



**MULTI-STATE EVALUATION OF THE SITE  
CHARACTERIZATION AND ANALYSIS  
PENETROMETER SYSTEM VOLATILE  
ORGANIC COMPOUND (SCAPS-VOC)  
SENSING TECHNOLOGIES**

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**-FINAL-**

**December 1997**

**Prepared by  
The Interstate Technology and Regulatory Cooperation  
Accelerated Site Characterization Work Team**

## **ABOUT ITRC**

Established in 1995, the Interstate Technology & Regulatory Council (ITRC) is a state-led, national coalition of personnel from the environmental regulatory agencies of some 40 states and the District of Columbia; three federal agencies; tribes; and public and industry stakeholders. The organization is devoted to reducing barriers to, and speeding interstate deployment of, better, more cost-effective, innovative environmental techniques. ITRC operates as a committee of the Environmental Research Institute of the States (ERIS), a Section 501(c)(3) public charity that supports the Environmental Council of the States (ECOS) through its educational and research activities aimed at improving the environment in the United States and providing a forum for state environmental policy makers. More information about ITRC and its available products and services can be found on the Internet at [www.itrcweb.org](http://www.itrcweb.org).

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## ACKNOWLEDGMENTS

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The SCAPS-VOC work team also wishes to acknowledge the US Army Environmental Center and the US Army Corps of Engineers Waterways Experiment Station for their support and effort in making this effort a success.

## EXECUTIVE SUMMARY

A series of innovative sensors have recently been developed for deployment with the Tri-Service - Site Characterization and Analysis Penetrometer System (SCAPS) which offer the potential to characterize hazardous waste sites more rapidly and efficiently. Under the sponsorship of the Environmental Security Technology Certification Program (ESTCP), the U.S. Army Corps of Engineers Waterways Experiment Station (WES) and the U.S. Army Environmental Center (AEC) have conducted field verification demonstrations of two configurations of in-situ volatile organic compound (VOC) field screening technologies using the SCAPS; the Thermal Desorption VOC Sampler and the HydroSparge VOC Sensing System. The Thermal Desorption VOC Sampler is capable of detecting subsurface VOC contamination in the vadose zone, while the HydroSparge VOC Sensor provides detection of VOC contamination in the saturated zone.

The SCAPS VOC technologies were selected by the Interstate Technology and Regulatory Cooperation (ITRC) Work Group to undergo a technology evaluation. The Accelerated Site Characterization (ASC), Subtask II - SCAPS New Sensor Development Review Team (SCAPS Team) was established by the ITRC to facilitate interstate acceptance of SCAPS technologies. The recent effort of the SCAPS Team was directed to an evaluation of the SCAPS deployed HydroSparge VOC Sensor and the Thermal Desorption VOC Sampler.

As part of the SCAPS VOC technologies evaluation process, SCAPS Team members have participated in a number of field demonstrations, reviewed workplans, and scrutinized data. Field demonstration protocols outlined in the workplans and data obtained through field verification of the SCAPS VOC sensor/sampler have been investigated by the SCAPS Team members with emphasis on state specific; field screening, data interpretation, and site characterization issues.

The SCAPS Team has concluded that the HydroSparge VOC Sensor and the Thermal Desorption VOC Sampler should be considered site characterization tools for field screening applications. Based on the findings of the SCAPS Team evaluation of the HydroSparge VOC Sensor, it is recommended that all ITRC member states pursue acceptance of this technology. The SCAPS Team is conducting further review of field data for the Thermal Desorption VOC Sampler, and will provide a future update regarding a determination on the acceptability of the technology and recommendation for full ITRC concurrence.

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# MUTLI-STATE EVALUATION OF THE SITE CHARACTERIZATION AND ANALYSIS PENETROMETER SYSTEM VOLATILE ORGANIC COMPOUND (SCAPS-VOC) SENSING TECHNOLOGIES

## 1.0 INTRODUCTION

The ITRC-ACS Subtask II, SCAPS Team, in conjunction with the Department of Defense, is evaluating site characterization technologies developed through the Tri-Service (Army, Navy and Air Force). Two new SCAPS deployed sensors/samplers, the HydroSparge VOC Sensing system and the Thermal Desorption VOC Sampler were selected for an evaluation by the SCAPS Team. These VOC Sensor/Sampler technologies, which have been developed for deployment with cone penetrometer systems, offer the opportunity to characterize hazardous waste sites more rapidly and efficiently.

In 1995, the Cone Penetrometer Technology (CPT) Task Group was established under the direction of the ITRC Work Group to facilitate interstate acceptance of the SCAPS-Laser Induced Fluorescence (LIF) site characterization technology. The CPT Task Group's participation in the review of SCAPS protocol, demonstration evaluations, and the California verification process resulted in formal acceptance of the technology by the 7 member Task Group states; California, New Jersey, Idaho, Utah, Louisiana, Nebraska and New Mexico. A report dated May 1996 (Multi-State Evaluation of an Expedited Site Characterization Technology, SCAPS-LIF) details the evaluation process and findings of the CPT Task Group. The conclusions of the May 1996 report acknowledges the states' support for the application of the SCAPS-LIF technology and provides an endorsement by the CPT Task Group of the California certification decision.

The process, initiated by the ITRC, to facilitate interstate acceptance of site characterization technologies is being continued by the SCAPS - New Sensor Development Review Team, a subgroup within the ITRC ASC Team. The SCAPS Team focused on an evaluation of two SCAPS VOC sensor/samplers, 1) the HydroSparge VOC Sensing System, and 2) the Thermal Desorption VOC Sampler. These two systems are capable of providing rapid, in-situ, subsurface measurement and distribution of VOC contamination, and in combination with SCAPS provides standard CPT data, including physical characteristics of soil.

The states' collaboration on the SCAPS technologies evaluation gave SCAPS Team members the opportunity to share information on their respective states' acceptance criteria for field measurement technologies. The SCAPS Team members developed an understanding of the SCAPS VOC technologies by participation in technology demonstrations and evaluation of verification data. The SCAPS Team members were provided an opportunity for full participation, along with access to the available data, for the purpose of achieving acceptance of the SCAPS VOC technologies within their respective state agency. The ultimate goal of the SCAPS Team effort is to encourage state regulators to pursue acceptance of the SCAPS technologies based on the SCAPS Team findings.

## 2.0 TECHNOLOGY DESCRIPTION

The HydroSparge VOC Sensor and the Thermal Desorption VOC Sampler, in concert with an ion trap mass spectrometer (ITMS), detect VOC contamination in the saturated and unsaturated zones, respectively. The HydroSparge VOC Sensor utilizes a commercially available Hydropunch™ or Powerpunch™ direct push groundwater sampling device to access the groundwater. The Hydropunch™ is pushed to the desired depth and the push rods are retracted, exposing the Hydropunch™ screen to the groundwater. The groundwater enters the Hydropunch™ and comes to equilibrium, which generally takes less than 15 to 20 minutes. The in situ sparge module, developed by Oak Ridge National Laboratory, is then lowered into the newly created well and operated at the groundwater interval approximately 18 inches below the water table. The sparge module purges the VOC analytes in situ from the groundwater using helium gas. The volatile organics sparged out of the water are carried by a transfer line to an onboard field portable ion trap mass spectrometer (ITMS), where the contaminants are analyzed in real-time. The ITMS, using the conditional EPA Method 8265, is capable of semi-quantitative detection of most VOCs in the low ppb range.

The Thermal Desorption VOC Sampler principle of operation is based on the capture of a known volume of soil in situ and heating the soil plug while purging the released VOCs. The sample probe is pushed to the desired depth below ground surface and an interior rod retracts the penetrometer tip. The probe is then pushed further into the soil, collecting an approximate 5 gram soil plug in the sample chamber. The soil plug is heated, releasing the VOCs. The released VOCs are carried to the surface by an inert gas where they are trapped on an adsorbent media. The adsorbent trap is then thermally desorbed into an onboard, field portable ITMS where the contaminants are analyzed in near-real time. The ITMS, using the conditional EPA Method 8265, is capable of detecting most VOCs qualitatively and quantitatively in the sub-ppm range. The soil plug is then expelled from the sample chamber. The sample chamber is heated and purged to remove any residual contamination. This process can be repeated at multiple depths during a single push.

## 3.0 BACKGROUND

The HydroSparge VOC Sensor and the Thermal Desorption VOC Sampler technologies have been developed to address many of the current problems associated with site characterization. SCAPS combines traditional cone penetrometer technology with the VOC sensor and sampler to quickly and inexpensively provide a profile of contaminants and geophysical properties at hazardous waste sites. SCAPS technology verification demonstrations comparing the HydroSparge VOC Sensor and the Thermal Desorption VOC Sampler with conventional VOC field sampling and analytical methods have been conducted at Bush River Study Area, Aberdeen Proving Ground, MD in June 1996, Davis Global Communications Site, McClellan Air Force Base, CA in November 1996, U.S. Army Cold Regions Research and Engineering Laboratories (CRREL), Hanover, NH in June 1997, and Fort Dix Army Installation, Wrightstown, NJ in June 1997.

ITRC state representatives met in Philadelphia on September 25, 1996 to discuss the direction and focus of the SCAPS Team. Interested ITRC member states participated in the group discussion, and

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a plan of action evolved based on input from the states attending the breakout session. A consensus was reached by the interested states that the SCAPS Team would undertake an evaluation of the SCAPS VOC technologies through participation in the SCAPS technology demonstrations, review of demonstration workplans and protocol, and evaluation of verification data.

As part of the evaluation process, SCAPS Team members and other state representatives participated in the demonstrations held at Aberdeen Proving Ground, McClellan AFB, Fort Dix Army Installation and the CRREL site. In addition, SCAPS Team members provided input on workplans, demonstration protocols, and verification data based on their own states' data and performance requirements. Throughout the evaluation process an effort was made by the SCAPS technology developers to address states' concerns and issues as deemed appropriate.

#### **4.0 METHODOLOGY**

The Technology Demonstration Plan, (Tri-Service Site Characterization and Analysis Penetrometer System (SCAPS) Validation at McClellan Air Force Base, California, September 1996) for the Tri-Service SCAPS validation at McClellan Air Force Base, California was reviewed by the SCAPS Team. Comments were solicited to identify and suggest amendments to the plan that would enhance acceptance of the SCAPS VOC technologies.

