16TH GREENHOUSE GAS CONTROL TECHNOLOGIES CONFERENCE

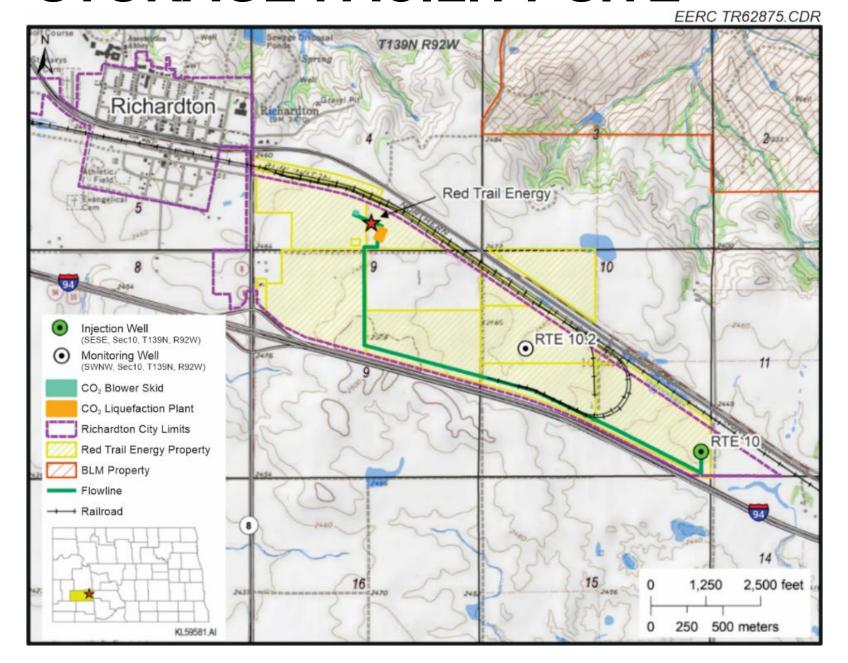
23 - 27 OCTOBER 2022



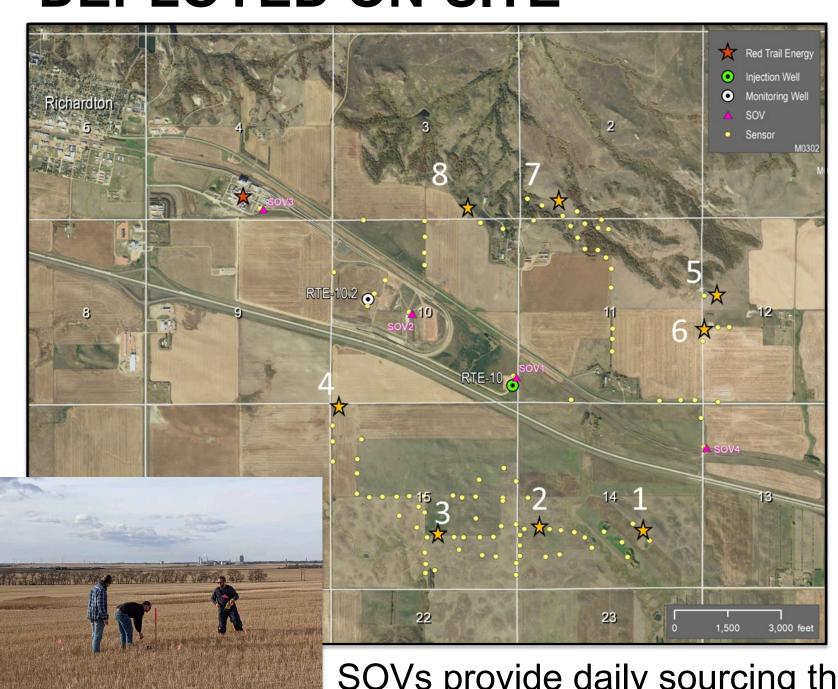
UNDEERC.ORG/RESEARCH

DEMONSTRATING NOVEL MONITORING TECHNIQUES AT AN ETHANOL 180,000-MT/YR CCS PROJECT IN NORTH DAKOTA

