Final MEETING NOTES

Expedited Site Characterization Field Quality Assurance Meeting

U.S. EPA Region X
San Francisco, CA

January 10, 1994

On January 10, 1994, a meeting was held at the EPA Region IX offices in San Francisco, the subject of which was "Expedited Site Characterization Field Quality Assurance". Marlon Mezquita of EPA Region IX and Sebastian Tindall of Bechtel Environmental, Inc. facilitated the meeting. Representatives from EPA and their contractors, (Bechtel Environmental, Inc. and ICF-Kaiser), the U.S. Navy, Southwest Division Technical Branch and their CLEAN 1 contractor technical team (Jacobs Engineering Group), the Arizona Department of Environmental Quality (ADEQ) and three firms specializing in Field Screening Technologies (Target Environmental Services, SiteWorks, Advanced Analytical Services). A list of the participants is attached. The notes presented below summarize the topics that were discussed during the course of the meeting and will be distributed to all participants.

MEETING OBJECTIVES

Mr. Mezquita and Mr. Tindall presented the following objectives for the meeting:

- To discuss the uses of field analytical data generated by gas chromatography/mass spectroscopy (GC/MS) and energy dispersive x-ray fluorescence spectroscopy (EDXRF), using direct push sampling procedures, and explore sample throughputs.

- To discuss achievable field analytical detection limits for EPA risk assessment needs.

- To discuss Quality Control (QC) specifications for field analytical methods.

- To identify the requirements for a Quality Assurance Project Plan (QAP$_j$P) using field analytical methods.

EPA Region IX representatives mentioned that a long range goal of EPA is to issue regional Superfund guidance (i.e., Standard Operating Procedures) for field screening /field quantitation level project plans, such as field work plans, field sampling plans, and field QAP$_j$Ps.

EXPEDITED SITE CHARACTERIZATION (ESC) M^3

Mr. Tindall presented the ESC M^3 approach to site characterization. The main objective of the approach is to quickly identify and classify clean areas of concern (AOCs) versus contaminated AOCs, thus allowing potentially responsible parties (PRPs) to save limited resources and to undertake removal type actions expeditiously. The ESC M^3 approach also overcomes the high degree of uncertainty associated

with traditional site investigations that results from the lack of comprehensive scoping and reduces the large number of non-detect samples that are customarily submitted for CLP-type (i.e., Contract Laboratory Program) analyses.

The ESC M^3 approach consists of the following three steps: Step 1) a "massive" sampling effort is first conducted at an AOC (e.g., 200 samples are collected using a grid approach); the samples are analyzed on a daily basis using real time onsite methods and field screening (FS)-type data are generated; Step 2) a "moderate" sampling effort is then conducted (e.g., 20 splits of the Step 1 samples from "clean" locations for a clean AOC or a lesser amount of splits from"hot" locations for a contaminated AOC, along with boundary location samples) to provide onsite verification of the FS-type data; the samples are analyzed using real time methods with an increased level of QC and field quantitation (FQ)-type data are generated; and finally, Step 3) a "minimal" sampling effort is conducted (e.g., 4 splits of the Step 2 samples from "clean" locations for a clean AOC and from "hot" and boundary locations for a contaminated AOC) to provide verification of the FQ-type data; the samples are sent to an offsite laboratory for analysis, and CLP-type data are generated.

Note that both the FS and FQ steps will generate quantitative results (i.e., concentration values for every analyte). The main difference is in the level of precision. Studies have shown the FS data precision to be comparable to CLP-type precision. While the level of QC for the CLP-type data is known, the appropriate levels of QC for the FS-type and FQ-type data still need to be defined.

All FS-type and FQ-type data will be loaded into an onsite data management system with three-dimensional (3-D) visualization capabilities. These data will be viewed by site managers, and Remedial Project Managers via modem transmissions, at the end of each day. Thus, remedial decisions will be made on a daily basis, rather than, as is typical of current practices, months or years after each phase of the site characterization field work has been completed. It is possible that only one field investigative effort will be required using this approach since data gaps can be seen on a daily basis and then accounted for on succeeding days while the investigation is ongoing.

