

The Data All Lives in a Yellow Submerged Thing: Corpus Christi Water Inspects 101-Mile Mary Rhodes Pipeline in Single Run



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Agenda

1. Key Aspects and Features of MRP
2. Objectives and Approach
3. Tools Applicable to MRP
4. Assessment Scenarios
5. Custom Tool Development-Testing
6. Results



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01 Key Design Features and Appurtenances of the Mary Rhodes Pipeline



Key Aspects of Mary Rhodes Pipeline

- 99-miles of 64-inch AWWA C303-95 (bar wrapped pipe)
- 2-miles of 72-inch AWWA C301 (PCCP)
- Manufacturer: Gifford Hill America
- Pipe Design Pressures: 100 to 175 psi
- Contractors incentivized
- Replacement costs: ~ \$1B - \$1.5B



Key Aspects of Mary Rhodes Pipeline

Design observations

- Double Polywrapped
- 4' cover (P&P's show less in places)
- Joints bonded
- Cathodic protection - anodes



02 – Objectives and Approach



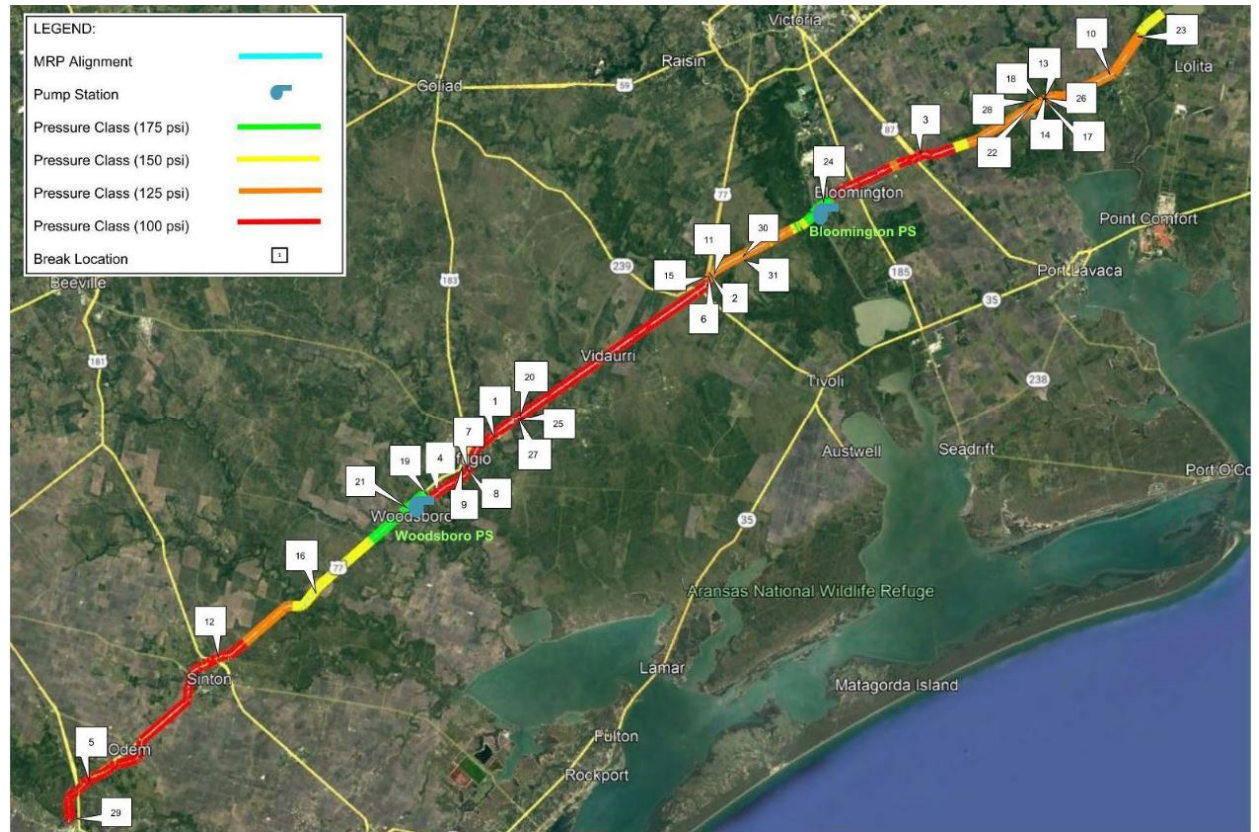
Objectives & Approach

- Identify tool(s) & methods to assess MRP
- Provide recommendations to extend its life