The demonstration/validation conducted at the Strategic Environmental Research and Development Program (SERDP) National Test Site at McClellan AFB, CA, was attended by SCAPS Team members from California, New Jersey, Ohio, New Mexico, Nebraska, Louisiana, and Idaho. The purpose of the McClellan field work was to assess the comparability of the data obtained by the HydroSparge VOC Sensor (HS) and the Thermal Desorption VOC Sampler (TDS) to that obtained and analyzed by conventional sampling and analytical methods.

Since the McClellan AFB - Davis site field work presented difficulties that hindered the generation of suitable SCAPS TDS verification data, additional demonstration/validation field work was carried out at the CRREL, Hanover, NH site. The CRREL field investigation was attended by representatives from the State of New Jersey, Department of Environmental Protection. Verification sampling was observed over the course of two days. TDS verification soil samples were collected adjacent to the TDS sampling sites with a CPT deployed split spoon sampler. Soil verification samples were collected and handled by a number of techniques including; methanol preservation, California brass sleeves, and Encore7 samplers for direct measurement by the TDS/ITMS. The methanol preservation samples were extracted, immediately placed in methanol in accordance with the method of Hewitt (1994)<sup>1</sup>, and sent off-site for analysis by EPA Method 8260A. The Brass

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<sup>1</sup>. Hewitt, A.D. 1994, "Comparison of Methods for Sampling Vadose Zone Soils for Determination of Trichloroethylene", Journal of the American Association of Official Analytical Chemist, Vol. 77,458-462.

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sleeve samples were immediately capped and sent off-site for analysis by method 8260A. Direct verification of the TDS was accomplished by placing samples from the split spoon sampler directly into the probe, thermally desorbing them, and analyzing the VOCs with the ITMS on board the SCAPS truck.

State representatives from New Jersey, Utah and Louisiana were present at the HS field work that was conducted at the Fort Dix Army Installation. The primary objective of the Fort Dix field work was to collect additional higher concentration VOC data for the verification data base. Fort Dix provided known areas of high VOC contamination, especially tetrachloroethylene and trichloroethylene. Several other areas at the base, known to have historical discharges of fuels containing benzene, toluene, ethylbenzene and xylene, were investigated using the SCAPS HS for the purpose of collecting additional validation samples.

SCAPS Team members that attended the field demonstrations collectively agreed that they gained a better understanding of the equipment and potential concerns that would have to be addressed prior to supporting the application of the SCAPS VOC technologies. As a result of SCAPS Team members' participation at the field demonstrations, a number of concerns were expressed regarding the SCAPS VOC technologies. Refer to Appendix A for a complete text of individual state comments.

## 5.0 SUMMARY

The ITRC Work Group is directed at encouraging state-to-state relationships and activities to advance the development, demonstration, and deployment of innovative environmental technologies.

The approach taken by the SCAPS Team was to directly involve those interested ITRC member states in the technology evaluation process as a means of facilitating interstate acceptance and use of the SCAPS technologies. With the opportunity for full participation, as well as access to the available data, it was anticipated that SCAPS Team members would support the application of the SCAPS VOC technologies and obtain acceptance within their respective state programs.

SCAPS Team members had an opportunity to review and comment on the demonstration workplan and to observe the McClellan field demonstration activities first-hand. This provided members not only first-hand knowledge of how the technologies operate, but the opportunity to discuss the operational principles and application of the SCAPS VOC technologies with the team of scientists, engineers, and technicians who developed and operate the system. In addition, attendance at the demonstrations allowed SCAPS Team members to exchange ideas about the technologies and provided an opportunity to compare state specific criteria for the use of field measurement technologies.

SCAPS Team members from Louisiana, New Jersey, Nebraska, and Ohio reviewed the SCAPS Technology Demonstration Plan, Tri-Service Site Characterization and Analysis Penetrometer System (SCAPS) Validation at McClellan Air Force Base, California, September 1996. Few comments were generated by states due to the condensed time line for submittal, and their initial unfamiliarity with the technology. Reviewers from the State of Ohio had specific comments

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regarding the collection of verification samples after the HS samples were collected. The concern was that most VOCs would be volatilized within the sample interval prior to collection of the verification samples. The sparging of contaminants is directed at a very small volume of water within the screened interval, therefore the influence of sparging on the greater volume of water, from which verification samples are collected, is negligible. However, to eliminate bias for potential loss of VOCs during sparging, verification sample collection with a bailer is conducted prior to collection of HydroSparge samples. Sample collection utilizing a bailer was reported to have little effect on contaminant loss as demonstrated by the generally good correlation between the laboratory analytical data and the Hydrosparge field data. Other comments from Ohio pertained to the Methanol preservation of verification soil samples, borehole grout formulations, and criteria to be utilized for determining whether formation water is present prior to groundwater sample collection. Overall, the SCAPS Team members did not have significant concerns with the Technology Demonstration Plan for McClellan.

State representatives from California, Idaho, Louisiana, Nebraska, New Mexico, New Jersey, and Ohio attended the McClellan demonstration on February 19, 1997. SCAPS Team members provided a written summary of their observations and comments on the SCAPS VOC technologies based on their participation at the McClellan Visitor Day, (Refer to Appendix C). Concerns raised by SCAPS Team members, as a result of their involvement at the field demonstration, were responded to by Mr. George Robitaille (U.S. Army Environmental Center, Aberdeen Proving Ground) and Dr. Bill Davis (U.S. Army Corps of Engineers, Waterways Experiment Station) at the June 2, 1997 ITRC meeting in Washington D.C.

The following represent a few of the major concerns raised by SCAPS Team members after observing the HydroSparge VOC Sensor at the McClellan AFB demonstration:

- !loss of analyte during transfer of VOCs to surface
- !possible loss of VOCs due to bailing procedure for verification sample
- !unorganized data presentation
- !need for additional data

The HydroSparge VOC Sensor assembly incorporates a teflon transfer line directly to the ITMS without filtration. The teflon line is purged until a steady state is achieved. During a discussion at the Washington, DC meeting in June, 1997, it was explained that the only apparent loss of analyte occurs during transfer of high concentration VOCs due to adsorption VO analytes into the Teflon transfer line. There is no effect of analyte adsorption on quantitative results due to the fact that standards for calibration are run under the same conditions as samples. It was further pointed out that since the HS measurement is a steady state measurement, any bias in groundwater sampling due to analyte adsorption is compensated in the calibration curve. The analyte adsorption is a concern as carry over (desorption after sampling is completed) between samples and only occurs significantly at water concentrations greater than 1 ppm. Desorption of analytes (particularly PCE and toluene) is monitored between samples by running blanks before and after each data acquisition. Further confirmation that loss is not occurring is evident by way of the reproducible calibration curves.

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The technique of bailing to collect verification samples is considered to be consistent with most state procedures, however some states prescribe to a low flow sampling technique for collection of VOC samples. The responses by Dr. Davis pointed out that, since the HS uses a 1" OD (0.75" ID) PVC screen, small diameter Teflon bailers are the only groundwater sampling tools available to obtain groundwater samples for verification analysis. Careful bailing appears to provide representative groundwater from the direct push wells, based on the strong correlation observed for the bailed verifications samples (EPA method 8260) results with the data generated by the HS.

A detailed data package was provided to all SCAPS Team members that included raw HS data, laboratory QC data, and tabulated summary data for both the HS and verification sample results. SCAPS Team members encountered difficulties in deciphering some of the information presented in the data package. A presentation by Dr. Davis regarding details of the data package took place at the June 2, 1997, ITRC meeting in Washington, DC. Further discussion of the SCAPS VOC technologies and verification data, with SCAPS Team members, took place during a August 21, 1997 conference call. Dr. Davis responded to criticism about the organization of the data and committed to reformatting the data package to improve the presentation of the data. Subsequent data packages, which includes HS data from the Fort Dix, NJ field demonstration and TDS data from the CRREL, NH field work is being finalized and is expected to be completed in the spring of 1998.

Other concerns expressed by state commenters related to the SCAPS Thermal Desorption VOC Sampler included:

- !VOC desorption efficiency relative to different soil types encountered
- !verification soil samples not collected from exact location as TDS sample
- !quantification of SW-846 laboratory Method 8265

VOC desorption efficiency was demonstrated to be dependent upon soil type. This was documented during initial laboratory studies and has been observed in the field. Desorption efficiencies can be optimized, however, with knowledge of the subsurface. For this reason, Dr. Davis recommends that the TDS standard operating procedure include a stratigraphy push to identify soil types that will be encountered during the TDS push. Drying temperatures and desorption times can be adjusted as needed to improve VOC desorption.

Because of the TDS sampler design, the verification sample cannot be taken from the same exact location as the TDS sample. To address this concern, a second verification sample was introduced. This sample is collected from the split spoon at the same time the methanol verification sample is taken, and is then inserted into the TDS sample chamber and desorbed under similar conditions as the subsurface TDS sample. Two unavoidable differences are the fact that the weight of the above-ground verification sample is known and that this sample is no longer in contact with the soil but is sealed inside the sample chamber during desorption. Details on the TDS verification sampling procedures are described in the Methodology Section of this report. Data packages for the CRREL field demonstration conducted in June 1997 will include comparisons of data from the TDS and the two verification sampling methods.

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Concerns regarding the draft status of Method 8265 were responded to by Dr. Davis. The draft method was reviewed and discussed by the US EPA SW846 Organics Working Group at their July 7, 1997 meeting. It was reported by Dr. Barry Lesnik, US EPA Organics Working Group chair, that the method would be included in the next edition's announcement for public comment in the Federal Register. Assuming public comment is acceptable, the method should be included in the Fourth Edition of US EPA SW 846. SCAPS Team members indicated that they will have more confidence in the SCAPS VOC data once Method 8265 becomes final.

