

J-FIELD
PHYTOREMEDIATION WELL AND LYSIMETER
INSTALLATION AND MONITORING PLAN
ABERDEEN PROVING GROUND, MARYLAND

OCTOBER 1996

J-FIELD PHYTOREMEDIATION WELL AND LYSIMETER INSTALLATION AND MONITORING PLAN

J-Field Phytoremediation

Aberdeen Proving Ground, Harford County, Maryland

Prepared by
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Richard J. Tobia
Task Leader

10/25/96
Date

1.0 OBJECTIVE

The overall objective of the this project is to remove volatile organic compounds (VOCs), primarily 1,1,2,2-tetrachloroethane (PCA) and trichloroethene (TCE), from groundwater at the J-Field Toxic Pits site, Aberdeen Proving Ground (APG), Maryland. One hundred eighty three hybrid poplar trees were planted from 25 March - 3 April 1996 in a one acre plot above contaminated groundwater. This is a pilot study with three possible outcomes. One possible outcome is that groundwater contamination concentrations remains the same over time another is that groundwater contamination concentrations increase over time. Based on the monitor well data, contamination concentrations have increased slightly over time. These outcomes could have three possible causes: 1) trees are not reducing VOCs; 2) trees are reducing VOCs, but the contaminant source (soil) is replenishing the groundwater; and/or 3) trees are reducing VOCs at an undetectable rate. The third possible outcome is that groundwater contamination concentrations decreases over time. This outcome could result from one or a combination of the following causes: 1) trees are aiding in soil microbial biodegradation of VOCs in the rhizosphere; 2) trees are removing and metabolizing VOCs; 3) trees are removing and transpiring VOCs; and/or 4) trees are removing and accumulating VOCs.

There are currently nine wells located in the surficial aquifer near the phytoremediation study area. No wells are located south or south east of the site. In order to obtain further groundwater data necessary to determine the effects of the phytoremediation study on the groundwater additional wells and lysimeters are proposed for the area. The specific objectives are as follows:

- to determine the draw down within the study area and the lateral extent of influence.
- to monitor the volatile contaminant gradient in the upper part of the surficial aquifer and how it is affected by the trees during the growing and dormant season.
- to correlate findings from tree tissue and off gas sampling with water quality data from the capillary fringe.

2.0 PROJECT SCOPE

2.1 Site History

J-Field is located at the tip of Gunpowder Neck, Edgewood Area of the APG, Harford County, Maryland. The Toxic Pits area of J-Field was once the disposal site for chemical warfare agents, munitions, and industrial chemicals. The Toxic Pits area consists of two parallel disposal pits that are approximately 10-feet-deep by 15-feet-wide by 200-feet-long. Remnants of other pits extend into the marsh area to the southeast. The pits were used for open-pit burning and detonation from 1940 through 1980.

During open burning, wood was first placed in the pit and the waste material, including high explosives, nerve agents, mustard agents, smoke materials, and solvents, were placed on top. The pit was then flooded with fuel oil and ignited. After the first burn, a reburn of the material was performed in the adjacent pit. Any remaining debris was pushed into the marsh. The area to the northeast of the pits appears to be the main push-out area for the pits.

The contaminants of concern are 1,1,2,2-tetrachloroethane (PCA), 1,1,2-trichloroethane (TCA), trans-1,2-dichloroethene (DCE), trichloroethane (TCE), tetrachloroethene (PCE), and lead. The volume of contaminated groundwater and soil to be addressed are unknown at this time. The ecosystem of concern is the Chesapeake Bay and surrounding waterways. Additional information may be found in: *Hydrology and Soil Gas at J-Field, Aberdeen Proving Ground, Maryland* (U.S.G.S. 1993), *J-Field Remedial Investigation Reports*, Volume 1 through 3.

2.2 Site Description

The phytoremediation planting area covers approximately one acre. The former toxic pits are located north and west of the planting area. The pit closest to the planting contains sweet gum (*Liquidambar styraciflua*), bayberry (*Myrica penslyvanica*), groundsel tree (*Baccharis halimifolia*), and sycamore (*Platanus occidentalis*). A freshwater marsh dominated by reed grass (*Phragmites australis*) begins approximately 100 feet to the north east of the planting area. The eastern border of the planting contains reed grass, little blue stem (*Schizachyrium scoparium*), and panic grass (*Panicum* sp.) and scattered thickets containing the species described earlier in the toxic pit. The southern border consists of mature forest dominated by sweet gum, co-dominated by tulip poplar (*Liriodendron tulipifera*), and containing an understory of sassafras (*Sassfras albidum*). Groundwater flows from the toxic pit area to the south and southeast. The planting area contained reed grass, panic grass, and little blue stem, as well as suckers of previously cleared bayberry, groundsel tree, sweet gum, and sycamore growing from cut stumps. The perched groundwater in the planting area at the time of planting ranged from two to six feet below the ground surface.

2.3 Scope of Work

It is proposed that five monitor wells and four lysimeters be installed according to Figure 1 so that data can be obtained that will allow for the evaluation of the phytoremediation pilot study.

The field investigation will involve the collection of leaves, shoots, stems, roots, soil, and groundwater over a five year period. All matrices will be analyzed for VOCs and Target Analyte List (TAL) metals. Soil and groundwater will also be analyzed for chloride. The water flux rate in trees along with transpirational gases will be measured.

