AMPLIFIED GEOCHEMICAL IMAGING LLC

Technical Note

The Benefits of Passive Soil Gas Monitoring for CO_2

AGI performs CO_2 monitoring using passive sensors that are inserted into the ground to a depth of approximately 60–70 cm and deployed for a period of approximately 7 days. The passive sampler contains a specially engineered adsorbent encased in a microporous membrane. These membrane pores are small enough to prevent soil particles and water from entering, but large enough to allow CO_2 molecules and hydrocarbon compounds to pass through and adhere to the adsorbent material. During that 7-day installation, the CO_2 concentration equilibrates with insitu soil concentrations. This time averaged measurement system provides stable and reproducible readings.

After retrieval, the modules are sent to the United States to be analyzed using GC/MS. The sample CO_2 concentrations are then quantified against a 5-point calibration curve to provide maximum accuracy.

The modules are deployed in unbiased grid patterns over the maximum plume demarcation boundary. This strategy allows survey designs to reflect subsurface geology, faulting, and structural trends. This deployment strategy is a critical differentiator as compared to other methods.

Key Advantages of AGI's CO_2 Monitoring Technology

Unbiased Grid Deployment

- Critical for programs where potential surface leakage points are unknown.
- Ensures that leaks are not missed due to insufficient spatial coverage.
- Unlike point-based methods such as Vertical Seismic Profiling (VSP) or Cross-Well Seismic (CWS), the grid provides areal coverage across the entire site, as opposed to single-point monitoring.

Comprehensive Monitoring Capability

Detects CO_2 migration to surface along faults and fractures, as well as leakage pathways associated with injection wellbores, plugged and abandoned wells, and orphaned wells.

High Sensitivity

Capable of detecting CO_2 leakage at very early stages well before leaks become operationally significant or catastrophic. Early detection reduces operational risk and provides valuable time for mitigation. The method is orders of magnitude (up to 10,000×) more sensitive than conventional 2D or 3D seismic imaging for near-surface leak detection. Surface seismic imaging can map CO_2 plumes but is not well suited for detecting leakage.

Proven Field Performance

AGI has been involved in global CCUS projects since 2000. This includes a multi-year CO_2 monitoring in the Krechba Field in Algeria (2015–2020), and a CCUS project in Oman's Yibal Field within the Fahud Salt Basin.

EPA-Validated Technology

AGI's technology has been validated under the U.S. EPA's Environmental Technology Verification (ETV) program. This independent validation forms the technical and regulatory foundation of AGI's CO_2 monitoring solution.

Benefits of Passive Sampling

Provides **results that are more reflective of insitu concentration** due to the fact they are:

- time integrated,
- not affected by soil permeability,
- not affected by soil moisture,
- Not affected by soil heterogeneity like grab samples.

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