Automated High Power Permanent Borehole Seismic Source Systems for Long-Term Monitoring of Subsurface CO_2 Containment and Storage

Award Number: DE-FE0028748

Project Summary:

The primary objective of this project was to develop and validate in an operational field environment a low-cost, automated borehole seismic source system for monitoring geologic carbon dioxide (CO_2) storage. The original scope of the project involved building and testing two types of permanent source, but the project ended up building and delivering three types of permanent seismic source. These sources were delivered to the field test site (Carbon Management Canada's Containment and Monitoring site near Calgary); however, only two of the systems were able to be tested before the contract ended. The reasons for the delay were primarily weather-related at both the U.S. preliminary field test site and the Carbon Management Canada site.

Prime Performer:
GPUSA, Inc.

Key Performers:
Lawrence Berkeley National Laboratory
Carbon Management Canada

Principal Investigator:
James K. Andersen

Project Duration:
10/1/2016 – 7/31/2018

Performer Location:
Chatsworth, California

Field Sites:
Containment Site, Calgary, Canada
Richmond Field Station

Program:
Carbon Transport & Storage

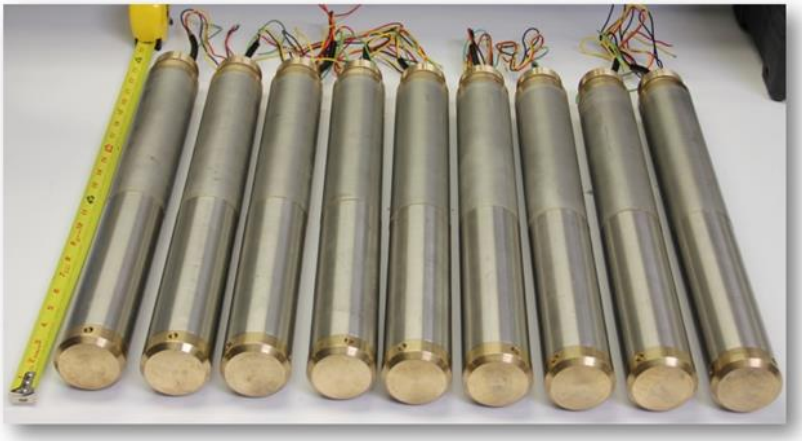

Figure 1: GPUSA's seismic source modules, like those shown here, are capable of both cross-well and vertical monitoring.

Project Outcomes:

Researchers have developed and successfully demonstrated two types of orbital vibrator seismic sources: the downhole orbital vibrator (DHOV) used for high-resolution crosswell surveys, and the MicroVibTM used for high-resolution VSP or other surface seismic surveys. The results of the testing showed that the prototype vibratory seismic sources had power and performance beyond any available on the market at the time of the research.

Presentations, Papers, and Publications

Final Report: Automated High Power Permanent Borehole Seismic Source Systems for Long-Term Monitoring of Subsurface CO_2 Containment and Storage (March 2019) – James Kengo Andersen