3.0 MONITOR WELL AND LYSIMETER INSTALLATION

3.1 Monitor Wells

Five 2-inch monitor wells will be installed by a State of Maryland licensed well driller. The placement of these wells was determined based on the objectives of the monitoring, site conditions, and accessibility. Monitor wells will be screened from 5 to 15 feet bgs. This screening interval will allow for the sampling and water level monitoring of the upper part of the surficial aquifer. This interval is the most likely to be initially impacted by the root zone of the hybrid poplar trees used in the phytoremediation study. The 5-foot depth will allow for adequate completion of the wells, while the 15-foot depth will allow for some consistency with existing groundwater monitor wells. As shown in Figure 1, Monitor Well 1, (MW-1) will be placed upgradient of the phytoremediation study area. The objective of the placement of this well is to obtain as representative of a sample of groundwater before it is affected by the trees. MW-2 and MW-3 will be placed within the study area to monitor the trees affect on water quality and levels. MW-4 will be placed in-line down gradient of MW-1, MW-2, and MW-3 so that the affect of a larger planting area on water quality and levels can be determined. MW-5 will be placed in the wooded area to the south of the site approximately 100 feet from the study border. Monitor well MW-4 and MW-5 should plug the data gap for both piezometric surface data and contaminant data which exists at these locations.

3.2 Lysimeters

Two sets of two lysimeters will be installed near monitor wells MW-2 and MW-3. The lysimeters will be placed in pairs and set at depths of 4 and 8-feet bgs. These depths will allow for coverage of the unsaturated zone during seasonal lows in the groundwater table level. The data obtained from the lysimeters will be correlated with the surrounding tree tissue and transpirational off-gas data to make a determination as to what degree the pilot study is

working.

4.0 MONITORING APPROACH

4.1 Plant Growth Measurements and Visual Observations

Plant growth will be measured upon installation and annually at the end of each growing season (October). Measures of plant growth will include diameter at breast height (DBH) (1.4 meters above ground level) using tree girth diameter tape. Total height will be measured with a telescoping tree measuring pole. Observations of plant health will be conducted as necessary. Evidence of insect damage, chlorosis, wilting, and other visual symptoms of poor health will be recorded upon inspection. Vegetation growing between the trees will be clipped annually to reduce competition with the trees. Dead trees will be replaced in late fall.

4.2 Groundwater Sampling

Groundwater sampling for VOCs and TAL metals will be conducted quarterly if not already being performed by other groups such as the U.S. Geological Survey (U.S.G.S.). Historical data exists for the wells located within and adjacent to the planting area. The wells of interest include: JF53, JF63, JF73, JF83, JF173, JF183, JF203, P2 and P4. Prior data will be used to assess the effectiveness of the remediation project. Permanent water elevation monitors are currently located at wells JF53, JF63, JF73, and JF83. Data from these recorders will be utilized to monitor the effect of the trees on groundwater levels. Additional groundwater level monitors will be installed in new monitor wells (MW-1, MW-2, MW-4, and MW-5) to expand on water level data. Groundwater sampling of the newly installed wells will be performed at a minimum of three times per year, once during the dormant season (December - January) and twice during the growing season (May - June and July-August).

4.3 Weather Monitoring

Weather parameters measured by the U.S.G.S. or a local or on-site source will be correlated with tree data and be utilized to estimate seasonal, daily, and yearly contaminant removal rates. Parameters such as daily precipitation, wind speed/direction, humidity, sun intensity, and temperature will be recorded throughout the term of the monitoring program. A photometer (Li-Cor, Inc., Model LI-185B) will be used to measure light intensity during any sampling event. This data will be correlated with measures of transpiration and off-gas.

4.4 Plant Tissue Sampling

As part of the pilot study, plant tissue samples (roots, shoots, stems, and leaves) will be collected from 8 randomly selected trees. Sample quantities will be determined by the analytical methodology, methodologies for analyzing plant tissues for VOCs, which will be developed under this pilot study. Sampling will be conducted quarterly to assess seasonal variability in the translocation of contaminants in plant tissues. The quarterly sampling will occur during January (dormant period), April (initiation of leaf formation), July (maximum growth period), and October (onset of leaf senescence). Different trees may be selected for sampling to avoid over-harvesting individual trees.

4.5 Soil Sampling

To evaluate the migration and possible accumulation of contaminants into the root zone, soil samples will be taken from the rhizosphere of the trees used for plant tissue sampling. An auger will be used to sample soil at a uniform depth. All samples will be analyzed for VOCs, chloride, and TAL metals. An increase in chloride concentrations in the rhizosphere may

indicate increased microbial degradation due to root exudates.

4.6 Plant Transpiration Measurements

The heat balance technique will be used to measure the water flux of whole trees. The technique uses the Dynamax Flow 32[™] Sap Flow System to measure the transpiration rate in grams water/hour/tree (Devitt *et al.* 1993, Gutierrez *et al.* 1994). This method is non-invasive and does not injure the tree. Transpiration rates will be recorded on eight trees over a one week period during the quarterly sampling event. An effort will be made to monitor some if not all the trees which are being sampled. This information will be correlated with measures of VOCs in transpirational off-gas in order to estimate the quantity of VOCs being emitted from the trees over the course of the season.

