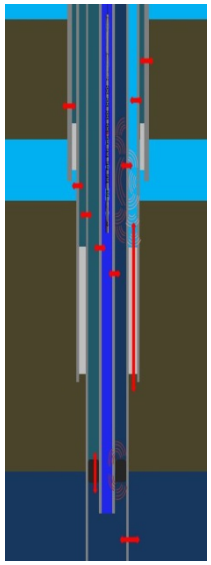
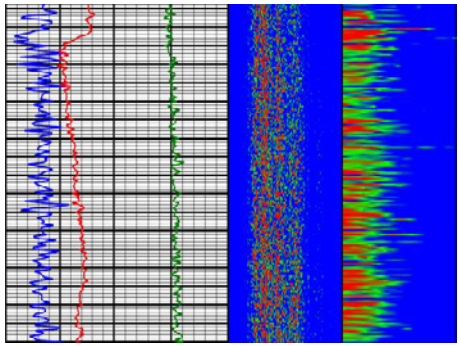




Halliburton Wireline and Perforating Acoustic Conformance Xaminer™

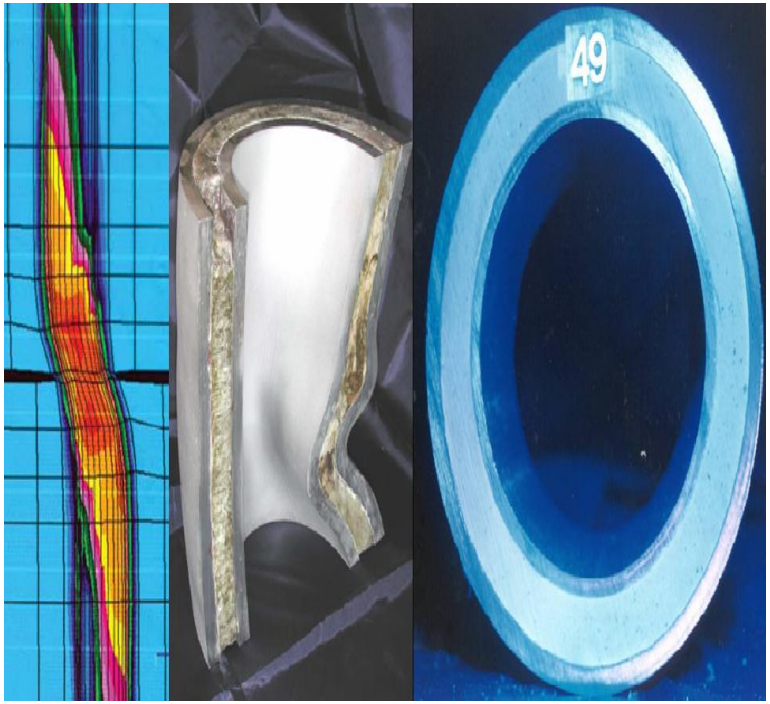
Michael Biery

Technical Advisor

HALLIBURTON

Customer Challenges

- Top Three Integrity Issues
  - Shallow flow
  - Mechanical leaks
  - Corrosion leaks