VENDOR PRESENTATIONS

Ned Tillman of Target Environmental Services, Inc. gave a presentation on adaptive sampling programs for expediting site characterization. He discussed the design of a "massive" soil gas sampling effort, the use of direct push technology for collecting surface/subsurface soil and soil gas samples (e.g., geoprobe and cone penetrometer), and analytical protocols for onsite GC analysis of soil gas samples using a modified EPA Method 8010/8020. Research is being conducted to evaluate the use of the MS as the detector in a soil vapor survey (SVS), rather than the traditional use of GC with various GC-type detectors. This continuous monitoring SVS-MS approach may significantly increase the amount of data collected at no increase in cost.

Al Robbat of SiteWorks, Inc. gave a presentation on rapid acquisition and evaluation of environmental data using real time GC/MS in the field. He indicated that real time GC/MS can currently be used for volatile organic compounds (VOCs), semivolatiles (SVOCs), pesticides, PCBs, and other organic compounds. The organic compounds are introduced into the GC/MS system via purge-and-trap for VOCs and thermal desorption for SVOCs, pesticides, and PCBs. Thermal desorption involves the use of a heated probe that removes the organic compounds from a soil extract. Once the organic compounds have been introduced into the GC/MS system, proprietary MS algorithms developed by Dr. Robbat and his colleagues at Tufts University are used to obtain the analytical results. Two levels of data quality are

obtainable from real time GC/MS, semi-quantitative and quantitative. For semi-quantitative data, the throughput time is 5 minutes for VOCs. For quantitative data, the throughput time is 20 minutes for VOCs. Dr. Robbat explained that he uses a 2-minute handshake extraction method for preparing the soil extract for SVOCs and that the analyses recovery rates are within CLP ranges. It was suggested that an alternative to the handshake method is the EPA-approved sonication technique, which takes 6 minutes, not including clean-up time.

Carl Meltzer of Advanced Analytical Products and Services gave a presentation on the use of EDXRF in field screening for metals. The method involves grinding soil samples and producing thin layer slides for analysis. This method achieves lower detection levels and allows analysis to be repeated at later dates.

Questions were directed to each presenter during and after these presentations.

DEMONSTRATION OF THERMAL DESORPTION GC/MS

Brian Abraham of SiteWorks, Inc. demonstrated the use of thermal desorption GC/MS for detecting PCBs.

QUESTION/ANSWER SESSION

Prior to the meeting, 15 questions were submitted by technical staff from the U.S. Navy and Jacobs Engineering Group regarding their concerns with the quality of data generated by field analytical methodologies. Most of the afternoon portion of the meeting was devoted to addressing these concerns.

In response to the question regarding the onsite experience that the vendors have had, Dr. Robbat said that he has had considerable field experience with generating real time data using GC/MS. Articles have been published in several professional journal and are available from Dr. Robbat. Mr. Meltzer said that his firm had done several field investigations using EDXRF for EPA. Mr. Tillman said Target had been using direct push sampling all over the U.S. for over 10 years.

In response to the questions regarding analysis time for field analytical methodologies, Mr. Tindall emphasized that field analytical methods can generate real time information that would only be available from traditional commercial laboratories months (perhaps more than a year) after field activities. Dr. Robbat said that in the semi-quantitative Selective Ion Monitoring System (SIMS) mode, each real time GC/MS instrument can analyze for 12 compounds at a time. For SVOCs, this field screening analysis would take 10 minutes per sample. Several instruments can be run simultaneously, each dedicated to the analysis of a specific class of compounds (e.g., VOCs, SVOCs, etc.), to increase the number of target compounds that are analyzed at one time. Dr. Robbat estimated that, in the SIMS mode, the total sample throughput per day is 70 samples for VOCs and PCBs and 40 samples for pesticides. In the quantitative Total Ion Current (TIC) mode, the GC/MS instrument is not limited to 12 compounds at a time. For SVOCs, the field quantitation analysis in the TIC mode would take 40 minutes per sample. Mr. Meltzer said that it takes approximately 10 minutes to analyze a sample using EDXRF, which includes 2 to 4 minutes to prepare the sample and 5 minutes to analyze the sample. A request was made of each vendor to prepare tables that provide sample throughput times for each data quality level, with the data quality levels clearly defined.