4.7 Transpirational Gas Sampling

Transpirational gas will be measured on trees during tissue sampling events. There are three sampling methods that will be explored to measure VOCs in the transpirational gas. During the trial period, each method will be attempted because it is unclear without having performed similar procedures which method will provide more precise and accurate data. The most accurate method will be used after the initial trials.

A Tedlar bag will be placed over a two foot section of the end of a branch. The end of the bag will be sealed around the stem using an adhesive and a mechanical fastener. In all three methods, air will be drawn from the sealed branch and analyzed for VOCs. Initially, concentrations of VOCs will be translated into quantities of transpired contaminant per leaf. An estimate of the quantity of contamination transpired in a whole tree will be made by formulating a leaf area index. This will be standardized to water flux (liters/tree/day) for the measured tree to give an estimate of contaminant transpired at a given water flux in a whole tree. Mean transpiration rates and mean contaminant concentrations in transpired gases will be used to estimate the quantity of transpired water and contaminants for the entire planting.

The following three sampling methods will be explored:

- 1) After the Tedlar bag is sealed about the tree branch, a Tenax/Carbon Molecular Sieve tube will be collected utilizing a low-flow pump. At a flow rate of approximately 10-20 milliliters per minute (ml/min), air from inside of the Tedlar bag will be drawn through the tube until a volume of 6 to 7 liters have passed through the tube. This volume will allow detection limits in the low parts per billion by volume for the target compounds listed in the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air (EPA-600/4-87/006) September 1986, METHOD TO1 - Method for the Determination of Volatile Organic Compounds in Ambient Air Using Tenax Adsorption and Gas Chromatography/Mass Spectrometer (GC/MS) and METHOD TO2 - Method for the Determination of Volatile Organic Compounds in Ambient Air By Carbon Molecular Sieve Adsorption and Gas Chromatography/Mass Spectrometer (GC/MS).

- 2) After the Tedlar bag is sealed about the tree branch, a Summa canister will be collected. A grab sample of the air from inside of the Tedlar bag will be drawn through a tube to a 6-liter Summa canister until the 6-liter Summa canister is filled. This volume will allow detection limits in the low parts per billion by volume for the target compounds listed in the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air (EPA-600/4-87/006) September 1986, METHOD TO14 - Method for the Determination of Volatile Organic Compounds in Ambient Air Using Summa Passivated Canister Sampling and Gas Chromatographic Analysis.

3) After the Tedlar bag is sealed about the tree branch, the Sciex Trace Atmospheric Gas Analyzer (TAGA) will be connected via a Teflon tube to the Tedlar bag and sample the air from inside the bag. The air would be drawn into the TAGA at approximately 10 ml/min where the trace molecules would be ionized by the source, separated by mass-to-charge ratios by the first quadrupole, fragmented by the argon gas in the second quadrupole, separated by mass-to-charge ratios by the third quadrupole, and detected by the photomultiplier. This technique will allow detection limits in the low parts per billion by volume for many of the target compounds present in the groundwater at the site.

4.8 Groundwater Modeling

Past analytical and water level data for the wells located on site will be gathered and entered into a database. This data will be utilized to model contaminant plumes and water levels in the area of the phytoremediation study. Seasonal and annual effects will be studied. New groundwater data will be entered into the database and modeled annually.

5.0 SAMPLING PROCEDURES

5.1 Standard Operating Procedures

APG SOPs will be utilized for sample documentation, well installation, sample packaging and shipping, and sampling techniques and analysis. The following APG SOPs will be utilized:

<u>SOP #</u>	<u>TITLE</u>
005	Decontamination
010	Water Level and Well-Depth Measurements
013	Collection of Monitoring Well Samples
019	Monitoring Well Installation
128	Well Boring and Abandonment

Any discrepancies to these SOPs will be noted in a field logbook.

5.2 Waste Residuals Disposal

All of the treated and untreated samples will be maintained for 60 days after the issuance of the final report. If no additional testing has been requested at the end of the 60 days, arrangements will be made for disposal.

5.3 Laboratories

The following laboratories are expected to provide these analyses:

<u>Lab Name</u>	<u>Location</u>	<u>Parameters</u>
REAC Inorganic Laboratory	Edison, NJ	TAL Metals
REAC Organic Laboratory	Edison, NJ	Volatile Organic Compounds
REAC Air Team	Edison, NJ	Transpirational gas analyses

The following laboratories/vendors are expected to provide these analyses:

<u>Lab Name</u>	<u>Location</u>	<u>Parameters</u>
To be determined	To be determined	Chloride

6.0 PROJECT MANAGEMENT AND REPORTING

The REAC Task Leader will maintain contact with the U.S. EPA/ERT Work Assignment Manager to provide information on the technical and financial progress of this project. This communication will commence with the issuance of the work assignment and project scoping meeting. Activities under this project will be reported in status or trip reports and other deliverables (e.g., analytical reports, final reports). Activities will also be summarized in appropriate format for inclusion in REAC Monthly and Annual Reports.

7.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The REAC Task Leader/Quality Control (QC) Coordinator (Richard Tobia) is the primary REAC point of contact with the U.S. EPA Work Assignment Manager (Harry Compton). The Task Leader is responsible for the development and completion of the Quality Assurance Sampling Plan (QASP), project team organization, and supervision of all project tasks, including reporting and deliverables. In addition, the QC Coordinator is responsible for ensuring field adherence to the QASP and recording any deviations from the QASP.