RED TRAIL ENERGY (RTE) STORAGE FACILITY SITE

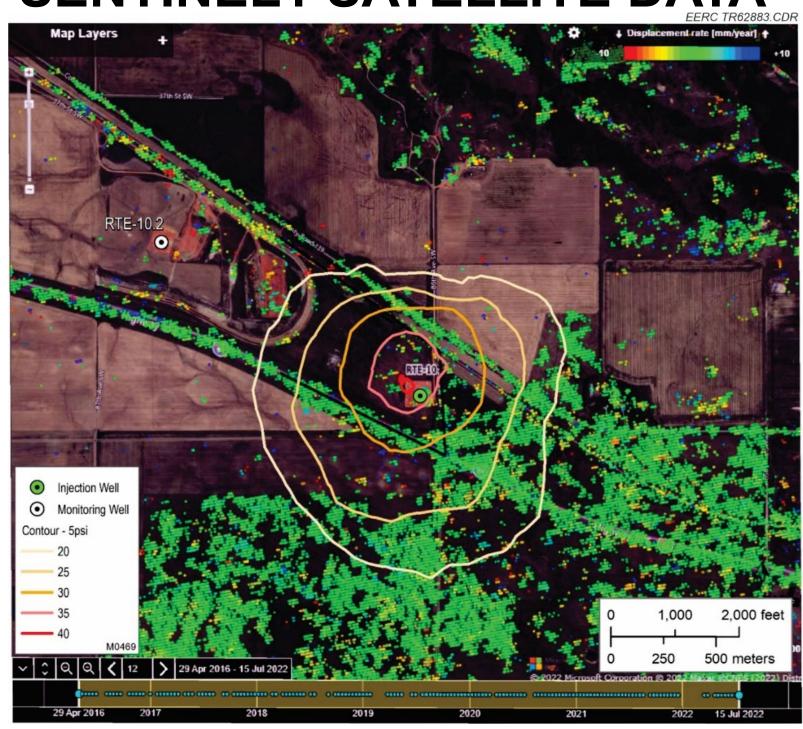


MAPPED SASSA* ARRAYS DEPLOYED ON-SITE

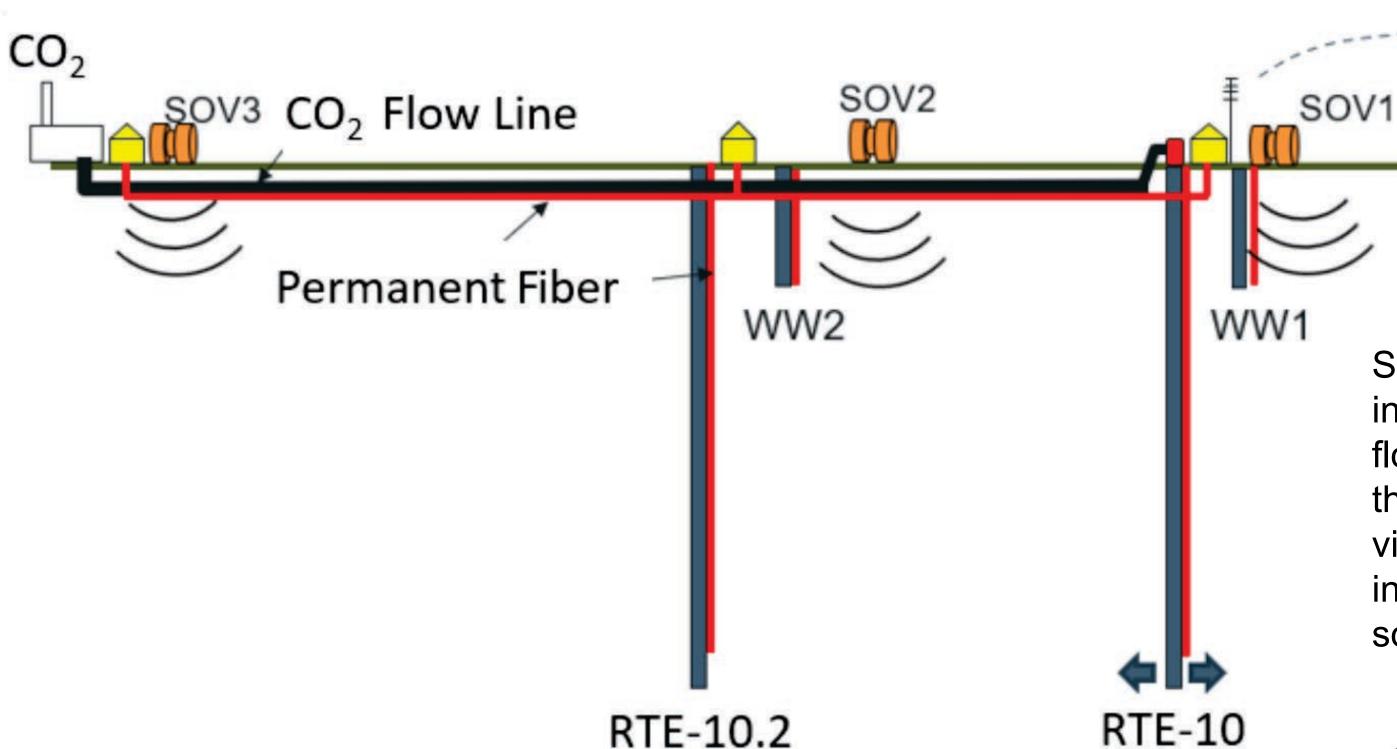


SOVs provide daily sourcing that is recorded on deployed sensors *semipermanent autonomous and permanently installed fiber.