Key Features

- 3 pump stations
- 263 2" air valves
- 24 12" CARV's
- 28 blow-off valves
- 5 inline butterfly valves



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03 – Tools Applicable to MRP

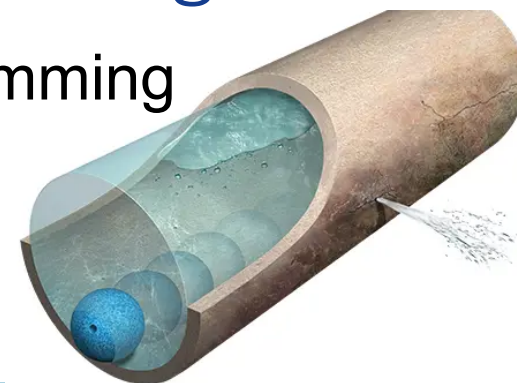


Common Acoustic Leak-Detection Configurations

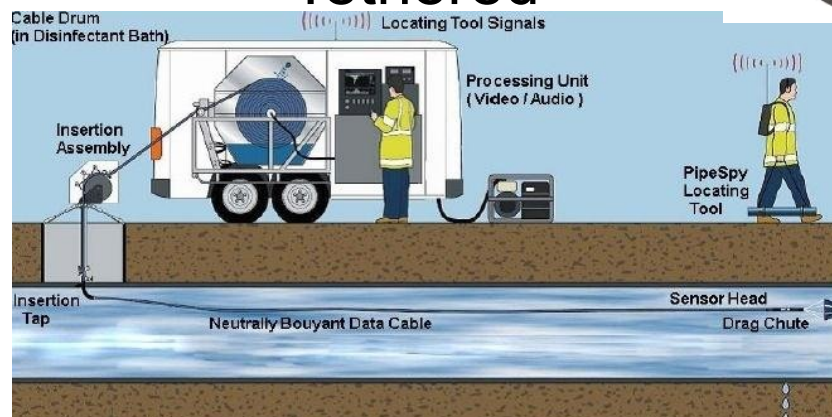


Correlator

Free Swimming



Tethered



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Benefits of Inline Acoustic Leak Detection

- High confidence
- Limitations well-known
- Detects difficult-to-find leaks
- Enables proactive repair
- Costs & logistics commensurate with MRP risks

