



Scanning Critical Host Pipes through Carbon Fiber, CIPP & SIPP Applications Using BEM Technology



Introduction

- BEM Scanning (Broadband Electromagnetic)
- Asset Owner Benefits
- Results
- Choosing A Repair for Future NDE Inspections on Critical Pipes



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BEM uses magnetic technology (pulse eddy current) to measure the density of metal and detect flaws of the pipe wall.

- Non-Abrasive Prep (FME Zones)
- Scan through offsets of 2" (CIPP, Concrete)



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- CIPP Liners have been around 40+ years
- Generally, Design Life of CIPP & No Dig Solutions are 50 years if installed correctly.
- Energy/Nuclear Plants 80-year licenses



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Benefits of Scanning Through Repairs:

- Budget Asset Maintenance/Replacement Costs
- Confirm Host Pipe Wall Thickness
- External Scanning/Live Flows (no outages)
- Predict Corrosion Rate of Host Pipe
- BEM can scan through 2" Thick Coatings



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30 Yr CIPP



Coatings



Fiber Glass



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30+ Yr Old CIPP – Host Pipe 24"

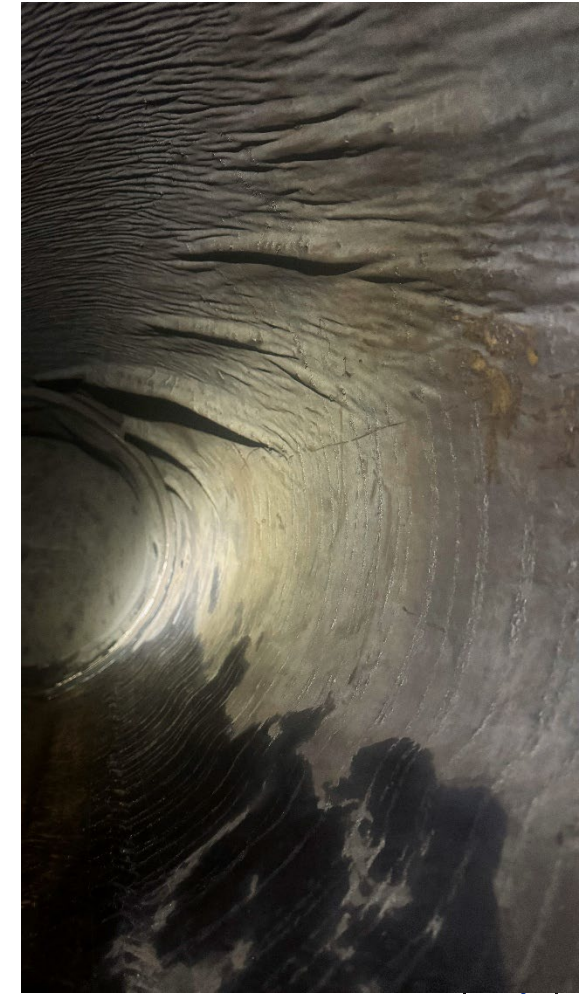
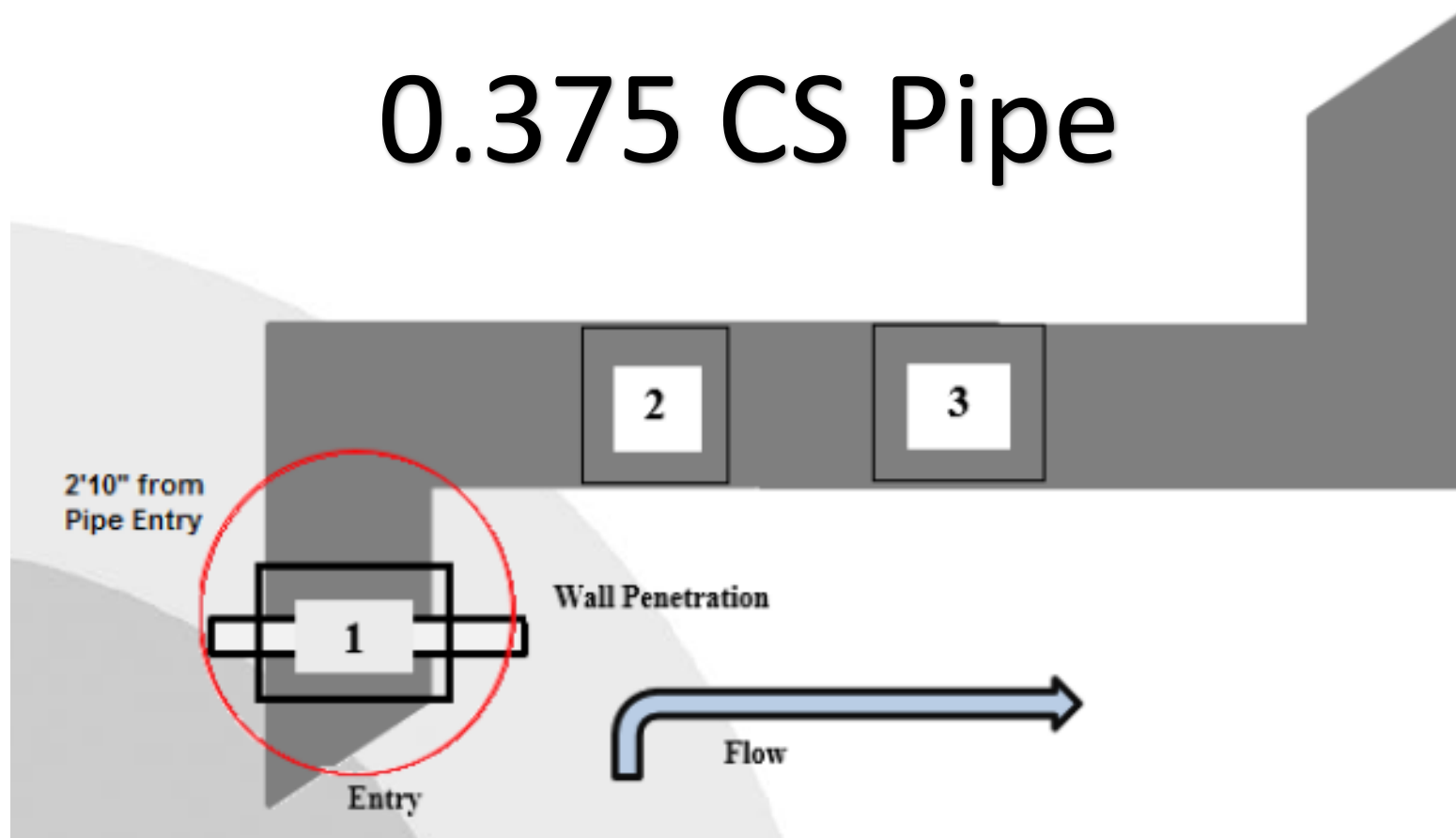