In response to the questions regarding data quality and usability, it was pointed out that QA/QC protocols have not been defined for all field analytical methods. For GC/MS, Dr. Robbat clarified that the SIMS

mode would be used to generate FS-type data, the TIC mode would be used to generate FQ-type data, and only a few samples would be sent to the laboratory to obtain CLP-type data. He handed out a table that compares the QC protocols for thermal desorption GC/MS in the SIMS and TIC modes to the QC requirements for VOC analysis in the CLP Statement of Work and SW-846 Methods 8240 and 8260 (a table for SVOC QC comparisons was also distributed). The difference between the compound used for instrument tuning in thermal desorption GC/MS, which is FC-77, and that used in CLP/SW-846 methods, which is 4-bromofluorobenzene (BFB), was discussed. Dr. Robbat pointed out that BFB is known by another identifier, FC-43. Mr. Mezquita noted that the chemical to be used for instrument tuning and other deviations from standard practices should be identified and rationalized in the QAPjP. For XRF, there are no standard guidelines from which to deviate. It was, therefore, suggested that the use of EDXRF be limited to the generation of FS-type data, with ICP being used to generate FQ-type and CLP-type data. Mr. Meltzer said that EDXRF has fewer variables that require QC protocols than organic analyses. In addition, EDXRF samples can be re-analyzed at any time. However, he is willing to develop a written protocol for EDXRF.

In response to a question regarding EPA's definition of validated data, Hedy Ficklin of EPA Region IX said that validated data means data of known quality.

In response to the question regarding the usability of field analytical data for risk assessment, Dan Stralka of EPA Region IX said that all data, including FS-type data, can be used for risk assessment, as long as the FS-type data have been confirmed by FQ-type and CLP-type data and the data is of known quality. He referred the meeting participants to the EPA's "Data Usability for Risk Assessment" (DURA) guidance. The issue of the capability of the field analytical methods to achieve detection limits that satisfy EPA risk assessment needs was raised. Dr. Stralka agreed to provide Dr. Robbat and Mr. Meltzer with the EPA Region IX Preliminary Remedial Goals (PRGs). The vendors, in turn, agreed to supply EPA with the FS and FQ detection limits for each analyte listed in the PRGs. In cases where the field analytical method detection limits do not meet site-required detection limits, traditional laboratory analytical methods will have to be used, as is the case in current practices. That is, the traditional laboratory analytical methods that are requested will be either standard or special, depending on how low of a detection limit is required.

In response to the question regarding operating costs, Dr. Robbat cited a Department of Energy (DoE) study from a national laboratory that indicates that the use of field sampling and analytical techniques can result in a cost saving of approximately 95 per cent. He stressed the importance of having qualified personnel operating the field analytical equipment. It was noted that the DURA guidance, on page 58, addresses operator proficiency levels for field instruments by class. The EPA Region IX Quality Assurance Management Section (QAMS) will also require proof of proficiency when using complex field analytical instruments such as GC/MS. Mr. Tillman stated that mobilization and demobilization costs have not been included in daily operating cost estimates discussed today.

In response to the question regarding handling of the massive amounts of FS data that will be generated, it was acknowledged that since data management is the key issue to the success of field analytical methods, a data management system must be in place before initiation of the field work. Dr. Robbat said that SiteWorks, Inc. uses the "Site Planner" program for 3-D visualization.

CLOSING REMARKS

Representatives from the U.S. Navy and Jacobs Engineering Group were asked if they now had enough information to prepare a QAPjP using field analytical methods. They replied that they had enough information to make some decisions regarding the applications of these FS and FQ methodologies.

SUMMARY

The four objectives of the meeting were met as follows:

- Regarding the first objective, the ESC M^3 approach was presented and the use of real time GC/MS and EDXRF methodologies for generating FS-type and FQ-type data were discussed. A request was made of each vendor to prepare tables that provide sample throughput times for each data quality level, with the data quality levels clearly defined.

- Regarding the second objective, Dr. Stralka of EPA Region IX said that FS-type data can be used for risk assessments, as long as it has been confirmed by FQ-type and CLP-type data and is of known quality. In addition, Dr. Stralka agreed to provide Dr. Robbat and Mr. Meltzer with the EPA Region IX PRGs for comparison with field analytical method detection limits. The vendors, in turn, agreed to supply EPA with the FS and FQ detection limits for each analyte listed in the PRGs.