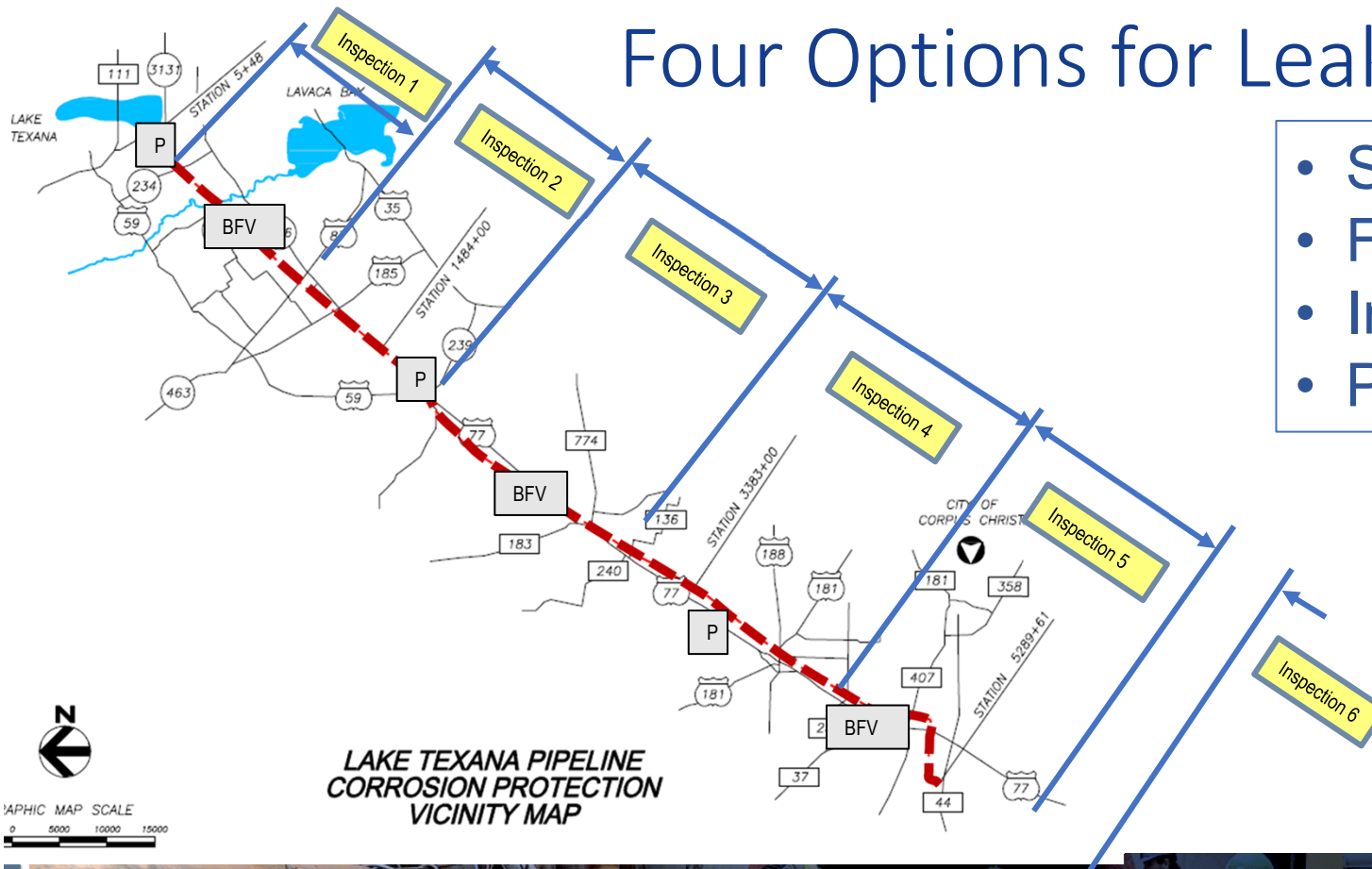


04 – Internal Condition Assessment Scenarios



Four Options for Leak Detection

- Standard
- Full Length
- Incremental
- Pipe in thirds



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Pros & Cons of Inspection Scenarios

Scenario	Pros	Cons
Standard	<ul style="list-style-type: none"> - Conventional approach - Could be spread out over multiple years 	<ul style="list-style-type: none"> - 6 inspections - Extensive ops support - Long inspection days
Full	<ul style="list-style-type: none"> - Minimal ops support - Economy of scale (less \$) - Schedule friendly 	<ul style="list-style-type: none"> - Long inspection (battery life concerns suggest custom device) - Long inspection days
Incremental	<ul style="list-style-type: none"> - Extract at WTP and insert progressively farther upstream 	<ul style="list-style-type: none"> - 6 inspections - Extensive ops support - Most expensive
Pipe in 3rds	<ul style="list-style-type: none"> - Less ops support than Standard and Incremental Scenarios 	<ul style="list-style-type: none"> - Requires shutdown of pump stations for insertion/extraction