The REAC QA Officer is Ed McGovern, the Health and Safety Officer is Tom Mignone, the Operations Section Leader is Edward F. Gilardi, and the Analytical Section Leader is Vinod Kansal. These individuals are responsible for auditing and guiding the project team, reviewing/auditing the deliverables and proposing corrective action, if necessary, for nonconformity to the QASP or HASP.

While not specifically identified, activities such as video documentation, photodocumentation, computer graphics and support, statistics, word processing, report preparation and purchasing support may be required in order to accomplish the objectives of this project.

Deliverables and task dates will be set by the work assignment manager. These will also be controlled by site access.

8.0 QUALITY ASSURANCE

The following QA objectives and protocols apply, as per Tables 8.1 and 8.2.

The following QA Protocols for QA1 data are applicable to all sample matrices:

1. Sample documentation in the form of field logbooks, the appropriate field data sheets, and chain of custody forms will be provided.
2. All instrument calibration and/or performance check procedures/methods will be summarized and documented in the field/personal or instrument log notebook.
3. Detection limit(s) will be determined and recorded, along with the data, where appropriate.

The following QA Protocols for QA2 data are applicable to all sample matrices:

1. Sample documentation in the form of field logbooks, the appropriate field data sheets, and chain of custody forms will be provided. Chain of custody sheets are optional for field screening locations.
2. All instrument calibration and/or performance check procedures/methods will be summarized and documented in the field/personal or instrument log notebook.
3. Detection limit(s) will be determined and recorded, along with the data, where appropriate.
4. Sample holding times will be documented; this includes documentation of sample collection and analysis dates.
5. Initial and continuing instrument calibration data, will be provided.
6. For sediment and water samples, rinsate blanks, field blanks, and trip blanks will be included at the rate specified in Table 8.1, footnotes 2 and 3, respectively.

7. Performance Evaluation (PE) samples are optional, if available.
8. Definitive Identification - the identification on 10 percent of the screened (field or lab) or 100 percent of the unscreened samples will be confirmed via an EPA-approved method; documentation such as chromatograms, mass spectra, etc. will be provided.
9. Quantitation - documentation for quantitative results from screening and an EPA-approved verification methods (for screened samples) or just quantitative results (in the case of unscreened samples) will be provided.

Numbers of samples to be collected for this project/event are presented in Table 8.1, Field Sampling Summary, and Table 8.2, QA/QC Analysis and Objectives Summary. These tables identify analytical parameters desired; type, volume and number of containers needed; preservation requirements; number of samples to be collected; and associated number and type of QA/QC samples based on the QA level.

All project deliverables will receive an internal peer review prior to release, per guidelines established in the REAC Administrative Procedures.

TABLE 8.1 Field Sampling Summary

Analytical Parameter	Action Level ¹	Matrix *	Container Type and Volume (# Containers req'd)	Preservative	Holding Times	Subtotal Samples	QC Extra's				Total Field Samples ⁶
							Rinsate Blanks ²	Field/Trip Blanks ³	PE Samples ⁴	Total Matrix Spikes ⁵	
Volatiles	0.1 ppm	RT LF/ST	4 oz glass w/ septum (1)	0°C	7/40 days	8 per event	NA	NA	NA	1	8 per event
TAL Metals	0.5 ppm	RT LF/ST	4 oz glass (1)	4°C	6 months	8 per event	NA	NA	NA	1	8 per event
Chloride	1 ppm	S	4 oz. glass (1)	4°C	28 days	4 per event	NA	NA	NA	1	4 per event
Chloride	1 ppm	GW	125 ml HDPE	4°C	28 days	7 per event	NA	NA	NA	1	7 per event
Volatiles	0.5 ppm	S	40 ml VOA (2)	4°C	7/40 days	4 per event	NA	NA	NA	1	4 per event
Volatiles	0.5 ppm	GW	40 ml VOA (3)	4°C	7/40 days	7 per event	NA	1/1	NA	1	9 per event
TAL Metals	0.5 ppm	S	4 oz. glass (1)	4°C	6 months	4 per event	NA	NA	NA	1	4 per event
TAL Metals	0.5 ppm	GW	1 L HDPE (1)	HNO ₃ pH<2	6 months	7 per event	NA	NA	NA	1	7 per event

* Matrix: S-Soil, W-Water, TG transpirational gas, RT root, LF leaf, ST stem, SD-Sediment, PW-Potable Water, GW-Groundwater, SW-Surface Water, SL-Sludge