Key Features

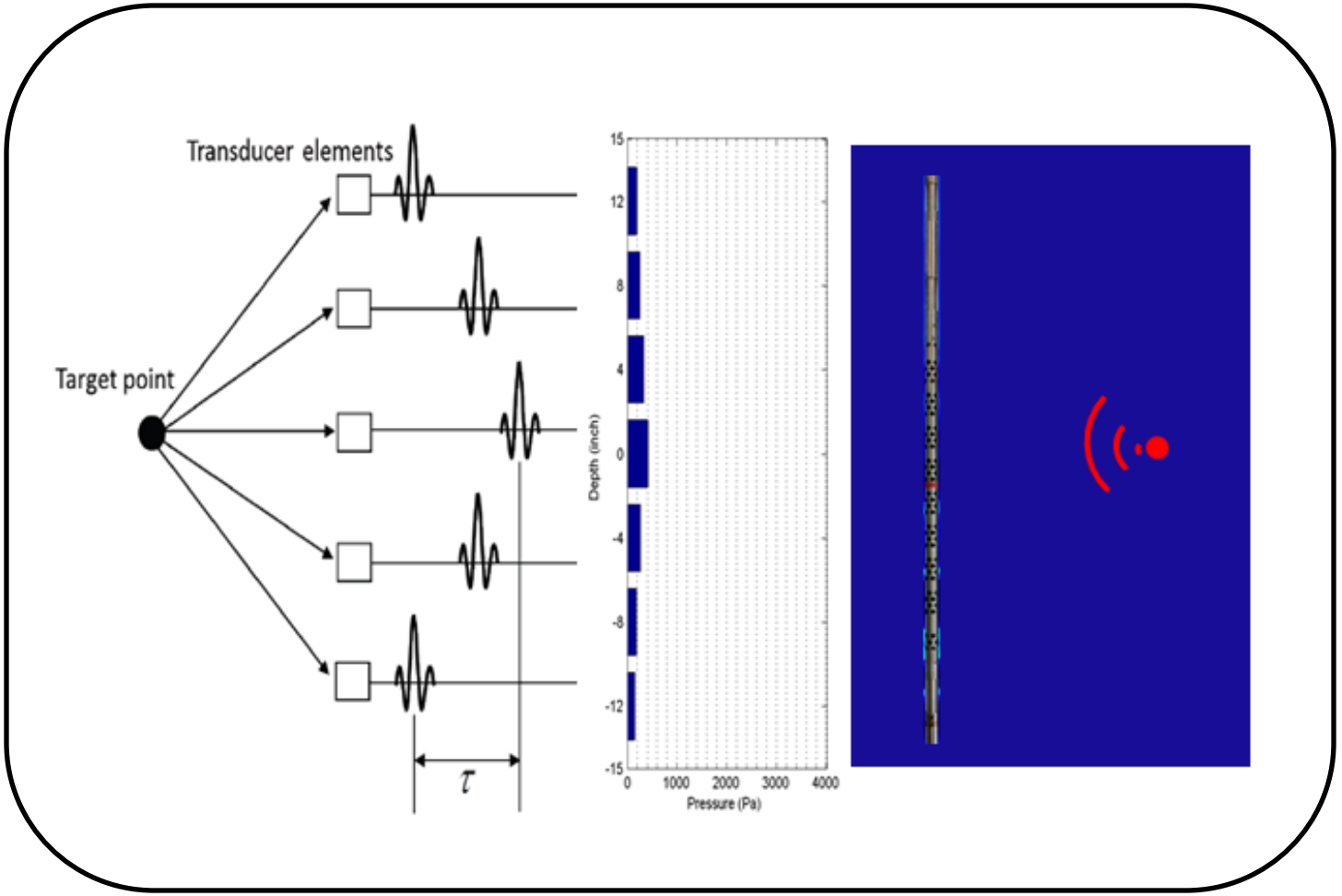
- Uses an array of acoustic sensors
- Finalized product capability:
  - Detects flow throughout well structure
  - Vertical accuracy usually within inches
  - Estimates radial location
- Characterizes detected flow:
  - Estimates flow rate – (Low/Medium/High, set thresholds)
  - Estimates flow composition – Liquid/Gas

