SAMPLING AND ANALYSIS PLAN
Remedial Action

Penta Wood Products
Town of Daniels, Wisconsin
WA No. 040-RDRD-05WE / Contract No. 68-W6-0025

November 1999

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November 10, 1999

Mr. Tony Rutter
Remedial Project Manager
U.S. Environmental Protection Agency
Remedial Response Branch (SR-6J)
77 West Jackson Boulevard
Chicago, IL 60604-3590

Dear Tony:

Subject: Sampling and Analysis Plan for Remedial Action
Penta Wood Products
Town of Daniels, Wisconsin
Work Assignment No. 040-RDRD-05WE
Contract No. 68-W6-0025

Enclosed please find 3 copies of the referenced document for the Penta Wood Products Site. Please call me if you have any questions or concerns.

Sincerely,

CH2M HILL

Regina Bayer

Regina Bayer

Site Manager

c: Stephen Nathan/PO/USEPA (w/o enclosure)
Eben Greybourne/CO/USEPA (w/o enclosure)
Tom Kendzierski/PM/WDNR
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The Penta Wood Remedial Action Sampling and Analysis Plan consists of three plans: the Quality Assurance Project Plan, the Field Sampling Plan, and the Data management Plan. Collectively these three plans are called the Sampling and analysis Plan.

These plans are supporting plans and have been prepared in conjunction with the following documents that have been prepared under separate cover:

- Penta Wood Remedial Design (RD) and Remedial Action (RA) Work Plans
- Penta Wood Site Management Plan (SMP), which contains the Pollution Control and mitigation Plan and Transportation and Disposal Plan

The RD and RA Work Plans describe the site background, physical characteristics, project approach, and derails of the tasks to be completed for the RD and RA. The SMP describes the procedures and safeguards that will be used to control site access, prevent contaminants from being released offsite due to RA activities, and manage and dispose of wastes generated during the RA.

QUALITY ASSURANCE PROJECT PLAN
Remedial Action

Penta Wood Products
Town of Daniels, Wisconsin
WA No. 040-RDRD-05WE / Contract No. 68-W6-0025

November 1999

QUALITY ASSURANCE PROJECT PLAN (QAPjP)
Remedial Action
Penta Wood Products
Town of Daniels, Wisconsin
WA No. 040-RDRD-05WE / Contract 68-W6-0025

Prepared by: CH2M HILL

Date: November 1999

Approved by:

USEPA, Region 5, Work Assignment Manager
Tony Rutter

USEPA, Region 5, Quality Assurance Manager

CH2M HILL Site Manager
Regina Bayer

CH2M HILL Quality Assurance Manager
for Lauri Gorton

Contents

1. Introduction

The United States Environmental Protection Agency (USEPA) requires that all environmental monitoring and measurement efforts mandated or supported by the USEPA participate in a centrally managed quality assurance (QA) program.

Any party generating data under this program has the responsibility to implement minimum procedures to assure that the precision, accuracy, completeness, and representativeness of its data are known and documented. To ensure that the responsibility is uniformly met, each party must prepare a written QA Project Plan (QAPjP) covering each respective project it is to perform.

This QAPjP presents the organization, objectives, functional activities, and specific QA and quality control (QC) activities associated with the Remedial Action (RA) Construction for the Penta Wood Products (PWP) site, located in the Town of Daniels, Wisconsin.

This QAPjP and associated Field Sampling Plan (FSP) and Data Management Plan (DMP) present the sampling and analysis QA/QC procedures for the sampling that will be conducted by the USEPA during field construction and start-up activities for the PWP RA. The USEPA will conduct soil, groundwater, soil gas and treatment system influent, effluent and byproduct sampling to verify the adequacy of the remedial construction and the effectiveness of treatment.

This QAPjP describes the specific protocols that will be followed for sampling, sample handling and storage, chain-of-custody, and laboratory and field analyses.

All QA/QC procedures will be in accordance with applicable professional technical standards, USEPA requirements, government regulations and guidelines, and specific project goals and requirements. CH2M HILL prepared this QAPjP for USEPA Region 5 under Work Assignment No. 040-RDRD-05WE in accordance with all USEPA QAPjP guidance documents, in particular, the Contract Laboratory Program (CLP) guidelines, *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans (QAMS-005/80)*, and the *Region 5 Model QAPjP (Revision No. 1, 1996)*.

2. Project Description

2.1 Site Description and History

2.1.1 Project Background

From 1953 to 1992, PWP operated on 80 acres of a 120-acre parcel located 2 miles west of Siren, Wisconsin (Figure 2-1). Raw timber was cut into posts and telephone poles and treated with either a 5 to 7 percent pentachlorophenol (PCP) solution in a No. 2 fuel oil carrier or with chemonite, a water-borne salt treatment consisting of ammonia, copper II oxide, arsenate, and zinc (ACZA). During its 39 years of operation, PWP discharged wastewater from an oil/water separator down a gully to a lagoon on the northeast corner of the property (Figure 2-2). Process wastes were also discharged onto the wood chip pile in the northwestern portion of the property. Wisconsin Department of Natural Resources (WDNR) investigators noted several large spills, stained soils, and poor operating practices in 1986. A 6-acre portion of the site, located south of old Highway 70, was used to transfer bulk PCP/oil mix to buyers.

In 1988, the onsite production well was closed for potable use when it was found to contain 2,700 parts per billion (ppb) of PCP. From 1989 to 1992, PWP funded an investigation to characterize soil and groundwater contamination with 58 soil borings, test pits, and 10 monitoring wells. In 1989, the Wisconsin Department of Transportation (WDOT) detected 2,800 parts per million (ppm) of PCP in a surficial soil sample within the right-of-way on the south side of old Highway 70.

The PWP facility was closed in May 1992 because it could not comply with RCRA regulations. In 1993, the WDNR conducted a Screening Site Inspection that detected 13 ppm PCP, 190 ppm copper, and 74 ppm of arsenic in a sediment sample collected from a wetland located downhill from the lagoon. Five residential wells were sampled and did not contain site contaminants.

Surficial soils and ash from the boiler where PCP sludges were burned were sampled at various times for dioxin. Sample results detected dioxin at less than 1 µg/kg toxicity equivalent using the 1987 USEPA toxicity equivalency factors.

The State of Wisconsin selected PWP as a Superfund Accelerated Cleanup Model (SACM) site in 1994. A federally funded removal action was conducted between April 1994 and June 1996 by USEPA Region V Emergency Response Branch (ERB). About 28 storage tanks containing liquids and sludges were emptied, and 43,000 gallons of PCP/oil and sludge were disposed of offsite for incineration. The ACZA treatment building was demolished, and the grossly contaminated soils from that area were excavated. About 1,600 cubic yards of contaminated soils (PCP and arsenic) were excavated from the site and hauled offsite. About 4,000 cubic yards of ACZA-contaminated soil was excavated and mixed with concrete onsite to form a 580- by 260-foot, 1-foot-thick concrete pad. The pad was intended to be used for ex situ bioremediation of PCP-contaminated soils.

In June 1995, a heavy rain released water from the lagoon into the wetlands northeast of the site. The removal team responded by building a retention pond adjacent to the lagoon and stockpiling excavated soil across gullies to reduce soil erosion.

During the removal action, ERB requested removal assistance and site characterization support by the USEPA Emergency Response Team (ERT). In 1994, an ERT conducted a hydrogeological and an on- and offsite surficial soil investigation. The hydrogeological investigation included installation of 12 additional wells, three lysimeter nests, infiltration tests, and seismic studies (ERT, 1994). About 300 soil samples were collected during soil boring installation and analyzed for PCP, total petroleum hydrocarbons (TPH), arsenic, copper, and zinc.

The soil investigation consisted of establishing a 200-foot interval grid system over the entire site and northeast of the property boundary. Soils were collected at 1-foot intervals down to 5 feet and analyzed with immunoassay kits for PCP and field portable X-ray fluorescence (XRF) for arsenic. The ERT conducted laboratory treatability studies, including soil washing and stabilization/solidification; and pilot-sized bioremediation treatability studies including land farming, ex situ biopiles, anaerobic dechlorination, and white rot fungus. Contaminated groundwater and wash water were treated with a Biotrol fixed-film biological reactor. The ERT did not complete all of its intended activities because of cut-backs in federal funding in 1995. The site was placed in the remedial program in 1996.

CH2M HILL conducted RI field activities for the USEPA in October 1997 to fill data gaps remaining after a site characterization investigation performed by ERT in 1994 and a removal action conducted by ERB in 1994 and 1996. RI activities included groundwater and residential well sampling, surface water and sediment sampling, surficial soil sampling, a subsurface soil investigation consisting of cone penetrometer testing/induced fluorescence (CPT/IF) and test pit excavation, and a screening level ecological investigation. In January-February 1998 five new monitoring wells were installed and sampled, along with an extraction/bioventing well and nine soil gas wells for a bioventing treatability study.

Additional site studies were conducted during pre-design from May 10 to May 26, 1999. These activities included soil sampling for total and leachable arsenic, conducting groundwater pump tests, sampling influent and effluent water from a GAC treatment system for the pump test water as well as other miscellaneous sampling for specific predesign evaluations.

2.1.2 Site Physical Characteristics

2.1.2.1 Topography

The PWP site is situated on a plateau that ranges from 20 to 50 feet above the adjacent land to the east, west, and north. The treatment area is located on the highest elevation of the site. Well defined drainage pathways, and areas of erosion and deposits have been created in the sandy overburden soils. A large gully extends northeast from the treatment area to the lagoon.

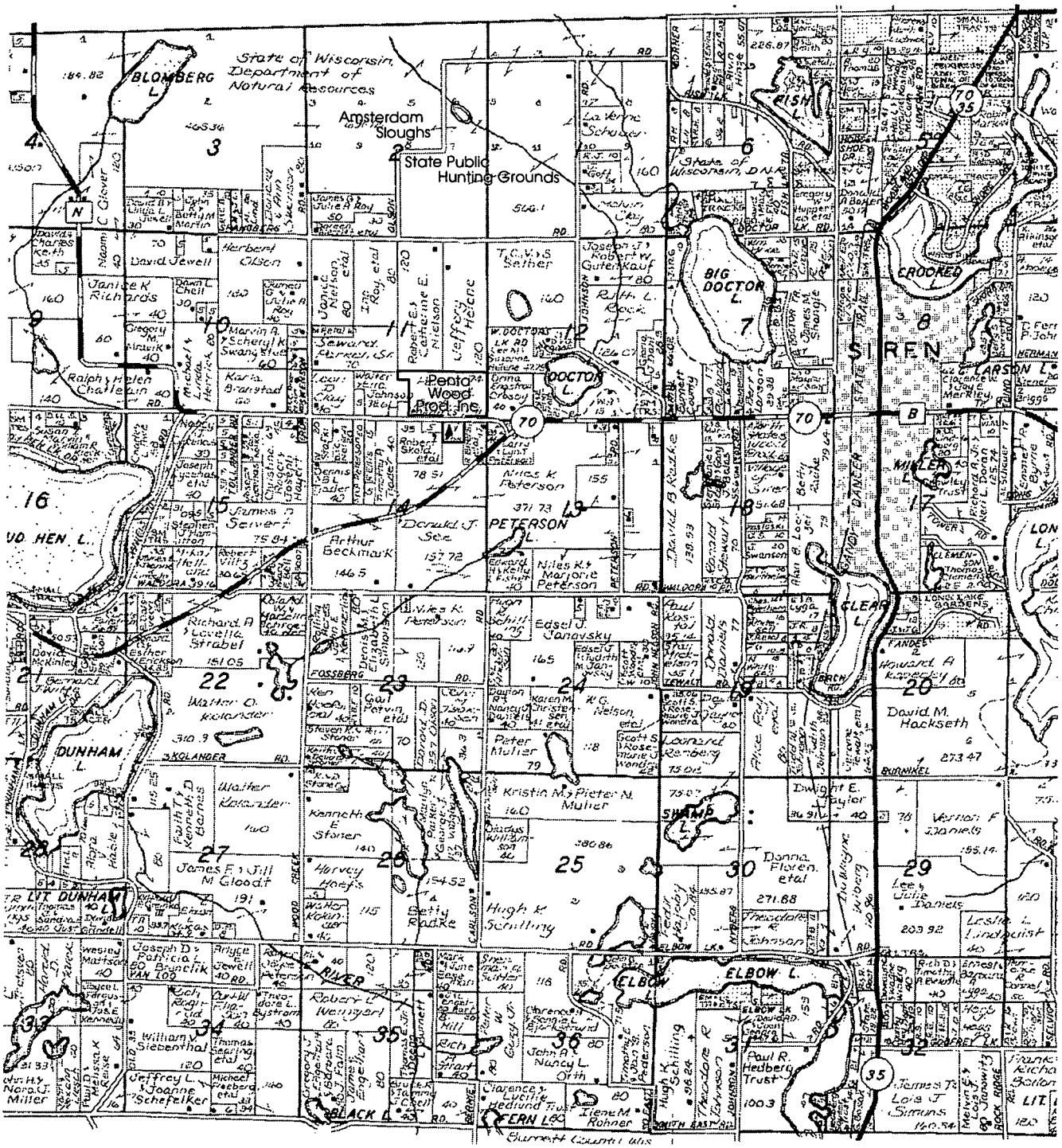
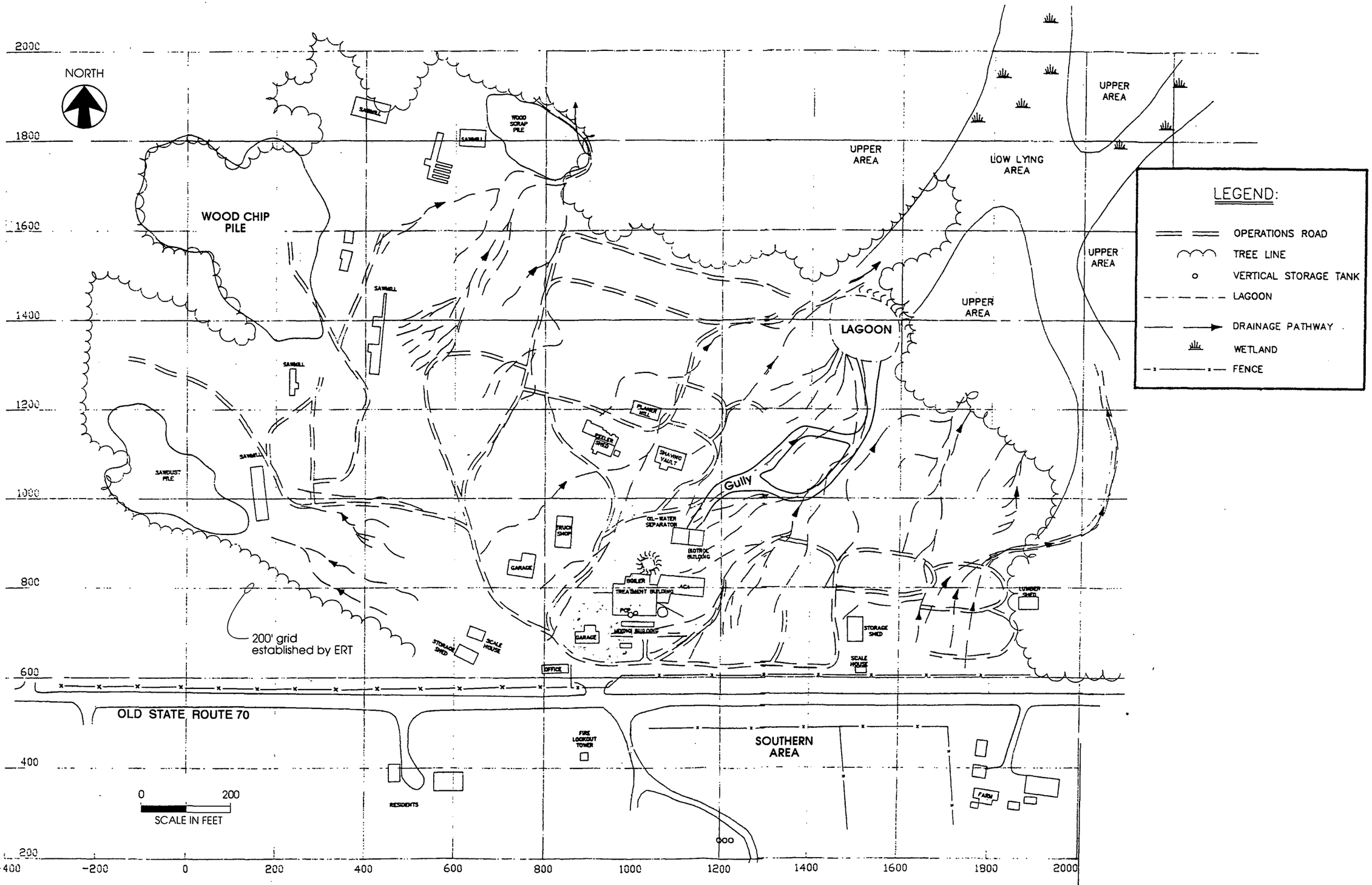


FIGURE 2-1
Site Location Map
Penta Wood Products RA Construction QAPP



BASEMAP SOURCE: US EPA Analytical Contract #68-C4-0022,
W.O.#03347-040-001-0026-01 Figure 4, May 1994

FIGURE 2-2
Site Features Map
Penta Wood Products RA Construction QAPP

E151745.DS.03.02 Figure 2_2 11-09-99amf

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2.1.2.2 Geology

ERT characterized site geology as consisting of three distinct stratigraphic layers: the upper sands, a glacial till, and the lower sands. The glacial till consists of sand and silt and forms a discontinuous boundary between the upper and lower sands. The upper sands extend from the surface to 90 to 120 feet below ground. The lower and upper sands may be indistinguishable when the glacial till layer is missing. The deepest soil boring of 300 feet below ground did not encounter bedrock. Regional maps indicate the Pleistocene deposits overlay Cambrian sandstones and Precambrian basalt flows.

