SUCCESSFUL DEMONSTRATION OF INNOVATIVE "SENSOR RING" FOR LONG-TERM WIRELESS MONITORING IN THE SUBSURFACE

Developing next-generation sensors to accurately monitor deep subsurface operations.

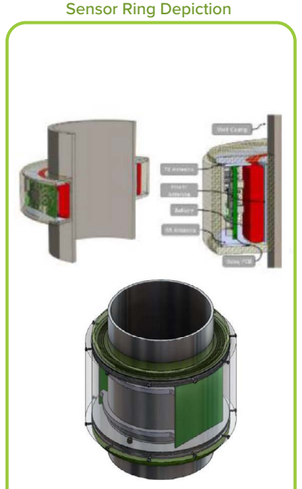
SUBSURFACE SENSOR DESIGN TO TRACK CO_2 IN STORAGE FORMATIONS

Sensor Design Completed

Downhole sensing system is designed to measure temperature as the primary indicator of CO_2 away from the borehole. Key technologies being developed:

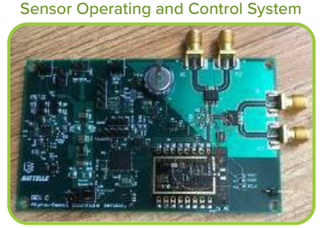
- Central data collection and transmitter
- Wireless charging
- Energy harvesting
- Data relay system to surface
- Encapsulation
- Retrievable wireless battery charging

Sensor Ring Depiction

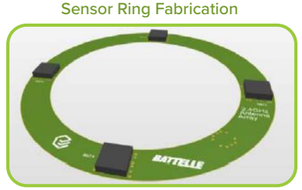


Encapsulation

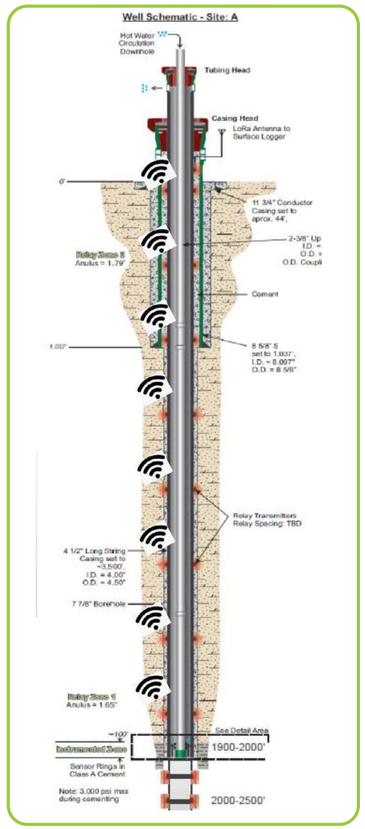
Sensor Operating and Control System



Sensor Ring Fabrication



Well Schematic – Site A



ONGOING WORK FOR MONITORING, VERIFICATION, ACCOUNTING:

- Fabrication of the sensor rings, relay rings, and centralizers has begun. A total of 100 sensor rings/relays will be constructed for field testing in two wells.
- Finalized arrangements for field testing the sensor system in two oil wells in Guernsey County, Ohio. Field testing is planned for November 2021.

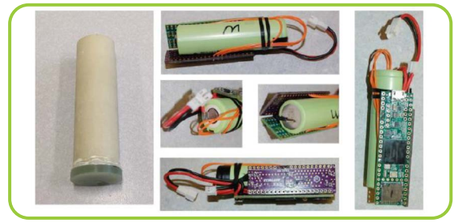
SUCCESSFUL SENSOR SYSTEM OPERATION

Lab-Scale Testing

Sensor prototype was exposed to supercritical CO_2 in a pressure test cell at high temperatures and pressures for 24 hours.

Resin housing protected electronics and showed no corrosion.

Visual Inspection of Sensor Prototype After Exposure Testing



Bench-Scale Testing

Data relay ring communication testing was completed in a series of test pipes with lengths of 3 to 120 feet.

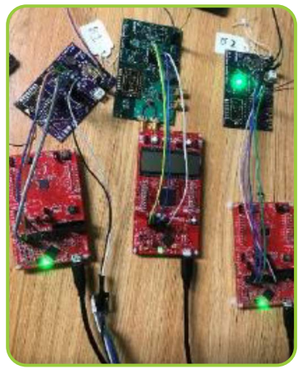
Results demonstrated signal communication through cemented pipe greater than 120 feet.

3- to 120-ft-Long Pipe-in-Pipe Set Up

Functional Testing

A series of tests confirmed operation of temperature sensors, wireless charging, sonic energy harvesting, data handling, and surface logging.

Temperature Sensor Data Handling



Sonic Harvesting and Wireless Charging

PARTNERS

ENGENIUSMICRO

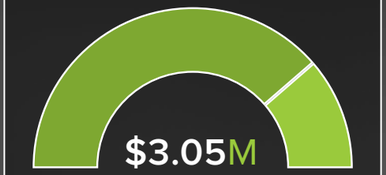
Hopco LTD. AN ENERGY RESOURCE DEVELOPMENT CORP.

BATTELLE

AWARD NUMBER
DE-FE0031850

PROJECT BUDGET

TOTAL PROJECT BUDGET



- DOE $2,374,747
- PERFORMER..... $677,000

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FECM RDD&D PRIORITIES

- DEMONSTRATE AND DEPLOY POINT-SOURCE CARBON CAPTURE
- INVEST IN THOUGHTFUL TRANSITION STRATEGIES

CLICK HERE FOR MORE INFORMATION