- The concentration level, specific or generic, that is needed in order to make an evaluation. This level will provide a basis for determining the analytical method to be used.
- If dedicated sampling tools are not used, rinsate blanks are required for the aqueous matrix. They are optional for the soil matrix. For QA2 and QA3, a minimum of one or one blank required per type of sampling device per day. For QA1, enter "N/A".
- Field blanks are required for aqueous and non-aqueous matrices. Aqueous field blanks are prepared with distilled/deionized water and non-aqueous field blanks are prepared with clean sand or soil. For QA2 and QA3, one blank required per day. For QA1, enter "N/A". For QA2 and QA3, one trip blank required per cooler used to transport VOA samples. For QA1, enter "N/A". Each aqueous trip blank consists of two 40 mL vials filled with distilled/deionized water. Each non-aqueous trip blank consists of two 40 ml vials filled with clean sand or soil.
- Performance evaluation samples are optional for QA2 and mandatory for QA3 at one per parameter per matrix. For QA1, enter "N/A".
- Ensure that sufficient volume of environmental sample is collected for lab spiking. All analyses conducted at the REAC laboratories require matrix spike samples at a frequency of $\geq 10\%$ total samples, regardless of QA Objective. In addition, for QA2 (optional) and for QA3 (mandatory): Determine bias (% recovery) using a minimum of 2 matrix spikes. Determine precision using a minimum of 8 matrix spikes.
- Add the numbers of rinsate blanks, field blanks, trip blanks, and PE samples to the subtotal number of samples to determine this.

TABLE 8.2 QA/QC Analysis and Objectives Summary

Analytical Parameter	Matrix *	Analytical Method Ref.	Matrix Spikes		QA/QC	
			Lab ¹	Additional ²	Detection Limits ³	QA Objective ⁴
Volatiles	RT/LF/ST	To be determined	1	NA	To be determined	QA2
TAL Metals	RT/LF/ST	To be determined	1	NA	To be determined	QA2
Volatiles	S	8240/SW-846	1	NA	Attachment A	QA2
Volatiles	GW		1	NA	Attachment A	QA2
TAL Metals	S	SW-846	1	NA	Attachment A	QA2
TAL Metals	GW		1	NA	Attachment A	QA2
Chloride	S	SW-9250	1	NA	Attachment A	QA2
Chloride	GW	EPA-600	1	NA	Attachment A	QA2

- * Matrix: S-Soil, W-Water, TG transpirational gas, RT root, LF leaf, ST stem, SD-Sediment, PW-Potable Water, GW-Groundwater, SW-Surface Water, SL-Sludge
1. Ensure that sufficient volume of environmental sample is collected for lab spiking. All analyses conducted at the REAC laboratories require matrix spike samples at a frequency of ≥10% total samples, regardless of QA Objective.
 2. For QA2 (optional) and for QA3 (mandatory): Determine bias (% recovery) using a minimum of 2 matrix spikes. Determine precision using a minimum of 8 matrix spikes. Laboratory matrix spikes may be utilized to fulfill these additional QA requirements.
 3. The method is currently under development, and should be equal to or less than the action level.
 4. Enter QA Objective desired: QA1, QA2, or QA3.

9.0 REFERENCES

Devitt, D.A., M. Berkowitz, P.J. Schulte, R.L. Morris. 1993. "Estimating Transpiration for Three Woody Ornamental Tree Species Using Stem-Flow Gauges and Lysimetry." *HortScience* 28(4):320-322.

Gutierrez, M.V., R.A. Harrington, F.C. Meinzer, and J.H. Fownes. 1994. "The Effect of Environmentally Induced Stem Temperature Gradients on Transpiration Estimates from the Heat Balance Method in Two Tropical Woody Species." *Tree Physiology* 14: 179-190.

U.S.G.S (U.S. Geological Survey). *Hydrology and Soil Gas at J-Field, Aberdeen Proving Ground, Maryland*. U.S. Geological Survey, Water-Resources Investigations Report 92-4087, 1993.