An in-depth response to comments (provided as Appendix C) was presented by Dr. Davis during the August 21, 1997 conference call with SCAPS Team members. Dr. Davis emphasized to SCAPS Team members that the SCAPS HydroSparge VOC Sensor and the Thermal Desorption VOC Sampler are field measurement technologies which are capable of producing high quality field screening data. As such, the objective of the Tri-Service SCAPS effort is to provide site characterization screening tools with the capability to increase the efficiency of conventional monitoring well and soil boring placement.

## **6.0 RECOMMENDATIONS**

The SCAPS Team has concluded that the HydroSparge VOC Sensor and the Thermal Desorption VOC Sampler should be considered site characterization tools for field screening applications. This Evaluation Report is intended to share information on the field demonstration and verification of the SCAPS VOC technologies with emphasis on state specific field screening and data useability issues.

Based on the findings of the SCAPS Team evaluation of the HydroSparge VOC Sensor, it is recommended that all ITRC member states consider and pursue acceptance of the HydroSparge VOC Sensor technology. The SCAPS Team is conducting further review of field data for the Thermal Desorption VOC Sampler and will provide a future update regarding a determination on acceptability of the technology and recommendation for full ITRC concurrence.

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## **7.0 REFERENCES**

Multi-State Evaluation of an Expedited Site Characterization Technology, SCAPS-LIF, May 1996.

Tri-Service Site Characterization and Analysis Penetrometer System (SCAPS) Validation at McClellan Air Force Base, California, September 1996.

## **APPENDIX A**

## ACRONYMS

|                   |                                                                                      |
|-------------------|--------------------------------------------------------------------------------------|
| AEC:              | US Army Environmental Center                                                         |
| ASC:              | Accelerated Site Characterization                                                    |
| CPT:              | Cone Penetrometer Technology task group                                              |
| CRREL:            | US Army Cold Regions Research and Engineering Laboratories                           |
| ESTCP:<br>Program | Department of Defense Environmental Security Technology Certification                |
| HS:               | HydroSparge VOC Sensor                                                               |
| ITMS:             | Ion Trap Mass Spectrometer                                                           |
| ITRC:             | Interstae Technology and Regulatory Cooperation work group                           |
| LIF:              | Laser Induced Flourescence                                                           |
| OD:               | Outer Diameter                                                                       |
| PCE:              | Perchlorethane                                                                       |
| ppm:              | parts per million                                                                    |
| PVC:              | Poly Vinyl Chloride                                                                  |
| QC:               | Quality Control                                                                      |
| SCAPS:            | Site Characterization and Analysis Penetrometer System                               |
| SERDP:            | Department of Defense Strategic Environmental Research and Development ..... Program |
| TDS:              | Thermal Desorption VOC Sampler                                                       |
| VOC:              | Volatile Organic Compounds                                                           |
| WES:              | US Army Corps of Engineers, Waterways Experiment Station                             |

## **APPENDIX B**

## ITRC CONTACTS

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## **APPENDIX C**

**COMMENTS RECEIVED FROM SCAPS TEAM MEMBERS AS A RESULT OF THEIR  
ATTENDANCE AT THE SCAPS VISITOR DAY AT MCCLELLAN AFB  
FEBRUARY 19, 1997**

**FROM:** *Frank Camera, New Jersey Department of Environmental Protection*

**A. Summary**

1. Method/Purpose: Demonstration of the SCAPS VOC sensors/samplers for both groundwater and soils. The methods are not intended to be a complete replacement for traditional soil borings and monitoring wells, but are a means of more accurately placing a reduced number of boreholes and monitoring wells in order to achieve site characterization.≡

2. Summary: At this time, it is recommended that additional verification data be generated and reviewed for both the HydroSparge and Thermal desorption systems before any decisions regarding acceptability can be made. See comments below for details.

**B. Comments**

In addition to attending the February 19th demonstration at McClellan AFB/Davis Global Communications Site, the following documents were reviewed prior to comment making:

- 1) Final Technology Demonstration Plan for SCAPS Validation at McClellan Air Force Base, California, dated October 1996;
- 2) VIP Program Tour at McClellan AFB Agenda;
- 3) Tri-Service SCAPS VOC Sensor Validation at McClellan AFB Report; and
- 4) SW-846 Proposed Method 8265 - Ion Trap Mass Spectrometry, dated July 1994.

Since the cone penetrometer system has been used extensively in the geotechnical industry and is used in accordance with ASTM Method D5778, no comments have been made in regards to this system.

**1. HydroSparge Sensor (HS)**

Description: After a temporary monitoring well is created via a Hydropunch, groundwater comes to equilibrium in a sampling chamber. Inert gas sparging in the chamber strips the VOCs from the water and they are then carried to the surface for analysis via the Ion Trap Mass Spectrometer (ITMS).

Advantages: To a certain extent the sparging/purging system utilized is a proven technology. Real time data is acquired. Costs savings are realized in the form of less permanently installed monitoring wells, very little waste generation and the ability to characterize ground water conditions at a site in a relatively short time.

Concerns:

- ! Possible loss of analyte during transfer of VOCs to the surface
- ! Size of screen which may make sampling from thin water bearing zones difficult
- ! Verification procedure, specifically bailing of the well
- ! Verification method (SW-846 8260)

! Data presentation (Fig. 4 of Tri-Services SCAPS VOC Sensor Validation Report) !

Need for additional data

Recommendation: Although the HS represents a system that has excellent potential for initial screening and/or delineation of VOC contamination in ground water, comments will be made after review of additional data associated with the forthcoming report takes place. At this time it is recommended that; 1) some data confirmation (lab) take place via SW-846 8265, 2) the data be presented in a clearer format and 3) use of a different evacuation technique, as opposed to bailing, be attempted.

## 2. Thermal Desorption Sampler (TDS)

Description: The sampler is pushed to a desired depth where a soil sample is collected. The sample is heated so as to release the VOCs. These VOCs are carried to the surface for analysis via the ITMS. This method has been described as Asemi-quantitative.

Advantages: This VOC sampler has the capability to collect and analyze multiple soil samples at different depths during a single penetrometer push. Again, real time data is acquired and costs savings are realized in the form of very little waste generation. There is minimal exposure of site personnel to toxic contaminants.

The five gram sample collected is consistent with current VOC soil sampling procedures. Verification utilizes a methanol preservation method which will much more accurately depict site VOC conditions than current standard procedures. In addition, some sample verification using SW-846 method 8265 took place.

### Concerns:

! VOC desorption efficiency dependent upon soil types encountered

! Actual verification soil sample is not from the same exact location as the TDS .. sample

! Laboratory verification method, for the most part, being SW-846 8260 and not 8265

! Data presentation (Figure 4 of Tri-Service SCAPS VOC Sensor Validation Report, as well the need for additional data

Recommendations: Although the TDS represents a system that also has excellent potential for initial screening and/or delineation of VOC soil contamination, comments will be made after review of additional data associated with the forthcoming report takes place. At this time it is recommended that 1) forthcoming data include a study on the VOC desorption efficiency for different soil types , 2) the data as depicted in Figure 5 be presented in a clearer fashion and 3) some VOC soil samples be lab analyzed without the use of methanol preservation or the EnCore<sup>R</sup> sampling device.

## 3. Ion Trap Mass Spectrometer (ITMS) with HS and TDS Interfaced

Description: SW-846 Proposed Method 8265 dated July 1994, screening procedure for the detection of VOCs.

Advantages: This method, with a seven minute run time, represents a quick and cost-effective VOC analytical method.

Concerns:

- ! Detection limit of ~ five ppb
- ! Condensed (34 VOCs) target analyte list
- ! Custom-built sparge unit and associated costs
- ! Status of method (proposed at this time)
- ! False positives detected
- ! Some VOCs (cis & trans isomers, etc.) can not be distinguished
- ! Extremely high level contamination carryover

Recommendations: Assuming this method will eventually be adopted, it would represent an excellent tool for initial screening and/or delineation of VOC contamination. At this time, more data should be verified (lab) using this method (8265). In addition, the method (8265) should be fine tuned - increase target list, lower detection limits, etc. in order to meet SCAPS Program needs.

***FROM: Hall Bohlinger, Louisiana Department of Environmental Quality***

The 2/19/97 demonstration was informative from the standpoint of technical discussions and presentations on the TDS and HydroSparge systems as well as additional sensors currently being developed and evaluated.

The limited data available from previous investigations of these sensors seemed to show acceptable correlation for site characterization purposes and substantial cost savings over conventional methods.

I foresee no impediments to regulatory acceptance in Louisiana at this time; however, I would like for staff to review the upcoming report from the field work and the CALEPA certification evaluation when available.

Please advise if I can provide further information at this time.

***FROM: Tom Schneider, Office of Federal Facilities Oversight, Ohio EPA***

Following are some observations based upon a review of the report and participation at the demo.

1) The data contained in the report are not sufficient to draw conclusions regarding the applicability of the technologies. The presenters at McClellan had some explanation of the data differences for the HydroSparge that were not contained in the report. It will be necessary to review the full data set and the investigator's interpretations prior to drawing any conclusions. Obviously, the McClellan site presented some challenges to the Thermal Desorption Sampler in

terms of physical limitations as well as VOC concentrations. Additional data and associated interpretations are necessary to draw conclusions.

2) If data from previous investigations and the McClellan investigation are provided in report forms and successfully reviewed, it is likely the SCAPS VOC sensors will be acceptable for screening level investigations. It is unlikely the Thermal Desorption and possibly the HydroSparge can move beyond the screening level since it is not possible to quantify the mass of soil or water from which VOCs are extracted. This lack of mass determination obviously affects the ability to quantify concentrations.

3) It will be important to include the full method 8260 data sheets within the report to evaluate whether the VOC sensors adequately detected all VOCs present.

4) One drawback to the test demonstrations that I saw was the fact that there were too many variables in the experiment to determine which caused any inconsistencies in data. I am referring to use of the VOC sensor, the methanol extraction, a new Ion-Trap Mass Spec. instrument, etc. Generally one would like to limit the number of variable parameters within the test and use baseline technologies for all but the tested technology.

5) Obviously the SCAPS LIF was further along in the CalEPA certification process at the point ITRC became involved than is the SCAPS VOC sensors. I believe further progress on the CalEPA Cert process will provide additional support for acceptance of the sensors as screening technologies.