ACX™ Tool - Specifications

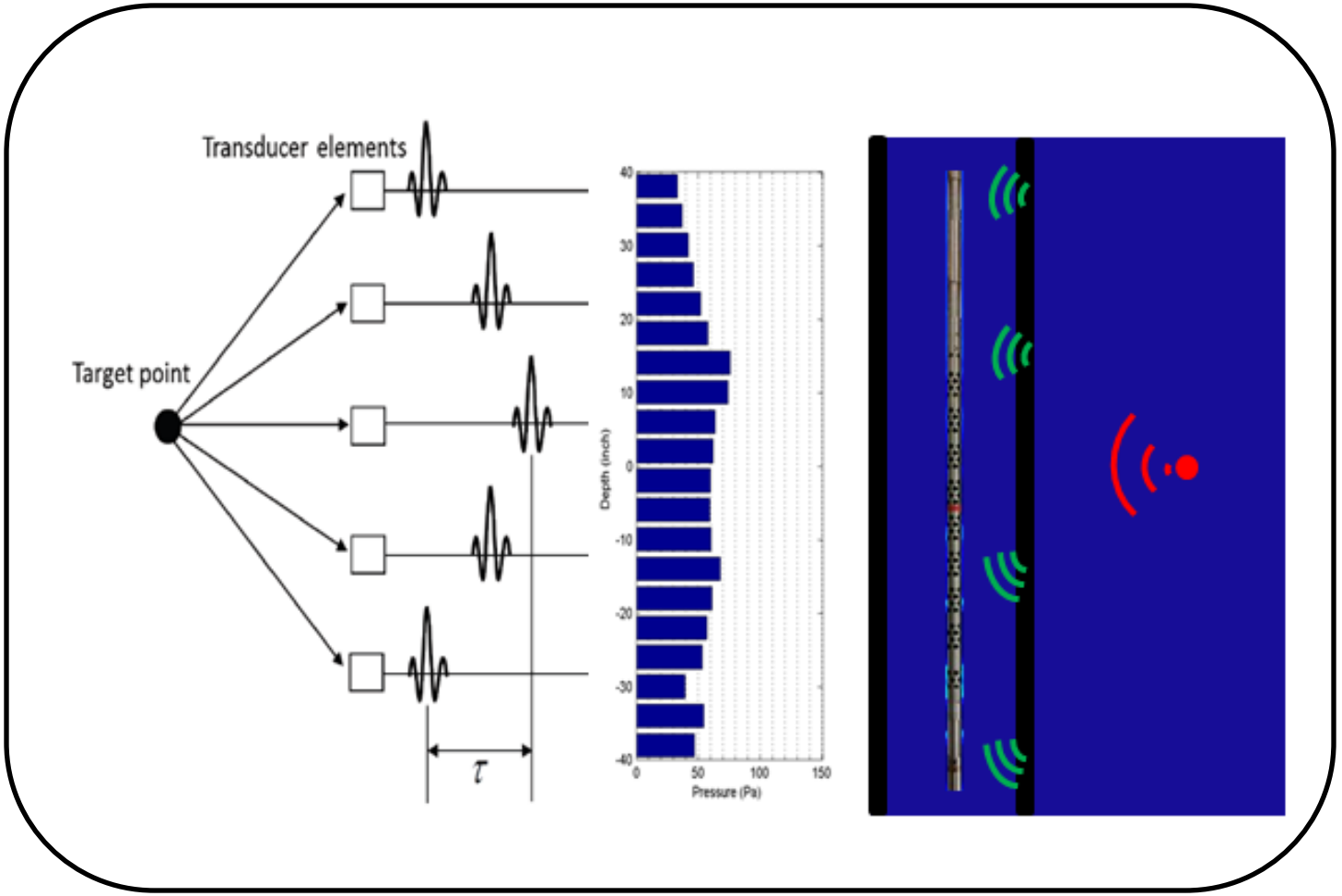
Tool

- OD 1-11/16 in. (42.86 mm)
- Length: Each section is 72 in. for a total of 12 ft
- Weight: 45 lb
- 15,000 psi, 300°F
- Memory chip for High Definition data
- Default tool string – ACX tool, gamma, CCL, pressure, temperature, and flow spinner