- Liner is hard in good condition
- Minor bubbling



3 Test Locations – Scanning Through CIPP

0.375 CS Pipe



PRELIMINARY
APPARENT WALL THICKNESS

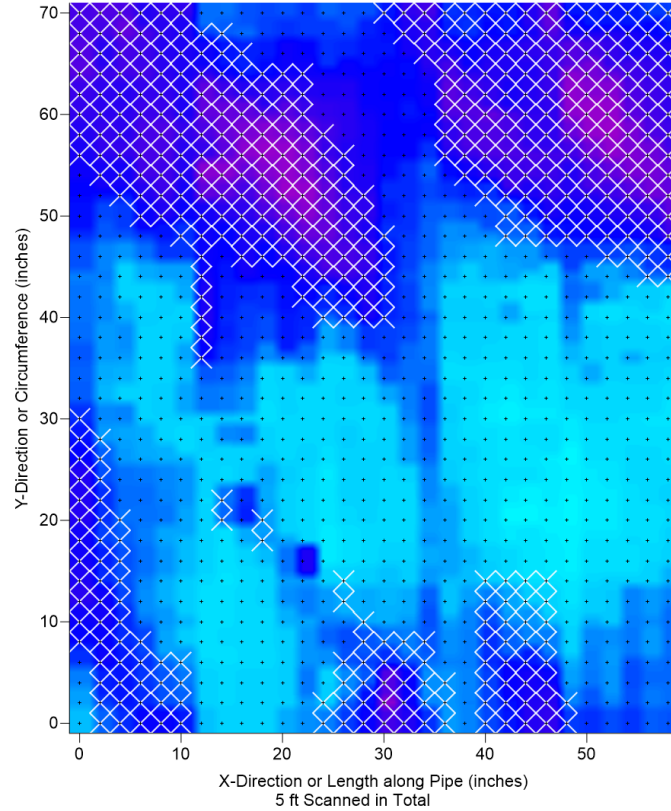
0.375 CS Pipe

5 ft Section No.2