6) I would recommend additional testing or reporting of data from testing of the Thermal Desorption sensor at a facility with significantly higher concentrations of VOCs in the soil.

7) I have difficulty concurring with the assessment of cost savings presented in the draft report. Particularly in concluding that one well would be required for each Hydrosparge sample location. Or that a HydroSparge sample would replace the need for a well, particularly considering the proclaimed screening nature of the technology. It would seem to me a more appropriate comparison would be to a geoprobe investigation of a plume leading up to the installation of monitoring wells.

8) With regard to the demo, I obviously have a better understanding of the equipment and investigators conclusions regarding the equipment. I believe though, the experience would have been more beneficial if it would have include observing a day of operation. We still had questions regarding efficiency of the sampling equipment with regard to number of samples per day, etc. In the future I would recommend ITRC focus its participation to demonstrations involving on-going field work.

Finally, I believe the SCAPS platform has exciting potential to expedite the site investigation process and save money. Ohio EPA looks forward to participating in further reviews and demonstrations of the VOC sensors as well as sensors developed for other contaminants.

***FROM: Tom Neace, Idaho Department of Health and Welfare, Division of Environmental Quality***

I attended the SCAPS demonstration held at McClellan AFB on February 19, 1997. This letter is to provide you with feed back concerning the visitors' day presentation that I attended. In general, I thought that the demonstration visitors' day was good. There were a number of tables set up with some of the tools on display, two SCAPS trucks were on site for inspection, appropriate literature concerning the equipment and tools were available, and highly qualified experts to answer questions regarding the technology and to give brief presentations regarding the technologies were on site. Items that could be improved in the future include:

- 1) Collection of actual data during the visitors' day. This helps assist professionals who are unfamiliar with new technologies get a better handle on exactly how the data is collected and processed. At the SCAPS demonstrations in Oxnard, California and Albuquerque, New Mexico, I was able to see the data being collected and gain a better appreciation for the technology. I did not see any real time data being generated at the McClellan visitors day demonstration.
- 2) It would be helpful especially with respect to the HydroSparge system, to build some working visual models which exhibit the functions of the SCAPS tools in the subsurface so that participants unfamiliar with hydrosparging can visualize the data collection process.

***FROM: Brett Anderson, State of Nebraska, Division of Environmental Quality***

I am pleased with the way that the field demonstration was presented. The background information which was available on the direct push tools and the scientific instruments have provided excellent resources for evaluating the SCAPS technology to others within NDEQ. The Superfund section is interested in technologies which will help in accurate and timely site characterization. The demonstrations presented within our own state, (York and Offutt AFB) have already helped to inform employees of NDEQ of the potential for SCAPS. We welcome the opportunity to review data which confirms this technology as useful through comparison to other more traditionally accepted scientific methods.

While at the demonstration showing field results, it was noted by one of the people attending that one of the breakdown products (vinyl chloride) was not detected by the mass spectrometer above detection level at the project site. This seemed anomalous due to the levels of contamination present at the communications area.

From a regulatory stand point, it is not clear whether step 6 (Initial Site Assessment) or step 7 (Detailed Site Assessment) under Title 118 (Ground Water Quality Standards and Use Classification) for the NDEQ will be satisfied by the SCAPS technology. I will copy and fax these regulations with this letter for your review. We understand that SCAPS can be used for site characterization and the optimum placement of monitoring wells, which are needed to satisfy Title 118.

Geologically, the State of Nebraska may be restrictive to the SCAPS technology since areas have very deep aquifers (140' +) and dense zones of lithology (clays, silts and compacted sands) which may prevent optimum use of the present direct push tools.

References cited; Nebraska Department of Environmental Control, Title 118 - Ground Water Quality Standards, and Use Classification, Revised Effective Date: September 3, 1991

*FROM: New Mexico Environmental Department (No comments were submitted)*

## **APPENDIX D**

**SCAPS TEAM COMMENTS ON THE DEMONSTRATION OF THE SCAPS  
HYDROSPARGE VOC SENSOR AND THE THERMAL DESORPTION VOC  
SAMPLER AT MCCLELLAN AFB AND THE CORRESPONDING  
LABORATORY DATA PACKAGE**

*Tom Neace  
Idaho Department of Health and Welfare  
Division of Environmental Quality*

I have reviewed the data package submitted by the U.S. Army under the Tri-Service SCAPS program for validation of field screening sensors. The data that I reviewed was for the HydroSparge groundwater data and traditional laboratory analyses for VOC compounds. The data that was submitted was not well organized, which inhibited detailed evaluation. However, general conclusions can be reached from review of the package.

In general, it appears that there is a good correlation between the ECB laboratory data and HydroSparge analytical data. The R5 values for the November 1996 Davis site data of 0.83, 0.97 and 0.89 for DCE, TCE and PCE respectively indicate a good correlation between the data sets. Linear regression plots of the data also suggest a good correlation between the data.

I used the data from the November 1996 Davis site to calculate relative percent differences (RPDs) and are attached to this letter. RPDS are commonly used in Idaho to evaluate duplicate samples. Samples within a 20 to 25% RPD are considered acceptable for duplicate samples. The DCE sample RPDs show 8 of 13 of the analyses to be within 25% RPD limit. TCE and PCE showed 6 of 13 and 8 of 13 sample comparison to be within the 25% RPD.

The data presented suggests that there is a reasonable correlation between the HydroSparge and traditional analytical data. However, based on the limited number of samples in this verification study, additional data needs to be collected and evaluated concerning the HydroSparge technology. The HydroSparge data appears to be a potentially promising technology for future site assessment projects. Idaho DEQ would allow the HydroSparge technology as part of the site assessment process, on a case by case basis, if appropriate laboratory confirmation samples were utilized to validate the data.

*Narendra Dave  
Louisiana Department of Environmental Quality  
Hazardous Waste Division*

We have reviewed the package which you provided for the above project and have the following comments:

We feel that Thermal Desorption, due to its lack of quantitative ability, should only be considered for screening contaminated sites and not clean-up. Further, it is stressed that the use of the HydroSparge should not be considered as a replacement for installation of a well. However, its use as a screening technology to help determine plume extent prior to selecting locations of monitoring wells may ultimately result in fewer wells being needed.

It is suggested that additional testing and confirmation by comparison to data from liquid samples from wells is needed to provide a better comparison of the HydroSparge procedure with classical sampling procedures from monitoring wells.

In conclusion, both the HydroSparge VOC Sensor (HS) and the Thermal Desorption VOC Sampler (TDS) appear to provide comparatively rapid field screening procedures for the higher concentrations of VOCs in water and soil matrices respectively. However, both techniques fall short in not being able to provide quantitative determinations and also their inability to identify compounds at lower concentrations and inability to detect some compounds such as vinyl chloride, and unable to distinguish cis & trans isomers, etc. They should, therefore, be utilized as screening and not be considered to provide the equivalent quality of data obtainable from laboratory analysis of soil samples and groundwater samples from monitoring wells.

Overall, DEQ does not have any problem in using SCAPS at contaminated sites for screening purpose.

*Hao Zhu  
Utah Department of Environmental Quality  
Division of Solid and Hazardous Waste*

The following comments are based on our participation in the demonstrations of the Site Characterization and Analysis Penetrometer System (SCAPS) HydroSparge VOC sensor technology at Fort Dix and a review of the data generated at the McClellan Air Force Base, and Davis California demonstration sites.

(1) The June 30, 1997 demonstration at the Fort Dix site was informative and provided an opportunity for Jeff Vandel to observe the data generation and collection processes and the operation of the technology. It appears that this technology utilizes a cone-Penetrometer platform to push the HydroSparge VOC sensor into aquifers, which sparges VOC contaminants in-situ. The VOC compounds are analyzed using a field portable ion-trap mass spectrometer (ITMS). It seems that the technology provides a real-time, expedited and cost-effective method for initial site screening characterization.

(2) It appears from the demonstration that individuals who operate the VOC sensor system are required to have extensive experience and training to perform consistent data collection and analysis following accepted operation protocols and standards. This would also be critical for any future commercialization of the technology. It is recommended that a detailed standard operating procedure for this technology be developed.

(3) It seems that the cost saving of the technology over conventional screening methods are based on cost data generated from DOD sites. A cost comparison for commercial sites would be more meaningful.

(4) It appears that the data generated from the McClellan demonstration site supports acceptance of the technology as a field screening tool to determine the location and relative extent of contamination in the groundwater. Overall, the demonstration results indicate that a good correlation with conventional EPA SW-846 method 8260 is achieved. However, it appears that, based on the linear regression comparison charts, the concentrations of DCE and TCA are commonly higher using the HydroSparge sensor than EPA method 8260. In addition, the data package generated from the McClellan and Davis demonstrations can be better presented and organized for review by persons who are not familiar with the technology.

(5) It is apparent that the draft HydroSparge data for push FD107A at the Fort Dix demonstration site is somewhat inconsistent. We would like review the final Fort Dix demonstration data when it is available.

(6) It is recommended that the SCAPS New Sensor subgroup develop a protocol for using the technology, including descriptions of the operation conditions and limitations of the technology, the appropriate number of confirmatory samples, etc.

(7) We expect that the SCAPS VOC technology will be further evaluated under the CalEPA technology certification program or the EPA technology verification program which will provide an additional level of confidence for using the technology. We also expect the proposed EPA SW-846 method 8265 for the SCAPS VOC sensor technology will be finalized in the future. This proposed method is also currently under review by the Utah Division of Laboratory Services.

(8) At this time, we recommend the staff of the Utah Department of Environmental Quality acknowledge the SCAPS VOC sensor technology to be used as an initial field screening method to delineate the extent of groundwater contamination, and optimize the number and locations of monitoring wells.

(9) We would like to review the demonstration data for the Thermal Desorption Sampler using ITMS to characterize soil contamination when it becomes available.

Here attached are additional comments from Utah Division of Laboratory Services that certifies analytical laboratories conducting EPA Methods used in Utah. I hope some of the comments can be addressed by Dr. Bill Davis.

Comments on Draft Method 8265

The amount of water vapor entering into the ion trap, how does that effect the generation of the EI spectrum? The water vapor may cause the generation of atypical EI spectrum, a pseudo CI.

