

**DEMONSTRATION PLAN FOR THE EVALUATION OF FIELD-TRANSPORTABLE  
GAS CHROMATOGRAPHY/MASS SPECTROSCOPY TECHNOLOGIES**

Environmental Technology Evaluation Program  
Consortium for Site Characterization Technologies

Sponsored by:  
U.S. Environmental Protection Agency  
National Exposure Research Laboratory  
Characterization Research Division  
Las Vegas, Nevada

**APPROVAL SIGNATURES**

This document is intended to ensure that all aspects of the demonstration are documented, scientifically sound, and that operational procedures are conducted within quality assurance and quality control specifications and health and safety regulations.

The signatures of the individuals below indicate concurrence with, and agreement to operate in compliance with, procedures specified in this document.

**FINAL DEMONSTRATION PLAN**

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#### APPROVAL SIGNATURES

The signatures of the developers below indicate that they have reviewed the experimental design of the demonstration plan and agree that the design will fairly represent and evaluate the developer's claims regarding performance of their technologies.

The signatures of the individuals below indicate concurrence with, and agreement to operate in compliance with procedures specified in this document.

#### FINAL DEMONSTRATION PLAN

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## **EXECUTIVE SUMMARY**

The purpose of this document is to provide a strategy for collecting data that can be used to fairly and thoroughly evaluate the performance of field transportable GC/MS technologies for measuring volatile organic compounds in soil, soil gas and ground water. This demonstration is being conducted under the auspices of the Consortium for Site Characterization Technology (CSCT). The planning and execution of the demonstration is a collaborative effort between the Department of Energy's Sandia National Laboratories (demonstration planning, execution, data evaluation, and report preparation), the environmental technology demonstration programs at the Savannah River Site (SRS) and Wurtsmith AFB, which help to coordinate site logistics, and the technology developers (demonstration plan preparation and review, technology operation, and data evaluation).

The primary objectives of the demonstration are: (1) to verify vendor claims regarding technology performance, (2) to determine how well each developer's technology performs in comparison to conventional laboratory analytical methods and protocols, (3) to determine the logistical and economic resources needed to operate each instrument, and (4) to produce a verified data set for use in considering the technology for future use in hazardous waste site investigations, for assessing the performance of remediation technologies, and for post-clean up monitoring.

The developers participating in this demonstration are Bruker-Franzen Analytical, Billerica, Massachusetts, Teledyne Electronic Technologies, Mountain View, California, and Viking Instruments Corporation, Chantilly, Virginia. The demonstration will be conducted at two different sites. The first demonstration will be conducted at the Department of Energy's Savannah River Site from July 16-21, 1995. The second demonstration will be conducted at Wurtsmith Air Force Base in Oscoda, Michigan, from September 11-15, 1995. The conditions at each of these sites represent what are considered typical conditions under which the technology would be expected to operate, but it is not considered all inclusive.

Both sites are contaminated with chlorinated solvents and have a wide range of levels of contamination in the media of interest.

This demonstration plan defines the:

- Roles and responsibilities of the demonstration participants
- Procedures governing demonstration activities such as sample collection, preparation, and analysis, and data collection and interpretation
- Experimental design
- Quality assurance/quality control (QA/QC) procedures for conducting the demonstration and for assessing the quality of the data generated
- Health and safety requirements for performing work at the two demonstration sites

## Acronyms

ACE	Alternating Chemical/Electron Ionization
AFB	Air Force Base
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CBD	Commerce Business Daily
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
COC	Chain of Custody
CPR	Cardio-pulmonary Resuscitation
CRD-LV	Characterization Research Division
CSCT	Consortium for Site Characterization Technology
CVOC	Chlorinated Volatile Organic Compounds
D/NETDP	Department of Defense/National Environmental Technology Demonstration Program
DC	Direct Current
DCE	Dichlorethylene
DOD	Department of Defense
DOE	Department of Energy
EI	Electron Ionization
EI/CI	Electron Ionization/Chemical Ionization
EM	Emission Mass Spectrometer
EnTICE	Environmental Technology Innovation Commercialization and Enhancement
EPA	Environmental Protection Agency
ETI	Environmental Technology Initiative
FID	Flame Ionization Detector
FNF	Filtered Noise Field
FSP	Field Sampling Plan
FY	Fiscal Year
GC/MS	Gas Chromatography/Mass Spectrometry
GEL	General Engineering Laboratories
HASP	Health and Safety Plan
HSD	Health and Safety Director

ICR	Ion-Cyclotron Resonance
ITER	Innovative Technology Evaluation Report
JP-4	Jet Fuel
LRL	Lower Recovery Limit
MI	Michigan
MIM	Multiple Ion Monitor
MIMS	Membrane Inlet Mass Spectrometry
MS/MS	Mass Spectrometry/Mass Spectrometry
MSDS	Material Safety Data Sheet
NAPL	Non-aqueous Phase Liquid
NCIBRD	National Center for Integrated Bioremediation Research and Development
NEC	National Electric Code
NERL	National Exposure Research Laboratory
NIOSH	National Institute for Occupational Safety and Health
ORNL	Oak Ridge National Laboratory
OSHA	Occupational Safety and Health Administration
PAH	Polyaromatic Hydrocarbon
PC	Personal Computer
PCE	Tetrachloroethene
PE	Performance Evaluation
PFTBA	Perfluorotributylamine
PID	Photoionization Detector
PPBW	Parts Per Billion by Weight
PPE	Personal Protective Equipment
PPMW	Parts Per Million by Weight
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
SAC	Strategic Air Command
SC	South Carolina
SHSO	Site Health and Safety Officer
SIM	Selected Ion Monitoring
SNL	Sandia National Laboratories
SOP	Standard Operating Procedure
SRI-CI	Selective Reagent Ion Chemical Ionization
SRS	Savannah River Site
SW-846 Method 8260	Gas Chromatography/Mass Spectrometry for Volatile Organics: Capillary Column Technique
TA	Traverse Analytical
TBD	To Be Determined
TCA	Trichloroethane
TCDD	Tetrachlorodibenzofuran
TCE	Trichloroethene

TER	Technology Evaluation Report
TO-14	Determination of Volatile Organic Compounds (VOCs) in Ambient Air Using Summa Passivated Canister Sampling and GC/MS Analysis
TOC	Total Organic Carbon
UM	University of Michigan
USCS	Unified Soil Classification System
UST	Underground Storage Tank
UV	Ultraviolet
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compound