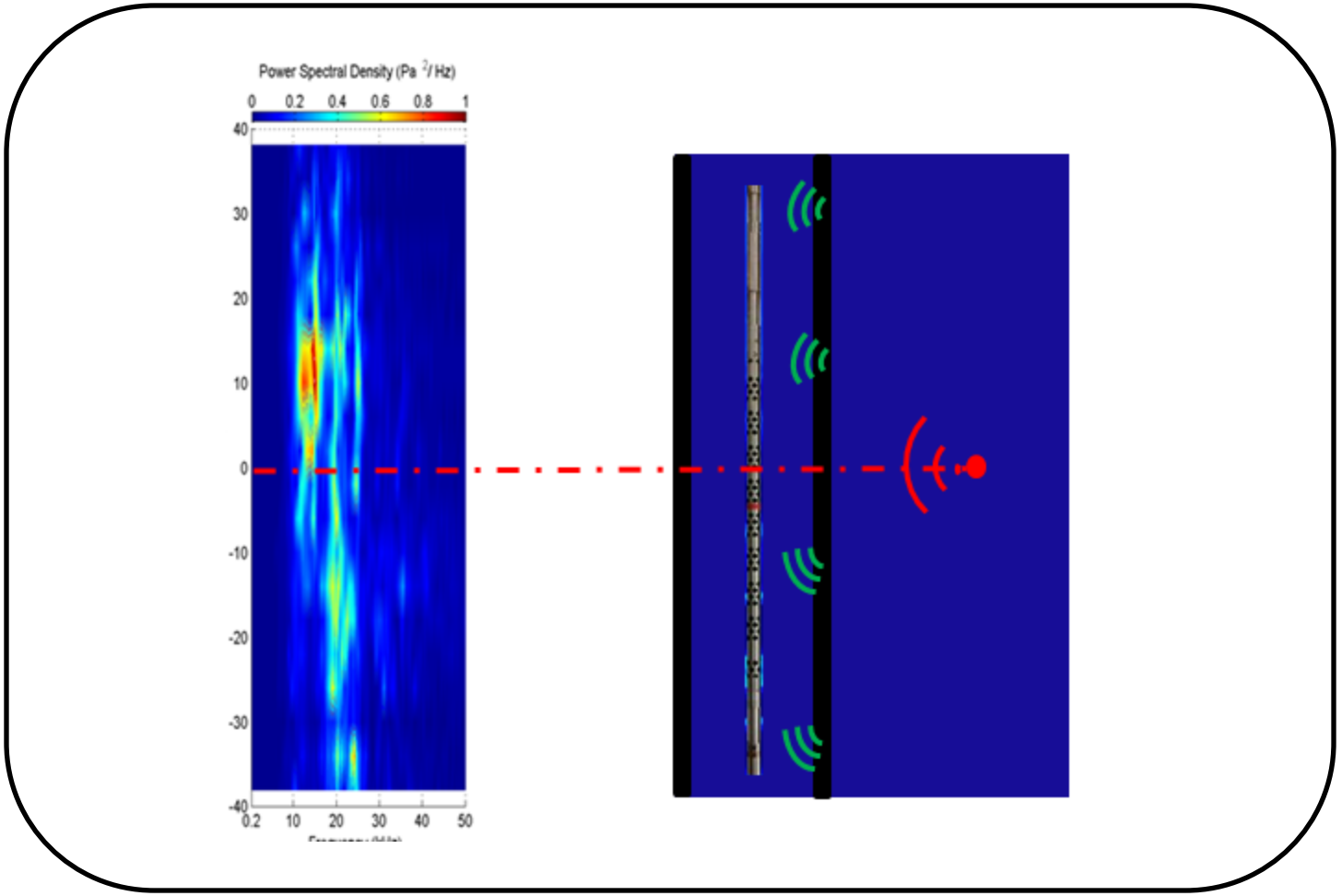
- Acoustic Testing

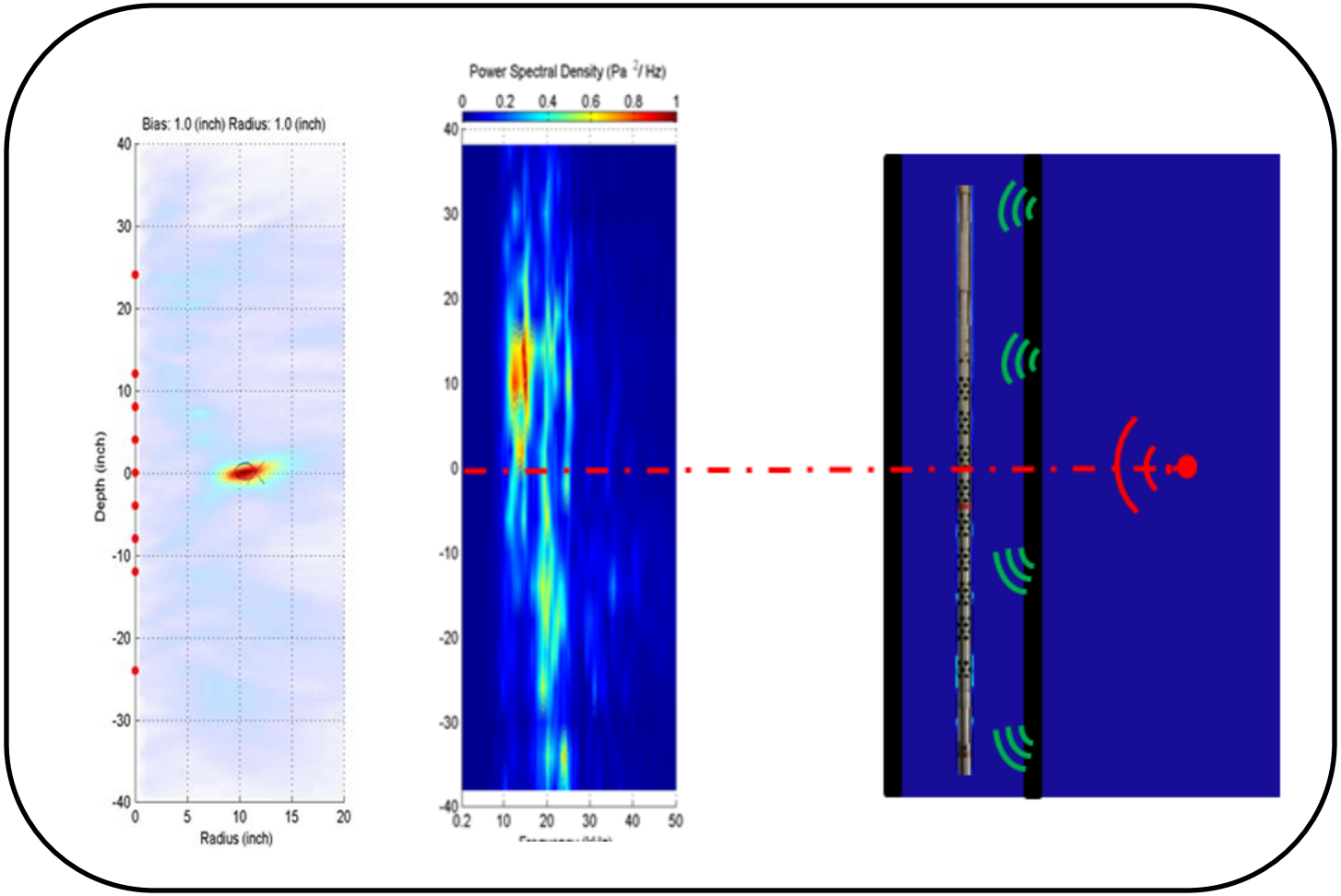


Phase two of Acoustic Testing