Each standard is run 4 times, how is this data used in the generation of the calibration curve?

It is not stated in the method how the generation of the CI spectra is used to complement the EI data.

Only compounds with unique mass spectra can be screened by this method. If a sample has a high concentration of non target, IE straight chain hydrocarbons, will the ion trap be able to discriminate target compound from the high background? Ion trap MS systems have difficulty with complex samples. When high concentration of compounds are introduced to the ion trap non-typical EI spectrum can be generated.

It seems that using the VOC vial method would be more time efficient than using the HydroSparge module. Inserting the module into the well and making sure that it is positioned correctly appears to be much harder than just dipping out a sample and carrying it to the instrument to be processed.

What is the effect of suspended material on purging efficiency when using the HydroSparge? The standard curve is generated in simulated water without the products that might be generated from hydropunch being driven into the ground, ie suspended material.

Great care will have to be taken to prevent carry over.

*Tom Schneider*  
*Ohio Environmental Protection Agency*

Having completed my review of the data package provided to Ohio EPA on May 17,1997, a number of my original comments from the McClellan demonstration are still appropriate. I have expanded upon those comments here.

1)The data contained in the report are not sufficient to draw conclusions regarding the applicability of the technologies. The presenters at McClellan had some explanation of the data differences for the HydroSparge that were not contained in the report. It will be necessary to review the full data set and the investigator's interpretations prior to drawing any conclusions. Obviously the McClellan site presented some challenges to the Thermal Desorber in terms of physical limitations as well as VOC concentrations. Additional data and associated interpretations are necessary to draw conclusions.

Ohio EPA believes the HydroSparge shows significant promise for expediting site characterization. However, we believe DOD must develop a complete report incorporating data from the various sites. This report should describe the circumstances under which the HydroSparge and/or the Thermal Desorber have been shown to work and the evidence supporting this conclusion. The report should describe limitations of the samplers and conditions under which they would not perform as expected. Finally, the report should state the use (e.g.,screening or final characterization) that DOD is trying to validate for these sensors and support that use with data and interpretations.

2)An obvious limitation for the sensors is the calibration for only three VOCS versus a lab method which provides results for a suite of VOCs. Thus, the VOC sensors would be most useful in defining the boundaries of a known plume of contaminants for which calibration could

be completed. The VOC sensors do not appear to be able to provide initial characterization of a site with multiple VOC contaminants.

3) Obviously the SCAPS LIF was further along in the CalEPA certification process at the point ITRC became involved than is the SCAPS VOC sensors. I believe further progress on the CalEPA Cert process will provide additional support for acceptance of the sensors as screening technologies.

4) I would recommend additional testing or reporting of data from testing of the Thermal Desorber sensor at a facility with significantly higher concentrations of VOCs in the soil.

Finally, I continue to believe the SCAPS platform has exciting potential to expedite the site investigation process and save money. Ohio EPA looks forward to participating in further reviews and demonstrations of the VOC sensors as well as sensors developed for other contaminants.

*Frank Camera*

*New Jersey Department of Environmental Protection*

#### A. Summary

At this time, it is recommended that 1) certain items (statistical and QA/QC) be submitted for the HydroSparge sensor, 2) additional data (CRREL) be reviewed for the Thermal Desorption system and 3) no decision regarding the acceptability of Method 8265 be made until the EPA decision is rendered. See comments below for details.

#### B. Comments

The following documents were reviewed:

- 1) HydroSparge Data Summary: Davis Global Communications Site, McClellan Air Force Base, Ca., May 1997.
- 2) Draft Method 8265 - Direct Sampling Ion Trap Mass Spectrometry (DSITMS) For The Measurement Of Volatile Organic Compounds In Water, Soil And Air dated June 1997.

In addition, many concerns of the ITRC were addressed during the recent (June 1997) ITRC meeting in Washington D. C. A summary of responses, as prepared by Dr. Bill Davis, WES was also reviewed.

#### 1. HydroSparge Sensor (HS)

##### Previous Concerns:

- ! Possible loss of analyte during transfer of VOCs to the surface;
- ! Small screened interval, which may make sampling from thin water bearing zones difficult;

- ! Verification procedure, specifically bailing of the well;
- ! Verification method (SW-846 8260) and
- ! Data presentation (Figure 4 of McClellan Air Force Base report), as well the need for additional data.

Comments/Recommendation: The HydroSparge Data Summary (Davis Global Communications Site) was reviewed. It is recommended that at a minimum, a reduced deliverable package (Tier II) be submitted for the ECB and West lab analyzed VOC results, so as to allow for data validation and/or review. Again, the figure (previously designated as Figure 4) now entitled A Comparison of HydroSparge and EPA Method 8260 for all sites should include a tabular summary of the actual sample results, as well as sample statistical calculations. Attached, is "**Data Quality Level 2**" requirements from the **NJ DEP Field Analysis Manual (FAM), July 1994**, (Attachment 1). It is recommended that it be confirmed that linear regression analysis was performed in accordance with these requirements. In addition, a discussion regarding the "pooling of data" approach for this figure shall be submitted.

## 2. Thermal Desorption Sampler (TDS)

### Previous Concerns:

- !VOC desorption efficiency may be dependent upon different soil types encountered;
- !Actual verification soil sample is not from the same exact location as the TDS sample;
- !Laboratory verification method, for the most part, being SW-846 8260 and not 8265 and
- !Data presentation (Figure 4 of McClellan Air Force Base report), as well the need for additional data.

Comments/Recommendations: The Davis response to ITRC concerns included a study on the VOC desorption efficiency for different soil types. As anticipated, % recoveries from clay-type soils were less (~ 10%) than those of silt and sand. Again, the TDS represents a system that has very good potential for initial screening and/or delineation of VOC soil contamination. However, final comments will be made after review of additional data (CRREL, Hanover, N. H.) are submitted. Reportedly, this system encountered carry-over problems when extremely elevated levels of VOC soil contamination were encountered.

## 3. Draft Method 8265 DSITMS, June 1997

### Previous Concerns:

- ! Detection limit of ~ five ppb;
- ! Condensed (34 VOCs) target analyte list;
- ! Custom-built sparge unit and associated costs;
- ! Status of method (proposed at this time);
- ! False positives detected and the fact that some VOCs (cis & trans isomers, etc.) can not be distinguished and
- ! Extremely high level contamination carryover.

Comments/Recommendations: Most concerns appear to have been addressed. However, it is recommended that since this method is under review by the EPA SW-846 Washington group, that a final determination regarding 8265 be put off until the EPA's decision is rendered.

## ATTACHMENT 1

2. Data Quality Level 2
  - A. Level 2 methods are intended to provide reliable, rapid, contaminant delineation.
  - B. Level 2 methods can achieve a high degree of reproducibility when required QA/QC procedures are employed.
  - C. Level 2 methods are typically laboratory methods which have been adapted for field use (i.e. field GC, portable XRF, field IR).
  - D. In addition to Level 1 requirements, quality assurance deliverables should include:
    - 1).....Initial calibration curves
    - 2).....Continuing calibration curves (1 per 10 samples)
    - 3).....Field Duplicates (1 per 20 samples)
    - 4).....Background/Blank data
    - 5).....Raw data submission (i.e. chromatograms, recorded instrument readouts, etc.)
    - 6).....Chain of Custody Documentation (or field sample tracking sheets)
    - 7).....Non-conformance summary listing all deviations from the approved SOP and QA/QC parameters outside control limits. The non-conformance summary should include an analyst certification statement.
    - 8).....Laboratory confirmation data should be submitted along with the field analytical data. At a minimum, 10% of all Data Quality Level 2 data should be laboratory confirmed (both clean and contaminated samples). The Technical Requirements for Site Remediation, N.J.A.C. 7:26E, section 2.1(b) require that 50% of all "clean" samples be laboratory confirmed during the site investigation and 100% of all "clean zone" samples be laboratory

analyzed during the remedial investigation. A variance from these requirements may be requested pursuant to N.J.A.C. 7:26E-1.6(d).

9) .....Results of analyst competency tests (i.e. performance evaluation tests and proof of training) are required.

10) .....Matrix Spike Recovery (case-by-case)

11) .....Surrogate Analyte Analysis (case-by-case)

12) .....Method Blank Analysis (case-by-case)

13) .....Quality Control Check Sample Analysis (case-by-case)

E. Level 2 methods are quantitative (i.e. providing an estimated value), but only semi-qualitative (definitive contaminant identification is not provided).

F. Level 2 contaminant delineation may be accomplished by providing enough laboratory confirmation data to allow for laboratory-field correlation throughout the entire contaminant concentration range and to confirm the clean zone (i.e. 50% during the SI, 100% during the RI). At a minimum, laboratory confirmation sampling shall be conducted on 10% of all field samples.

G. Environmental samples frequently contain contaminants, most of which are of unknown concentrations. Laboratory data is not one hundred percent accurate, but currently represents the best estimate of the true concentration of a contaminant in an environmental sample. Therefore, a comparison of field and laboratory data can help to provide some guidance on the validity of the field data.

A laboratory-field correlation of level 2 data has two components and can be calculated by the following regression analysis equation:

$$L = xF + y$$

where:

L = the reported laboratory concentration of a contaminant

F = the reported field concentration of the same  
contaminant

x = the slope of the correlation of field and laboratory data

y = the intercept of the field and laboratory data (constant)

R squared = fit of equation

The two components of the laboratory-field correlation are: 1) the fit (R squared) and 2) the intercept (y). Given the lack of homogeneity of environmental samples, variation in sample handling and variations inherent in both field and laboratory data, the fit of the equation is not expected to be perfect (i.e. in most cases, R squared  $\neq$  100%); however, R

squared and a plot of the scatter graph should be should be developed by the data reviewer and submitted to the Department. An examination of the R squared and scatter graph should be made to determine the usefulness of the field data. Professional judgement should be used when determining whether field data should be used for delineation and/or clean samples.

The intercept (y) is important due to differences in concentrations determined in field versus laboratory data. During the remedial investigation (RI), field based contaminant zone delineation levels may be adjusted per the following equation:

$$C_f = C + y$$

where:

$C_f$  = contamination zone delineation criteria for field generated data

$C$  = cleanup criteria for laboratory data

$y$  = the intercept of the field and laboratory data correlation equation

Final remediation; however, should be based on the site specific cleanup criteria using Data Quality Level 3 methods.

