

# Application and Use of Microdrilling for Vertical Seismic Profiling



**Commercial Vertical Seismic Profiling System**

## Objective of the Project:

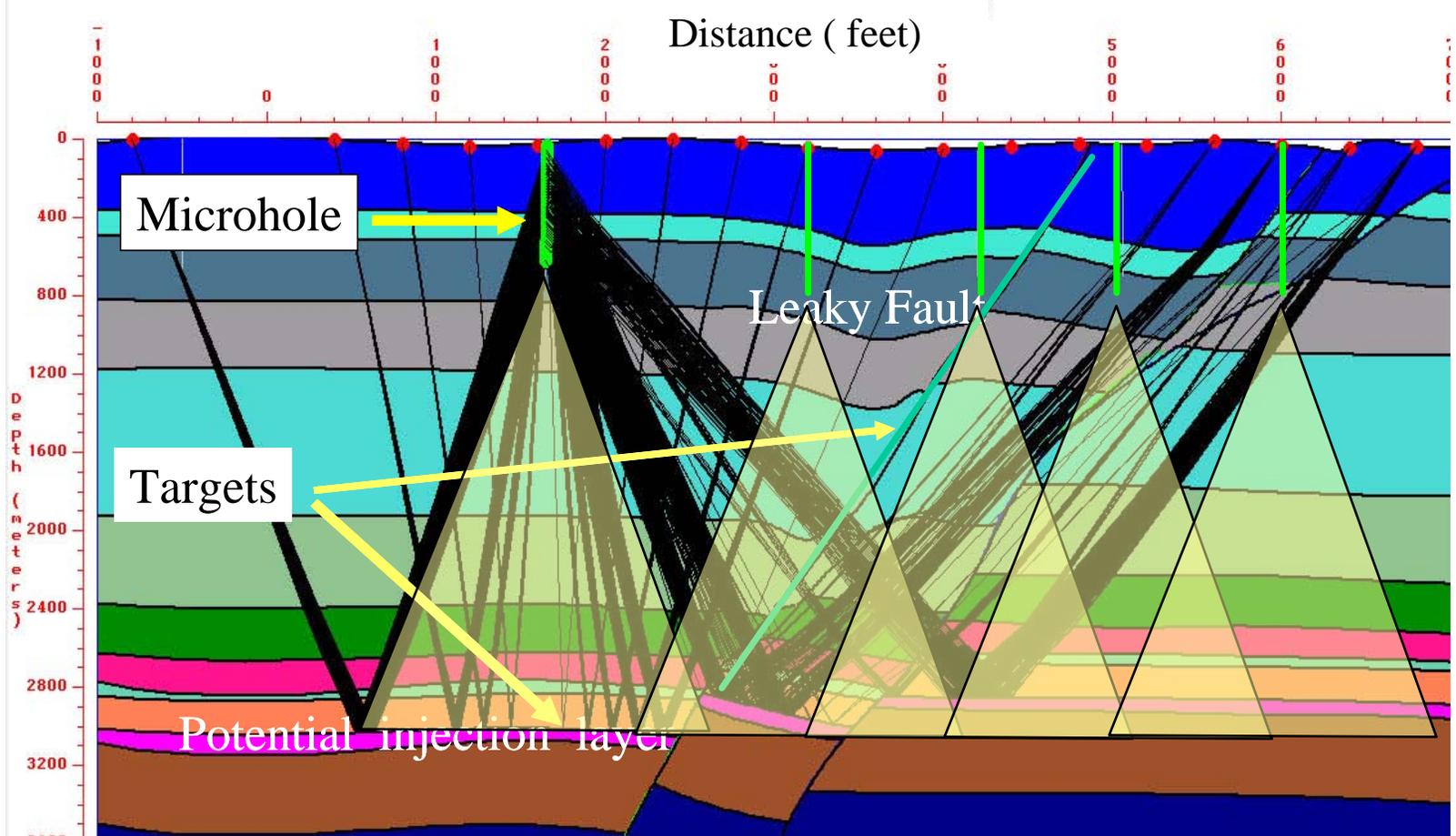
- Demonstrate through field testing that use of micro-holes constitute a viable inexpensive alternative for performing vertical seismic profiles