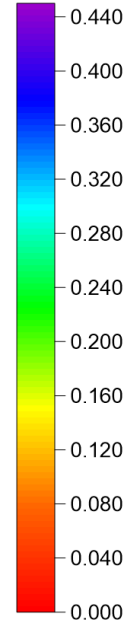
Pipe Crown
→

Pipe Invert
→

Pipe Crown
→



Apparent
Wall Thickness
(Inches)



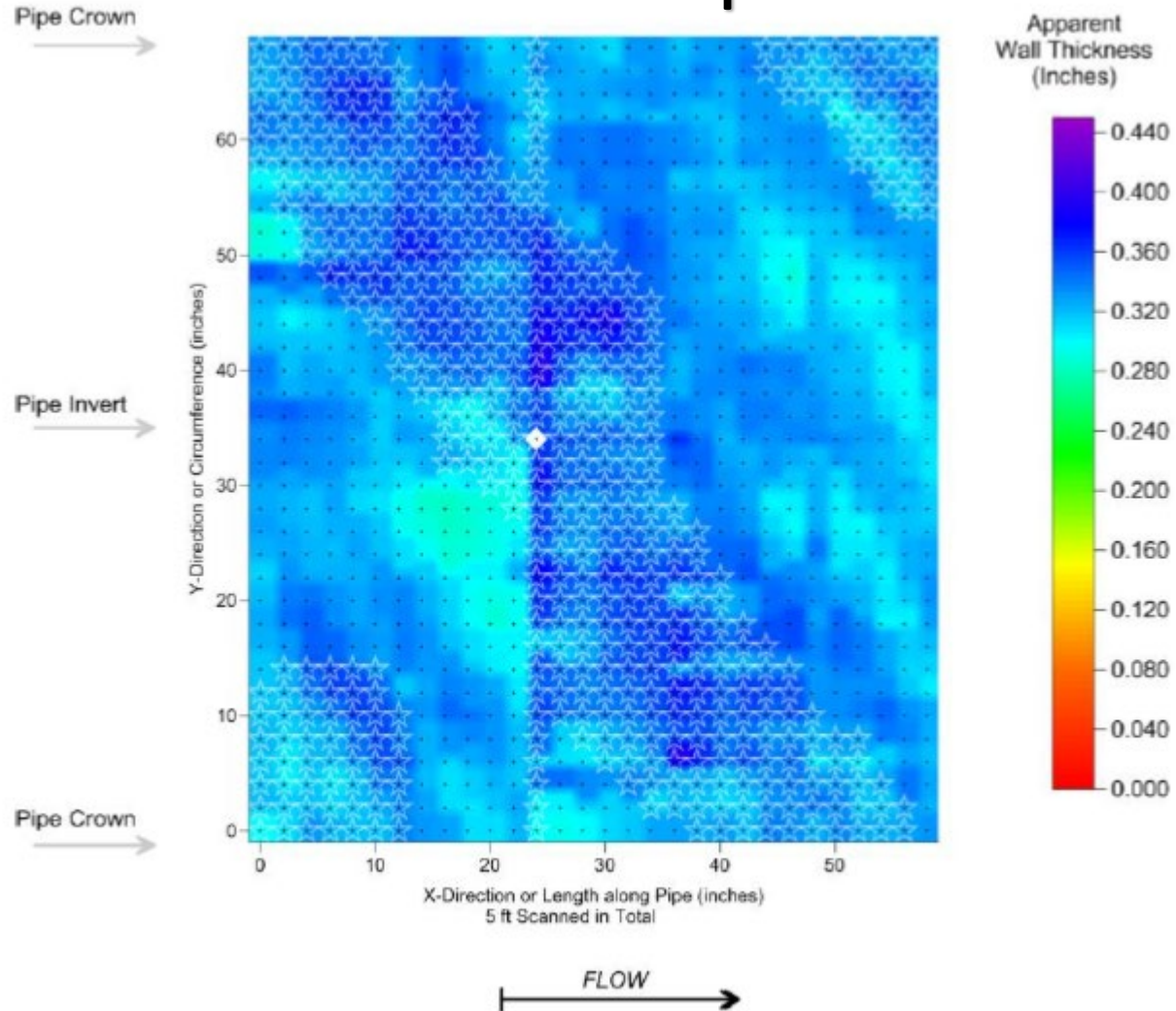
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0.375 CS Pipe