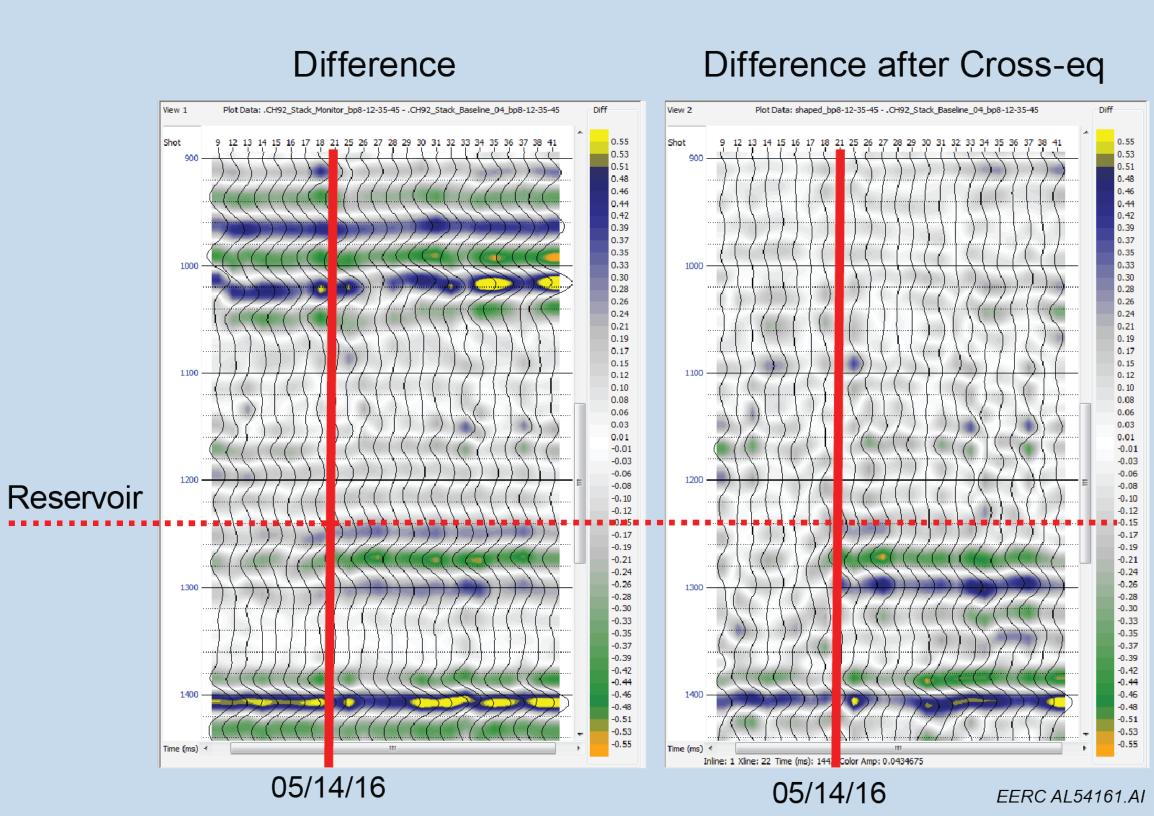
HISTORICAL ANALYSIS OF **SENTINEL1 SATELLITE DATA**



The illustration shows the simulated 5-and 20-year pressure plumes taken from the approved RTE (2021) Class VI well permit. Image credit: SkyGeo.