Lawrence Berkley National Lab  
FEW ESD04-006

*Source: LBNL*



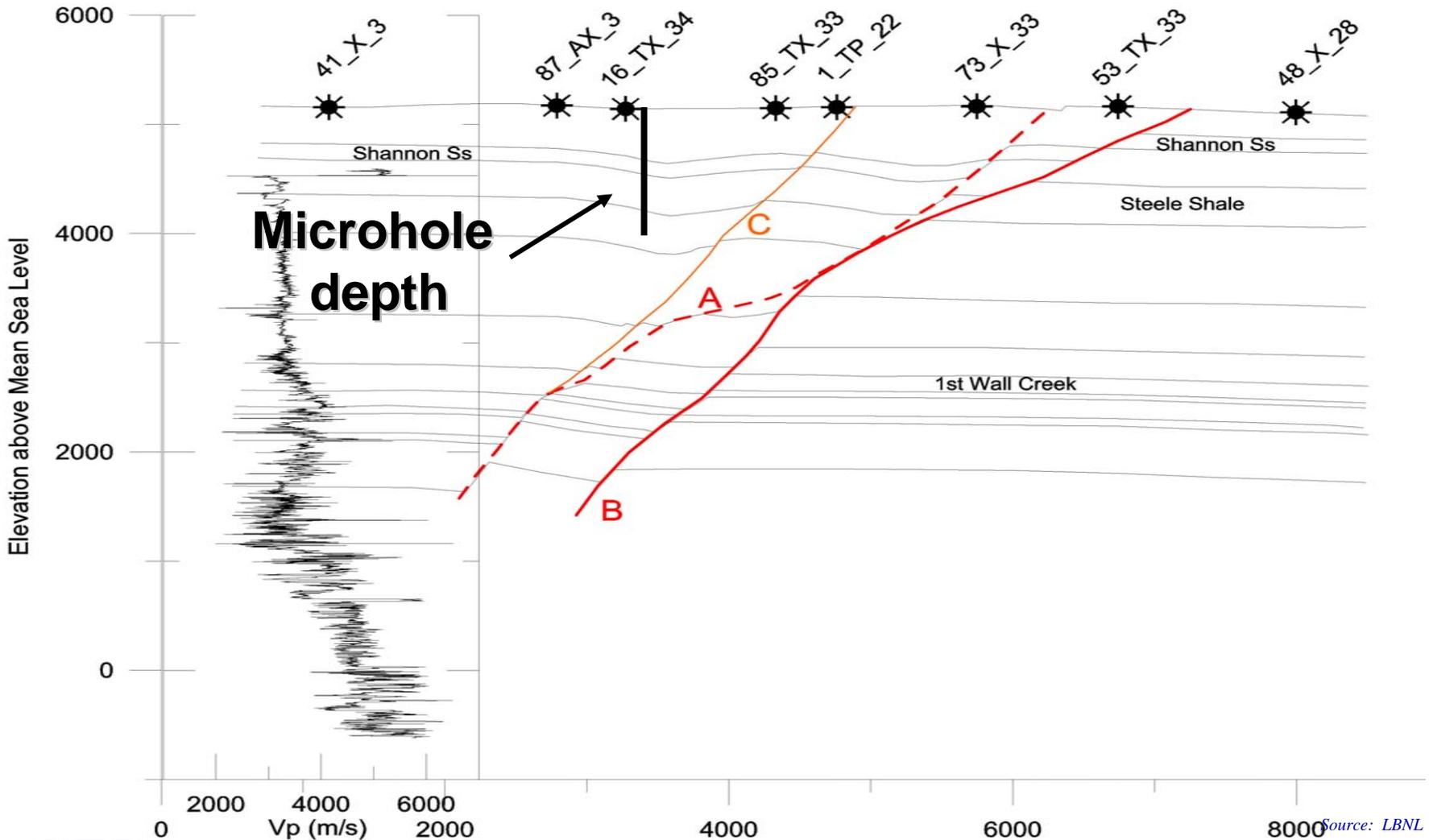
# Basis of Imaging Part of Project at NPR-3, Teapot Dome Field, Wyoming: Establish Potential of Deep VSP Using Microholes