Geotechnical analysis of the upper sands indicates the material has neutral to alkaline pH, low cation exchange capacity, and little organic carbon in noncontaminated areas. The permeability of the material is quite high with a median value of 19.3 ft/day.

2.1.2.3 Hydrogeology

Groundwater at the PWP site occurs both in a thin, unconfined, water-bearing unit about 100 feet below ground and within a multilayered system of semiconfined water-bearing units. In most areas of the site, the upper sands form a deep unsaturated zone. Semiconfined conditions are a result of the discontinuous, dipping till deposit of varying thickness. The sandy outwash deposits function as a single, water-bearing unit beneath the lagoon area, the gully, the eastern portion of the site, and the PCP treatment area where the glacial till is absent.

The site is situated in a groundwater recharge zone. Because of the high permeability of surficial soils, precipitation rapidly infiltrates the soil. Regional groundwater flow is to the north. An analysis of the onsite well water levels indicates that the water table is relatively flat with a north-northeast flow direction.

2.1.2.4 Groundwater Use

Three residences served by private wells screened in the semiconfined aquifer are within 200 feet of the site. There are 38 private wells within 1 mile of the site. The Town of Siren's wells are located 2 miles east of the site.

2.1.2.5 Surface Water Hydrology

Surface water that does not infiltrate the sandy soils primarily drains northeast of the site. A 1979 aerial photo of the site shows at that time, the lagoon consisted of a number of overflow impoundments down the steep hill towards the wetland. Materials used to construct the impoundments (e.g., wood chips and log ends) have been found in a depositional path from the lagoon to the wetland. Contaminants have migrated to the wetland through overland flow.

2.1.2.6 Surrounding Land Use

The site is located in a residential/agricultural/recreational area. A farm is located across from the site on old Highway 70. A 94-acre bog lake, 2,137 acres of lakes, and 7,500 acres of wetlands are located within a 4-mile radius of the site. The 7,233-acre Amsterdam Slough

Public Hunting Area is located within 1 mile of the site and provides nesting areas for bald eagles, osprey, red-shouldered hawks, trumpeter swans, and other waterfowl.

2.1.3 Conceptual Site Model

As a result of spills and poor waste handling practices at the site, subsurface soils to a depth of over 100 feet are contaminated with the PCP/oil mixture beneath the gully where wastewater was discharged from an oil/water separator to a lagoon. Over the years, PWP filled erosional gullies with wood debris. This wood debris layer is semi-saturated with the PCP/oil mixture. The PCP/oil mixture, which has traveled to the groundwater and spread horizontally as a LNAPL layer, is in equilibrium with pore pressures and is not expected to continue spreading A LNAPL of PCP/oil is floating on the water table over an estimated 4-acre area.

A dissolved phase PCP plume exists in the groundwater. PCP concentrations in groundwater have been monitored at the site since 1988, and some of the wells have 11 rounds of sampling data. PCP groundwater concentrations have shown consistent declines at the majority of monitoring wells over time, although many of the wells have only been monitored for three years. There is a general decrease in the size of the PCP plume, and the total contaminant mass of PCP in the saturated zone has declined since 1994. PCP contamination detected at 2,000 µg/L at MW17 in 1994 has declined to non-detect levels in 1997. Contaminated groundwater is not discharging to the wetland, or migrating below the wetland to surface water bodies.

Additional evidence that PCP is biodegrading in groundwater is supported by the natural attenuation parameter data. The groundwater is under anaerobic conditions in both the unconfined and semiconfined aquifer in the LNAPL plume area. The anaerobic plume is not expanding, which is important because aerobic biodegradation has a faster decay rate than anaerobic biodegradation.

The northern lagoon wall is collapsing and overland transport of oil saturated soil and wood debris has resulted in sediment and surface water contamination in an offsite wetland. Surficial soil samples collected from a minor gully that starts below a wood scrap pile on the northwestern property boundary and discharges to an offsite hollow did not contain PCP; however, arsenic levels were slightly elevated.

Wastewater was discharged into a ravine filled with wood chips. Despite elevated levels of PCP and TPH detected in the wood chips, the soil and groundwater below them appear to be minimally impacted. The wood chips may be retaining the contamination.

Surficial soils down to 5 feet are contaminated with arsenic. The metals-contaminated soil is mainly around the treatment building and on the eastern portion of the site where ACZA-treated wood was stored. Surficial soil PCP contamination exists along the gully corridor and in hot spots near the rail tracks, treatment cylinder, and areas used to store the treated wood.

2.1.4 Selected Remedy

A record of decision (ROD) was finalized for the PWP site on September 29, 1998. The selected remedial action for the site consists of soil and sediment consolidation and bioventing, LNAPL collection and disposal, ground water collection and treatment in the

LNAPL area, and monitored natural attenuation for the remainder of the groundwater plume. The selected remedy focuses on removing free phase LNAPL and the grossly-contaminated groundwater while slowly drawing down the water table and enhancing natural biodegradation of the soils above the LNAPL by bioventing (adding air to the soils above the water table). PCP/fuel oil contaminated soils and sediments will be consolidated under a cover prior to bioventing. Arsenic/metals contaminated soil will be segregated where possible; highly contaminated soils will be solidified in cement and placed onsite. The overland transport of contaminated site materials through a collapsing lagoon wall to an adjacent wetland will be eliminated through grading, covering and establishing vegetation. The natural degradation of contaminants that is occurring in the groundwater plume will be monitored. If monitoring detects that offsite receptors are threatened, or if the remedy fails to effectively reduce contaminant mass within a reasonable amount of time, contingency plans will be implemented. The major components of this remedy include:

- Building demolition
- Segregation, select solidification, and placement of all arsenic soils in an onsite CAMU
- Consolidation of PCP/fuel oil soils and wood chips under a soil cover
- Bioventing PCP/fuel oil contaminated material
- Biopad removal and disposal onsite in the CAMU
- Erosion control measures
- Revegetation
- LNAPL removal
- Collection, treatment, and discharge of grossly contaminated groundwater (exceeding 1,000 µg/L PCP)
- Monitored natural attenuation
- Institutional controls
- Environmental monitoring/maintenance
- Point-of-entry carbon treatment, if necessary
- 5-year site reviews

2.2 Contaminants of Concern

Contaminants of concern (COC) are defined as those most likely to contribute to risk as a result of exposure. The USEPA and WDNR have established that the primary COCs at the PWP site are PCP, arsenic, benzene, naphthalene and diesel range organics (DRO).

2.3 Project Objectives

The objective of the remedial construction and start-up sampling and analysis are:

- Determine whether visibly stained concrete meets the arsenic performance criteria
- Determine whether soil below visibly stained concrete exceeds performance criteria for arsenic, PCP and DRO
- Delineate the extent of soil with arsenic exceeding 200 mg/kg in Area 1 (ACZA Treatment Area)
- Delineate extent of arsenic contamination in Area 12 (Northeast Wooded Area)
- Verify that soil exceeding the 200 mg/kg arsenic performance criteria for solidification has been sufficiently excavated
- Verify that soil exceeding the arsenic and PCP performance criteria for excavation and consolidation has been sufficiently excavated
- Verify that solidified soil meets the performance criteria for solidified soil
- Determine existing groundwater contaminant and natural attenuation parameter concentrations
- Evaluate treatment system contaminant removal effectiveness
- Evaluate treatment system residuals and LNAPL contaminant concentrations
- Determine baseline unsaturated zone pore water contaminant concentrations
- Balance bioventing system air flow rates, determine baseline soil gas conditions and determine bioventing blower operation on-off duration

2.4 Sample Network Design and Rationale

The soil, groundwater, soil gas and treatment system sample location rationale are described in detail in the FSP.

2.5 Parameters to be Tested

A summary of sampling, sample matrices, specific parameters to be analyzed for each matrix, and estimated numbers of samples are presented in Table 2-1.

Analytical parameters, and analytical methods, and the project's required detection limits for sample analysis can be found in Table 2-2. Table 2-3 provides a summary of requirements for sample quantity, container, preservative, and packaging.

TABLE 2-2
Parameter List and Project Required Detection Limits

		Detection Limits	
Parameter	**Method**	**Soil (mg/kg)**	**Water (µg/L)**
Pentachlorophenol	Field Procedure	0.1	0.06
	SW846-8270	0.5	0.1
Phenol			
2,4-Dimethylphenol	SW846-8270	0.33	10
2,3,4,6-Tetrachlorophenol		0.33	10
2,4,6-Trichlorophenol		0.33	10
Acenaphthene		0.33	10
Anthracene		0.33	10
Benzo(a)anthracene		0.33	10
Benzo(b)fluoranthene		0.33	10
Benzo(k)fluoranthene		0.33	10
Benzo(a)pyrene		0.33	10
Chrysene		0.33	10
Dibenzo(a,h)anthracene		0.33	10
Fluoranthene		0.33	10
Indeno(1,2,3-c,d)pyrene		0.33	10
Naphthalene		0.33	10
Phenanthrene		0.33	10
Pyrene		0.33	10
Arsenic	Field Procedure	50	N/A
	SW846-7060A	0.5	2.0
Copper	SW846-6010B	NA	5.0
Iron	SW846-6010B	NA	100
Manganese	SW846-6010B	NA	10
Zinc	SW846-6010B	NA	2.0
Nitrate	EPA-300	NA	130
Sulfate	EPA-300	NA	2,000
Sulfide	SW846 9030	NA	500
Methane	SW846-8020	NA	1.0
Chloride	EPA-300	NA	3,000
Carbon Dioxide	SM4500-C02D	NA	NA[a]
DRO	SW846-8015A	1	NA
TOC	SW846-9060	NA	1,000
BTEX	SW846-8260/8020	NA	0.1 for benzene, 1.0 for others

TABLE 2-2
Parameter List and Project Required Detection Limits

		Detection Limits	
Parameter	**Method**	**Soil (mg/kg)**	**Water (µg/L)**
Polychlorinated Bibenzo-p-Dioxins			
HxCDD	SW846-8290	0.0001	0.0063
PeCDD		0.0001	0.0063
TCDD		0.0001	0.0063
Polychlorinated Dibenzofurans	SW846-8290		
HxCDF		0.0001	0.0063
PeCDF		0.0001	0.0035
TCDF		0.0001	0.0063
Hardness	EPA-130.2	NA	500
Alkalinity	EPA-310.1	NA	5,000
SPLP Arsenic (Total)	SW846-1312	0.5 mg/L	2.0
pH	SW846-9045	0.1 pH unit	NA

[a] = Method SM4500-CO2D for carbon dioxide is a calculation method.
TOC = Total Organic Carbon.
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes.
TCLP = Toxicity Characteristic Leachate Procedure.

TABLE 2-3
Sample Containers, Preservatives, and Holding Times

Analysis	Container	Preservation/Storage	Maximum Hold Time
Soil PCP	4-oz. amber glass jar [a]	4°C protect from light	7 days to extraction and 40 days from extraction to analysis
Soil DRO	4-oz. amber glass jar [a]	4°C	14 days to extraction and 40 days from extraction to analysis
Solid Waste-PCP, 2,4-Dimethylphenol, Phenol, 2,3,4,6-Tetrachlorophenol, 2,4,6-Trichlorophenol	4-oz. amber glass jar [a]	4°C protect from light	7 days to extraction and 40 days from extraction to analysis
Soilds Waste - PCDDs and PCDFs	4-oz. amber glass jar [a]	4°C protect from light	30 days to extraction and 45 days from extraction to analysis
Solid Waste -PAHs	4-oz. amber glass jar [a]	4°C protect from light	7 days to extraction and 40 days from extraction to analysis
SPLP Solid Waste/Concrete - —Arsenic, (Total)	4 8-oz.amber glass jar [a]	4°C	6 months
Soil—Arsenic	4-oz. amber glass jar [a]	4°C	6 months
Soil—pH	4-oz. amber glass jar [a]	4°C	Analyze immediately
Water/Liquid Waste —PCP, 2,4-Dimethylphenol, Phenol, 2,3,4,6-Tetrachlorophenol, 2,4,6-Trichlorophenol	1-liter amber glass bottle [a]	4°C protect from light	7 days to extraction and 40 days from extraction to analysis
Water/Liquid Waste PAHs	1-liter amber glass bottle [a]	4°C protect from light	7 days to extraction and 40 days from extraction to analysis
Water/Liquid Waste-PCDDs and PCDFs	1-liter amber glass jar [a]	4°C protect from light	30 days to extraction and 45 days from extraction to analysis
Water—Arsenic, Copper, Iron, Manganese, Zinc	500-mL polyethylene bottle	HNO_3, pH<2, 4°C	6 months
SPLP Water/Liquid Waste — Arsenic (Total)	500-mL polyethylene bottle	HNO_3, pH<2, 4°C	180 days
Water—Nitrate, Sulfate, Chloride	1-liter poly	4°C	NO_3 - 48 hours SO_4 - 28 days Cl - 28 days
Water—Sulfide	1-liter amber glass jar [a]	4°C, NaOH, pH > 9, Zinc acetate	48 hours
Water—Methane	3 40-mL vials [a]	HCl, pH<2, 4°C, protect from light	14 days
Water—Manganese	100 mL poly	HNO_3, pH<2, 4°C	6 months

TABLE 2-3
Sample Containers, Preservatives, and Holding Times

Analysis	Container	Preservation/Storage	Maximum Hold Time
Water—TOC	100 mL poly	H_2SO_4, pH<2, 4°C	28 days
Water—BTEX	3x40 mL vials [a]	HCl, pH<2, 4°C, protect from light	14 days
Water—Alkalinity	250 mL poly	4°C	14 days
Water—Iron (soluble)	100 mL poly	HNO_3, pH<2, 4°C	6 months
Water—Hardness	100 mL poly	HNO_3, pH<2, 4°C	6 months

[a] - Teflon-lined cap or septa.
PCP = Pentachlorophenol.
TOC = Total Organic Carbon.
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes.
SPLP = Synthetic Precipitation Leachate Procedure
PCDD = Polychlorinated Dibenzo-p-Dioxins
PCDF = Polychlorinated Dibenzo Furans

2.6 Data Quality Objectives

2.6.1 Step 1: State the Problem

Pentachlorophenol (PCP) solution in a No. 2 fuel oil carrier and chemonite, a water-borne salt treatment consisting of ammonia, copper II oxide, arsenate, and zinc (ACZA) have been released to site soils and resulted in risks to human health and the environment from exposure to soils and contaminated groundwater. The EPA selected remedy addresses the risks posed by the site. This QAPjP is directed at the sampling and analysis to be performed during remedial construction to verify the adequacy of the remediation, the operation of the groundwater collection and treatment system and bioventing system and to establish a baseline of environmental contamination immediately prior to system operation

2.6.2 Step 2: Identify the Decision

The major decisions required are:

- Determine whether remedial performance criteria have been met for soils to be solidified
- Determine whether remedial performance criteria have been met for soil to be excavated and consolidated within the CAMU.
- Determine whether groundwater treatment system is operating effectively to meet discharge criteria
- Determine whether bioventing system is balance and operating effectively
- Determine disposal requirements for treatment system residuals and LNAPL

2.6.3 Step 3: Identify Inputs to the Decision

The key inputs to the decisions listed above will be soil sample analytical results for verification of the adequacy of solidification and excavation, groundwater treatment system sampling before and after treatment system unit processes, treatment system residual sampling and analysis, baseline groundwater sampling and analysis, bioventing system operational parameter measurements, and baseline unsaturated zone sampling and analysis, Additional soil excavation during remedial construction and/or treatment system process modifications during start-up will likely be necessary. Additional sampling and analysis will be performed following modifications.