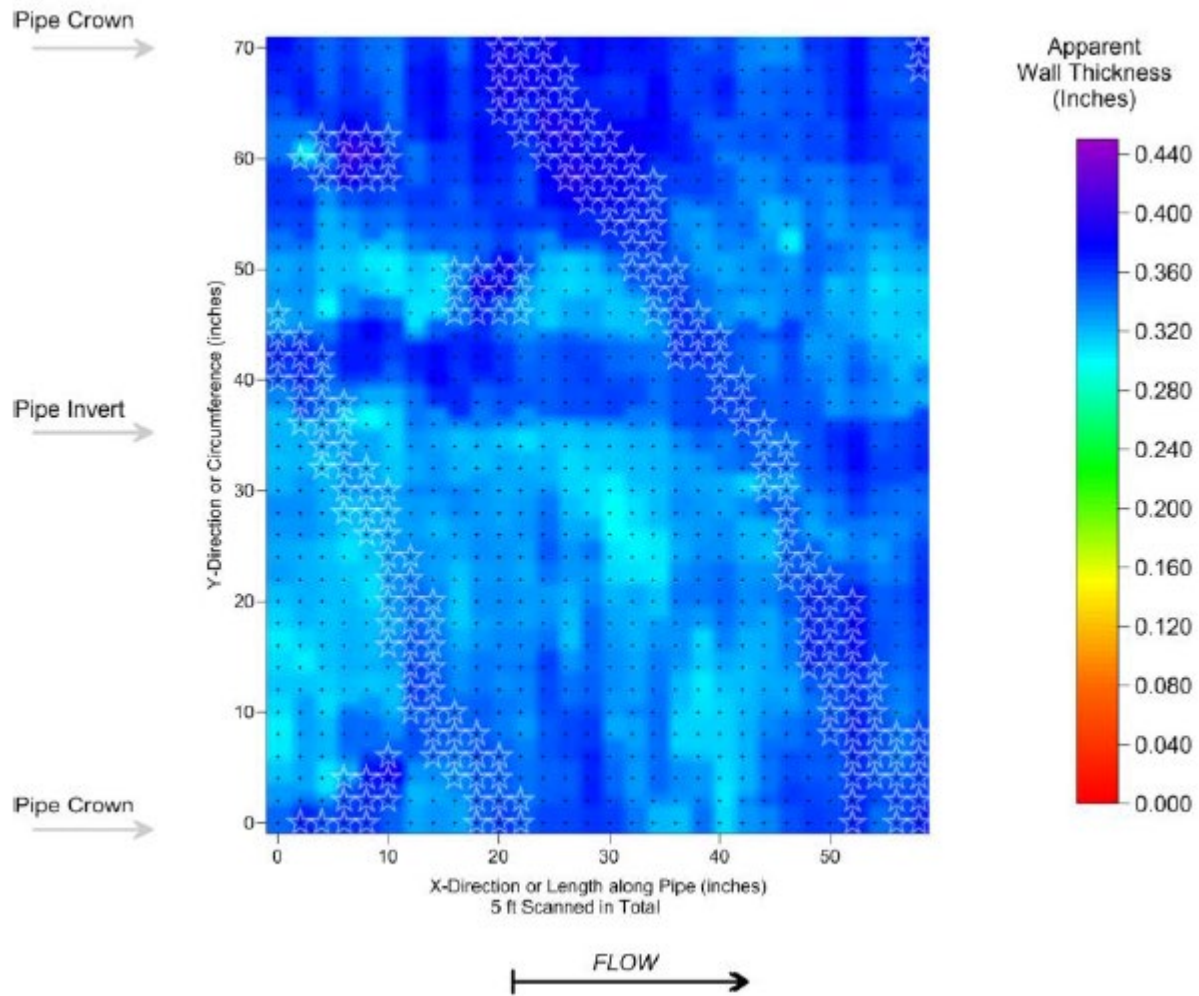


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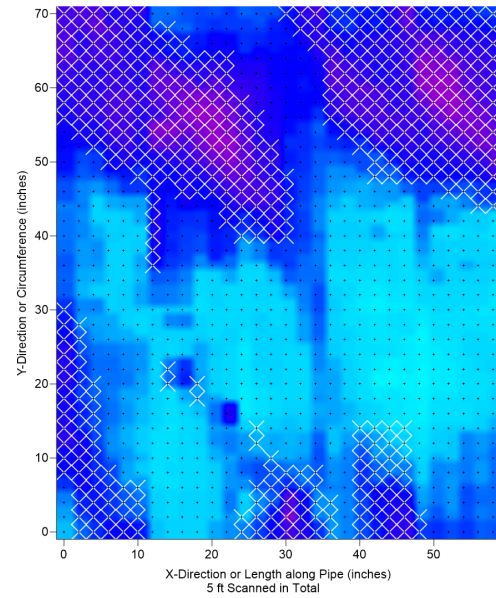
PRELIMINARY APPARENT WALL THICKNESS

5 ft Section No.2

Pipe Crown
→

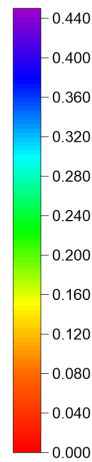
Pipe Invert
→

Pipe Crown
→



FLOW →

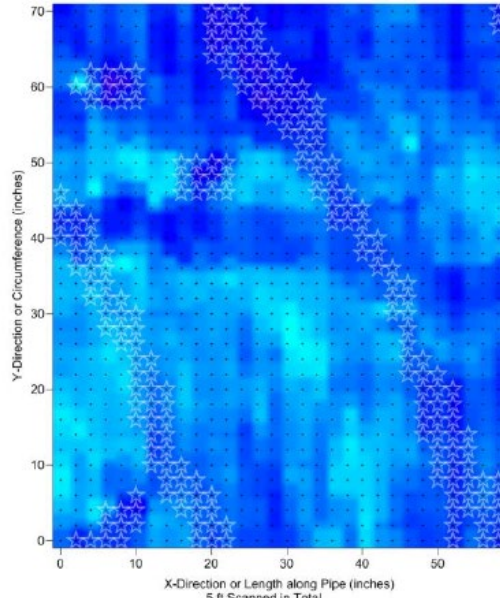
Apparent
Wall Thickness
(Inches)