- H. Level 2 methods also include published laboratory methods such as USEPA SW-846 laboratory methods which are highly reproducible; however, data are documented using only limited quality assurance deliverables.
- I. The quality of Level 2 data generated from laboratory methods with limited deliverables is a function of sample handling, storage and preservation procedures, and analytical instrument maintenance. These data should be reliable if proper sampling and analytical procedures are followed.

# **APPENDIX E**

**U.S. ARMY RESPONSES TO SCAPS TASK GROUP COMMENTS ON THE  
DEMONSTRATION OF THE SCAPS HYDROSPARGE VOC SENSOR AND THE  
THERMAL DESORPTION VOC SAMPLER AT MCCLELLAN AFB AND THE  
CORRESPONDING LABORATORY DATA PACKAGE.**

**OHIO:**

**Excerpted from memo dated 24 July 1997 from T. Schneider to J. Prendergast**

**(1). Provide evidence supporting circumstances under which HS has been shown to work.**

Significant data have been developed and presented that support the quantitative screening capabilities of the HydroSprage (i.e. validation comparisons with EPA 8260). Data for HS and validation samples has been provided for Davis, CA site and is forth coming for Fort Dix, NJ. HS has been successfully deployed at seven locations and verification sampling has confirmed that the method provides results equivalent to U.S. EPA Method 8260 (see enclosure 1).

**..report should describe limitations....**

This has been covered in detail in the previously furnished ESTCP work plan (Section 2.4) and in the most recent version of EPA 8265.

**Screening versus final characterization.**

The ESTCP work plan clearly states that the objective is to produce a screening tool to be used to increase the efficiency of conventional monitoring well placement. However, data collected with HS indicate that the data quality are higher than what is normally considered screening level.

**(2). An obvious limitation for the sensors is the calibration for only three VOCs versus a lab method which provides results for a suite of VOCs. Thus, the VOC sensors would be most useful in defining boundaries of a known plume.... The VOC sensors do not appear to be able to provide initial characterization of a site with multiple VOC contaminants.**

The revised EPA Method 8265 includes QC criteria for over 30 VOC analytes (Tables 7,8 and 10) that have been tested in the lab by DSITMS. The system is capable of quantitative analysis of these analytes and probably others. The HS and TDS are capable of providing initial characterization of sites due to the strong qualitative identification capabilities of mass spectrometry. The mass spectra of the analytes of interest are distinct enough to allow qualitative identification of unknowns during initial penetrations at a site. This allows the ITMS operator to decide which analytes are present and then produce the site specific calibration. This selection of analytes for calibration based on initial qualitative screening significantly reduces the amount of time required for calibration and ultimate analysis.

Laboratories analyzing samples from many different sites must be prepared for any analyte within the target list for a given analytical method. However, the HS and TDS are calibrated for each specific site investigated. Once initial qualitative screening of the site is completed, the

DSITMS is calibrated for the analytes identified to be present. If additional analytes are identified during the investigation, the DSITMS is then calibrated for this analyte. The only limitation to the qualitative identification capabilities of the DSITMS is the lack of ability to differentiate analytes yielding identical mass spectra (i.e. isomers of DCE) as discussed in the ESTCP work plan.

**(6) ...recommend additional testing ....of the TDS at a facility with significantly higher concentrations of VOCs in the soil.**

This has been done at Cold Regions Research and Engineering Laboratory (CRREL), NH. Concentrations ranged up to >100 ppm TCE in soil. Results indicated correlation between validation samples and TDS results.

**UTAH:**

**Excerpted from memo dated 11 July 1997 from H. Zhu to J. Prendergast.**

**(2). .... individuals who operate the VOC sensor system are required to have extensive experience and training.... It is recommended that a standard operating procedure ... be developed.**

The WES SCAPS has developed a standard operation procedure and in collaboration with ORNL, EPA Method 8265 has been developed for operation of the DSITMS. Training is required to operated the DSITMS. However, the WES team trained the CE Savannah District SCAPS crew to operate the HS over a three week field investigation and the Savannah district has been performing investigations with minimal oversight. It should be noted that the Savannah crew included a chemist, but he had no previous experience with a mass spectrometer.

**(3). A cost comparison with commercial sites would be more meaningful.**

Cost data for conventional investigations are based on data provided by site managers at DOD facilities. The cost for well installation used for comparison are for both CE District Corps drill crew installations and for commercial contractors ' well installations. Since the SCAPS program only operates on DOD sites, commercial site data is not available. Cost comparisons with commercial sites will be made if data is provided.

**(4). HS data appears to be higher than EPA Method 8260.**

It should be noted that the HS method requires less sample handling and no sample storage or shipping compared with EPA Method 8260. This could account for the HS higher values.

**(5). .... the draft HS data for push FD107A at Ft. Dix .... is somewhat inconsistent.**

The verification data for the well FD107A and HS samplings FD107AH1 to H3 indicated good agreement with the HS in situ measurements. The variations in the HS penetration data versus the monitoring well are due to geological variation on the spacial scale investigated. It should be

noted that the near scale geological heterogeneity observed in the FD107A investigation is the norm observed thus far in this project for HS/well comparison investigations.

**Excerpted from e-mail from T. Lamoreaux to H. Zhu, forwarded to J. Prendergrast.**

**The water vapor may cause the generation of atypical EI spectrum, a pseudo chemical ionization (CI).**

The DSITMS is operated to eject the  $\text{H}_3\text{O}^+$  during acquisition of EI spectra.

**Each standard is run 4 times, how is the data used in the generation of the calibration curve?**

All data are pooled for the linear regression that produces the calibration curve.

**It is not stated in the method how the generated CI spectra (are) used to complement the EI spectra.**

CI spectra are used for the analysis of BTEX analytes and EI spectra are used for the analysis of chlorinated VOCs. EI spectra of ethylbenzene and xylenes yield ions that interfere with the analysis of toluene and toluene, ethylbenzene and xylenes yield ions that interfere with the analysis of benzene. However, using water CI all the BTEX analytes yield pseudo molecular ions ( $\text{M}+\text{H}^+$ ) with essentially no fragmentation. This allows the selective and sensitive detection of BTEX analytes using the DSITMS.

**Only compounds with unique mass spectra can be screened.... If a samples has a high concentrations of nontarget, i.e. straight chain hydrocarbons, will the trap be able to discriminate target compounds...**

One of the limitations of the DSITMS method is that analytes with identical mass spectra cannot be differentiated, since no physical or chemical separation is carried out prior to sample introduction into the DSITMS. However, the example of high level hydrocarbon "background" interfering with target compound analytes has not been observed. Generally, the presence of high level hydrocarbons occurs at petroleum contaminated sites where BTEX are the groundwater analytes of interest. This is another advantage of using water CI for the detection of BTEX target analytes. The water CI method very efficiently ionizes the aromatic components of petroleum, but not the straight chain hydrocarbon fraction. HS experiments were successfully conducted at Ft. Dix in groundwater that contained free product gasoline and 10-100 ppm BTEX.

**It seems that using the VOC vial would be more time efficient than using the HS.**

Inserting the HS module into the direct push well, once water is obtained in the well is in fact much faster than bailing samples into vials. Total analysis times for HS, once the water is in the well, are generally < 5 minutes. In addition, there is no water sample handling, thus reducing the chance of errors due to handling (field and laboratory) and shipping.

**What is the effect of suspended material on purging efficiency....?**

Empirically, no affect of suspended material has been observed. Validation samples collected from wells containing high levels of silt correlate well with the HS data generated in situ. It should be noted that the silt settles in the validation sample vials during shipment and the sample is decanted for analysis. The fact that the in situ HS measurements and the decanted validation sample results correlate, indicate that suspended solids have little affect on the HS results.

**Great care will have to be taken to prevent carry over.**

This is a very true statement. Extreme care is exercised to prevent carry over between analyses. The in situ sparge module is cleaned with distilled water after each standard or sample analysis. Also, blank samples are analyzed before and after each sample to insure that carry over is not contributing a bias to the sample data.

**Louisiana:**

**Excerpted from memo (FAX) dated 05 August 1997 from Narendra Dave to J. Prendergast.**

**.... both the (HS and TDS) fall short of being able to provide quantitative determinations and also their inability to identify compounds at lower concentration and inability to detect ... vinyl chloride....**

Both the HS and TDS have been demonstrated to detect analytes at or below the detection limits established by EPA Method 8260 for water and soil, respectively. Low level detection by the DSITMS is not a problem.

The HS has been demonstrated with standards, in the field during normal operating conditions to detect vinyl chloride.

The TDS sampled a site at CRREL, NH thought to be contaminated with vinyl chloride. No vinyl chloride was detected using the TDS. These non-detects were confirmed by on-site headspace analysis of soil verification samples using Method 3810.

Draft Method 8265 contains QC data, generated in the lab that indicates the DSITMS detection capabilities for vinyl chloride in water (Tables 7, 9 and 10).

QC data generated in the field for the HS and validation samples analyzed by EPA Method 8260, indicate that the HS is significantly more quantitative than what is normally considered screening level data.

**Idaho:**

**Excerpted from memo dated 18 July 1997 from T. Neace to J. Prendergast.**

**RSDs are commonly used in Idaho to evaluate duplicate samples.**

It should be noted that duplicate samples usually refers to samples analyzed by the same instrument, or at least the same procedure by different instruments (split samples). The comparison of HS data to validation samples run by EPA Method 8260 do not even qualify as split samples. However, the point of RSD is a good one and a useful tool.

**New Jersey:**

**Excerpted from memo dated 11 July 1997 from F. Camera to J. Prendergast.**

**B.1. Comments: HydroSparge Sensor**

**Possible loss of analyte during transfer of VOCs to the surface.**

As discussed at the Washington DC meeting in June, the only real loss of analyte during transfer in the Teflon transfer line are due to adsorption of certain VOC analytes into the Teflon transfer line. There is no effect of analyte adsorption on quantitative results due to the fact that standards for calibration are run under the same conditions as samples. Since the HS measurement is a steady state measurement, any bias in groundwater sampling due to analyte adsorption is compensated in the calibration curve. The analyte adsorption is a concern as carry over (desorption after sampling is completed) between samples and only occurs significantly at water concentrations > 1 ppm. Desorption of analytes (particularly PCE and toluene) is monitored between samples by running blanks before and after each data acquisition.