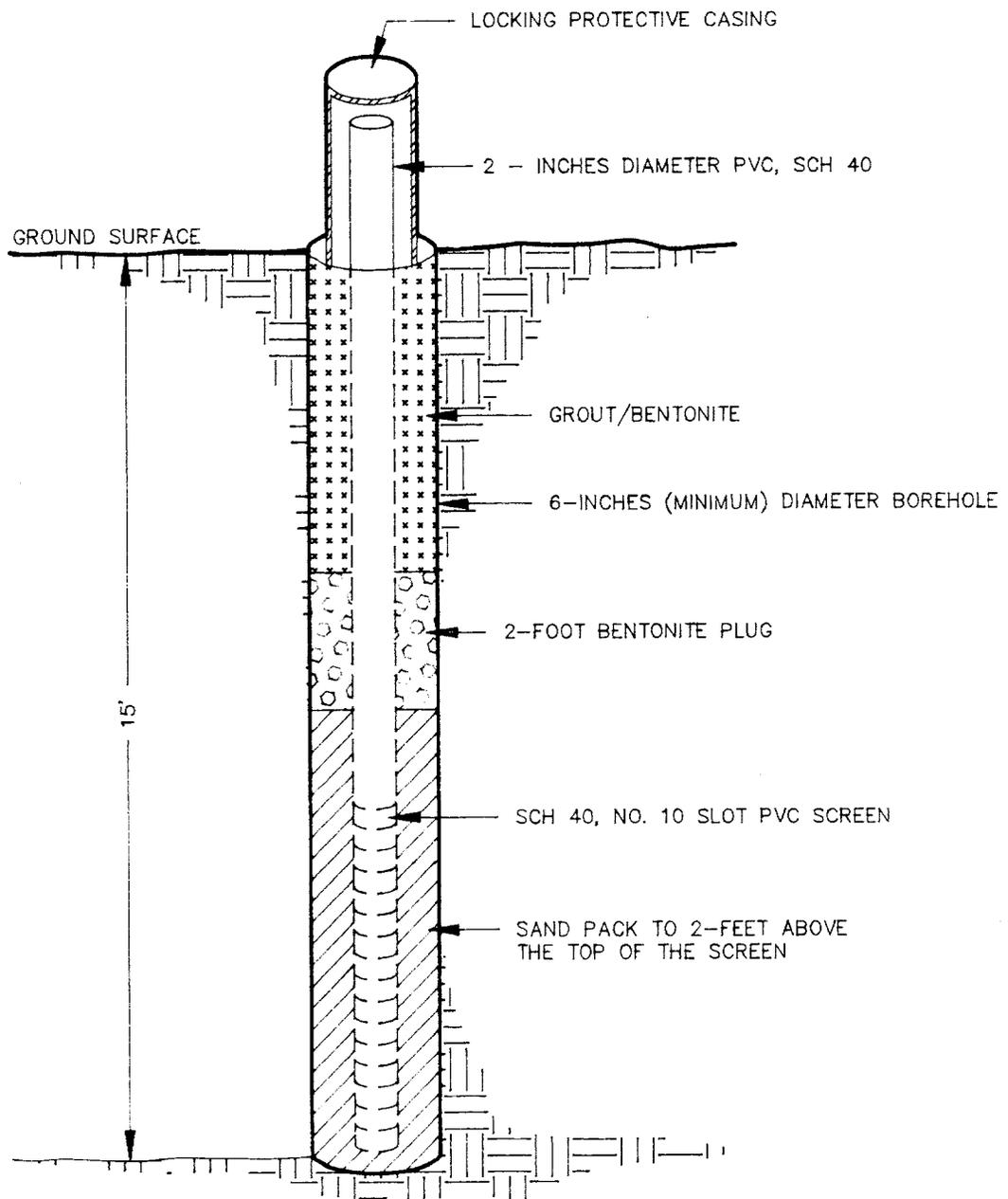


FIGURE 2
TYPICAL WELL CONSTRUCTION
ABERDEEN PROVING GROUND
J-FIELD SITE
HARFORD COUNTY, MD
OCTOBER 1996

U.S. EPA ENVIRONMENTAL RESPONSE TEAM CENTER
 RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
 68-C4-0022
 W.O.# 03347-041-001-1173-01

CHLORIDE QUANTITATION LIMITS (QLs)⁽¹⁾

Analyte	Quantitation Limits ⁽²⁾	
	Water mg/L	Soil, mg/kg
Chloride	To be determined	To be determined

⁽¹⁾ Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

⁽²⁾ Quantitation limits listed for soil are based on wet weight. The quantitation limits calculated by the laboratory for soil, on a dry weight basis will be higher.

Attachment A
Target Compound List and Quantitation Limits

**TARGET COMPOUND LIST (TCL) AND
QUANTITATION LIMITS (QLs)⁽¹⁾**

Volatiles	CAS Number	Quantitation Limits ⁽²⁾	
		Water µg/L	Low Soil ⁽³⁾ µg/kg
Chloromethane	74-87-3	10	10
Bromomethane	74-83-9	10	10
Vinyl Chloride	75-01-4	10	10
Chloroethane	75-00-3	10	10
Methylene Chloride	75-09-2	5	5
Acetone	67-64-1	10	10
Carbon Disulfide	75-15-0	5	5
1,1-Dichloroethane	75-35-4	5	5
1,1-Dichloroethene (DCE)	75-34-3	5	5
1,2-Dichloroethane (total)	540-59-0	5	5
Chloroform	67-66-3	5	5
1,2-Dichloroethane	107-06-2	5	5
2-Butanone	78-93-3	10	10
1,1,1-Trichloroethane	71-55-6	5	5
Carbon Tetrachloride	56-23-5	5	5
Bromodichloromethane	75-27-4	5	5
cis-1,3-Dichloropropene	10061-01-5	5	5
Trichloroethane (TCE)	79-01-6	5	5
Dibromochloromethane	124-48-1	5	5
1,1,2-Trichloroethane	79-00-5	5	5
Benzene	71-43-2	5	5
trans-1,3-Dichloropropene	10061-02-6	5	5
Bromoform	75-25-2	5	5
4-Methyl-2-pentanone	108-10-1	10	10
2-Hexanone	591-78-6	10	10
Tetrachloroethene (PCE)	127-18-4	5	5
Toluene	108-88-3	5	5
1,1,2,2-Tetrachloroethane	79-34-5	5	5
Chlorobenzene	108-90-7	5	5
Ethyl Benzene	100-41-4	5	5
Styrene	100-42-5	5	5
Xylenes (total)	1330-20-7	5	5