2.6.4 Step 4: Define the Boundaries of the Study

The boundaries of the studies are the site boundaries previously established. Nearly all the study sampling and measurements will take place within the property boundaries of the former Penta Wood Products facility. The specific areas of soil sampling are identified in the FSP. The groundwater treatment and bioventing treatment systems will be located in a central area onsite. The target area of groundwater collection and soil bioventing is onsite in an area of about 4 acres in the central area of the CAMU.

2.6.5 Step 5: Develop a Decision Rule

Organic vapor monitors and other real-time monitoring instruments will be used in the field for health and safety monitoring. The instruments will be calibrated daily. The person calibrating the instrument will enter the calibration information in the field log book. No other QC measures are required for health and safety monitoring.

Engineering level data will be needed for much of the remedial construction sampling and analysis. It will include soil, groundwater, soil gas and treatment system results. The QA/QC generated in support of this level of data will consist of following the field SOPs, instructions, and analyzing field duplicates and field blanks at a frequency of one per 10 field sample measurements. These analyses will be performed by trained personnel.

Confirmational data will be used to confirm the results of soil verification testing (at a rate of 10 % of field samples analyzed), verification that solidified soil meets performance criteria and analysis of treatment system residuals. These analyses are conducted using promulgated USEPA procedures. The analytical data is validated in accordance with the USEPA-recognized protocols. All offsite analyses of soil samples will be performed at the confirmational level. It will require high quality data and complete analytical data packages. The QA/QC generated in support of this level will be as provided in the SASs (Appendix A).

2.6.6 Step 6: Specify Limits on Decision Errors

The probability of sampling and measurement errors that exist at any site under investigation necessitates the development of sampling guidelines and the collection of quality control samples. Field errors are minimized by having each member of the field team follow the same standard operating procedures (SOPs) for sampling. Sampling techniques are discussed (or referenced) in detail in the Field Sampling Plan. QC samples

are used to verify the accuracy and precision of the data. When a QC sample is outside of a laboratory's established control limits, the data user will be notified through the laboratory report's case narrative that the data are suspect. The QC samples will be used to assist in data validation. Data validation is an important step in determining how the data can be used by the risk assessors or for development of remedial alternatives.

2.6.7 Step 7: Optimize the Design

The soil verification sampling design has been optimized by providing for onsite analysis for the critical parameters affecting solidification and excavation, arsenic and PCP. A statistically based sample design has been developed to minimize the sampling and analysis to verify the adequacy of the remedial action. The sample design is presented in detail in the FSP. Confirmation of the onsite analysis will be through the offsite analysis of 10% of the samples.

Sampling and analysis to determine treatment system effectiveness has been optimized through the judicious selection of critical sampling points. The total number of samples has been estimated, but flexibility has been allowed for more or less samples depending on actual system performance and the need for process modifications. The establishment of baseline groundwater conditions has been optimized by selecting the monitoring wells that provide a reasonable horizontal distribution within and immediately outside the plume and that are representative of the unconfined and semiconfined aquifers.

2.7 Measurement Performance Criteria

The measurement performance criteria is checked on several levels:

- Built in quality control standards
- Senior review
- Management controls

The measurement data is given specific QC standards by which it must abide. If these standards are not met, the data is suitably qualified. The analytical data and QC results are checked by the bench chemist, the laboratory's QA manager, and an USEPA data validator.

All documents which pertain to the quality standards of the project are drafted by and reviewed internally by CH2M HILL staff with relevant technical experience. These documents must then be approved by the USEPA's region 5.

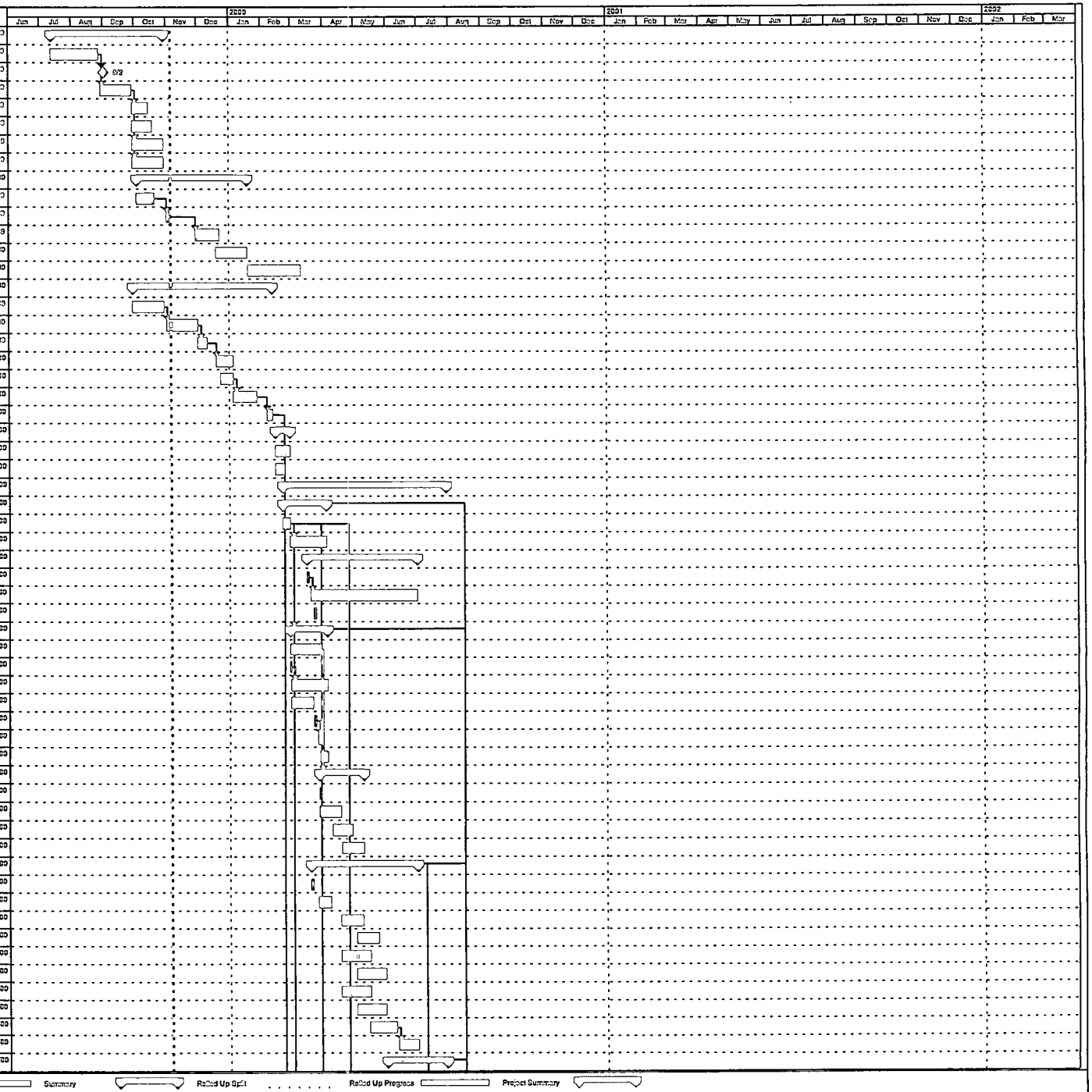
While performing field sampling activities, the field team leaders will supervise activities to assess if standard operating procedures are being followed.

2.8 Project Schedule

Figure 2-3 is a current project schedule. It will be updated as required.

[redacted]

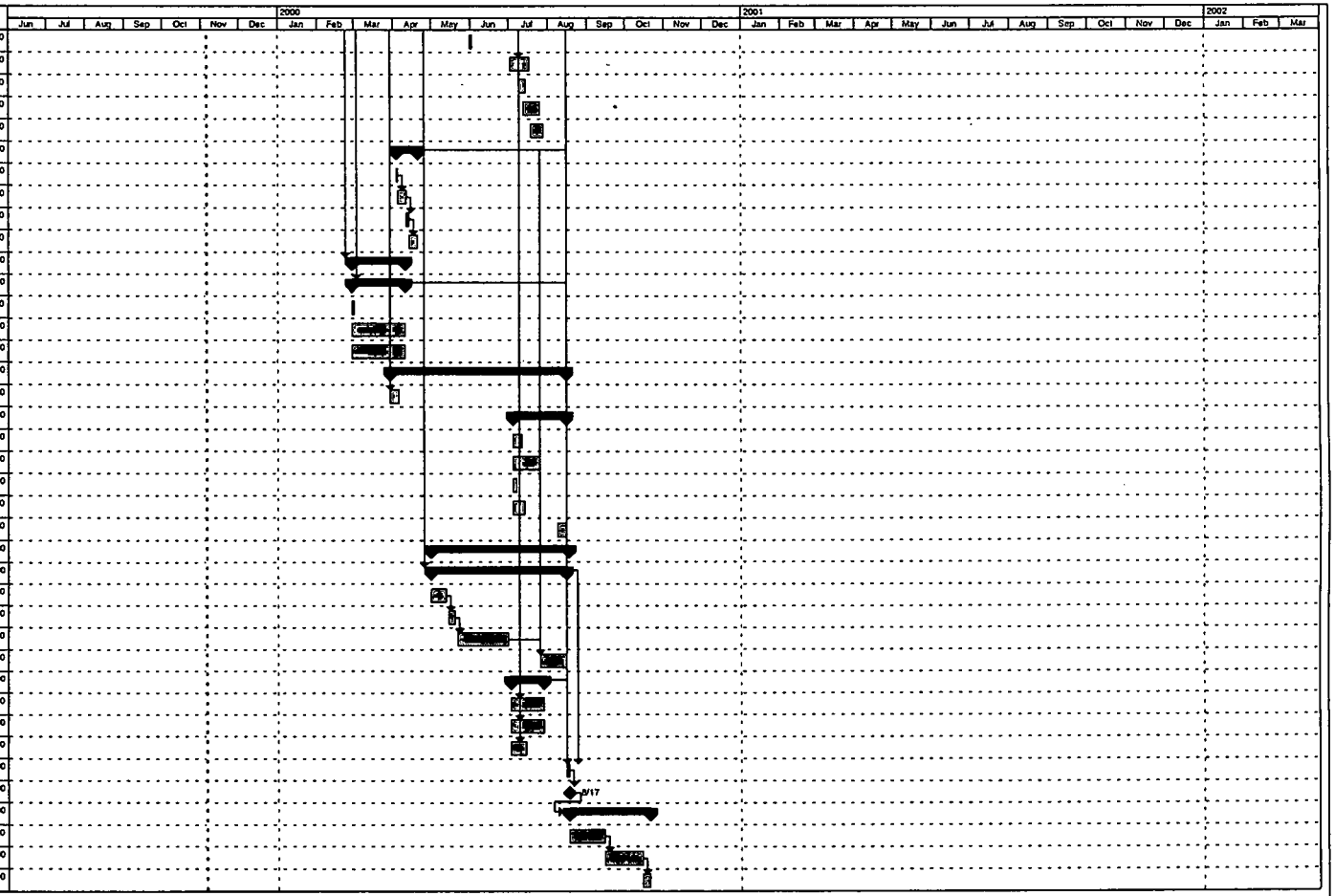
ID	Task Name	Duration	Start	Finish
1	**Task 11 Prefinal/Final Design**	103 days	Tue 7/12/00	Fri 10/20/00
2	Prepare Prefinal Design Packages	49 days	Tue 7/13/00	Fri 9/22/00
3	Prefinal Design Briefing	0 days	Thu 9/2/00	Thu 9/2/00
4	Agency Review of Prefinal Design	30 days	Mon 9/25/00	Tue 9/26/00
5	Incorporate Agency Comments	15 days	Thu 9/28/00	Thu 10/14/00
6	Prepare Final Design Packages	19 days	Thu 9/28/00	Mon 10/16/00
7	Prepare Draft O&M Manual	30 days	Thu 9/28/00	Fri 10/20/00
8	Prepare CQAP	30 days	Thu 9/28/00	Fri 10/20/00
9	**Task 12 Post-RD Support (Bid Mtg and Evaluation)**	107 days	Mon 10/9/00	Tue 1/16/01
10	Advertise Bid	17 days	Mon 10/9/00	Wed 10/25/00
11	Pre Bid Meeting	3 days	Tue 11/7/00	Thu 11/9/00
12	Bid Evaluation	23 days	Tue 11/28/00	Wed 12/27/00
13	Modify Site Plans	30 days	Mon 12/25/00	Tue 1/16/01
14	**Task 13 WA Closeout**	45 days	Thu 1/25/01	Fri 3/16/01
15	**Remedial Action (RA) WP and Subcontract Award**	135 days	Thu 6/29/00	Fri 2/11/01
16	Prepare RA Work Plan	30 days	Thu 6/29/00	Fri 10/20/00
17	Agency Review of RA WP	30 days	Tue 11/7/00	Wed 12/13/00
18	Negotiate/Revise WP	9 days	Thu 12/7/00	Fri 12/15/00
19	Agency Approval of WP	10 days	Mon 12/25/00	Tue 1/9/01
20	Agency Approval of Subcontractors	12 days	Fri 12/29/00	Tue 1/16/01
21	Award Bid/Subs plans	23 days	Wed 1/3/01	Thu 1/27/01
22	Notice to Proceed	5 days	Mon 2/5/01	Fri 2/11/01
23	**Remedial Construction Submittals and Mobilization**	10 days	Tue 2/15/01	Mon 2/26/01
24	Subcontractor Submittal Review	10 days	Tue 2/15/01	Mon 2/26/01
25	Mobilization	5 days	Tue 2/15/01	Mon 2/21/01
26	**Site Preperation/Earthwork Subcontract**	114 days	Tue 2/22/01	Fri 7/20/01
27	**Site Preperation**	30 days	Tue 2/22/01	Mon 4/2/01
28	Establish Erosion Control Mons. & As CAMU Prep.	5 days	Tue 2/22/01	Mon 2/26/01
29	Clearing & Grubbing (except As wooded slope)	25 days	Tue 2/27/01	Mon 4/2/01
30	**Onsite laboratory**	77 days	Thu 3/1/01	Fri 6/15/01
31	Mobilization	2 days	Thu 3/1/01	Fri 3/2/01
32	Sampling and Analysis	75 days	Mon 3/5/01	Fri 6/15/01
33	Collects initial excavation areas	2 days	Thu 3/22/01	Fri 3/23/01
34	**Biopad/Concrete Removal & CAMU Disposal**	20 days	Tue 3/6/01	Tue 4/3/01
35	Biopad demolition & CAMU disposal (4,700 cy)	20 days	Tue 3/6/01	Mon 3/27/01
36	Visual inspection of Concrete Foundations	1 day	Tue 3/27/01	Tue 3/27/01
37	Concrete TCLP Sampling & Testing	23 days	Wed 3/7/01	Tue 4/3/01
38	Concrete Removal & CAMU disposal	15 days	Wed 3/7/01	Tue 3/27/01
39	Biopad subgrade soil excavation & CAMU disposal	2 days	Thu 3/22/01	Fri 3/23/01
40	Biopad Footprint Verification Sampling & Testing	5 days	Mon 3/27/01	Fri 3/31/01
41	Biopad addl excavation, sampling, testing, & disposal	5 days	Wed 3/28/01	Tue 4/3/01
42	**Arsenic (> 200 mg/kg) Solidification & Consol.**	31 days	Tue 3/20/01	Tue 5/1/01
43	Treatment bldg area sampling and testing	2 days	Tue 3/20/01	Wed 3/21/01
44	Arsenic Excavation & Solidification (2,330 cy)	15 days	Tue 3/20/01	Mon 4/16/01
45	Confirmatory Sampling & Testing	15 days	Mon 4/16/01	Fri 4/20/01
46	Addl excavation, solidification, sampling, & disposal	15 days	Wed 4/18/01	Tue 5/1/01
47	**Excavate & Consol. As & PCP soil & wood chips**	75 days	Mon 3/26/01	Fri 6/29/01
48	Protect As soil on wooded slope	2 days	Mon 3/26/01	Tue 3/27/01
49	Clear and Grub Wooded As Slope	10 days	Mon 3/27/01	Fri 4/7/01
50	Excavate and Consolidate As Soil (14,700 cy)	15 days	Tue 4/10/01	Mon 5/3/01
51	As Verification Sampling & Testing	15 days	Wed 5/2/01	Tue 5/22/01
52	Excavate, mix, and consolidate PCP soils (14,400 cy)	20 days	Tue 4/10/01	Mon 5/15/01
53	PCP soil Verification Sampling & Testing	20 days	Wed 5/2/01	Tue 5/29/01
54	Excavate, mix, and consol. PCP wood chips (7,200 cy)	20 days	Tue 4/10/01	Mon 5/15/01
55	PCP wood chip Verification Sampling & Testing	20 days	Wed 5/2/01	Tue 5/29/01
56	Additional excavation, sampling, testing, & disposal	20 days	Mon 5/16/01	Fri 6/15/01
57	Trenching and pipe installation	15 days	Mon 6/12/01	Fri 6/29/01
58	**CAMU Cover construction**	42 days	Thu 5/1/01	Fri 7/20/01