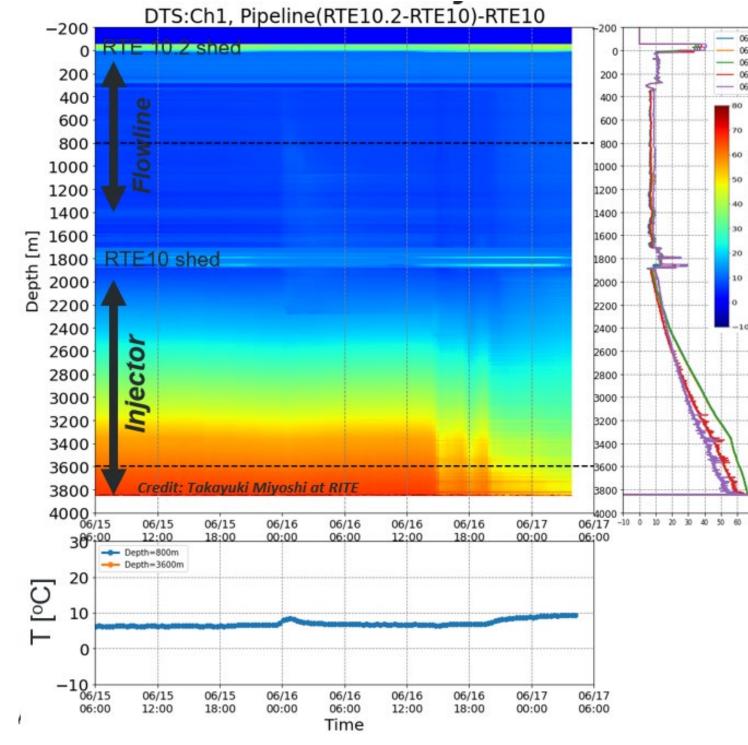
Seismic Source Sensor - Surface Waves ∠ Reflected Waves Depth CO2 Reservoir **Monitor Point** Shot Number Difference



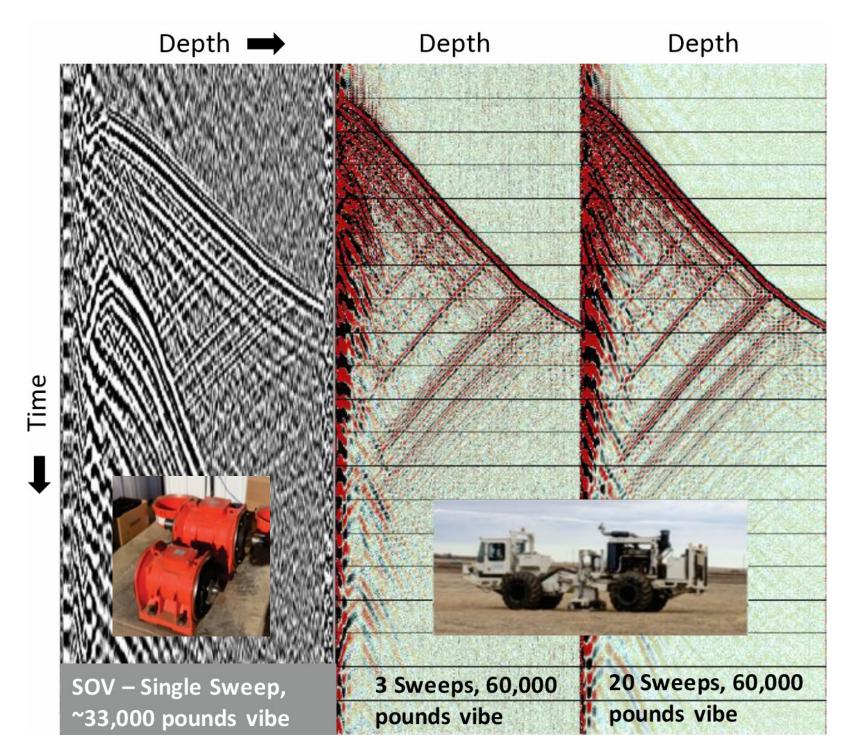
Generalized SASSA surface design for monitoring seismic reflection changes at discrete subsurface locations, indicating a change in CO₂ saturation. Example from Bell Creek, Montana.

Schematic illustrates permanent fiber installed in the injection well, deep monitoring well, CO₂ flowline, and groundwater-monitoring wells and the relative positions of the surface orbital vibes (SOVs). SOVs and permanent fiber installations provide a sustainable monitoring solution at the RTE site.

SOV4



Distributed temperature sensing shows the temperature reduction in the injection well after a few days of initial injection tests.



Comparison of SOV with conventional large vibroseis truck shows great data quality with both source types. The SOV installation (shown on the right) is secured to its foundation inside a shed to reduce cultural noise and protect the equipment from the elements.



spouse seismic array

NORTH DAKOTA.







^aEERC





^bResearch Institute of Innovative Technology for the Earth, 9-2, Kizugawadai, Kizugawa-Shi, Kyoto, 619-0292, JAPAN