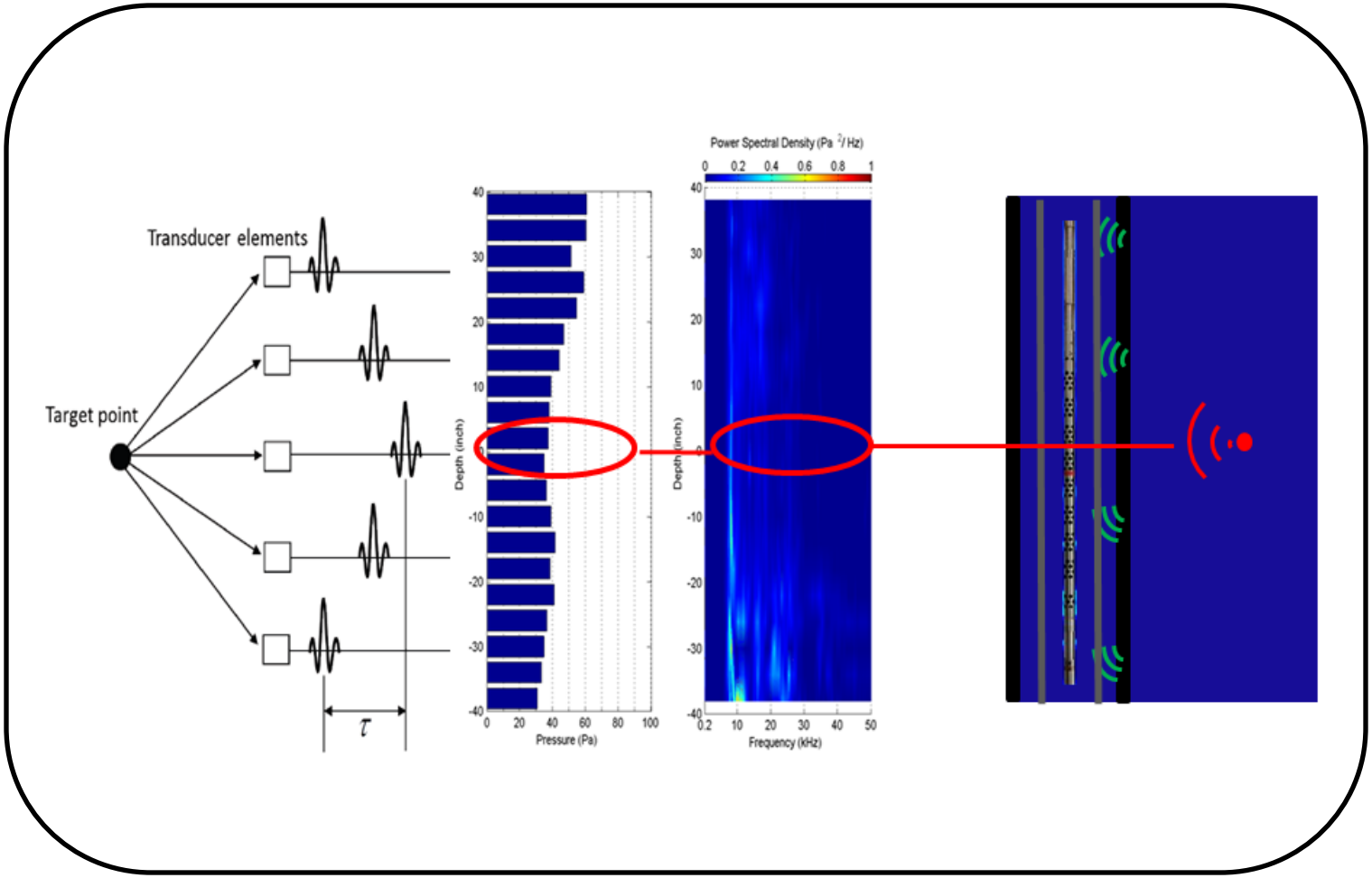


Magnitude

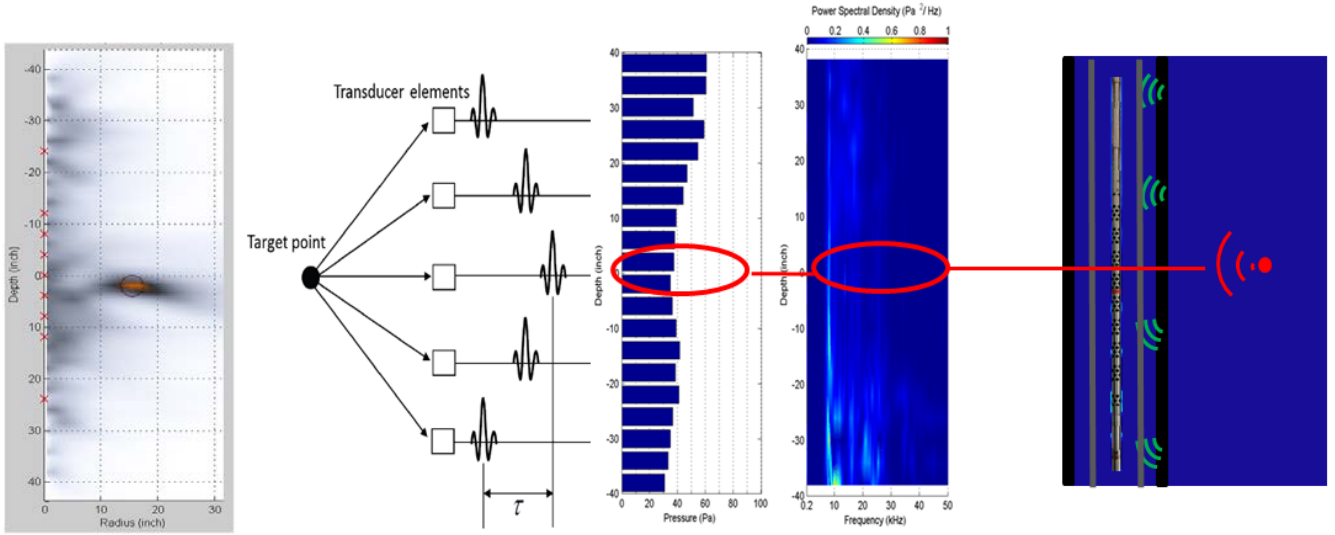

Power Spectral Density (Pa ²/ Hz)
0 0.2 0.4 0.6 0.8 1
40 30 20 10 0 -10 -20 -30 -40
0.2 10 20 30 40 50


Bias: 1.0 (inch) Radius: 1.0 (inch)
Depth (inch)
Radius (inch)
Power Spectral Density (Pa ²/ Hz)

