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Author(s):	Pantea, Cristian
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Report Q3FY21 - High-Resolution 3D Acoustic Borehole Integrity Monitoring

by Cristian Pantea

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Quarterly Research Performance Progress Report

Federal Agency and Organization: Office of Fossil Energy (FE); National Energy Technology Laboratory (NETL); Geologic Storage Technologies

Recipient Organization: Los Alamos National Laboratory

Project Title: High-Resolution 3D Acoustic Borehole Integrity Monitoring, FWP-FE-855-17-FY17

Report Submitted by: Cristian Pantea
Research Scientist 4
pantea@lanl.gov
505-665-7598

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Project Partners:

- LANL: Cristian Pantea (PI), Dipen Sinha, Eric Davis, Vamshi Chillara, Craig Chavez
- SNL: Jiann-Cherng Su
- ORNL: Hector Santos-Villalobos
- no cost-sharing partners

DOE Project Team:

DOE Project Officer – Mark Ackiewicz
Traci Rodosta
Project Monitor – Natalie Iannacchione

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EXECUTIVE SUMMARY

SubTER Topic 1. Wellbore Diagnostics and Integrity Assessment

Real-time, in-situ, high spatial resolution (sub-cm) imaging of the near-borehole environment would revolutionize wellbore diagnostics and integrity assessment by direct observation of defects. It is becoming increasingly apparent, that better understanding of the near-wellbore environment is required to meet the safety and operational needs in challenging environments such as those present in subsurface energy extraction (geothermal) and storage (CO2 sequestration) applications. Therefore, it is important to have a more robust ability to image the near-borehole and reliably detect defects.
It was proposed to further develop and improve our advanced 3D imaging system to evaluate casing defects (e.g. corrosion) and cement quality in either open- or cased-borehole with the ultimate goal to develop a commercially deployable technology. The system consists of a unique acoustic source (LANL) and advanced inversion techniques for image processing (LANL, ORNL). This system will provide comprehensive borehole integrity monitoring with improved resolution over existing techniques. As an application of this imaging system, we will characterize the effectiveness of next-generation wellbore completion technology (NETL, SNL), and will demonstrate that, unlike current technology, the proposed approach can successfully characterize foamed cements.

ACCOMPLISHMENTS & MILESTONE UPDATE

LANL:
Performed preliminary data analysis on a Sierra White granite samples.

ORNL:
ORNL is wrapping up their image reconstruction work.

SNL:
Onsite work is planned for September 2021, depending on COVID evolution in the state of NM.