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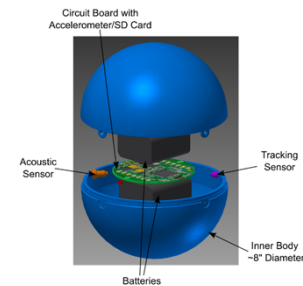
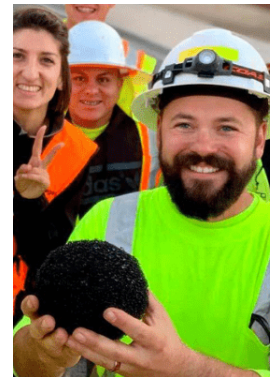
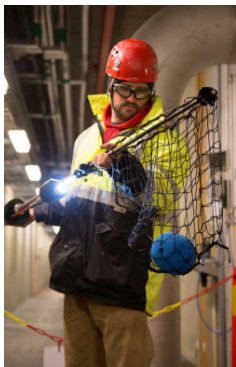
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Leak Detection Tool Provider Comparison

Tool Provider	Buouyancy	Trackability	Battery Life	Customizable?	Cost	Primary Application	Recommended for MRP?
Xylem	Negative	Yes	336 hours	No	\$\$	Water	Yes
Ingu	Neutral	No	20 hours	No	\$\$	Water	No
PICA	Neutral	No	27 hours	No	\$\$	Wastewater	No
Nautilus	Neutral	No	20 hours	No	\$	Water	No
XK Innovate	Neutral	Yes	As designed	Yes	\$\$	Water	Yes



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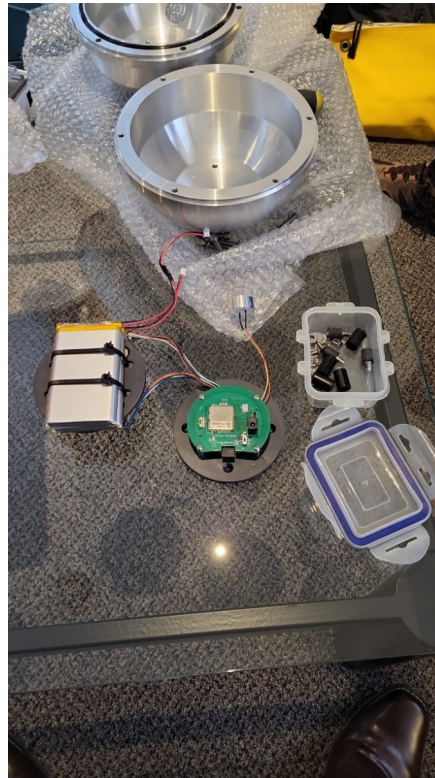
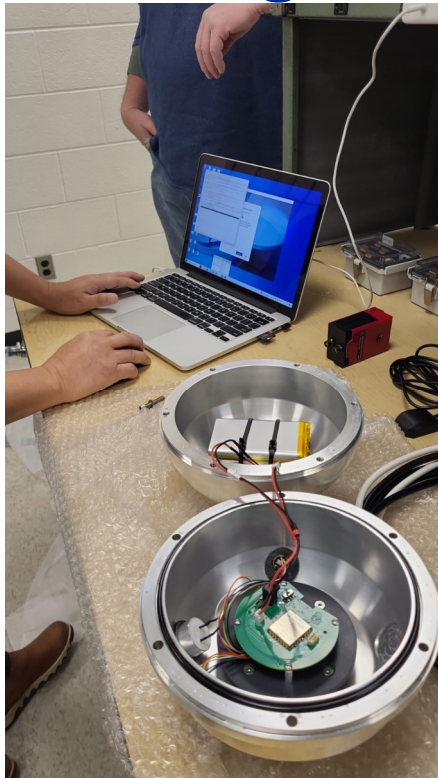
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05 – Custom Tool Development - Testing



Tool Testing in Toronto Lab



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Tool Testing in Toronto Lab (Cont.)



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06 – Results



Results

- Both balls retrieved at WTP
- 101-miles in single run!
- Three leaks & one air pocket detected!