**TARGET COMPOUND LIST (TCL) AND
QUANTITATION LIMITS (QLs)⁽¹⁾**

Volatiles (Cont'd)	CAS Number	Quantitation Limits ⁽²⁾	
		Water µg/L	Low Soil ⁽³⁾ µg/kg
Dichlorofluoromethane	75-43-4	10	10
Trichlorofluoromethane	75-69-4	5	5
trans-1,2-Dichloroethene	156-60-5	5	5
2,2-Dichloropropane	594-20-7	5	5
cis-1,2-Dichloroethene	156-59-2	5	5
1,1-Dichloropropene	563-58-6	5	5
1,2-Dichloropropane	78-87-5	5	5
Dibromomethane	74-95-3	10	10
1,3-Dichloropropane	142-28-9	5	5
1,2-Dibromomethane	106-93-4	5	5
1,1,1,2-Tetrachloroethane	630-20-6	5	5
p-Xylene	106-42-3	5	5
m-Xylene	108-38-3	5	5
o-Xylene	95-47-6	5	5
Isopropylbenzene	98-82-8	5	5
1,2,3-Trichloropropane	96-18-4	5	5
Bromobenzene	108-86-1	5	5
n-Propylbenzene	103-65-1	5	5
2-Chlorotoluene	95-49-8	5	5
4-Chlorotoluene	106-43-4	5	5
1,3,5-Trimethylbenzene	25551-13-7	5	5
tert-Butylbenzene	98-06-6	5	5
1,2,4-Trimethylbenzene	25551-13-7	5	5
sec-Butylbenzene	135-98-8	5	5
1,3-Dichlorobenzene	541-73-1	5	5
p-Isopropyltoluene	99-87-6	5	5
1,4-Dichlorobenzene	106-46-7	5	5
1,2-Dichlorobenzene	95-50-1	5	5
n-Butylbenzene	104-51-8	5	5
1,2-Dibromo-3-Chloropropane	96-12-8	5	5
1,2,4-Trichlorobenzene	120-82-1	5	5
Naphthalene	91-20-3	5	5
Hexachlorobutadiene	87-68-3	10	10
1,2,3-Trichlorobenzene	12002-48-1	10	10

- ⁽¹⁾ Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.
- ⁽²⁾ Quantitation limits listed for soil are based on wet weight. The quantitation limits calculated by the laboratory for soil, on a dry weight basis will be higher.
- ⁽³⁾ Medium Soil/Sediment QLs for Volatile TCL Compounds are 125 times the individual Low Soil/Sediment QL.

INORGANIC TARGET ANALYTE LIST (TAL)⁽¹⁾

Analyte	Quantitation Limits ⁽²⁾	
	Water µg/L	Soil/Tissue mg/kg
Aluminum	100	20
Antimony	10	6
Arsenic	5	1
Barium	5	5
Beryllium	2	0.5
Cadmium	5	1
Calcium	500	50
Chromium	5	1
Cobalt	10	1.5
Copper	10	1
Iron	50	10
Lead	5	5
Magnesium	500	50
Manganese	5	2
Mercury	0.2	0.04
Nickel	10	2
Potassium	2000	200
Selenium	5	1
Silver	5	1
Sodium	500	50
Thallium	5	1
Vanadium	10	2
Zinc	5	2

⁽¹⁾ Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

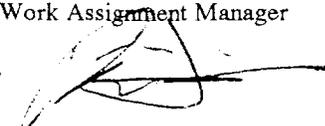
⁽²⁾ Quantitation limits listed for soil are based on wet weight. The quantitation limits calculated by the laboratory for soil, on a dry weight basis will be higher.



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DATE: 4 November 1996

TO: Harry Compton, U.S. EPA/ERTC Work Assignment Manager

FROM: Richard Tobia, REAC Task Leader 

SUBJECT: MINUTES FOR CONFERENCE CALL, 31 OCTOBER 1996, J-FIELD APG,
EDGEWOOD, MD, WA# 1-173 - MEMORANDUM

On 31 October 1996 a conference call was held to discuss comments to the J-Field Phytoremediation Well and Lysimeter Installation and Monitoring Plan. The following people were part of the conference call:

Richard Tobia, REAC
Harry Compton, U.S. EPA/ERTC
John Wrobel, DSHE
Chris Jacobs, DSHE
Wendy Noe, MDE
Steve Hirsh, U.S. EPA Region III
Cathy Davies, U.S. EPA Region III

The following items were discussed:

1. Well and Lysimeter Labels:

The wells and lysimeters should follow the current labeling scheme. Wells will be labeled JFP-1 through JFP-5, lysimeters will be labeled JFL-1 through JFL-4. JF for J-Field, P for phytoremediation, and L for lysimeter.

2. Lysimeter Installation Depth:

Concerns were raised over the proposed 4 foot and 8 foot depth and the groundwater level. The 8 foot depth was thought to be too deep and that there was the possibility that the lysimeters may always be submerged. It was decided that a judgement call would be made in the field based on depth to groundwater at the time of installation. If a shallower installation is decided on, the new depths will be 3 feet and 7 feet below ground surface (bgs).

3. Well Installation Depth:

Concerns were raised over the 3 foot installation depth and obtaining a proper seal. It was decided that as long as a proper seal can be obtained, and that these wells will not be utilized for risk assessment purposes, we do not have to abide by the 5 foot depth stated in the SOP.

4. Well Diameter:

Concerns were raised over the 2-inch well diameter and whether this was big enough to accept a permanent transducer. There are transducers made to fit a 2-inch well but it is unknown whether the USGS loggers will fit this size well.



5. Well and Lysimeter Sampling:

REAC will collect and analyze groundwater samples at the same time when other wells are sampled. Data can not be utilized for risk assessment purposes because of the QA level.

6. Placement of Monitoring Well 1:

MW-1 (JFP-1) will be placed as far upgradient as safety and accessability will allow.