Project: Penta Wood RA Scedule
Date: Fri 11/3/00

Task | Progress | Summary | Rolled Up Split | Rolled Up Progress | Project Summary
Split | Milestone | Rolled Up Task | Rolled Up Milestone | External Tasks

ID	Task Name	Duration	Start	Finish
59	Borrow Site Setup	2 days	Thu 6/1/00	Fri 6/2/00
60	Borrow Soil Excav., Transport, and Placement	11 days	Mon 7/3/00	Mon 7/17/00
61	Topsoil Import	5 days	Mon 7/10/00	Fri 7/14/00
62	Topsoil Placement	9 days	Thu 7/13/00	Tue 7/25/00
63	Top Soil Stabilization	6 days	Wed 7/19/00	Fri 7/28/00
64	Infiltration Basin Construction	13 days	Tue 4/4/00	Thu 4/20/00
65	Boring and Infiltration testing	1 day	Tue 4/4/00	Tue 4/4/00
66	Excavation	5 days	Wed 4/5/00	Tue 4/11/00
67	Material Delivery & Placement	2 days	Wed 4/12/00	Thu 4/13/00
68	Discharge Pipe Installation	5 days	Fri 4/14/00	Thu 4/20/00
69	Demolition Subcontract	30 days	Tue 2/29/00	Mon 4/10/00
70	Demolition and Offsite Disposal	30 days	Tue 2/29/00	Mon 4/10/00
71	Asbestos, lead, PCB Inspection	2 days	Tue 2/29/00	Wed 3/1/00
72	IDW, lab chemicals, misc. debris disposal	30 days	Tue 2/29/00	Mon 4/10/00
73	Bldg demo and disp. (15 bldgs, 3 tanks, 3 structures)	30 days	Tue 2/29/00	Mon 4/10/00
74	Drilling Subcontract	99 days	Thu 3/30/00	Tue 8/15/00
75	GW Production Well Abandonment	5 days	Thu 3/30/00	Wed 4/5/00
76	Bioventing & GW/LNAPL Systems Construction	30 days	Wed 7/5/00	Tue 8/15/00
77	Pilot Boreholes and Soil Sampling & Testing	5 days	Wed 7/5/00	Tue 7/11/00
78	Well Installation	15 days	Wed 7/5/00	Tue 7/25/00
79	Well Development	3 days	Wed 7/5/00	Fri 7/7/00
80	Pump Placement	7 days	Wed 7/5/00	Thu 7/13/00
81	Well performance testing	5 days	Wed 8/9/00	Tue 8/15/00
82	Treatment System Subcontract	79 days	Mon 5/1/00	Thu 8/17/00
83	Treatment Building Construction	77 days	Mon 5/1/00	Tue 8/15/00
84	Foundation Constr.	10 days	Mon 5/1/00	Fri 5/12/00
85	Building Constr.	5 days	Mon 5/15/00	Fri 5/19/00
86	Equipment and I&C Installation	30 days	Mon 5/22/00	Fri 6/30/00
87	System Startup	15 days	Wed 7/26/00	Tue 8/15/00
88	Site Restoration	20 days	Mon 7/3/00	Fri 7/28/00
89	Grass Seeding	20 days	Mon 7/3/00	Fri 7/28/00
90	Tree Planting	20 days	Mon 7/3/00	Fri 7/28/00
91	Erosion Controls Installation	10 days	Mon 7/3/00	Fri 7/14/00
92	Final Inspection	2 days	Wed 8/16/00	Thu 8/17/00
93	Remedial Action Complete	0 days	Thu 8/17/00	Thu 8/17/00
94	RA Completion Report	64 days	Fri 8/18/00	Fri 10/20/00
95	Preparation of Draft RA Completion Report	28 days	Fri 8/18/00	Thu 9/14/00
96	Agency Review	30 days	Fri 9/15/00	Sat 10/14/00
97	Final RA Report	6 days	Sun 10/15/00	Fri 10/20/00



Project: Panta Wood RA Scedule
Date: Fri 11/5/99

Task Progress Summary Rolled Up Split Rolled Up Progress Project Summary
Split Milestone Rolled Up Task Rolled Up Milestone External Tasks

3. Project Organization and Responsibility

At the direction of the USEPA Region 5, CH2M HILL is responsible for all phases of the RA activities at the PWP site in the Town of Daniels, Wisconsin. CH2M HILL will perform the remedial action construction. CH2M HILL will also provide project management. The various QA and management responsibilities of key project personnel are defined below and shown in Figure 3-1.

3.1 USEPA Region 5 Work Assignment Manager

The work assignment manager (WAM) has the overall responsibility for all phases of the RA. The WAM is also responsible for the review and approval of this QAPjP. Tony Rutter will be the WAM for the PWP site.

3.2 WDNR Site Manager

The WDNR site manager (SM) assigned to the PWP site is Tom Kendzierski.

3.3 CH2M HILL Program Manager

The CH2M HILL program manager is Ike Johnson. He has overall responsibility for meeting USEPA objectives and CH2M HILL quality standards. In addition, the program manager is responsible for technical QC and project oversight.

3.4 CH2M HILL QA Manager

The QA manager is Lauri Gorton. The QA manager will remain independent of direct job involvement and day-to-day operations and has direct access to management staff to resolve QA disputes, as necessary. Specific functions and duties include the following:

- Directing the QA review of the various phases of the project, as necessary
- Directing the review of QA plans and procedures
- Providing QA technical assistance to project staff, as necessary

3.5 CH2M HILL Site Manager

The CH2M HILL site manager (SM) is Regina Bayer. The SM is responsible for implementing the project and is authorized to commit resources to meet project objectives and requirements. The SM's primary function is to achieve technical, financial, and scheduling objectives. The SM will report directly to the USEPA Region 5 WAM and will be the major point of contact for matters concerning the project. More specifically, the SM will:

- Define project objectives and develop a detailed work plan and schedule
- Establish project policy and procedures to address the specific needs of the project as a whole, as well as the objectives of each task
- Acquire and apply technical and corporate resources to meet budget and schedule constraints
- Orient field leaders and support staff with regard to the project's special considerations
- Monitor and direct other team members
- Develop and meet ongoing project or task staffing requirements, including mechanisms to review and evaluate each task product
- Review the work performed on each task to ensure quality, responsiveness, and timeliness
- Review and analyze overall task performance with regard to planned schedule and budget
- Review external reports (deliverables) before submission to USEPA Region 5
- Represent the project team at meetings and public hearings

3.6 CH2M HILL Review Team Leader

The review team leader is Phil Smith. The role of the review team leader is to support the SM in site management activities and to coordinate CH2M HILL internal reviews. The review team leader will also be involved in ongoing planning activities.

3.7 CH2M HILL Project Chemist

The CH2M HILL project chemist is Rich Baldino. He will be responsible for tracking data and overseeing the data evaluation. Specific responsibilities include the following:

- Schedule the analytical laboratories
- Oversee the tracking of samples and data from the time of field collection until results are entered into a database
- Coordinate activities with laboratories and data validators
- Oversee data validation and production of result tables
- Evaluate data usability

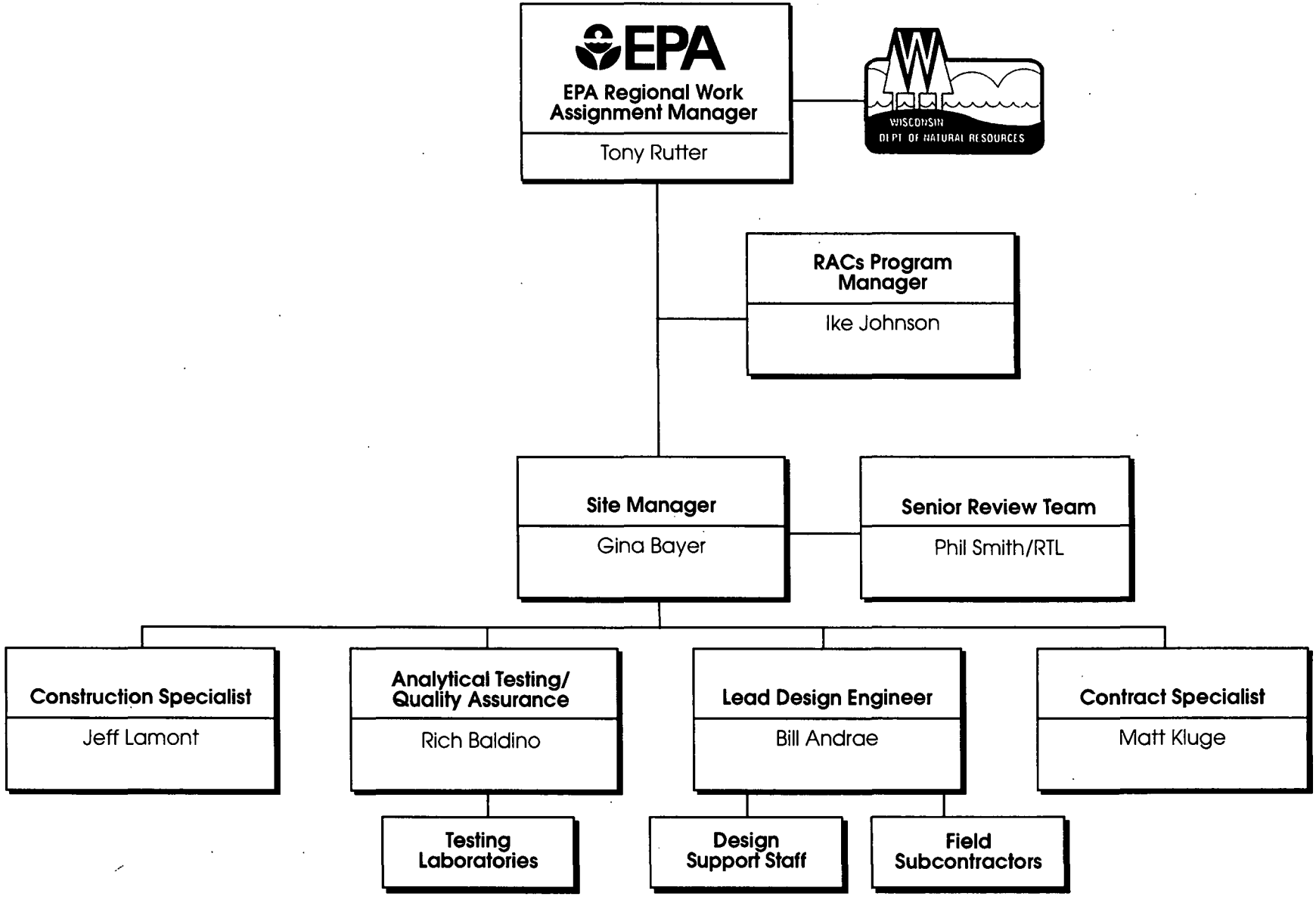


FIGURE 3-1
CH2M HILL Project Organization
Penta Wood Products RA Construction QAPP

3.8 CH2M HILL Contract Specialist

Dawn Adams is CH2M HILL's RAC Program APM-ADMIN. Matt Kluge works directly for Ms. Adams. Mr. Kluge will be responsible for the contract documents created in support of RA activities. Specific responsibilities include the following:

- Contracting the analytical laboratories
- Contracting the subcontractors
- Resolving any contract disputes

3.9 CH2M HILL Technical Resources

CH2M HILL will draw on its corporate resources to gather and analyze data and prepare various task reports and support materials.

3.10 Subcontract Laboratories' Project Managers

The analyses to be performed by laboratory subcontractors are listed in Table 2-2. CH2M HILL will select the laboratories with approval by the USEPA. The laboratories' project managers will be responsible for coordinating and scheduling the laboratory analyses; supervising the in-house chain-of-custody; accepting requirements outlined within this QAPjP; and overseeing the data review and analytical reports preparation.

3.11 Subcontract Laboratories' QA Officers

The laboratories' QAOs will be responsible for overseeing the laboratory QA and the analytical results QA/QC documentation; conducting the data review; selecting any necessary laboratory corrective actions; adherence to applicable in-house standard operating procedures (SOPs); adherence to the QAPjP; and approving the final analytical reports. Each laboratory may have more than one QAO, if, for example, any of these various activities take place in different departments within the laboratory.

4. Quality Assurance Objectives for Measurement Data

The overall QA objective is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting that will provide results that are legally defensible. Specific procedures for sampling, chain-of-custody, laboratory instrument calibration, laboratory analysis, data reporting, internal QC audits, field equipment preventive maintenance, and corrective action are described in other sections of this QAPjP. This section addresses the specific objectives for accuracy, precision, completeness, representativeness, and comparability.