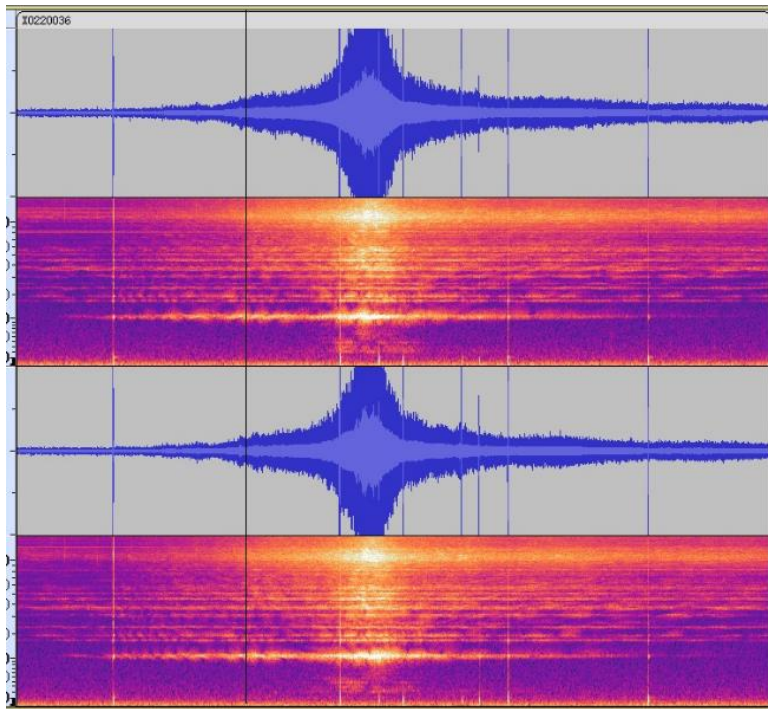
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Results: Medium Leak



Time	Station	Box	Item	Comment
Thu, 9:30:00	2+00			Start
Thu, 13:00:00	57+66			Plant Full Speed
Thu, 16:02:27	TBD			LEAK
Fri, 2:30:25	1545+00		Steel Pipe	Magnetometer

Medium leak: approximately 10-25 gpm

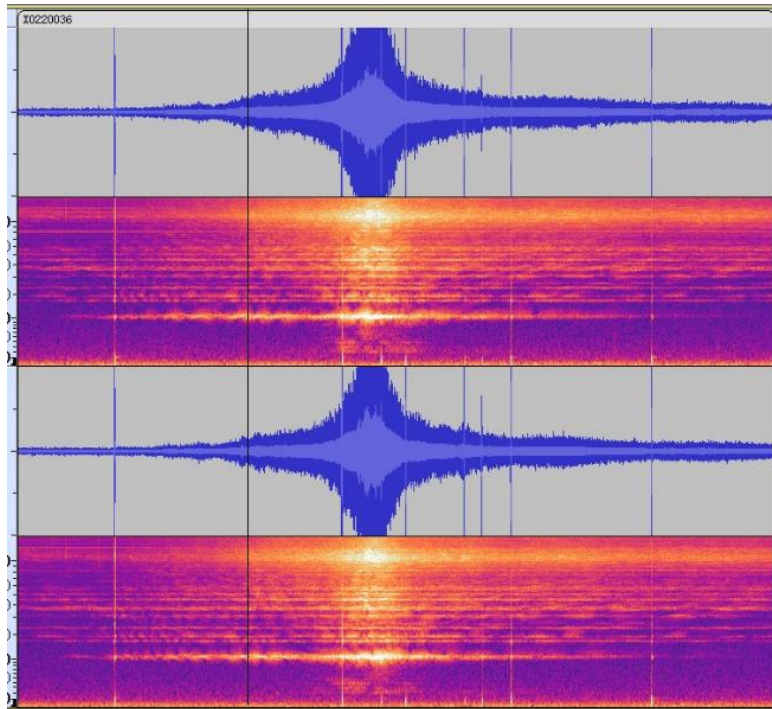
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Results: Medium Leak



Time	Station	Box	Item	Comment
Fri, 14:52:40	44+20	17	12" ARV	Tracked
Fri, 14:57:00				Plant Full Speed
Fri, 18:18:38	TBD			LEAK
Sat, 4:56:49	1545+00		Steel Pipe	Magnetometer