Crown
→

invert
→

Crown
→

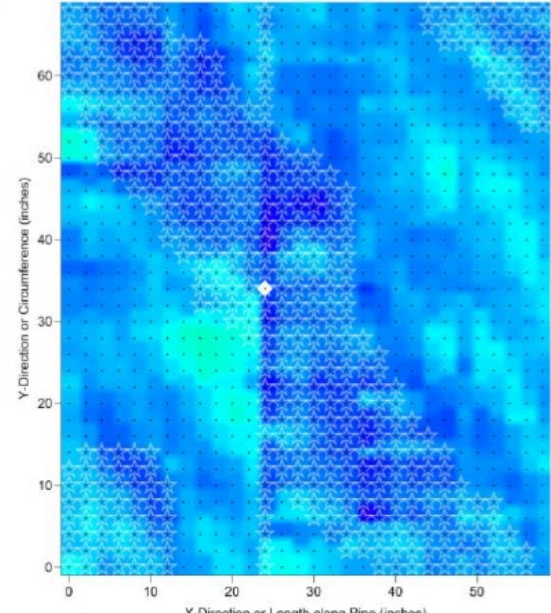


FLOW →

Pipe Crown
→

Pipe Invert
→

Pipe Crown
→



FLOW →

Apparent
Wall Thickness
(Inches)



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- Scan and send the files off after shift to Rocksolid BEM
NDE Processors available 24hrs worldwide
(Prague/Australia)
- Wake up next morning with results that is sent to
engineering departments working 24hrs during the
Nuclear Outage
- Buried Pipe Engineers assess data and confirm repair
method of CIPP or possibly host pipe
- Possible Repairs – Weld, Coatings, Grout and Seal



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Information Client Received

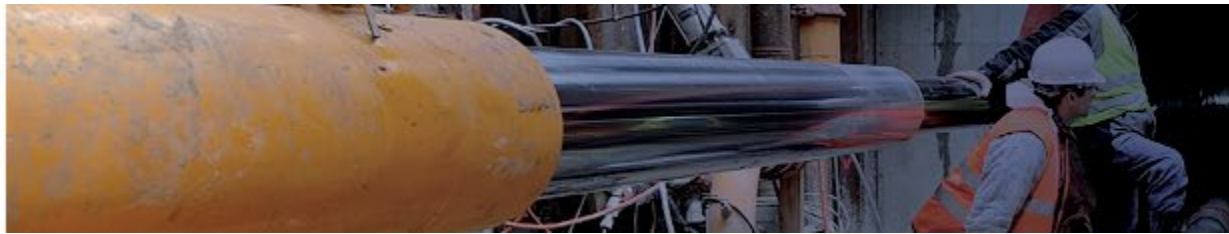
- Pipe Age 66 years – Pipe is in great condition
- CIPP liner is hard and doing its job
- No need to replace piping (\$\$\$)
- Plan to redo liner in under 5 years
- Monitor Liner Condition next outages



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Scanning structure from 2018 – 2024



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- Corrosive Pit (Chlorine Feeders)
- Base scan to confirm BEM - 2018



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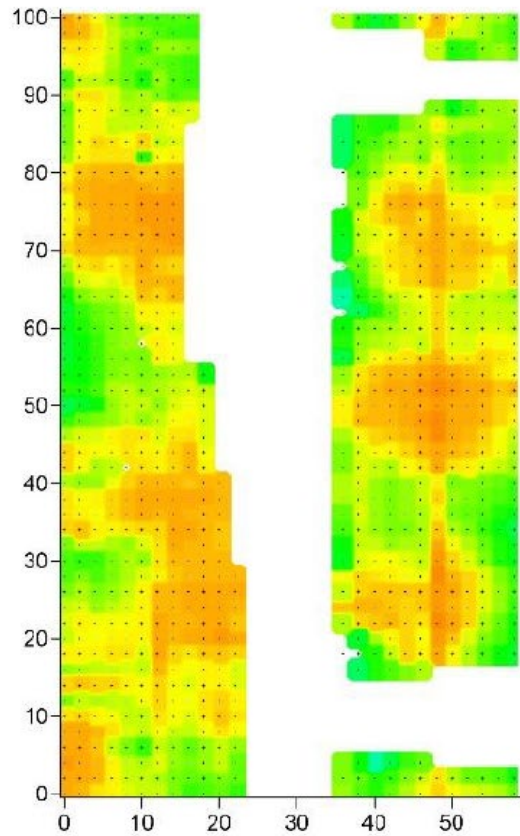