4.1 Level of Quality Control Effort

Field blanks, trip blanks, duplicates, and MS/MSD samples will be analyzed to assess the data quality resulting from the field sampling and analytical programs.

Field and trip blanks consisting of HPLC-grade water will be submitted to the analytical laboratories. Field blank samples are analyzed to check for procedural contamination at the site. One water field blank will be collected and analyzed for every ten or fewer investigative samples, whichever is greater. Trip blanks are used to assess the potential for contamination of samples during shipment and storage. One VOC trip blank will be included with each shipping container of aqueous VOC samples. Duplicate soil and water samples will be collected for every ten field samples to check for sampling and analytical reproducibility.

MS/MSD samples provide information about the effect of the sample matrix on the measurement methodology. One MS/MSD sample will be collected for every 20 or fewer investigative samples that are confirmational level data.

The RA soil and water samples will be sent to a qualified laboratory for analysis. Table 2-2 contains the analytical parameters and associated reporting limits for the organic and inorganic compounds.

The level of QC effort provided by the laboratory will be as specified in Section 2 of this QAPjP, and in the Special Analytical Services (SASs) contained in Appendix A.

4.2 Accuracy, Precision, and Sensitivity of Analysis

The fundamental QA objective with respect to accuracy, precision, and sensitivity of laboratory analytical data is to achieve the QC acceptance criteria of the analytical SASs.

The procedures for the use of field equipment are found the SOPs.

4.3 Completeness, Representativeness and Comparability

4.3.1 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. It is expected that the selected analytical laboratory will provide data meeting QC acceptance criteria for 90 percent or more for all samples analyzed.

After the analytical testing is complete, the percent completeness will be calculated by the following equation:

$$\text{completeness (\%)} = \frac{\text{(number of valid data)}}{\text{(number of samples collected for each parameter analyzed)}} \times 100$$

All data generated of acceptable quality will be used. The 90 percent QC acceptance criteria is a goal. The success in meeting this goal will have no negative affect on the analytical program.

4.3.2 Representativeness

Representativeness expresses the degree to which data precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness is a qualitative parameter that is dependent upon the proper design of the sampling program and proper laboratory protocol. The rationale of the sampling network is discussed in detail in the FSP. Representativeness will be satisfied by following the FSP, such that proper sampling technique(s) are used, proper analytical procedures are followed, and holding times for the samples are not exceeded in the laboratory. Representativeness will also be assessed by field-duplicated sample analysis.

4.3.3 Comparability

Comparability expresses the confidence with which one data set can be compared with another. The extent to which planned analytical data will be comparable to future analytical data depends on the similarity of sampling and analytical methods. The procedures used to obtain the planned analytical data, as documented in the QAPjP, are expected to provide comparable data.

5. Sampling Procedures

A FSP has been prepared as part of the sampling and analysis plan (SAP). The FSP contains sampling procedures and includes the following:

- Detailed procedures for the collection of samples for the required parameters
- Detailed procedures for sample packaging and handling
- Detailed procedures for collection of QC samples
- Documentation requirements of sampling activities (use of field log books, field measurement forms, etc.)

Refer to Table 2-1 for a summary of the sampling and analysis program and Table 2-3 for summaries of sample quantity, container, and packaging requirements. Appendix B contains detailed procedures for chain-of-custody procedures and sample shipment.

6. Sample Custody

It is USEPA's and Region 5's policy to follow the USEPA Region 5 sample custody, or chain-of-custody, protocols as described in "NEIC Policies and Procedures," EPA-330/9-78DDI-R, revised June 1985. Chain-of-custody involves three parts: sample collection, laboratory analysis and final evidence files. Final evidence files, including all originals of laboratory reports and purge files, are maintained under document control in a secure area.

A sample or evidence file is under your custody if it:

- Is in your possession
- Is in your view, after being in your possession
- Is in your possession, and you place them in a secured location, or is in a designated secure area

6.1 Field Chain-of-Custody Procedures

The sample packaging and shipment procedures summarized below will be followed so that the samples will arrive at the laboratory with the chain-of-custody intact. The protocol for specific sample numbering and other sample designations are included in Section 3 of the FSP, and in Appendix B.

6.1.1 Field Procedures

The field sampler is personally responsible for the care and custody of the samples until they are transferred or properly dispatched. As few people as possible should handle the samples.

All sample containers will be labeled and tagged with sample numbers and locations. Sample labels and tags will be completed for each sample using waterproof ink unless prohibited by weather conditions. For example, a logbook notation would explain that a pencil was used to fill out the sample tag because the ballpoint pen would not function in freezing weather.

The SM will review all field activities to determine whether proper custody procedures were followed during the fieldwork and decide if additional samples are required. The SM will notify the USEPA RPM if a breach or irregularity in chain-of-custody procedures occurs.

6.1.2 Field Logbooks/Documentation

Data collection activities performed will be recorded in a field logbook. Activities will be described in as much detail as possible so that persons going to the site will be able to reconstruct particular events without reliance on memory.

Field logbooks will be bound field survey books or notebooks. Logbooks will be assigned to field personnel, but will be stored in the document control center when not in use. Each logbook will be identified by the project-specific document number.

The title page of each logbook will contain the following:

- Person to whom the logbook is assigned
- Logbook number
- Project name
- Project start date
- End date

Logbook entries will contain a variety of information. At the beginning of each entry, the date, start time, weather, names of all sampling team members present, level of personal protection being used, and the signature of the person making the entry will be entered. The names of site visitors, field sampling or investigation team personnel, and the purpose of their visit will also be recorded in the field logbook.

Measurements made and samples collected will be recorded. Entries will be made in ink and no erasures will be allowed. If an incorrect entry is made, the information will be crossed out with a single strike mark, initialed, and dated. Whenever a sample is collected or a measurement is made, a detailed description of the location of the station shall be recorded. The number of the photographs taken of the station, if any, will also be noted. All equipment used to make measurements will be identified, along with the date of calibration.

Samples will be collected following the sampling procedures documented in the FSP and subsequent appendices. The equipment used to collect samples will be noted, along with the time of sampling, sample description, sample location, and volume and number of containers. A sample identification number will be assigned before sample collection. Collocated and field blank samples, which will receive an entirely separate sample identification number, will be noted under the sample description.

6.1.3 Transfer of Custody and Shipment Procedures

Samples will be accompanied by a properly completed chain-of-custody form. The sample numbers and locations will be listed on the chain-of-custody form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This documents the transfer of custody from the sampler to another person, to the permanent laboratory, or to/from a secure storage area.

Samples will be properly packaged for shipment and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in each sample box or cooler. Shipping containers will be closed and secured with strapping tape and EPA custody seals for shipment to the laboratory. The preferred procedure includes use of a custody seal attached to the front right and back left of the cooler. The custody seals are to be covered with clear plastic tape. The cooler is to be strapped shut with strapping tape in at least two locations.

Whenever samples are collocated with a source or government agency, a separate sample receipt is prepared for those samples and marked to indicate with whom the samples are being collocated. The person relinquishing the samples to the facility or agency should request the representative's signature acknowledging sample receipt. If the representative is unavailable or refuses, this is noted in the "Received By" space of the custody form.

All shipments will be accompanied by the chain-of-custody record identifying the contents. The original record will accompany the shipment, and the pink and yellow copies will be retained by the sampler for returning to the sampling office.

If the samples are sent by common carrier, a bill of lading should be used. Bills of lading receipts will be retained as part of the permanent documentation. If sent by mail, the package will be registered with return receipt requested. Commercial carriers are not required to sign off on the custody form as long as the custody forms are sealed inside the sample cooler and the custody seals remain intact.

6.2 Laboratory Chain-of-custody Procedures

The analytical laboratory chain-of-custody procedures are discussed in each laboratory's quality assurance plan (QAP).

6.3 Final Data Files Custody Procedures

CH2M HILL is the custodian of the data files and will maintain the data files. Included in the data files are all relevant records, reports, logs, field notebooks, pictures, subcontractor reports, correspondence, laboratory logbooks, chain-of-custody forms, analytical data, and any other pertinent records stored in a secured, limited access area and under custody of the SM. Upon closure of the work assignment, all data files will be transferred to the USEPA.

7. Calibration Procedures and Frequency

This section describes procedures for maintaining the accuracy of all the instruments and measuring equipment that are used for conducting field tests and laboratory analyses. These instruments and equipment should be calibrated before each use or on a scheduled, routine basis.

7.1 Field Instruments/Equipment

Equipment used during the field sampling will be examined to check that it is operating properly. This includes checking the manufacturer's operating manual and the instructions for each instrument to ensure that the maintenance requirements are being observed.

Calibration of field instruments, as specified by the SOPs, will be performed at the intervals specified by the manufacturer or more frequently as conditions dictate. Field instruments will include an organic vapor photoionization detector (PID), an X-ray fluorescence meter, an oxygen, carbon dioxide, and temperature soil gas meter, a dissolved oxygen, temperature, pH, conductivity and ORP meter, and an oil/water interface probe.

In the event that an internally calibrated field instrument fails to meet calibration/ checkout procedures, it will be replaced by the vendor and returned to the manufacturer for service.

7.2 Laboratory Instruments

Calibration procedures for the laboratory equipment will be as specified in SASs. Records of calibration, repairs, or replacement will be filed and maintained by the designated laboratory personnel performing QC activities. These records will be filed at the location where the work is performed and will be subject to QA audit.

Calibration of laboratory equipment will be based on approved written procedures. Calibration, repairs, or replacement records will be filed and maintained by the designated laboratory personnel performing quality control activities. These records will be filed at the location where the work is performed and will be subject to QA audit. For all instruments, the laboratory will maintain a factory-trained repair staff with in-house spare parts or will maintain service contracts with vendors.

The records of calibration will be kept in accordance with the laboratory QAP.

8. Analytical Procedures

Water and soil samples from the PWP field sampling will be analyzed by non-CLP analytical services at USEPA and at a Wisconsin-certified laboratory (to be determined).

8.1 Laboratory Analysis

The analytical procedures for the SAS analyses are described in the requests for special analytical services in Appendix A. Also specified in the SASs are calibration procedures, calibration frequency, and internal quality control checks required for each analysis.

Table 2-2 provides the analytical parameter and the method of analysis.

8.2 Field Screening Analytical Protocols

The procedures for the field measurement of total organic vapors are described in the FSP and the SOPs.

9. Internal QC Checks

9.1 Field Quality Control Checks

QC procedures for field measurements will include calibrating the instruments as described in the instruments operating manual, measuring duplicate samples and checking the reproducibility of the measurements by taking multiple readings on a single sample or reference standard. Assessment of field sampling precision and bias will be made by collecting field duplicates and field blanks for laboratory analysis.

9.2 Laboratory Analysis

A QA program and QC checks will be employed by the analytical laboratory to ensure the production of analytical data of known and documented usable quality.

9.2.1 QA Program

The laboratory selected to perform these analyses will have a written quality assurance plan (QAP). The QAP provides guidelines to ensure the reliability and validity of work conducted at the laboratory. Compliance with the QAP is coordinated and monitored by the laboratory's QA unit (QAU). The QAU acts independently of the operating departments and reports directly to the laboratory manager.

The objectives of the laboratory QAP are to:

- Ensure that all procedures are documented, including any changes in administrative and/or technical procedures
- Ensure that all analytical procedures are conducted according to sound scientific principles and have been validated
- Monitor the laboratory performance by a systematic inspection program and provide for a corrective action as necessary
- Ensure that all data are properly recorded and archived

9.2.2 QC Checks

The selected laboratory will perform the analyses according to the SOPs and requirements specified in the SAS requests.

The laboratory will document, in each data package provided, that both initial and ongoing instrument and analytical QC functions have been met. Any samples analyzed in nonconformance with the QC criteria shall be reanalyzed by the laboratory. Continued nonconformance will be duly noted as to the quality of the analytical result in the analytical report case narrative.

10. Data Reduction, Validation, and Reporting

All data generated by field activities or the laboratory will be reduced and validated prior to reporting.

10.1 Data Reduction

10.1.1 Field Measurements and Sample Collection

Raw data from field measurements and sample collection activities will be appropriately recorded in the field logbook. If the data will be used in the project reports, they will be reduced and summarized; the method of reduction will be documented in the report.

10.1.2 Laboratory Services

The samples collected at the PWP site will be sent to a qualified offsite laboratory. Data review, reduction, and result reporting will be performed by this laboratory in accordance with the requirements of their QAP. The data will then be sent to CH2M HILL.

10.2 Data Validation

10.2.1 Field Measurement Data Validation

Field result data validation will simply consist of the field team leader double-checking at least 10 percent of the field calculations and ensuring that instrument calibration occurred at the frequency described in the SOPs.

10.2.2 Laboratory Data Validation

The analytical laboratory data validation will be performed by USEPA following the USEPA *National Functional Guidelines for Organic and Inorganic Data Review*, February 1994. Validation will be accomplished by comparing the contents of the data packages and QA/QC results to the requirements specified in the analytical methods, the non-CLP SAS request forms, and the QAPjP. Raw data such as gas chromatography/mass spectrometry (GC/MS) total ion current (TIC) chromatograms or GC chromatograms, flame atomic absorption (FAA) data reports, and data station printouts will be examined to ensure that reported results are accurate and complete.

The data reviewer will identify any out-of-control data points and data omissions, and notify CH2M HILL, who will interact with the laboratory to correct data deficiencies. Decisions to repeat sample collection and analyses may be made by the WAM and SM based on the extent of the deficiencies and their importance in the overall context of the project.

10.3 Data Reporting

10.3.1 Field Data Reporting

Raw data from field measurements and sample collection activities will be appropriately recorded in the field logbook. If the data will be used in the project reports, they will be reduced and summarized and the method of reduction will be documented in the report.

10.3.2 Laboratory Data Reporting

The analytical laboratory will prepare and submit full analytical reports to CH2M HILL in compliance with requirements SASs. The laboratory will report the data in the same chronological order in which it was analyzed. The types of information provided by the laboratory will include, at a minimum, the following:

- Cover sheets listing the samples included in the report and comments describing problems encountered in analysis
- Tabulated results of inorganic and organic compounds identified and quantified
- Analytical results for QC sample spikes, sample duplicates, initial and continuous calibration verifications, blank results, and laboratory control sample results
- Tabulation of instrument detection limits
- Raw data system printouts (or legible photocopies) identifying date of analyses, analyst, parameters determined, calibration curve used, associated method blanks, and any dilutions

The data for the RD sampling will be available for use by the site manager and project staff.

11. Performance and System Audits

Performance and system audits of both field and laboratory activities may be conducted to verify that sampling and analysis are performed in accordance with the procedures established in the FSP and QAPjP. The field and laboratory audits include two independent parts—internal and external audits.

11.1 Field Audits

An internal audit of field activities may be conducted by CH2M HILL's SM or their representative. The audit would include an examination of field sampling records, field instrument operating records, sample collection, handling, and packaging in compliance with the established procedures, maintenance of QA procedures, chain-of-custody, etc.

An additional external audit of the field procedures may be conducted by the USEPA Region 5.

11.2 Laboratory Audits

The laboratory may be audited by reviewing its QAP and/or SOPs. Areas that may be reviewed include, but will not be limited to: documentation on sample receiving and sample log-in, sample storage procedures, chain-of-custody procedures, sample preparation and analysis, instrument operating records, data reduction, and data reporting procedures.

At the discretion of CH2M HILL with the approval of USEPA, onsite audits of the laboratory may be conducted.

External audits of the laboratory may also be conducted by the USEPA Region 5.

12. Preventive Maintenance Procedures

12.1 Field Equipment/Instruments

The field equipment for this project includes volatile organic monitors. Specific preventive maintenance procedures to be followed for field equipment are those recommended by the manufacturer.