# Entire Vertical Seismic Profiling Microhole System



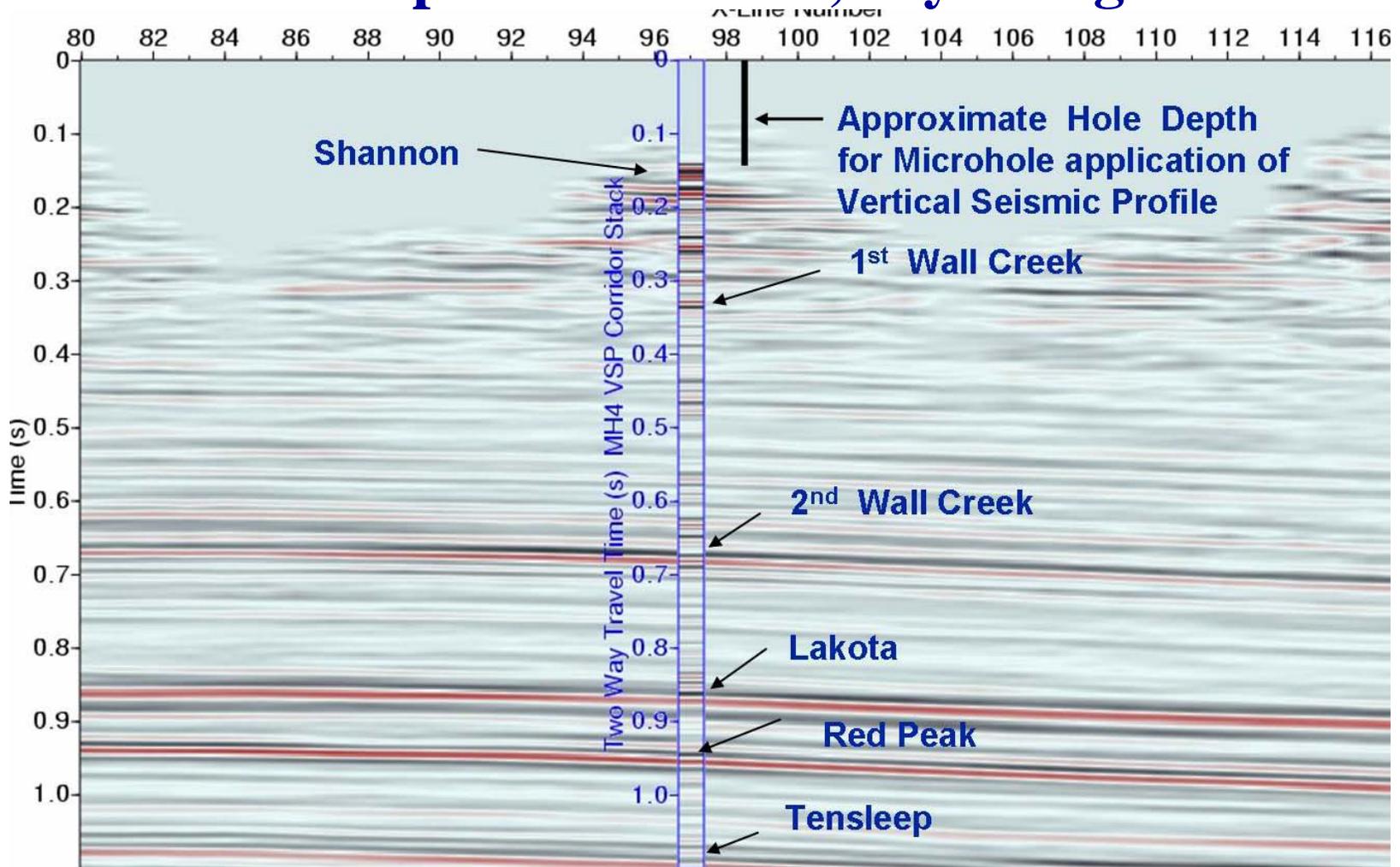
# Application and Use of Microdrilling for Vertical Seismic Profiling – Part of Project at NPR-3, Teapot Dome Field, WY