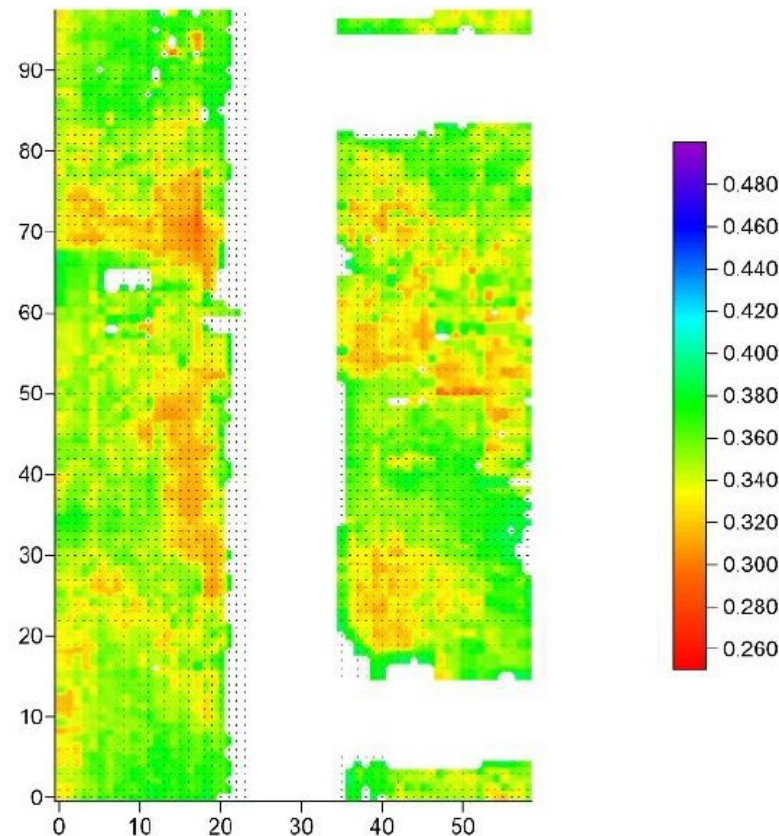
- Re Scan 2021 & 2024



2021 POST CFC (50392)
C-main-PIPE-2i-HD
AWT Plotting



2024 POST CFC (50445)
C-main-PIPE-1i-HD = LS+PS sites
AWT Plotting



2024 (50445) Minimum AWT	2021 (50392) Minimum AWT
0.294	0.303
0.315	0.311
0.290	0.287
0.293	0.280
0.309	0.303
0.297	0.291
0.281	0.307
0.289	0.311
0.309	0.299

2" Antenna 1" Antenna (HD)