Field instruments will be checked and calibrated by the vendor before they are shipped or carried to the field. These instruments will be checked and calibrated daily before use. Calibration checks will be documented with the sample results in a field logbook.

Critical spare parts such as tape, papers, and batteries will be kept onsite to minimize instrument downtime. Backup instruments and equipment should be available onsite or within 1-day shipment to avoid delays in the field schedule.

12.2 Laboratory Instruments

As part of their QA/QC program, a routine preventive maintenance program will be required by the selected analytical laboratory. The objective of the preventive maintenance program is to minimize instrument failure and other system malfunctions. The laboratory will have an internal group perform routine scheduled maintenance and to make repairs, or coordinate with the vendor for the repair of instruments. All laboratory instruments will be maintained in accordance with manufacturer's specifications and within the requirements of the laboratory QAP.

13. Specific Routine Procedures to Assess Data Precision, Accuracy, and Completeness

13.1 Field Measurements

The project chemist will assess the field data and review the field results for compliance with the established QC criteria that are specified in the QAPjP and FSP. Accuracy of the field measurements will be assessed using daily instrument calibration and blanks analysis. Precision will be assessed on the basis of reproducibility by analyzing duplicate samples. Data completeness will be calculated using Equation 13-1.

$$\%\,\text{Completeness} = \frac{\text{Valid Data Obtained}}{\text{Total Data Planned}} \times 100 \qquad \text{Equation 13-1}$$

13.2 Laboratory Data

Laboratory results will be assessed for compliance with required precision, accuracy, completeness, and sensitivity as follows:

13.2.1 Precision

The laboratory analysis precision will be assessed by reviewing field duplicate sample results. The relative percent difference (%RPD) will be calculated for the duplicate samples using Equation 13-2.

$$\%\text{RPD} = \frac{S - D}{(S + D)/2} \times 100 \qquad \text{Equation 13-2}$$

Where: S = First sample value (original value)
D = Second sample value (duplicate value)

13.2.2 Accuracy

Laboratory results accuracy will be assessed for compliance with the established QC criteria described in the SASs using the analytical results of laboratory control samples and method, and field blanks. The percent recovery (%R) of laboratory control samples will be calculated using Equation 13-3.

$$\%\text{R} = \frac{A}{B} \times 100 \qquad \text{Equation 13-3}$$

Where: A = The analyte concentration determined experimentally from the laboratory control sample
B = The known amount of the concentration in the sample

13.2.3 Completeness

The data completeness of laboratory analyses results will be assessed for compliance with the amount of data required for decisionmaking. The completeness is calculated using Equation 13-1.

14. Corrective Actions

Corrective actions may be required for two classes of problems: analytical and/or equipment problems and noncompliance problems. Analytical and equipment problems may occur during sampling, sample handling, sample preparation, laboratory instrumental analysis, and data review. If the problem is analytical in nature, information on these problems will be promptly communicated to CH2M HILL's SM and the project chemist. Implementation of corrective action will be confirmed in writing through the same channels.

For noncompliance problems, a formal corrective action program will be determined and implemented at the time the problem is identified. The person who identifies the problem is responsible for notifying the SM, who in turn shall notify the WAM. Any nonconformance with the established quality control procedures in the QAPjP will be identified and corrected in accordance with the QAPjP. The USEPA WAM or their designee will issue a nonconformance report for each nonconformance condition.

14.1 Sample Collection/Field Measurements

Technical staff and project personnel will be responsible for reporting all suspected technical or QA nonconformances or suspected deficiencies of any activity or issued document by reporting the situation to the SM. The SM will be responsible for assessing the suspected problems in consultation with the project chemist and for making a decision based on the situation's potential affect on the quality of the data. If it is determined that the situation warrants a reportable nonconformance requiring corrective action, then a nonconformance report will be initiated by the SM.

Field corrective actions will be implemented and documented in the field logbook. No staff member will initiate a corrective action without prior communication of findings through the proper channels. If corrective actions are insufficient, work may be stopped with a stop-work order from the WAM.

The SM will be responsible for ensuring that corrective action for nonconformances is initiated by:

- Evaluating all reported nonconformances
- Controlling additional work on nonconforming items
- Determining disposition or action to be taken
- Maintaining a nonconformance log
- Reviewing nonconformance reports and corrective actions taken
- Ensuring nonconformance reports are included in the project files

Corrective action for field measurements may include:

- Repeating the measurement to check the error

- Checking for all proper adjustments for ambient conditions such as temperature
- Checking the batteries
- Recalibrating
- Checking the calibration
- Replacing the instrument or measurement devices
- Stopping work (if necessary)

The SM is responsible for site activities. In this role, the SM may be required to adjust the site programs to accommodate site-specific needs. When it becomes necessary to modify a program, the SM notifies the WAM of the anticipated change and implements the necessary changes after obtaining the approval of the WAM. The SM is responsible for controlling, tracking, and implementing the identified changes. Reports on all changes will be distributed to all affected parties, including the USEPA WAM.

14.2 Laboratory Analyses

Corrective actions are required whenever an out-of-control event or potential out-of-control event is noted. The type of investigative action is somewhat dependent on the analysis and the event.

Laboratory personnel are alerted that corrective actions may be necessary if:

- QC data are outside the warning or acceptable windows for precision and accuracy
- Blanks contain target analytes above acceptable levels
- Undesirable trends are detected in the RPD between collocated samples
- There are unusual changes in detection limits
- Deficiencies are detected by the QA department during internal or external audits or from the results of performance evaluation samples
- Inquiries concerning data quality are received

Corrective action procedures are often handled at the bench level by the analyst who reviews the preparation or extraction procedure for possible errors and checks the instrument calibration, calibration mixes, instrument sensitivity, and so on. If the problem persists or cannot be identified, the matter if referred to the laboratory supervisor, manager and/or QA department for further investigation. Once resolved, full documentation of the corrective action procedure is filed with the QA department and included in the case narrative portion of the analytical report.

15. Quality Assurance Reports to Management

In addition to the audit reports that may be submitted to the SM in accordance with QAPjP Section 11, a monthly progress report that addresses all QA issues and corrective actions proposed or already taken is submitted to the USEPA WAM. The RD field summary report will contain QA sections that summarizes data quality information collected during the project.

Appendix A
Special Analytical Services

5/016-6/96

U.S. Environmental Protection Agency Region V
SFD/Contracts Mgmt. Section
77 West Jackson, SM-5J
Chicago, Illinois 60604
PHONE: (312) 886-1488 FAX: (312) 886-0753

SAS Number
BNAs in Solid Waste
SAS

SPECIAL ANALYTICAL SERVICES
Client Request

[X] Regional Transmittal

A. EPA Region/Client: Region V
B Howard Pham Technical Project Manager (TPM): C. Moore
C. Telephone Number: (312) 353-2310 (312) 886-1488
D. Date of Request: September 1999
E. Site Name: Penta Wood Products

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delays in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. **General description of analytical service requested:**

Analysis of PAHs, Pentachlorophenol, 2,4-Dimethylphenol, 2,3,4,6-Tetrrachlorophenol, 2,4,6-Trichlorophenol and phenol in soil and solid waste samples. The concentration of the analytes analyzed in samples will be determined by gas chromatography/mass spectrometry (GC/MS). Sample results will be reported on a dry weight basis in µg/kg.

2. **Definition and number of work units involved (specify whether whole samples or fractions; whether aqueous or soil and sediments; and whether low, medium, or high concentration):**

Analysis of a minimum of 20 soil samples plus QA/QC samples (duplicates and MS/MSD). All samples are low concentration soil samples.

3. **Purposes of analysis (specify whether Superfund [Remedial or Enforcement], RCRA, NPDES, etc.):**

Superfund-Remedial

4. **Estimated date(s) of collection:**

2000

5. **Estimated date(s) and method of shipment:**

Method of shipment will be by overnight carrier.

6. **Number of days analysis and data required after laboratory receipt of samples:**

The holding time is not to exceed 7 days from sample collection to extraction and 40 days from extraction to analysis.

The laboratory will be required to provide results within 28 days of receipt of samples.

7. **Analytical protocol required (attach copy if other than a protocol currently used in this program):**

Analytical protocol taken from SW846 Method 8270C.

Samples will be stored at 4 C until analysis and validation of results.

Note: Laboratory data rejection and non-payment will be recommended if methods other than those specified in this document are used.

8. **Special technical instruction (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):**

The detection limit for pentachlorophenol shall be less than or equal to 0.5 mg/kg. The most recent MDL study shall be enclosed.

The method recommended surrogate and internal standards shall be used and prepared at the recommended concentrations.

Used five calibration standards. The lowest standards should represent concentrations near, but above, the respective method detection limit.

All QA/QC requirements (surrogates, matrix spike/matrix spike duplicates, lab blanks, laboratory control samples, GC/MS tuning) shall be performed and reported as recommended in the method. The procedures, frequencies and acceptance criteria used shall be the same as those recommended in the method or referenced in the method.

9. **Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain of Custody documentation, etc.). If not completed, format of results will be left to program discretion.**

The laboratory shall perform data reduction and shall report sample analysis data and quality control information similar to that designated in the CLP SOW Rev. 10/92. The sample analysis data package shall include all documentation, data reporting forms and raw data as specified in the CLP SOW.

All procedures used shall be clearly identified. All original raw data, forms, calculation worksheets, instrument read-outs, preparation forms, internal sample and/or extract chain of custody forms, strip charts and copies of pages from preparation and analysis logbooks shall be submitted. If originals were submitted in another data package, photocopies may be submitted with a record of the location of the originals.

All records of analysis and calculations shall be legible and be sufficient to recalculate all sample concentrations and QA audit results. QC reference samples or initial calibration standards shall be identified as to source, lot number and sample number.

Results will be reported on a dry weight basis in mg/kg.

10. **Other (use additional sheets or attach supplementary information, as needed):**

The laboratory is to conduct matrix spike and matrix spike duplicate (MS/MSD) analyses and report the results on the appropriate form.

The laboratory should provide a summary of their most recent MDL study using those protocols. The laboratory shall adhere to chain-of-custody and document control procedures described in the SW846 Method 8270C.

All original sample tags, chain of custody forms, SAS packing lists, airbills and any other original receiving or transmittal forms or copies of receiving logbook pages pertaining to this SAS shall be submitted to the Region within the time frame listed in section 6 above. Photocopies may be submitted with a record of the location of the originals.

Payment to laboratories for this SAS analysis may be reduced if all procedures noted above are not followed and all required deliverables noted above are not supplied. The Region or its contractors shall not be charged further for the provision of required deliverables within this agreement.

11. **Name of sampling/shipping contact and phone number:**
David Shekoski (414)272-2426

I. DATA REQUIREMENTS

Parameter	Detection Limit (mg/kg)	Precision Desired
Pentachlorophenol	0.5	± 20 percent
2,4-Dimethylphenol Phenol	0.33	
2,3,4,6-Tetrachlorophenol	0.33	
2,4,6-Trichlorophenol	0.33	
Acenaphthene	0.33	
Anthracene	0.33	
Benzo(a)anthracene	0.33	
Benzo(b)fluoranthene	0.33	
Benzo(k)fluoranthene	0.33	
Benzo(a)pyrene	0.33	
Chrysene	0.33	
Dibenzo(a,h)anthracene	0.33	
Fluoranthene	0.33	
Indeno(1,2,3-c,d)pyrene	0.33	
Naphthalene	0.33	
Phenanthrene	0.33	
Pyene	0.33	

Note: These are minimum requirements. Report actual detection limit(s) used, based on allowable methodology options.

II. QC REQUIREMENTS

As required by the SW846 Method 8270C.

Audit	Frequency of Audits	Limits
Method Blank	at least one per group of 20 or fewer samples	concentration < detection limit
Laboratory control sample	at least one per group of 20 or fewer samples	% recovery within historical acceptance limits
MS/MSD	at least one per group of 20 or fewer samples	% recovery within historical acceptance limits
Surrogate spiking compounds	surrogates spiked into all samples (incl. QC samples)	% recoveries must be in control
Internal standard compounds	compounds spiked into all samples (incl. QC samples)	areas -50 to +100% from the last daily calibration check standard

III. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Take corrective action. Contact the Region for problems that might result in the delay of reporting sample results.

5/016-6/96

U.S. Environmental Protection Agency Region V
SFD/Contracts Mgmt. Section
77 West Jackson, SM-5J
Chicago, Illinois 60604
PHONE: (312) 886-1488 FAX: (312) 886-0753

SAS Number
BNAs in Liquid Waste
SAS

SPECIAL ANALYTICAL SERVICES
Client Request

[X] Regional Transmittal

A. EPA Region/Client: Region V
B Howard Pham Technical Project Manager (TPM): C. Moore
C. Telephone Number: (312) 353-2310 (312) 886-1488
D. Date of Request: September 1999
E. Site Name: Penta Wood Products

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delays in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. **General description of analytical service requested:**

   Analysis of PAHs, Pentachlorophenol, 2,4-Dimethylphenol, 2,3,4,6-Tetrrachlorophenol, 2,4,6-Trichlorophenol and phenol in liquid waste samples. The concentration of the analytes analyzed in samples will be determined by gas chromatography/mass spectrometry (GC/MS).

2. **Definition and number of work units involved (specify whether whole samples or fractions; whether aqueous or soil and sediments; and whether low, medium, or high concentration):**

   Analysis of a minimum of 20 liquid samples plus QA/QC samples (duplicates and MS/MSD). All samples are low concentration soil samples.

3. **Purposes of analysis (specify whether Superfund [Remedial or Enforcement], RCRA, NPDES, etc.):**

   Superfund-Remedial

4. **Estimated date(s) of collection:**

   2000

5. **Estimated date(s) and method of shipment:**

   Method of shipment will be by overnight carrier.

6. **Number of days analysis and data required after laboratory receipt of samples:**

   The holding time is not to exceed 7 days from sample collection to extraction and 40 days from extraction to analysis.

   The laboratory will be required to provide results within 28 days of receipt of samples.

7. **Analytical protocol required (attach copy if other than a protocol currently used in this program):**

   Analytical protocol taken from SW846 Method 8270C.

   Samples will be stored at 4 C until analysis and validation of results.

Note: Laboratory data rejection and non-payment will be recommended if methods other than those specified in this document are used.

8. **Special technical instruction (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):**

The detection limit for pentachlorophenol shall be less than or equal to 0.1 ug/L. The most recent MDL study shall be enclosed.

The method recommended surrogate and internal standards shall be used and prepared at the recommended concentrations.

Used five calibration standards. The lowest standards should represent concentrations near, but above, the respective method detection limit.

All QA/QC requirements (surrogates, matrix spike/matrix spike duplicates, lab blanks, laboratory control samples, GC/MS tuning) shall be performed and reported as recommended in the method. The procedures, frequencies and acceptance criteria used shall be the same as those recommended in the method or referenced in the method.

9. **Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain of Custody documentation, etc.). If not completed, format of results will be left to program discretion.**

The laboratory shall perform data reduction and shall report sample analysis data and quality control information similar to that designated in the CLP SOW Rev. 10/92. The sample analysis data package shall include all documentation, data reporting forms and raw data as specified in the CLP SOW.

All procedures used shall be clearly identified. All original raw data, forms, calculation worksheets, instrument read-outs, preparation forms, internal sample and/or extract chain of custody forms, strip charts and copies of pages from preparation and analysis logbooks shall be submitted. If originals were submitted in another data package, photocopies may be submitted with a record of the location of the originals.

All records of analysis and calculations shall be legible and be sufficient to recalculate all sample concentrations and QA audit results. QC reference samples or initial calibration standards shall be identified as to source, lot number and sample number.

10. **Other (use additional sheets or attach supplementary information, as needed):**

The laboratory is to conduct matrix spike and matrix spike duplicate (MS/MSD) analyses and report the results on the appropriate form.