**Size (short interval) of screen which may make sampling from thin water bearing zones difficult.**

The HS is deployed using the Power Punch direct push ground water sampling tool. The standard, schedule 40, 1" OD PVC screen used with this tool is 4 ft in length and has flush mount threads. Multiple screens can be screwed together to achieve any desired screened interval. HS experiments have been conducted with screened intervals from 0.25 ft to 20 ft.

**Verification procedure, specifically bailing of the (direct push) well.**

As discussed above, the HS uses a 1" OD (0.75" ID) PVC screen. Small diameter Teflon bailers are the only groundwater sampling tools available to obtain groundwater samples for verification analysis. Careful bailing appears to provide representative groundwater from the direct push wells, based on the strong correlation observed for the bailed verifications samples EPA 8260 results with the data generated by the HS.

**Verification method (SW846 8260).**

EPA Method 8260 was selected as the verification analytical method because it is a purge and trap/GC mass spectrometric method and therefore most similar to the HS method. Some

discussion in Washington and among ITRC members centered on using the EPA 8265 40 mL vial purge method as a verification procedure. A limited number of experiments have been conducted obtaining split samples from HS wells and analyzing splits by EPA 8260 and EPA 8265. Results indicate that the verification methods correlate well with each other and with the HS results.

**Data presentation (Figure 4 of McClellan AFB report), as well (as) the need for additional data.**

The graph of verification sample results compared to HS in situ results would have been more informative if the linear regression results for this data set had been included. It should be noted that the graphical results were presented as summary data. A detailed data package has been provided that includes raw HS data, QC data and tabulated summary data for both the HS and verification sample results. Additional data (HS and verification) will be provided shortly for the FT. Dix, NJ HS investigation. As part of the comments provided by Mr. Frank Camera, NJ DEP an excerpt of the NJ Field Analysis Manual was provided. Section G., pages 5-6 provides a description of the use of linear regression for comparing field data with laboratory data. The linear regression procedure and use of the  $r^2$ , slope and intercept to determine the usefulness of the field data (i.e. HS data) are identical to those used for the HS. Individual site data and pooled data for all sites indicates HS comparisons to laboratory verification samples yields slopes between 1.2 and 0.8 and  $r^2$  values  $>0.8$ . The intercept is a measure of bias between the laboratory and the field methods. The intercepts for HS comparisons with EPA Method 8260 are on the order of 1 to 3  $\mu\text{g/L}$ , very small and near the method detection limits. Considering the inherent variability of VOC analyses, these values indicate the field data can be used to delineate contaminant distribution and to determine areas that are clean.

**B.2. Thermal Desorption Sampler (TDS)**

**VOC desorption efficiency may be dependent upon different soil types encountered.**

VOC desorption efficiency is dependent upon soil type. This was demonstrated during initial laboratory studies and has been observed in the field. Desorption efficiencies can be optimized, however, with knowledge of the subsurface. For this reason, TDS standard operating procedures should include a stratigraphy push to identify soil types that will be encountered during the TDS push. Drying temperatures and desorption times can be adjusted as needed to improve VOC desorption. The laboratory evaluation report is available for review.

**Actual verification soil sample is not from the same exact location as the TDS sample.**

Because of the sampler design, the verification sample cannot be taken from the same exact location as the TDS sample. To address this concern, a second verification sample was introduced. This sample is taken from the split spoon at the same time the methanol verification sample is taken. This verification sample is inserted into the TDS sample chamber and is desorbed under similar conditions as the subsurface TDS sample. Two unavoidable differences are the fact that the weight of the above-ground verification sample is known and that this sample is no longer in contact with the soil but is sealed inside the sample chamber during desorption. Data packages will include comparisons of data from the TDS and the two verification sampling methods.

**Laboratory verification method, for the most part, being SW-846 8260 and not 8265.**

EPA Method 8260 was selected as the primary, approved verification analytical method at the beginning of TDS development. Method 8265 is a proposed method. A subset of the methanol verification samples taken at CRREL, NH were analyzed on-site by Method 8265 and by Method 3810. Soil samples were also taken from the split spoon and analyzed on-site by Method 3810.

**... this system encountered carry-over problems when extremely elevated levels of VOC soil contamination were encountered.**

The TDS system evidenced no significant carry-over from soils with TCE concentrations up to 20 mg/kg wet weight. At the end of the field trial, a 5 gram sample of soil with TCE concentrations greater than 200 mg/kg wet weight was placed into the TDS and desorbed. This was done to challenge the system and to determine carry-over effects. Carry-over was found to decrease exponentially with purging time. After 30 minutes of purging the blank concentration had decreased to approximately 1 mg/kg or 0.5 percent of the initial concentration.

**B.3. Draft Method 8265 DSITMS, June 1997**

**Detection limit of ~ five ppb.**

The nominal detection limits report for HS have been 5 ppb. However, using US EPA prescribed procedures, actual calculated detection limits for data acquired in the field under normal operating conditions are normally on the order of one to two ppb. Also, Table 7 of Method 8265 indicates detection limits < 5ppb for most analytes in water.

**Condensed (34 VOCs) target analyte list.**

The target list for EPA 8265 is significantly smaller than that for EPA Method 8260. Most of the analytes listed in EPA 8260 could be analyzed using EPA 8265, within the limitations of "co-eluting" ions for isomers discussed earlier.

**Custom built sparge unit and associated costs.**

Many of the interfaces described in Method 8265 have been licensed by DOE, Oak Ridge National Laboratory to Teledyne Electronic Technologies (TET) as part of the TRP program to develop the field portable DSITMS. These interface licenses have been sub-licensed to Scientific Instrumentation Services, PA and will soon be commercially available. The HS interface is currently under negotiation with TET for licensing.

**Status of Method (8265) (proposed at this time).**

The method was reviewed and discussed by the US EPA SW846 Organics working group at their July 7, 1997 meeting. Mr. Robitaille and Drs. Wise, Guerin and Davis answered questions from the committee. Based on these discussions, Mr. Lesnik, US EPA working group chair, stated that the method would be included in the next edition's announcement for public comment

in the Federal Register. Assuming public comment is acceptable, the method should be included in the Fourth Edition of US EPA SW 846.

**False positives detected and the fact that some VOCs (cis & trans isomers, etc.) can not be distinguished.**

Section 3. of the draft method state, "...compounds in the samples which yield molecular ions or fragment ions with the same m/z values as the characteristic ions of targeted VOCs will give false positive response...". This is true, as discussed earlier (see Ohio comments) for isomers that yield the same ions (m/z). False positive response will occur only when an unknown compound yields an ion identical to the m/z of a target analyte and the ion is reported as the target analyte. However, there are a limited number of target analytes and possible interferences that can cause false positive responses. For example, cis-1,2-DCE, trans-1,2-DCE and 1,1-DCE all yield total DCE (61 m/z). Similarly, chloroform and 1,1,2,2-tetrachloroethane yield the same fragment ion (83 m/z) and are reported as an analyte pair (i.e., either chloroform or 1,1,2,2-tetrachloroethane). Reporting analyte pairs and totals of isomers does not constitute false positive responses but represents a fundamental limitation to the screening application of DSITMS. Draft EPA Method 8265 recommends that the true identities of analytes with the same m/z characteristic ions be verified by sampling and analysis using a EPA Method 8260 (Section 1.0). As with any field screening method, verification of field results by an alternate laboratory method on a quality control basis is desirable.

**Extremely high level contamination carry over.**

This has been discussed previously relative to the HS (see Utah comments and earlier in the New Jersey comments). The amount of carry over relative to analyte concentration and the solution are interface specific concerns. For example, the 40 mL vial purge experiences significant carry over at levels > 1 ppm, similar to the HS transfer line. However, there is no transfer line for the 40 mL vial purge and changing the septum in the interface (< 1 min.) generally removes the carry over. All SOPs for application of DSITMS include frequent blank sample analysis to ensure that carry over is not occurring.

# **APPENDIX F**

## **SCAPS Team Concurrence Letters**



State of Louisiana  
Department of Environmental Quality



M.J. "MIKE" FOSTER, JR.  
GOVERNOR

J. DALE GIVENS  
SECRETARY

January 30, 1998

**CERTIFIED - RETURN RECEIPT REQUESTED (P 531 378 892)**

Mr. John Prendergast  
ITRC-SCAPS Team Lead  
New Jersey Department of Environmental Protection  
401 E. State Street  
NC 413  
Trenton, New Jersey 08625

Re: ITRC Workgroup, Evaluation of SCAPS-VOC Technologies

Dear Mr. Prendergast:

The Louisiana Department of Environmental Quality (LDEQ) has been involved in the review, evaluation, and observation of the field work associated with the SCAPS Hydrosparge technology demonstration undertaken by the ITRC committee for some time.

We have reviewed the final draft of the report dated December 1997, and support and agree with the findings and recommendations of the ITRC workgroup for the implementation of the SCAPS Hydrosparge VOC technology as a screening tool for sites contaminated with volatile organic constituents (VOCs).

LDEQ supports this initiative undertaken by ITRC for developing procedures to field screen VOC contaminated soils as long as the procedures are supplemented and verified by traditional sampling and EPA approved laboratory analysis. We believe this technology will streamline the corrective action process while at the same time continue to be protective of human health and the environment.

If you need additional information, please contact Mr. Narendra M. Dave, Chief Geologist of the Hazardous Waste Division at (504) 765-0361.