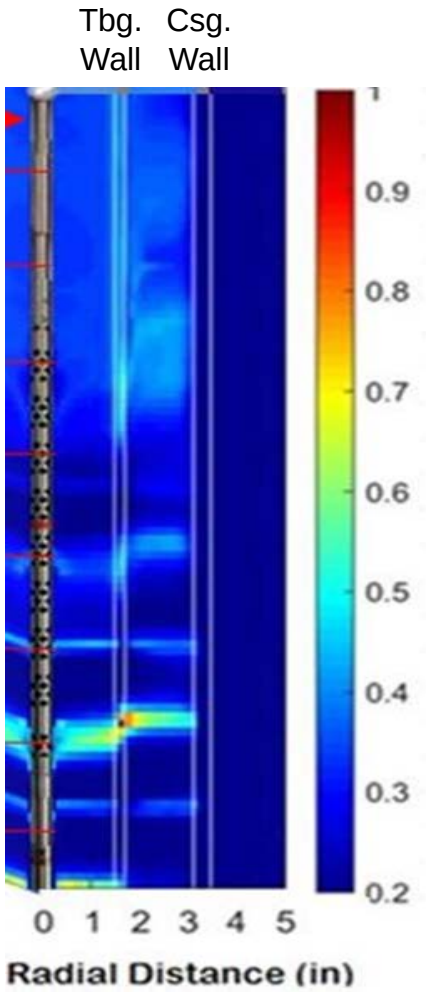
Tubing and Casing

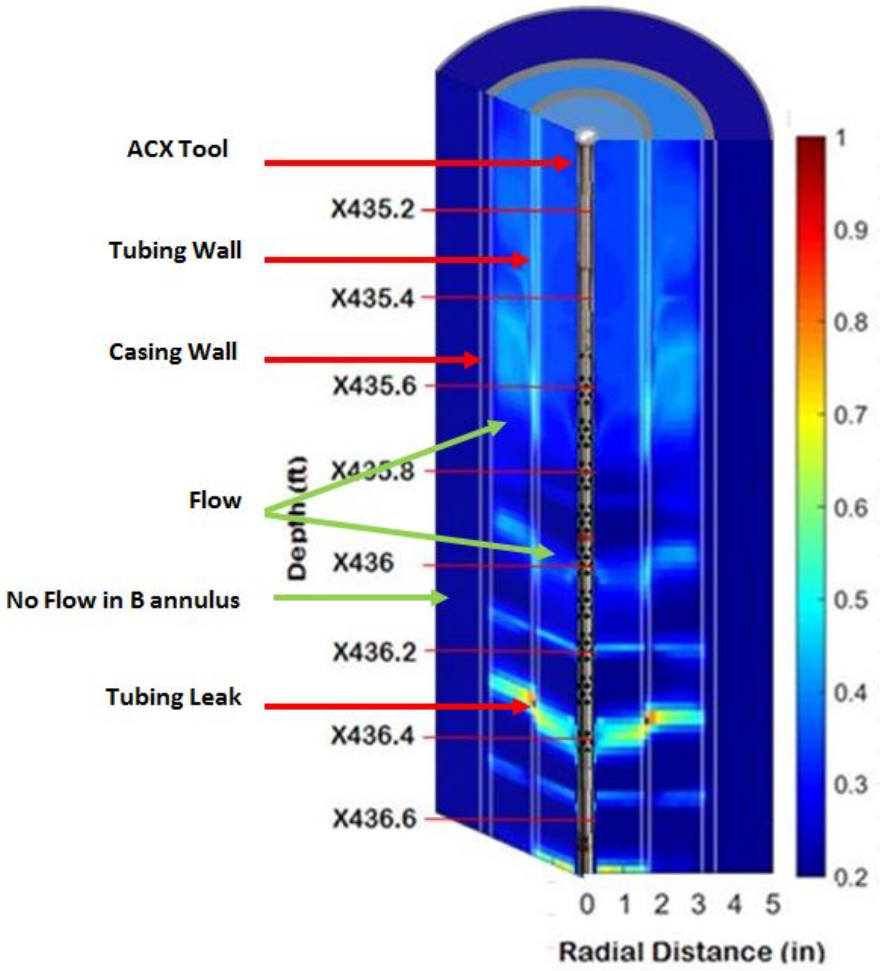


Forward modeling of the same data identifies the depth and radial location of the leak within inches



Examples


Tbg. Wall
Csg. Wall
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0 1 2 3 4 5
Radial Distance (in)


ACX Tool
X435.2
Tubing Wall
X435.4
Casing Wall
X435.6
X435.8
Flow
X436
No Flow in B annulus
X436.2
Tubing Leak
X436.4
X436.6
Depth (ft)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0 1 2 3 4 5
Radial Distance (in)

Local Case Study - Shallow Leak