The laboratory should provide a summary of their most recent MDL study using those protocols. The laboratory shall adhere to chain-of-custody and document control procedures described in the SW846 Method 8270C.

All original sample tags, chain of custody forms, SAS packing lists, airbills and any other original receiving or transmittal forms or copies of receiving logbook pages pertaining to this SAS shall be submitted to the Region within the time frame listed in section 6 above. Photocopies may be submitted with a record of the location of the originals.

Payment to laboratories for this SAS analysis may be reduced if all procedures noted above are not followed and all required deliverables noted above are not supplied. The Region or its contractors shall not be charged further for the provision of required deliverables within this agreement.

11. **Name of sampling/shipping contact and phone number:**
David Shekoski (414)272-2426

5/016-6/96

I. DATA REQUIREMENTS

Parameter	Detection Limit (µg/L)	Precision Desired
Pentachlorophenol	0.1	± 20 percent
2,4-Dimethylphenol Phenol	10	
2,3,4,6-Tetrachlorophenol	10	
2,4,6-Trichlorophenol	10	
Acenaphthene	10	
Anthracene	10	
Benzo(a)anthracene	10	
Benzo(b)fluoranthene	10	
Benzo(k)fluoranthene	10	
Benzo(a)pyrene	10	
Chrysene	10	
Dibenzo(a,h)anthracene	10	
Fluoranthene	10	
Indeno(1,2,3-c,d)pyrene	10	
Naphthalene	10	
Phenanthrene	10	
Pyene	10	

Note: These are minimum requirements. Report actual detection limit(s) used, based on allowable methodology options.

II. QC REQUIREMENTS

As required by the SW846 Method 8270C.

Audit	Frequency of Audits	Limits
Method Blank	at least one per group of 20 or fewer samples	concentration < detection limit
Laboratory control sample	at least one per group of 20 or fewer samples	% recovery within historical acceptance limits
MS/MSD	at least one per group of 20 or fewer samples	% recovery within historical acceptance limits
Surrogate spiking compounds	surrogates spiked into all samples (incl. QC samples)	% recoveries must be in control
Internal standard compounds	compounds spiked into all samples (incl. QC samples)	areas -50 to +100% from the last daily calibration check standard

III. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Take corrective action. Contact the Region for problems that might result in the delay of reporting sample results.

5/016-6/96

U.S. Environmental Protection Agency Region V
SFD/Contracts Mgmt. Section
77 West Jackson, SM-5J
Chicago, Illinois 60604
PHONE: (312) 886-1488 FAX: (312) 886-0753

SAS Number
Arsenic-Soil

SPECIAL ANALYTICAL SERVICES
Client Request

[X] Regional Transmittal

A. EPA Region/Client: Region V
B. RSCC Representative: C. Moore
C. Telephone Number: (312) 886-1488
D. Date of Request: September 1997
E. Site Name: Penta Wood Products

Acting Technical Project Manager (TPO): C. Moore
(312) 886-1488

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delays in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. **General description of analytical service requested:**

   Analysis of arsenic in soil samples. Sample results will be reported in mg/kg.

2. **Definition and number of work units involved (specify whether whole samples or fractions; whether aqueous or soil and sediments; and whether low, medium, or high concentration):**

   Analyze 8 soil samples. This number is inclusive of QA/QC samples (duplicates, blanks and MS/MSD).

3. **Purposes of analysis (specify whether Superfund [Remedial or Enforcement], RCRA, NPDES, etc.):**

   Superfund-Remedial

4. **Estimated date(s) of collection:**

   October 1997.

5. **Estimated date(s) and method of shipment:**

   Method of shipment will be by overnight carrier.

6. **Number of days analysis and data required after laboratory receipt of samples:**

   The laboratory will be required to provide results within 28 days of receipt of samples.

7. **Analytical protocol required (attach copy if other than a protocol currently used in this program):**

   Analytical protocol taken from SW846 Method 7060 with special instructions as noted in Section 8.

   Samples will be stored at 4 C until analysis and validation of results.

   Note: Laboratory data rejection and non-payment will be recommended if methods other than those specified in this document are used.

8. **Special technical instruction (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):**

   The detection limit for arsenic shall be less than or equal to 0.5 mg/kg. The most recent MDL study shall be enclosed.

Follow protocol according to the SW846 Method 7060. Dilute samples with sample concentrations greater than the highest standard.

All QA/QC requirements shall be performed and reported as recommended in the method. The procedures, frequencies and acceptance criteria used shall be the same as those recommended in the method or referenced in the method.

9. Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain of Custody documentation, etc.). If not completed, format of results will be left to program discretion.

The laboratory shall perform data reduction and shall report sample analysis data and quality control information similar to that designated in the CLP SOW, Rev. 10/92. The sample analysis data package shall include all documentation, data reporting forms and raw data similar to those specified in CLP SOW, Rev. 10/92.

All procedures used shall be clearly identified. All original raw data, forms, calculation worksheets, instrument read-outs, preparation forms, internal sample and/or extract chain of custody forms, strip charts and copies of pages from preparation and analysis logbooks shall be submitted. If originals were submitted in another data package, photocopies may be submitted with a record of the location of the originals.

All records of analysis and calculations shall be legible and be sufficient to recalculate all sample concentrations and QA audit results. QC reference samples or initial calibration standards shall be identified as to source, lot number and sample number.

Results will be reported in mg/kg.

10. Other (use additional sheets or attach supplementary information, as needed):

The laboratory is to conduct matrix spike and matrix spike duplicate (MS/MSD) analyses and report the results on the appropriate form.

All original sample tags, chain of custody forms, SAS packing lists, airbills and any other original receiving or transmittal forms or copies of receiving logbook pages pertaining to this SAS shall be submitted to the Region within the time frame listed in section 6 above. Photocopies may be submitted with a record of the location of the originals.

Payment to laboratories for this SAS analysis may be reduced if all procedures noted above are not followed and all required deliverables noted above are not supplied. The Region or its contractors shall not be charged further for the provision of required deliverables within this agreement.

11. Name of sampling/shipping contact and phone number:
David Shekoski (414)272-2426

I. DATA REQUIREMENTS

Parameter	Required Detection Limits	Precision Desired
Arsenic	0.5 mg/kg	+/- 20 percent

II. QC REQUIREMENTS

As required by the SW846 Method 7060.

Audit	Frequency of Audits	Limits

Method Blank	at least one per group of 20 or fewer samples	concentration < detection limit
Laboratory control sample	at least one per group of 20 or fewer samples	+/- 20% recovery
Matrix Spike	at least one per group of 20 or fewer samples	80-120% recovery
Matrix Spike Duplicate	at least one per group of 20 or fewer samples	80-120% recovery; <20% RPD

III. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Take corrective action. Contact the Region for problems that might result in the delay of reporting sample results.

5/016-6/96

U.S. Environmental Protection Agency Region V
SFD/Contracts Mgmt. Section
77 West Jackson, SM-5J
Chicago, Illinois 60604
PHONE: (312) 886-1488 FAX: (312) 886-0753

SAS Number
Arsenic-Water

SPECIAL ANALYTICAL SERVICES
Client Request

[X] Regional Transmittal

A. EPA Region/Client: Region V
B. RSCC Representative: C. Moore
C. Telephone Number: (312) 886-1488
D. Date of Request: September 1997
E. Site Name: Penta Wood Products

Acting Technical Project Manager (TPO): C. Moore
(312) 886-1488

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delays in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. **General description of analytical service requested:**

   Analysis of arsenic in water samples. Sample results will be reported in µg/L

2. **Definition and number of work units involved (specify whether whole samples or fractions; whether aqueous or soil and sediments; and whether low, medium, or high concentration):**

   Analyze 77 water samples. This number is inclusive of QA/QC samples (duplicates, blanks and MS/MSD).

3. **Purposes of analysis (specify whether Superfund [Remedial or Enforcement], RCRA, NPDES, etc.):**

   Superfund-Remedial

4. **Estimated date(s) of collection:**

   2000.

5. **Estimated date(s) and method of shipment:**

   Method of shipment will be by overnight carrier.

6. **Number of days analysis and data required after laboratory receipt of samples:**

   The laboratory will be required to provide results within 28 days of receipt of samples.

7. **Analytical protocol required (attach copy if other than a protocol currently used in this program):**

   Analytical protocol taken from SW846 Method 7060 with special instructions as noted in Section 8.

   Samples will be preserved in the field with HNO_3 to pH<2, and stored at 4 C until analysis and validation of results.

   Note: Laboratory data rejection and non-payment will be recommended if methods other than those specified in this document are used.

8. **Special technical instruction (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):**

The detection limit for arsenic shall be less than or equal to 2.0 µg/L. The most recent MDL study shall be enclosed.

Follow protocol according to the SW846 Method 7060. Dilute samples with sample concentrations greater than the highest standard.

All QA/QC requirements shall be performed and reported as recommended in the method. The procedures, frequencies and acceptance criteria used shall be the same as those recommended in the method or referenced in the method.

9. **Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain of Custody documentation, etc.). If not completed, format of results will be left to program discretion.**

The laboratory shall perform data reduction and shall report sample analysis data and quality control information similar to that designated in the CLP SOW, Rev. 10/92. The sample analysis data package shall include all documentation, data reporting forms and raw data similar to those specified in CLP SOW, Rev. 10/92.

All procedures used shall be clearly identified. All original raw data, forms, calculation worksheets, instrument read-outs, preparation forms, internal sample and/or extract chain of custody forms, strip charts and copies of pages from preparation and analysis logbooks shall be submitted. If originals were submitted in another data package, photocopies may be submitted with a record of the location of the originals.

All records of analysis and calculations shall be legible and be sufficient to recalculate all sample concentrations and QA audit results. QC reference samples or initial calibration standards shall be identified as to source, lot number and sample number.

Results will be reported in µg/L.

10. **Other (use additional sheets or attach supplementary information, as needed):**

The laboratory is to conduct matrix spike and matrix spike duplicate (MS/MSD) analyses and report the results on the appropriate form.

All original sample tags, chain of custody forms, SAS packing lists, airbills and any other original receiving or transmittal forms or copies of receiving logbook pages pertaining to this SAS shall be submitted to the Region within the time frame listed in section 6 above. Photocopies may be submitted with a record of the location of the originals.

Payment to laboratories for this SAS analysis may be reduced if all procedures noted above are not followed and all required deliverables noted above are not supplied. The Region or its contractors shall not be charged further for the provision of required deliverables within this agreement.

11. **Name of sampling/shipping contact and phone number:**
David Shekoski (414)272-2426

I. DATA REQUIREMENTS

Parameter	Required Detection Limits	Precision Desired
Arsenic	2.0 µg/L	+/- 20 percent

II. QC REQUIREMENTS

As required by the SW846 Method 7060.

Audit	Frequency of Audits	Limits
Method Blank	at least one per group of 20 or fewer samples	concentration < detection limit
Laboratory control sample	at least one per group of 20 or fewer samples	+/- 20% recovery
Matrix Spike	at least one per group of 20 or fewer samples	80-120% recovery
Matrix Spike Duplicate	at least one per group of 20 or fewer samples	80-120% recovery; <20% RPD

III. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Take corrective action. Contact the Region for problems that might result in the delay of reporting sample results.

5/016-6/96

U.S. Environmental Protection Agency Region V
SFD/Contracts Mgmt. Section
77 West Jackson, SM-5J
Chicago, Illinois 60604
PHONE: (312) 886-1488 FAX: (312) 886-0753

SAS Number
Copper-Water

SPECIAL ANALYTICAL SERVICES
Client Request

[X] Regional Transmittal

A. EPA Region/Client: Region V
B. RSCC Representative: C. Moore — Acting Technical Project Manager (TPO): C. Moore
C. Telephone Number: (312) 886-1488 — (312) 886-1488
D. Date of Request: September 1997
E. Site Name: Penta Wood Products

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delays in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. **General description of analytical service requested:**

   Analysis of copper in water samples. Sample results will be reported in µg/L.

2. **Definition and number of work units involved (specify whether whole samples or fractions; whether aqueous or soil and sediments; and whether low, medium, or high concentration):**

   Analyze 77 groundwater and surface water samples. This number is inclusive of QA/QC samples (duplicates, blanks and MS/MSD).

3. **Purposes of analysis (specify whether Superfund [Remedial or Enforcement], RCRA, NPDES, etc.):**

   Superfund-Remedial

4. **Estimated date(s) of collection:**

   2000.

5. **Estimated date(s) and method of shipment:**

   Method of shipment will be by overnight carrier.

6. **Number of days analysis and data required after laboratory receipt of samples:**

   The laboratory will be required to provide results within 28 days of receipt of samples.

7. **Analytical protocol required (attach copy if other than a protocol currently used in this program):**

   Analytical protocol taken from SW846 Method 6010 with special instructions as noted in Section 8.

   Samples will be preserved in the field with HNO_3 to pH<2, and stored at 4 C until analysis and validation of results.

   Note: Laboratory data rejection and non-payment will be recommended if methods other than those specified in this document are used.

8. **Special technical instruction (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):**

The detection limit for copper shall be less than or equal to 50 µg/L. The most recent MDL study shall be enclosed.

Follow protocol according to the SW846 Method 6010. Dilute samples with sample concentrations greater than the highest standard.

All QA/QC requirements shall be performed and reported as recommended in the method. The procedures, frequencies and acceptance criteria used shall be the same as those recommended in the method or referenced in the method.

9. Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain of Custody documentation, etc.). If not completed, format of results will be left to program discretion.

The laboratory shall perform data reduction and shall report sample analysis data and quality control information similar to that designated in the CLP SOW, Rev. 10/92. The sample analysis data package shall include all documentation, data reporting forms and raw data similar to those specified in CLP SOW, Rev. 10/92.

All procedures used shall be clearly identified. All original raw data, forms, calculation worksheets, instrument read-outs, preparation forms, internal sample and/or extract chain of custody forms, strip charts and copies of pages from preparation and analysis logbooks shall be submitted. If originals were submitted in another data package, photocopies may be submitted with a record of the location of the originals.

All records of analysis and calculations shall be legible and be sufficient to recalculate all sample concentrations and QA audit results. QC reference samples or initial calibration standards shall be identified as to source, lot number and sample number.

Results will be reported in µg/L.

10. Other (use additional sheets or attach supplementary information, as needed):

The laboratory is to conduct matrix spike and matrix spike duplicate (MS/MSD) analyses and report the results on the appropriate form.

All original sample tags, chain of custody forms, SAS packing lists, airbills and any other original receiving or transmittal forms or copies of receiving logbook pages pertaining to this SAS shall be submitted to the Region within the time frame listed in section 6 above. Photocopies may be submitted with a record of the location of the originals.

Payment to laboratories for this SAS analysis may be reduced if all procedures noted above are not followed and all required deliverables noted above are not supplied. The Region or its contractors shall not be charged further for the provision of required deliverables within this agreement.

11. Name of sampling/shipping contact and phone number:
David Shekoski (414)272-2426

I. DATA REQUIREMENTS

Parameter	Required Detection Limits	Precision Desired
Copper	50 µg/L	+/- 20 percent

II. QC REQUIREMENTS

As required by the SW846 Method 6010.

Audit	Frequency of Audits	Limits
Method Blank	at least one per group of 20 or fewer samples	concentration < detection limit
Laboratory control sample	at least one per group of 20 or fewer samples	+/- 20% recovery
Matrix Spike	at least one per group of 20 or fewer samples	80-120% recovery
Matrix Spike Duplicate	at least one per group of 20 or fewer samples	80-120% recovery; <20% RPD
Serial Dilution	at least one per group of 20 or fewer samples	10 % Difference

III. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Take corrective action. Contact the Region for problems that might result in the delay of reporting sample results.