- Regarding the third objective, Dr. Robbat presented a table that compares the QC protocols for GC/MS to the QC requirements for VOC analysis in the CLP Statement of Work and SW-846 Methods 8240 and 8260 (a table showing similar QC comparisons for SVOCs was also presented). Mr. Meltzer agreed to provide tables for the EDXRF method.

- Regarding the fourth objective, it was noted that any deviations from standard practices (e.g., using FC-43 for tuning of the real time GC/MS, rather than the FC-77 standard that is required for CLP and SW-846 VOC analytical methods) should be identified and rationalized in the QAPjP. Since there are not standard guidelines from which to deviate for EDXRF, it was suggested that the use of EDXRF be limited to the generation of FS-type data, with ICP being used to generate FQ-type and CLP-type data. However, Mr. Meltzer agreed to prepare a written EDXRF analytical protocol for EPA review.

References

The following publications and handouts were distributed during the meeting.

Presentation Transparencies, Advanced Analytical Products and Services.

Abraham , B.M., T.Y. Liu, and A. Robbat, Jr., Data Comparison Study Between Field and Laboratory Detection of Polychlorinated Biphenyls and Polycyclic Aromatic Hydrocarbons at Superfund Sites.

California Regional Water Quality Control Board, Los Angeles Region, 1993, Requirements for Active Soil Gas Investigation (Well Investigation Program), December 1993.

Comparison of Documentation for CLP and non-CLP, Organic Data, compiled from U.S. EPA Statement of Work for Organic Analysis Multi-Media, Multi-Concentration Document Number OLM01.0 through OLM01.9 July, 1993, and from U.S. EPA Region IX, Laboratory Documentation Requirements for Data Validation, Document Control Number 9QA-07-89, January 1990.

Comparison of Documentation for CLP and non-CLP, Inorganic Data, compiled from U.S. EPA Statement of Work for Organic Analysis Multi-Media, Multi-Concentration Document Number ILM03.0, No date given, and from U.S. EPA Region IX, Laboratory Documentation Requirements for Data Validation, Document Control Number 9QA-07-89, January 1990.

Maney, J.P. 1993, Heterogeneity, Simplifying the Measurement Process, in *Environmental Testing and Analysis,* September/October 1993.

Rosecrance, A.E., 1993, EPA Method Data Validation, in *Environmental Testing and Analysis*, September/October 1993.

Tillman N., 1993, Site Investigation and Remediation with Direct Push Technology, in *The National Environmental Journal*, September/October 1993.

U.S. EPA, 1993, Analytical Services Available Through Superfund's Analytical Operations Branch/Contract Laboratory Program (CLP), October 1993.

U.S. EPA, 1993, Multi-Media, Multi-Concentration, Organic Analytical Service for Superfund, Office of Solid Waste and Emergency Response, Publication 9240.0-08FS, October 1993.

U.S. EPA, 1993, Multi-Media, Multi-Concentration, Inorganic Analytical Service for Superfund, Office of Solid Waste and Emergency Response, Publication 9240.0-09FS, October 1993.

U.S. EPA, 1993, Low Concentration, Organic Analytical Service for Superfund (Water Matrix), Office of Solid Waste and Emergency Response, Publication 9240.0-10FS, October 1993.

U.S. EPA, 1993, Low Concentration, Inorganic Analytical Service for Superfund (Water Matrix), Office of Solid Waste and Emergency Response, Publication 9240.0-11FS, October 1993.

U.S. EPA, 1993, Ambient Air Analytical Service for Superfund, Office of Solid Waste and Emergency Response, Publication 9240.0-15FS, October 1993.

U.S. EPA, 1993, High Concentration, Inorganic Analytical Service for Superfund, Office of Solid Waste and Emergency Response, Publication 9240.0-16FS, October 1993.

U.S. EPA, 1993, Multi-Media, Multi-Concentration, PCDD/PCDF Analytical Service for Superfund, Office of Solid Waste and Emergency Response, Publication 9240.0-17FS, October 1993.

U.S. EPA, 1993, Quick Turnaround Method Analytical Service for Superfund, Office of Solid Waste and Emergency Response, July 1993.

Expedited Site Characterization Field Screening Quality Assurance Meeting Attendees - January 10, 1994

Name	Affiliation
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