Sincerely,

L. Hall Bohlinger  
Deputy Secretary

LHB:NMD:dwh

OFFICE OF THE SECRETARY P.O. BOX 82263 BATON ROUGE, LOUISIANA 70884-2263

TELEPHONE (504) 765-0741 FAX (504) 765-0746



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# STATE OF NEBRASKA



E. Benjamin Nelson  
Governor

## DEPARTMENT OF ENVIRONMENTAL QUALITY

Randolph Wood

Director

Suite 400, The Atrium

1200 'N' Street

P.O. Box 98922

Lincoln, Nebraska 68509-8922

Phone (402) 471-2186

December 31, 1997

John Prendergast  
ITRC-SCAPS Team Lead  
New Jersey Department of Environmental Protection  
401 E. State Street  
CN 413  
Trenton, NJ 08625

Dear Mr. Prendergast:

The Superfund Section of the Nebraska Department of Environmental Quality (NDEQ), has reviewed the revisions to the last draft of the SCAPS HydroSparge VOC Sensor and the Thermal Desorption VOC Sampler report, sent on November 19, 1997. Our personnel have also reviewed the revised Recommendations Section, which was faxed to us on December 12, 1997. We look forward to receiving the final report on these technologies in the near future.

NDEQ staff have been involved with the review and evaluation of the SCAPS hydrosparge technology through ITRC. We have provided our evaluation of the hydrosparge technology demonstration to the ITRC-SCAPS work group. Nebraska agrees with the findings and recommendations of the ITRC report concerning the applicability of utilizing the Hydrosparge VOC Sensor technology as a field screening tool.

NDEQ will accept data collected by SCAPS technologies in Nebraska for field screening of sites with petroleum hydrocarbon contamination, as long as verification samples are collected using traditional methods and analyzed by standard EPA laboratory methods. Site investigation using SCAPS technologies for projects other than petroleum hydrocarbon contamination will be accepted on a case by case basis.

Sincerely

A handwritten signature in cursive script that reads "Randolph Wood".

Randolph Wood, P.E.  
Director



IDAHO DEPARTMENT  
OF HEALTH AND WELFARE

DIVISION OF  
ENVIRONMENTAL QUALITY

1410 North Hilton, Boise, ID 83706-1255, (208) 373-0502

Philip E. Batt, Governor

December 22, 1997

Mr. John Prendergast  
ITRC-SCAPS Team Lead  
New Jersey Department of Environmental Protection  
401 E. State Street  
NC 413  
Trenton, New Jersey 08625

RE: Interstate Technology and Regulatory Cooperation Work Group, SCAPS Team  
Evaluation of SCAPS-VOC Technologies.

Dear Mr. Prendergast:

Idaho DEQ staff have been involved with review and evaluation of the SCAPS hydrosparge technology through the ITRC. We have provided our evaluation of the SCAPS hydrosparge technology demonstration to the ITRC-SCAPS work group. Idaho DEQ agrees with the findings and recommendations of the ITRC report concerning the applicability of utilizing the Hydrosparge VOC Sensor technology as a field screening tool.

Idaho DEQ will accept data collected by SCAPS technologies in Idaho for field screening of sites with petroleum hydrocarbon contamination, as long as verification samples are collected using traditional methods and analyzed by standard EPA laboratory methods. Site investigations using SCAPS technologies for projects other than petroleum hydrocarbon contamination will be accepted on a case by case basis.

If you have any questions contact myself or Tom Neace at 208-373-0260.

Sincerely,

Scott Short

Aquifer Protection Manager

cc: Nancy Uziemblo, Washington DOE  
Mary Yelken, Nebraska DEQ



# State of Utah

## DEPARTMENT OF ENVIRONMENTAL QUALITY DIVISION OF SOLID AND HAZARDOUS WASTE

Michael O. Leavitt  
Governor

Dianne R. Nielson, Ph.D.  
Executive Director

Dennis R. Downs  
Director

288 North 1460 West  
P.O. Box 144880  
Salt Lake City, Utah 84114-4880  
(801) 538-6170 Voice  
(801) 538-6715 Fax  
(801) 536-4414 T.D.D.

January 12, 1998

Mr. John Prendergast  
ITRC-SCAPS Team Leader  
New Jersey Department of Environmental Protection  
401 E. State Street  
Trenton, NJ 08625

**Subject: Interstate Technology and Regulation Cooperation (ITRC) Work Group  
SCAPS-VOC Technologies**

Dear Mr. Prendergast:

Staff from the Utah Division of Solid and Hazardous Waste (DSHW) have participated in the evaluation of in-situ volatile organic compound (VOC) field screening technologies using the Site Characterization and Analysis Penetrometer System (SCAPS) platform and the field demonstration of the technology at Fort Dix, New Jersey. Last year, DSHW staff and a member from the Utah Division of Laboratory Services provided an evaluation of the VOC sensor technology demonstration and the draft EPA SW-846 method 8265 for the VOC sensor technologies. Our staff also reviewed the ITRC report of the Multi-State Evaluation of the SCAPS-VOC Sensor Technologies and concurs with the findings and recommendations of the report. The DSHW expects the EPA SW-846 method 8265 to be finalized in the future.

The DSHW will accept data collected by the SCAPS-VOC sensor technology for initial field screening to delineate subsurface contamination at hazardous waste sites in Utah. However, a site-specific characterization and sampling plan, which includes an appropriate number of confirmatory samples, must be approved prior to using the technology.

If you have any questions regarding this letter, please feel free to call Hao Zhu of my staff at 801-538-6170.

Sincerely,



Dennis Downs, Director  
Utah Division of Solid and Hazardous Waste

DRD/HZ/ts



Mr. John Prendergast  
January 12, 1998  
Page 2

c: Kent Gray, Director, Utah Division of Environmental Response and Remediation  
George Robitaille, SCAPS Program Manager, US Army Environmental Center  
SFIM-EEC-ETD, Building E-4430, Aberdeen Proving Ground, MD 20010-5401

F:\SHWHWB\HZHUNTRCSCAPSVOC.LTR



State of Ohio Environmental Protection Agency

**Southwest District Office**

401 East Fifth Street  
Dayton, Ohio 45402-2911  
(513) 285-6357  
FAX (513) 285-6249

George V. Voinovich  
Governor

February 10, 1998

RE: CONCURRENCE: ITRC SCAPS  
VOC SENSOR FINAL REPORT

Mr. John Prendergast  
ITRC-SCAPS Team Lead  
New Jersey Department of Environmental Protection  
401 East State Street, P.O. Box 413  
Trenton, NJ 08625-0413

Dear Mr. Prendergast:

The purpose of this letter is to provide Ohio EPA's concurrence with the "Multi-State Evaluation of the Site Characterization And Analysis Penetrometer System Volatile Organic Compound (SCAPS-VOC) Sensing Technologies" prepared by the Accelerated Site Characterization (ASC) Team, Subtask II, SCAPS New Sensor Development Review Team, established under the Interstate Technology and Regulatory Cooperation (ITRC) Work Group. The Thermal Desorption VOC Sampler is designed for detecting subsurface VOC contamination in the vadose zone, while the HydroSparge VOC Sensor is designed detection of VOC contamination in the saturated zone.

Ohio EPA staff have followed the demonstration of this technology for nearly two years through review of work plans, conference calls, reports, etc. Ohio EPA staff have visited and toured the demonstration site at the US DOD McClellan Air Force Base.

The SCAPS Team has concluded that the HydroSparge VOC Sensor and the Thermal Desorption VOC Sampler should be considered site characterization tools for field screening applications. Ohio EPA observed that the HydroSparge VOC Sensor has been adequately demonstrated and that this technology may be applicable to many other contaminated sites. Ohio EPA will await the further review and recommendations of the SCAPS Team regarding the Thermal Desorption VOC Sampler.

Please note that this concurrence is based on an evaluation of technology performance under specific, predetermined criteria and appropriate quality assurance procedures. Ohio EPA makes no expressed or implied warranties as to the performance of the technology and does not certify that any technology will always, under circumstances other than those tested, operate at the levels in these demonstrations. This concurrence is not an endorsement of this technology by Ohio EPA, and should not be used as such. The end user is solely responsible for complying with any and all applicable federal, state, and local requirements.

Mr. John Prendergast  
February 10, 1998  
Page 2

If you have any questions about Ohio EPA's involvement in this ITRC project, please contact me at (937)285-6466.

Sincerely,

A handwritten signature in black ink, appearing to read "Thomas A. Schneider", with a long, sweeping horizontal flourish extending to the right.

Thomas A. Schneider  
Fernald Project Manager  
Office of Federal Facilities Oversight

cc: Tom Velalis, DERR/CO



## State of New Jersey

Department of Environmental Protection

Christine Todd Whitman  
Governor

Robert C. Shinn, Jr.  
Commissioner

Mary A. Yelken  
ITRC State Engagement Coordinator  
1200 N. Street, Suite 400  
Lincoln, NE 68509-8922

MAR 11 1998

**RE:** Site Characterization and Analysis Penetrometer System Volatile Organic Compound (SCAPS-VOC) Sensor Technology Review .

Dear Ms. Yelken:

The State of New Jersey, Department of Environmental Protection (NJDEP) is a member state of the Interstate Technology Regulatory Cooperation (ITRC) Work Group and is represented on the Accelerated Site Characterization Subtask; SCAPS New Sensor Development Review Team. An evaluation of the SCAPS HydroSparge VOC Sensor technology was conducted by NJDEP staff, within the scope of the ITRC Accelerated Site Characterization Team. The determination by NJDEP has concluded that, with an appropriate number and collection of confirmatory laboratory samples, the HydroSparge VOC Sensor technology is capable of providing real time in-situ detection of VOC's below the water table.

The NJDEP encourages the use of field screening methods for the purpose of streamlining the site investigation and remediation process at contaminated sites. Our evaluation of the HydroSparge VOC Sensor technology has determined it to be an acceptable field screening method for use at hazardous site investigations within the State of New Jersey. As with any field analysis or screening method utilized in New Jersey, all applicable regulations and requirements as outlined in the Technical Requirements for Site Remediation, N.J.A.C. 7:26E, must be complied with prior to undertaking a site investigation.

The NJDEP supports the efforts of the ITRC to speed the efficient, safe, and effective cleanup of waste sites by accelerating the regulatory acceptance and commercial use of innovative technologies. The State of New Jersey is committed to assist in this effort and we look forward to continued cooperation with other states to help us achieve our common goals.

Sincerely,



Robert C. Shinn, Jr.  
Commissioner