Medium leak: approximately 10-25 gpm

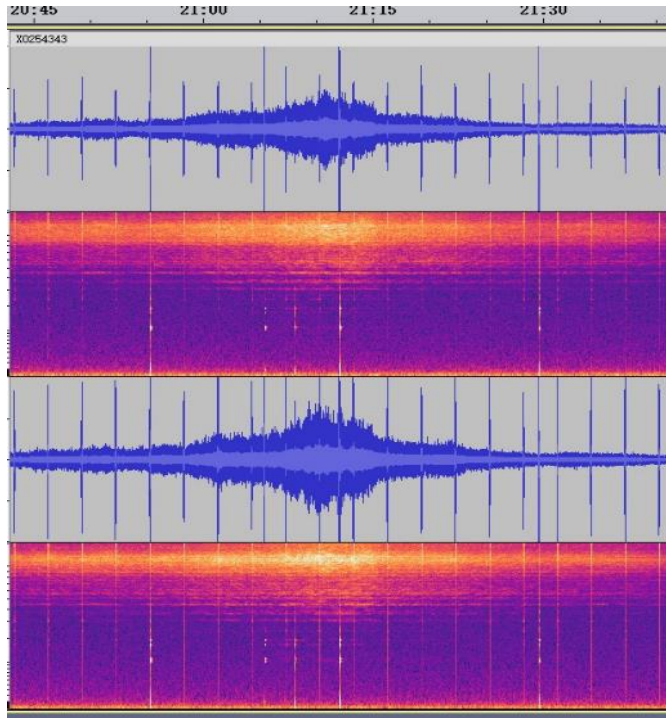
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Results: Small Leak



Time	Station	Box	Item	Comment
15:01:58	44+20	17		Tracked
Fri, 15:06:18	57+66			Plant Full Speed
Fri, 18:18:00	TBD			Medium Leak
Fri, 20:04:54	TBD			Small Leak
Sat, 4:56:49	1545+00		Steel	

Small sized leak < 10 gals/min

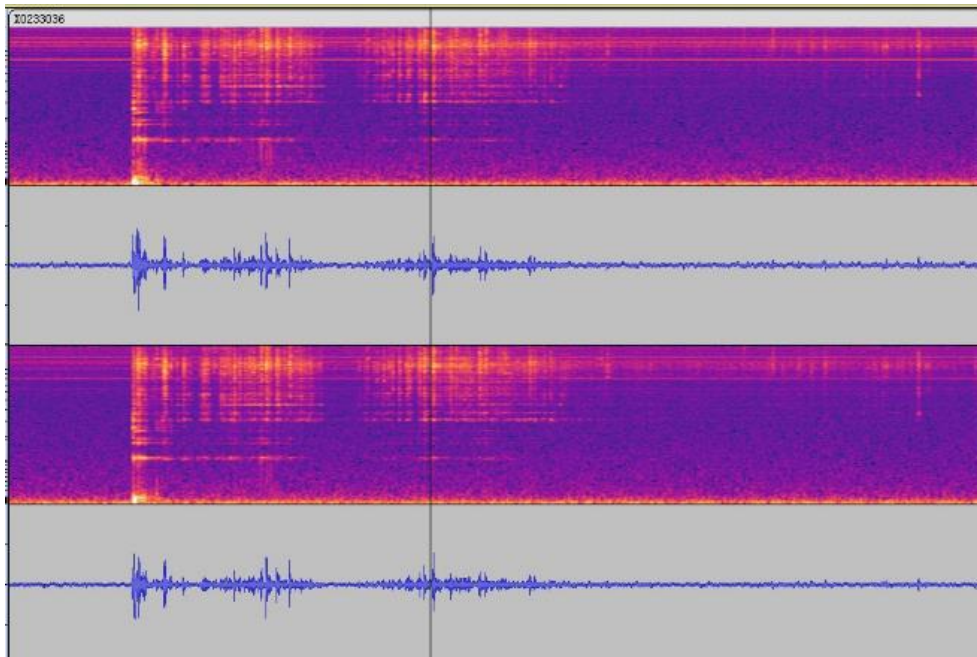
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Results: Air Pocket



Time	Station	Box	Item	Comment
09:30:00	2+00			Start
13:00:00	57+66			Plant Full Speed
16:02:27	TBD			Medium Leak
17:56:15	TBD			AIR POCKET
2:30:25	1545+00	42	2" ARV	Steel Pipe

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Questions?

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