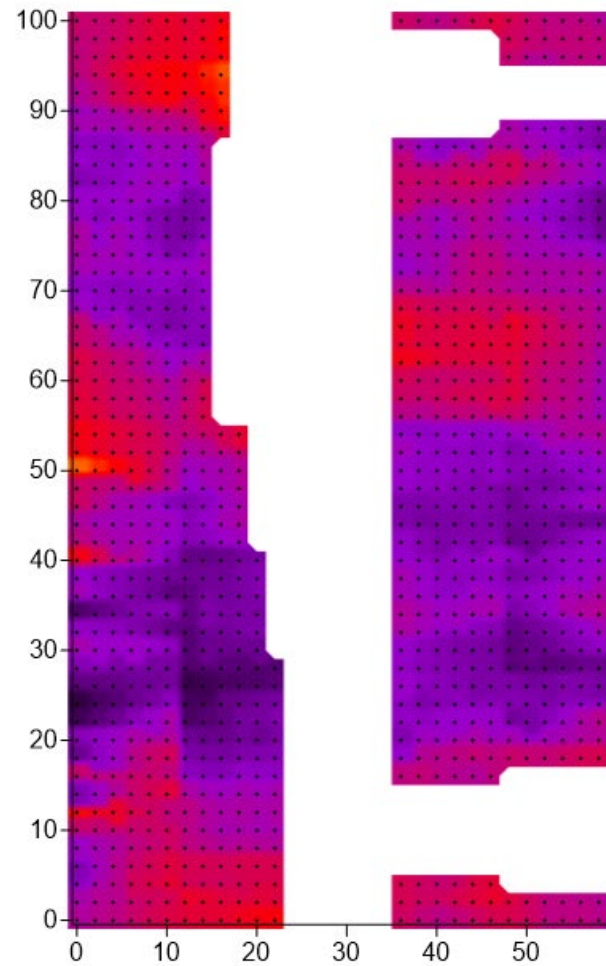
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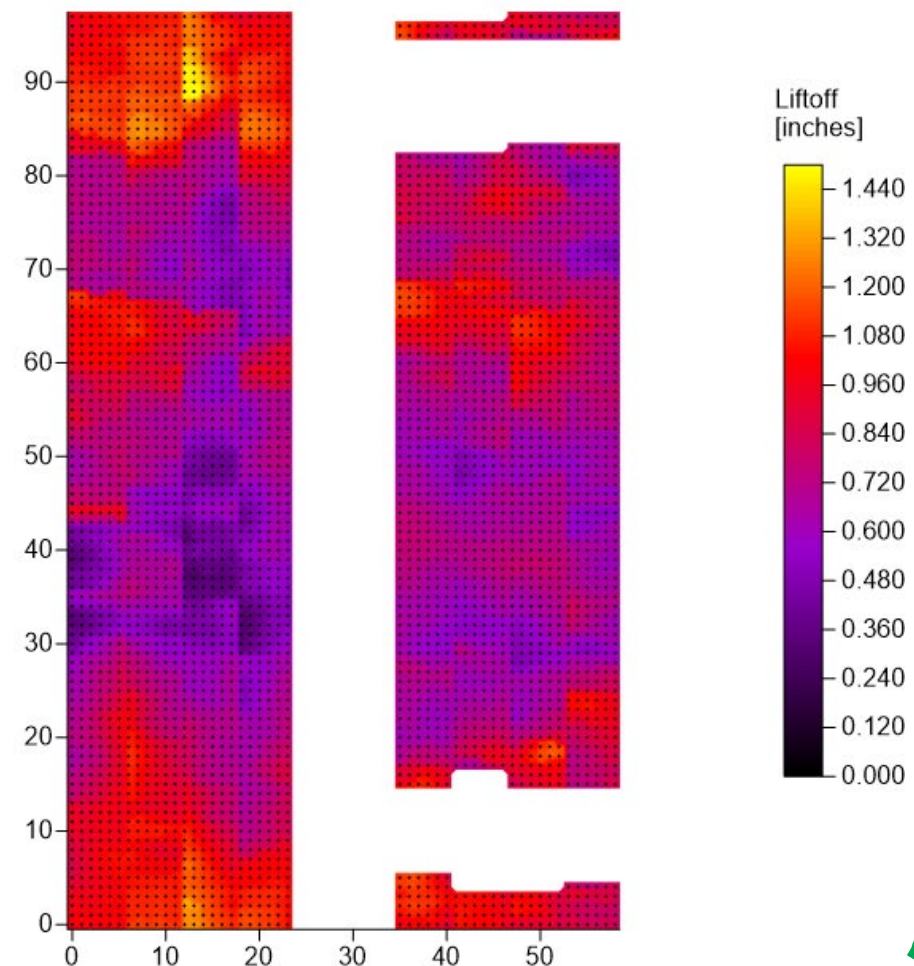
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**POST CFC
2021**
Antenna Liftoff from the Metallic Wall



**POST CFC
2024**
Antenna Liftoff from the Metallic Wall



Information Client Received

- Fiber Glass Wrap doing its job
- Plan to wrap 7 other pits
- Scan all locations and monitor next few years
- Budget to replace piping in pits over 10+ years



24" SIPP Max 200-mil Thickness for NDE PIG



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- Plants Operating up to 80yrs
- Old Repair Methods Coming to End of Life
- Demand to know host pipe condition for future repairs and maintenance
- BEM fills the requirement





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