
</table>
PODS Event Tables
(15 event tables – 33 attributes)

- DOT Class
- Exposure
- External Coating
- HCA Boundary
- HCA CA Boundary
- ILI Inspection
- ILI Range

- MAOP Rating
- Pipe Operating History
- Pipe Segment
- Product Range
- Status Range
- Test Pressure
- + 2 New
Benefits of LRS Submissions

• Easier
  – LRS to LRS format, direct data export
  – Easier to QC – record counts & mileage
  – Facilitates communication with NPMS

• Faster
  – More tables but fewer rows of data
  – Repeatable process – minimal data manipulation
Questions?

*Phone lines will be open after taking questions from the room*
Segmentation in Geospatial Data

• How the NPMS defines “pipeline segment”
• How segmentation negatively impacts the NPMS
• How the NPMS currently handles your segmentation
• How the proposed Information Collection will impact your segmentation
• Operator Panel and Q&A:
  • How do you determine segmentation?
Definition of a Pipe Segment

According to the NPMS, a pipeline segment is...

- Part or all of a pipeline system
- Must be uniquely identified
- Single part, linear feature, only 2 ends, no branches
- Can be straight or have multiple vertices
- Section of pipe with common attribute values
- *The number of pipeline segments should be kept to a minimum necessary to represent the pipe and it’s attributes*

BOTTOM LINE: A pipeline system should be broken into multiple pipeline segments for only two reasons:

1) to represent a branch or intersection with another pipe
2) to allow for an attribute change
Segmentation hurts...

Impacts to:
- Web map viewer performance
- Query performance
- Database performance
How your segmentation impacts the NPMS

Impacts of **unnecessary** and **inconsistent** operator segmentation

- **Submission Processing**
  - Slows the processing workflow
  - Can increase analyst’s dependency on operators
  - Potential for confusion and poor assumptions
  - Inhibits Change Detection matching; impacts History quality

- **Production Database Data Storage**
  - Clunky and slower

- **End user products**
  - PIMMA and Public Viewer are slower to draw and return query results
  - History not as reliable or effective
How the NPMS currently handles your segmentation

- Submission Processing
  - Goal – operator segmentation retained in centerline
  - Exceptions - Spatial edits to accommodate our LRS database
    - Repair Geometry
    - Explode Multi-Part Features
    - Delete features smaller than 0.00005 mi (0.26 ft)
- End user products
  - Multiple outputs created by dynamic segmentation - each serving a different purpose
    - “Derived Layers”
  - Example: PIMMA and Public Viewer Derived Layers are segmented on county boundaries
How the proposed Info Collection impacts segmentation

• We understand that the collection of additional attributes will greatly increase segmentation

• Our solution: The LRS submission format
  • Leverages how operators store their data
  • Reduces the number of segments in centerline
  • Speeds up processing time
  • Avoids the need for analyst to manipulate submission segmentation (unlike the traditional method)
  • NPMS can create Derived Layers with event table attributes as needed
## Derived Layers

<table>
<thead>
<tr>
<th>Pipe Route # 123</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wall Thickness</strong></td>
<td>0.281”</td>
<td>0.312”</td>
<td>0.281”</td>
</tr>
<tr>
<td><strong>Coating</strong></td>
<td>FBE</td>
<td>CTE</td>
<td></td>
</tr>
<tr>
<td><strong>Class Location</strong></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td><strong>Gas HCA</strong></td>
<td>No</td>
<td>HCA</td>
<td>No</td>
</tr>
<tr>
<td><strong>MAOP</strong></td>
<td>1052</td>
<td>877</td>
<td>1123</td>
</tr>
<tr>
<td><strong>Last MFL ILI Insp.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Route turns into 10 segments
If you do not use the LRS submission format...

- The NPMS will force your data into our LRS data model
- The NPMS will redefine and remove segmentation
- The NPMS will require more time to process your submission (ultimately impacting all operators)
Segmentation Discussion

• Operator Panel, in person comments, then phone comments
  • How do you determine data segmentation?
  • Thoughts or questions related to segmentation?
  • Suggestions for improvements?
“Predominant”

• Predominant refers to collecting generalized values for an attribute
• PHMSA’s intent was to ease the burden on operators and to avoid unnecessary segmentation
• No elements in current NPMS submissions are collected as predominant
• Only two elements in the Information Collection are marked as predominant: decade of installation and pipe grade
Example: decade of installation

- Small sections of pipe are often replaced
- Under working definition in Info Collection, a small replaced segment would be reported as the same decade of installation as the underlying pipe
- **This would reduce segmentation in NPMS submissions/data, but is it desirable or useful to operators? How is this data stored in your systems?**
Discussion

• Operators will always have the option of submitting actual, not predominant, values. Is submitting predominant values feasible or desirable for operators?
• Should PHMSA delete all references to predominance in the NPMS Information Collection?

(Comments will be taken from the room first, then phone lines will be opened)
Conclusions: Q&A

• What other concerns do you have about the NPMS submission process post-Info Collection?
• Are there potential roadblocks we have not yet discussed?

We will only address comments on the submission process, not the Info Collection in general.
Operator Webinars

• 2 webinars will be held in January; NPMS staff will discuss common submission issues and suggested solutions

• 2015 Liquid Operator Webinar (.ppt) is available in Pipeline Operator section of NPMS Website

• An email will be sent to Technical Contacts on NPMS submissions as well as to this workshop’s participants with details once we set the dates
OSAVE

- Operator Submission and Validation Environment
- Coming in early 2016
- A web-based interface used to upload your new full replacement submission or to make minor attribute and removal changes to your last submitted data
  - Traditional submissions will still be accepted
- NPMS staff will send an email about training resources
OSAVE -- Operator Submission and Validation Environment

- Online submission environment with 2 workflows:
  1. Upload the GIS data file for your full replacement submission
     - OSAVE will run QC scripts and report issues back to the operator via an email report
  2. Report changes to your existing data using a map environment
     - In lieu of a Full Replacement Submission
     - You must only have attribute changes or pipeline removals
     - If you have spatial changes or new pipelines you need to make a full replacement submission
     - Will be most helpful to operators with small changes

- Both workflows allow you to complete certain components online:
  - Metadata
  - Cover Letter/ Transmittal Letter
  - Contact Information
Closing

• Submit comments on the Information Collection 60-day notice to the docket by 11/25
• We will post presentations and meeting minutes to this workshop’s registration page by Monday COB

Phone lines open for Q&A

Thanks for your participation!

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