Source: LBNL



# VSP Compared to Surface Seismic at NPR-3, Teapot Dome Field, Wyoming



Line 243 Teapot Dome Natrona County, Wyoming 3-D Seismic Data Set

e: LBNL



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## Results of Project:

- **Active Seismic**

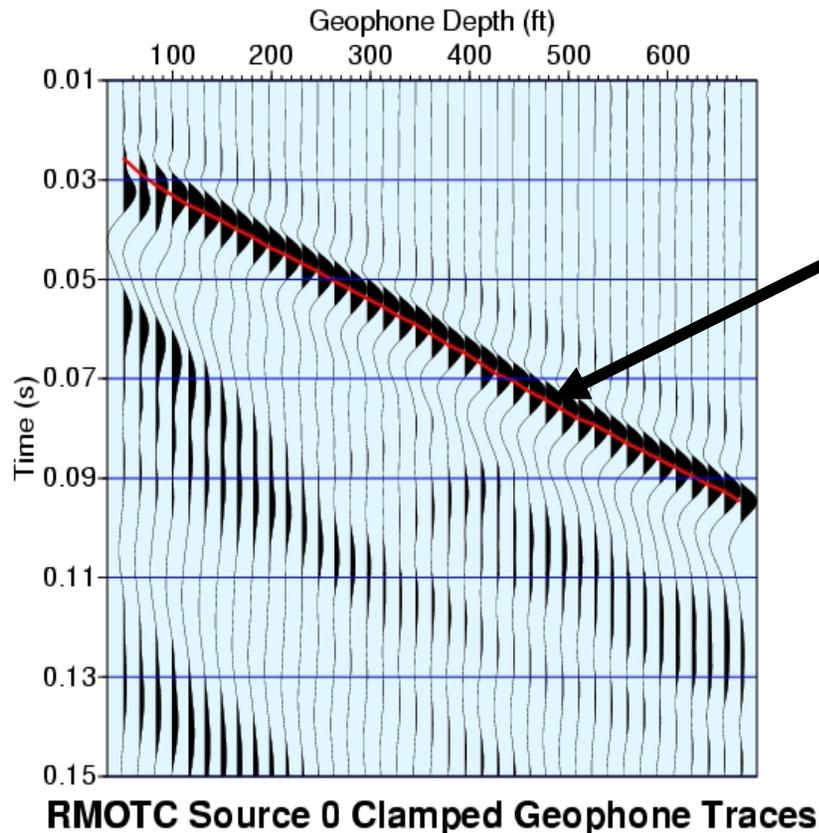
- Microhole VSP can look up to 10 times hole depth
- Resolution ( due to reduced signal to noise) is up to three time better than “ conventional” VSP
- Makes seismic surveys are faster and much cheaper
- Allows operator to easily customize/change surveys for changing reservoir conditions and varying reservoir conditions across any particular field

- **Passive Seismic**

- Critical information on fracture generation, fluid interactions and fluid paths can be obtained from borehole seismic data
- Sensors do not need to be placed at reservoir level
- Sensors do need to be placed away from surface and in sufficient azimuthal coverage to eliminate path effects and obtain data for analysis of source mechanisms critical to understanding fracture generation and analysis.



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**High frequency seismic signal shows, clean first breaks**

## **Publications:**

- Request sent to PI for list of publications and any graphics that captures the essence of the project