7. Soil Disposal:

Drill cuttings will be sampled and analyzed for metals and also checked with an OVA and a HNu. Cuttings from MW-1 (JFP-1) and MW-5 (JFP-5) will be sampled separately. Cuttings from MW-2, 3, and 4 (JFP-2, 3, and 4) will be combined for analysis.

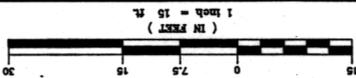
8. Development Water Disposal:

Development water will be placed in the tanks utilized for the pump test of Well JF-183.

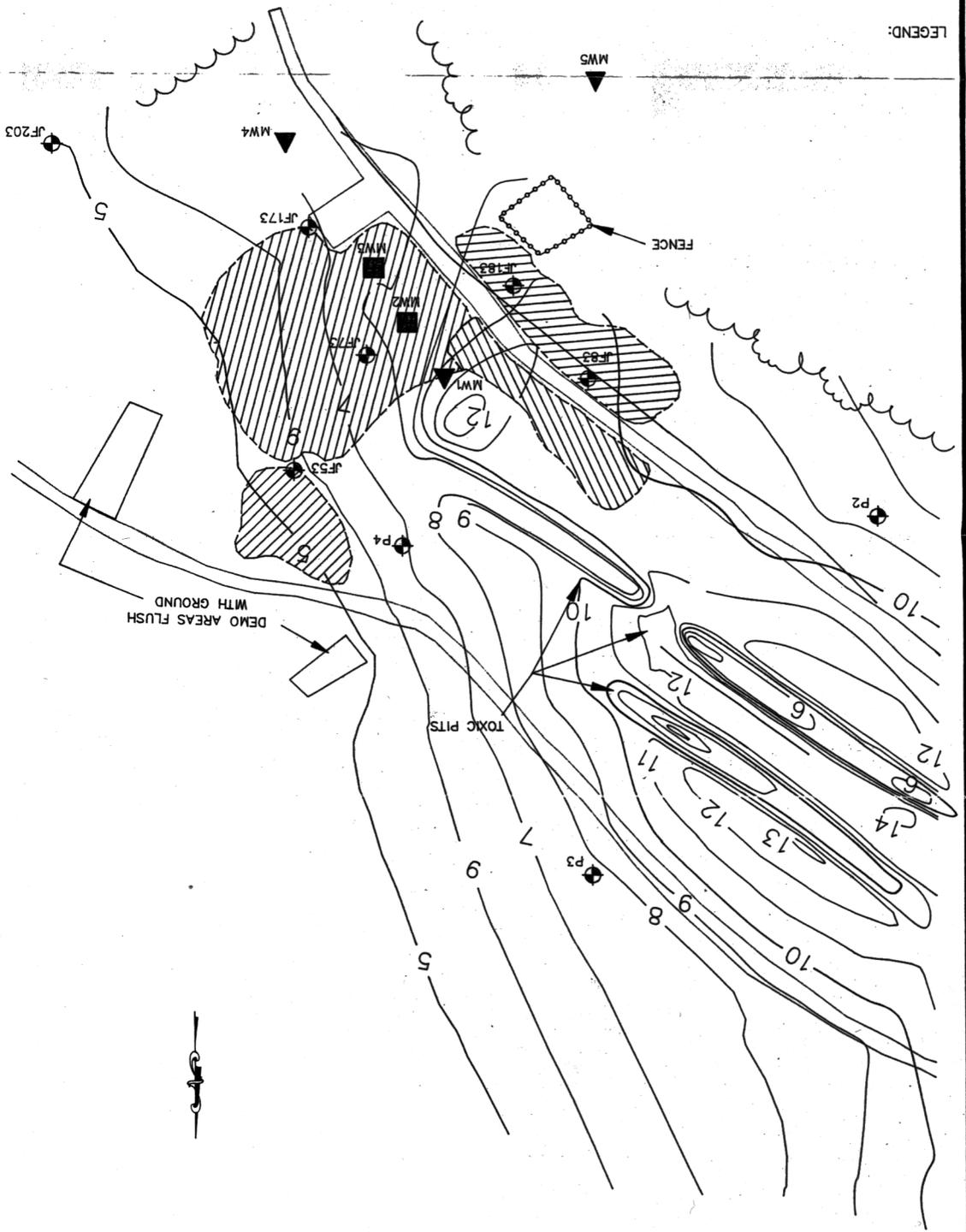
cc: Central File WA 1-173 (w/attachment)
Edward F. Gilardi, REAC (w/o attachment)

ABERDEEN PROVING GROUND, MD
 J-FIELD TREATMENT AND LYSIMETER LOCATIONS
 PROPOSED MONITOR WELL
 FIGURE 1
 OCTOBER 1996

U.S. EPA ENVIRONMENTAL RESPONSE TEAM CENTER
 RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
 W-18 0347-041-001-172-01
 89-C-4-0022



- LEGEND:
- ◻ MONITOR WELL
 - ◼ PROPOSED MONITOR WELL LOCATION
 - ◼ PROPOSED MONITOR WELL AND LYSIMETER LOCATION
 - ▨ TREATMENT AREA
 - 9 — CONTOUR INTERVAL



9/4/1996
 173.NJW/B