



PROJECT ID:
568

Evaluation of Various Real-Time Monitors to Accelerate On-Site Analysis for Vapor Intrusion



A number of COTS instruments including this one will be demonstrated in this NESDI effort that seeks to identify the most reliable device for the mobile analysis of indoor air and soil gas samples. (Photo Credit: Travis Lewis)

OBJECTIVE:

The purpose of this project is to identify the most reliable on-site mobile analyzer for indoor air and soil gas samples to be used as tool to expedite vapor intrusion (VI) investigation. Project investigators will identify and validate alternative commercial-off-the-shelf (COTS) instruments for implementation of this proven and effective approach to investigate the VI pathway.

On-site analysis of air and soil gas samples with real-time results provides the ability to “follow the smoke trail” of the VOC source.

PROBLEM STATEMENT:

One of the most challenging health risks facing regulators in recent years is the vapor intrusion of volatile organic compounds (VOC) from soil or groundwater to indoor air. On-site analysis of air and soil gas samples with real-time results provides the ability to “follow the smoke trail” of the VOC source. This approach can yield investigation results that are timelier and more accurate than conventional investigation approaches. As a result, it has proven popular with a number of VI practitioners.

Currently, most projects utilizing the real-time investigation approach use a Gas Chromatograph/Mass Spectrometer (GC/MS) for on-site analysis of air samples. Although performance of a GC/MS may be sufficient for this application, instrument reliability can be a recurring problem. Some investigators that have used a GC/MS have experienced mechanical failure during field testing. Instrument failure results in incomplete site investigations, delay and increased expense.

DESCRIPTION:

Five COTS instruments have been identified for potential inclusion in this demonstration. Each of these technologies will be evaluated for inclusion in the study based on availability and vendor-reported performance capabilities.

The instrument evaluation will be conducted in two one-week phases:

1. A bench-top evaluation using control samples with known concentrations of target VOCs.
2. A field evaluation at a Department of Defense site with known or potential VI concerns.

To ensure comparability, all of the selected instruments will be evaluated together during each phase of the study. Before the bench-top study, the project team will define minimum acceptable criteria for accuracy. Any instrument that does not meet the minimum acceptable criteria will not be retained for the field evaluation. It is expected that at least three instruments will be selected for inclusion in the study.

During bench top testing, accuracy and precision will be tested by analyzing control samples with known concentrations of VOC. The same samples will be measured replicate times to determine whether there is any variance in readings. Instruments will be tested for sensitivity by determining the lowest VOC concentration at which accuracy and precision goals can be achieved.



The effect of normal instrument use on stability will be evaluated by analyzing replicate samples at multiple points, including before and after normal-use activities. Efficiency evaluation will include instrument throughput (the number of site samples that can be analyzed per unit time) as well as the potential for carryover (analyte retained by the instrument during one analysis potentially impacting results in subsequent analyses). On-site calibration and maintenance requirements will also be evaluated in the bench-top testing.

All instruments meeting minimum performance standards during the bench-top evaluation will be carried forward into the field evaluation to be conducted at an actual VI investigation site.

All the instruments will be evaluated against manufacturer performance criteria, which was previously demonstrated in an Environmental Security Technology Certification Program (ESTCP) study (Use of On-Site GC/MS Analysis to Distinguish between Vapor Intrusion and Indoor

Sources of VOCs (ER-201119)). The field evaluation will serve to verify the instrument performance and efficiency under actual field conditions. Questions surrounding ease of use (Is special training needed?) and flexibility (Can the instrument's operation be modified for specific applications?) will be reviewed and answered.

On-site analysis with real-time decision making is a proven method for the successful evaluation of vapor intrusion. Validation of alternative instruments will significantly expand the application of the method at Navy sites by providing field investigators confidence that the selected instrument will perform as expected.

TRANSITION DESCRIPTION:

Transitioning the results of this project will be accomplished through development of an electronic planning tool and user guide for Remedial Project Managers that will summarize instrument performance as documented in this study. The layout of the tool and user guide will prioritize easy-to-understand tables and graphics. In addition, guidelines for instrument

selection based on specific project requirements (e.g., instrument sensitivity) and practical considerations (e.g., ease-of-use) will be included. The guide also will provide information in instrument costs and purchase/rental options.

Project information may also be used in Naval Facilities Engineering Command (NAVFAC) technology transfer initiatives such as the Remedial Innovative Technology Seminar (RITS) and training programs including the Navy's Advanced Environmental Restoration course. Results of the demonstration will also be presented at relevant meetings and conferences.

The project team also plans to transition the technology to targeted non-federal sectors such as manufacturing and other operations-intensive industries.

CONTACT:

For more specific information about this project, contact the Principal Investigator at 805-982-5036. Contact the NESDI Program Manager at 805-982-4893 for more general information about the program.



ABOUT THE NESDI PROGRAM

The Navy Environmental Sustainability Development to Integration (NESDI) program is the Navy's environmental research and development demonstration and validation program, sponsored by the Chief of Naval Operations Energy and Environmental Readiness Division and managed by the Naval Facilities Engineering Systems Command from the Engineering and Expeditionary Warfare Center in Port Hueneme, CA. The mission of the program is to provide solutions by demonstrating, validating and integrating innovative technologies, processes and materials and by filling knowledge gaps to minimize operational environmental risks, constraints and costs while ensuring Navy readiness and lethality.

Visit the program's public website at <https://www.navfac.navy.mil/NESDI> for more information.