5/016-6/96

U.S. Environmental Protection Agency Region V
SFD/Contracts Mgmt. Section
77 West Jackson, SM-5J
Chicago, Illinois 60604
PHONE: (312) 886-1488 FAX: (312) 886-0753

SAS Number
Iron-Water

SPECIAL ANALYTICAL SERVICES
Client Request

[X] Regional Transmittal

A. EPA Region/Client: Region V
B. RSCC Representative: C. Moore — Acting Technical Project Manager (TPO): C. Moore
C. Telephone Number: (312) 886-1488 — (312) 886-1488
D. Date of Request: September 1997
E. Site Name: Penta Wood Products

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delays in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. **General description of analytical service requested:**

   Analysis of soluble iron in groundwater samples. Sample results will be reported in µg/L. Samples will be field filtered.

2. **Definition and number of work units involved (specify whether whole samples or fractions; whether aqueous or soil and sediments; and whether low, medium, or high concentration):**

   Analyze 80 groundwater samples. This number is inclusive of QA/QC samples (duplicates, blanks and MS/MSD).

3. **Purposes of analysis (specify whether Superfund [Remedial or Enforcement], RCRA, NPDES, etc.):**

   Superfund-Remedial

4. **Estimated date(s) of collection:**

   2000.

5. **Estimated date(s) and method of shipment:**

   Method of shipment will be by overnight carrier.

6. **Number of days analysis and data required after laboratory receipt of samples:**

   The laboratory will be required to provide results within 28 days of receipt of samples.

7. **Analytical protocol required (attach copy if other than a protocol currently used in this program):**

   Analytical protocol taken from SW846 Method 6010 with special instructions as noted in Section 8.

   Samples will be preserved in the field with HNO_3 to pH<2, and stored at 4 C until analysis and validation of results.

   Note: Laboratory data rejection and non-payment will be recommended if methods other than those specified in this document are used.

8. **Special technical instruction (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):**

The detection limit for iron shall be less than or equal to 100 µg/L. The most recent MDL study shall be enclosed.

Follow protocol according to the SW846 Method 6010. Dilute samples with sample concentrations greater than the highest standard.

All QA/QC requirements shall be performed and reported as recommended in the method. The procedures, frequencies and acceptance criteria used shall be the same as those recommended in the method or referenced in the method.

9. **Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain of Custody documentation, etc.). If not completed, format of results will be left to program discretion.**

The laboratory shall perform data reduction and shall report sample analysis data and quality control information similar to that designated in the CLP SOW, Rev. 10/92. The sample analysis data package shall include all documentation, data reporting forms and raw data similar to those specified in CLP SOW, Rev. 10/92.

All procedures used shall be clearly identified. All original raw data, forms, calculation worksheets, instrument read-outs, preparation forms, internal sample and/or extract chain of custody forms, strip charts and copies of pages from preparation and analysis logbooks shall be submitted. If originals were submitted in another data package, photocopies may be submitted with a record of the location of the originals.

All records of analysis and calculations shall be legible and be sufficient to recalculate all sample concentrations and QA audit results. QC reference samples or initial calibration standards shall be identified as to source, lot number and sample number.

Results will be reported in µg/L.

10. **Other (use additional sheets or attach supplementary information, as needed):**

The laboratory is to conduct matrix spike and matrix spike duplicate (MS/MSD) analyses and report the results on the appropriate form.

All original sample tags, chain of custody forms, SAS packing lists, airbills and any other original receiving or transmittal forms or copies of receiving logbook pages pertaining to this SAS shall be submitted to the Region within the time frame listed in section 6 above. Photocopies may be submitted with a record of the location of the originals.

Payment to laboratories for this SAS analysis may be reduced if all procedures noted above are not followed and all required deliverables noted above are not supplied. The Region or its contractors shall not be charged further for the provision of required deliverables within this agreement.

11. **Name of sampling/shipping contact and phone number:**
David Shekoski (414)272-2426

I. DATA REQUIREMENTS

Parameter	Required Detection Limits	Precision Desired
Iron	100 µg/L	+/- 20 percent

II. QC REQUIREMENTS

As required by the SW846 Method 6010.

Audit	Frequency of Audits	Limits
Method Blank	at least one per group of 20 or fewer samples	concentration < detection limit
Laboratory control sample	at least one per group of 20 or fewer samples	+/- 20% recovery
Matrix Spike	at least one per group of 20 or fewer samples	80-120% recovery
Matrix Spike Duplicate	at least one per group of 20 or fewer samples	80-120% recovery; <20% RPD
Serial Dilution	at least one per group of 20 or fewer samples	10 % Difference

III. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Take corrective action. Contact the Region for problems that might result in the delay of reporting sample results.

5/016-6/96

U.S. Environmental Protection Agency Region V
SFD/Contracts Mgmt. Section
77 West Jackson, SM-5J
Chicago, Illinois 60604
PHONE: (312) 886-1488 FAX: (312) 886-0753

SAS Number
Manganese-Water

SPECIAL ANALYTICAL SERVICES
Client Request

[X] Regional Transmittal

A. EPA Region/Client: Region V
B. RSCC Representative: C. Moore
C. Telephone Number: (312) 886-1488
D. Date of Request: September 1997
E. Site Name: Penta Wood Products

Acting Technical Project Manager (TPO): C. Moore
(312) 886-1488

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delays in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. **General description of analytical service requested:**

   Analysis of manganese in groundwater samples. Sample results will be reported in µg/L.

2. **Definition and number of work units involved (specify whether whole samples or fractions; whether aqueous or soil and sediments; and whether low, medium, or high concentration):**

   Analyze 80 groundwater samples. This number is inclusive of QA/QC samples (duplicates, blanks and MS/MSD).

3. **Purposes of analysis (specify whether Superfund [Remedial or Enforcement], RCRA, NPDES, etc.):**

   Superfund-Remedial

4. **Estimated date(s) of collection:**

   2000.

5. **Estimated date(s) and method of shipment:**

   Method of shipment will be by overnight carrier.

6. **Number of days analysis and data required after laboratory receipt of samples:**

   The laboratory will be required to provide results within 28 days of receipt of samples.

7. **Analytical protocol required (attach copy if other than a protocol currently used in this program):**

   Analytical protocol taken from SW846 Method 6010 with special instructions as noted in Section 8.

   Samples will be preserved in the field with HNO_3 to pH<2, and stored at 4 C until analysis and validation of results.

   Note: Laboratory data rejection and non-payment will be recommended if methods other than those specified in this document are used.

8. **Special technical instruction (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):**

The detection limit for manganese shall be less than or equal to 10 µg/L. The most recent MDL study shall be enclosed.

Follow protocol according to the SW846 Method 6010. Dilute samples with sample concentrations greater than the highest standard.

All QA/QC requirements shall be performed and reported as recommended in the method. The procedures, frequencies and acceptance criteria used shall be the same as those recommended in the method or referenced in the method.

9. Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain of Custody documentation, etc.). If not completed, format of results will be left to program discretion.

The laboratory shall perform data reduction and shall report sample analysis data and quality control information similar to that designated in the CLP SOW, Rev. 10/92. The sample analysis data package shall include all documentation, data reporting forms and raw data similar to those specified in CLP SOW, Rev. 10/92.

All procedures used shall be clearly identified. All original raw data, forms, calculation worksheets, instrument read-outs, preparation forms, internal sample and/or extract chain of custody forms, strip charts and copies of pages from preparation and analysis logbooks shall be submitted. If originals were submitted in another data package, photocopies may be submitted with a record of the location of the originals.

All records of analysis and calculations shall be legible and be sufficient to recalculate all sample concentrations and QA audit results. QC reference samples or initial calibration standards shall be identified as to source, lot number and sample number.

Results will be reported in µg/L.

10. Other (use additional sheets or attach supplementary information, as needed):

The laboratory is to conduct matrix spike and matrix spike duplicate (MS/MSD) analyses and report the results on the appropriate form.

All original sample tags, chain of custody forms, SAS packing lists, airbills and any other original receiving or transmittal forms or copies of receiving logbook pages pertaining to this SAS shall be submitted to the Region within the time frame listed in section 6 above. Photocopies may be submitted with a record of the location of the originals.

Payment to laboratories for this SAS analysis may be reduced if all procedures noted above are not followed and all required deliverables noted above are not supplied. The Region or its contractors shall not be charged further for the provision of required deliverables within this agreement.

11. Name of sampling/shipping contact and phone number:
David Shekoski (414)272-2426

I. DATA REQUIREMENTS

Parameter	Required Detection Limits	Precision Desired
Manganese	10 µg/L	+/- 20 percent

II. QC REQUIREMENTS

As required by the SW846 Method 6010.

Audit	Frequency of Audits	Limits
Method Blank	at least one per group of 20 or fewer samples	concentration < detection limit
Laboratory control sample	at least one per group of 20 or fewer samples	+/- 20% recovery
Matrix Spike	at least one per group of 20 or fewer samples	80-120% recovery
Matrix Spike Duplicate	at least one per group of 20 or fewer samples	80-120% recovery; <20% RPD
Serial Dilution	at least one per group of 20 or fewer samples	10 % Difference

III. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Take corrective action. Contact the Region for problems that might result in the delay of reporting sample results.

5/016-6/96

U.S. Environmental Protection Agency Region V
SFD/Contracts Mgmt. Section
77 West Jackson, SM-5J
Chicago, Illinois 60604
PHONE: (312) 886-1488 FAX: (312) 886-0753

SAS Number
Zinc-Water

SPECIAL ANALYTICAL SERVICES
Client Request

[X] Regional Transmittal

A. EPA Region/Client: Region V
B. RSCC Representative: C. Moore — Acting Technical Project Manager (TPO): C. Moore
C. Telephone Number: (312) 886-1488 — (312) 886-1488
D. Date of Request: September 1997
E. Site Name: Penta Wood Products

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delays in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. **General description of analytical service requested:**

   Analysis of zinc in water samples. Sample results will be reported in µg/L.

2. **Definition and number of work units involved (specify whether whole samples or fractions; whether aqueous or soil and sediments; and whether low, medium, or high concentration):**

   Analyze 77 groundwater and surface water samples. This number is inclusive of QA/QC samples (duplicates, blanks and MS/MSD).

3. **Purposes of analysis (specify whether Superfund [Remedial or Enforcement], RCRA, NPDES, etc.):**

   Superfund-Remedial

4. **Estimated date(s) of collection:**

   2000.

5. **Estimated date(s) and method of shipment:**

   Method of shipment will be by overnight carrier.

6. **Number of days analysis and data required after laboratory receipt of samples:**

   The laboratory will be required to provide results within 28 days of receipt of samples.

7. **Analytical protocol required (attach copy if other than a protocol currently used in this program):**

   Analytical protocol taken from SW846 Method 6010 with special instructions as noted in Section 8.

   Samples will be preserved in the field with HNO_3 to pH<2, and stored at 4 C until analysis and validation of results.

   Note: Laboratory data rejection and non-payment will be recommended if methods other than those specified in this document are used.

8. **Special technical instruction (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):**

The detection limit for copper shall be less than or equal to 2.0 µg/L. The most recent MDL study shall be enclosed.

Follow protocol according to the SW846 Method 6010. Dilute samples with sample concentrations greater than the highest standard.

All QA/QC requirements shall be performed and reported as recommended in the method. The procedures, frequencies and acceptance criteria used shall be the same as those recommended in the method or referenced in the method.

9. **Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain of Custody documentation, etc.). If not completed, format of results will be left to program discretion.**

The laboratory shall perform data reduction and shall report sample analysis data and quality control information similar to that designated in the CLP SOW, Rev. 10/92. The sample analysis data package shall include all documentation, data reporting forms and raw data similar to those specified in CLP SOW, Rev. 10/92.

All procedures used shall be clearly identified. All original raw data, forms, calculation worksheets, instrument read-outs, preparation forms, internal sample and/or extract chain of custody forms, strip charts and copies of pages from preparation and analysis logbooks shall be submitted. If originals were submitted in another data package, photocopies may be submitted with a record of the location of the originals.

All records of analysis and calculations shall be legible and be sufficient to recalculate all sample concentrations and QA audit results. QC reference samples or initial calibration standards shall be identified as to source, lot number and sample number.

Results will be reported in µg/L.

10. **Other (use additional sheets or attach supplementary information, as needed):**

The laboratory is to conduct matrix spike and matrix spike duplicate (MS/MSD) analyses and report the results on the appropriate form.

All original sample tags, chain of custody forms, SAS packing lists, airbills and any other original receiving or transmittal forms or copies of receiving logbook pages pertaining to this SAS shall be submitted to the Region within the time frame listed in section 6 above. Photocopies may be submitted with a record of the location of the originals.

Payment to laboratories for this SAS analysis may be reduced if all procedures noted above are not followed and all required deliverables noted above are not supplied. The Region or its contractors shall not be charged further for the provision of required deliverables within this agreement.

11. **Name of sampling/shipping contact and phone number:**
David Shekoski (414)272-2426

I. DATA REQUIREMENTS

Parameter	Required Detection Limits	Precision Desired
Zinc	2.0 µg/L	+/- 20 percent

II. QC REQUIREMENTS

As required by the SW846 Method 6010.

Audit	Frequency of Audits	Limits
Method Blank	at least one per group of 20 or fewer samples	concentration < detection limit
Laboratory control sample	at least one per group of 20 or fewer samples	+/- 20% recovery
Matrix Spike	at least one per group of 20 or fewer samples	80-120% recovery
Matrix Spike Duplicate	at least one per group of 20 or fewer samples	80-120% recovery; <20% RPD
Serial Dilution	at least one per group of 20 or fewer samples	10 % Difference

III. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Take corrective action. Contact the Region for problems that might result in the delay of reporting sample results.

5/016-6/96

U.S. Environmental Protection Agency Region V
SFD/Contracts Mgmt. Section
77 West Jackson, SM-5J
Chicago, Illinois 60604
PHONE: (312) 886-1488 FAX: (312) 886-0753

SAS Number
Nitrate- Water

SPECIAL ANALYTICAL SERVICES
Client Request

[X] Regional Transmittal

A. EPA Region/Client: Region V
B. RSCC Representative: C. Moore Acting Technical Project Manager (TPO): C. Moore
C. Telephone Number: (312) 886-1488 (312) 886-1488
D. Date of Request: September 1997
E. Site Name: Penta Wood Products

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delays in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. **General description of analytical service requested:**

Analysis of nitrate in groundwater samples. Sample results will be reported as µg/L. Samples will be unfiltered.

2. **Definition and number of work units involved (specify whether whole samples or fractions; whether aqueous or soil and sediments; and whether low, medium, or high concentration):**

Analyze 28 groundwater samples. This number is inclusive of QA/QC samples (duplicates, blanks and MS/MSD).

3. **Purposes of analysis (specify whether Superfund [Remedial or Enforcement], RCRA, NPDES, etc.):**

Superfund-Remedial

4. **Estimated date(s) of collection:**

2000.

5. **Estimated date(s) and method of shipment:**

Method of shipment will be by overnight carrier.

6. **Number of days analysis and data required after laboratory receipt of samples:**

The laboratory will be required to provide results within 28 days of receipt of samples. Samples shall be analyzed within 48 hours of sample collection.

7. **Analytical protocol required (attach copy if other than a protocol currently used in this program):**

Analytical protocol taken from EPA Method 300 with special instructions as noted in Section 8.

Samples stored at 4 C until analysis and validation of results.

Note: Laboratory data rejection and non-payment will be recommended if methods other than those specified in this document are used.

8. **Special technical instruction (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):**

The detection limit for nitrate shall be less than or equal to 130 µg/L.

Follow protocol according to the EPA Method 300.

All QA/QC requirementsshall be performed and reported as recommended in the method. The procedures, frequencies and acceptance criteria used shall be the same as those recommended in the method or referenced in the method.

9. **Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain of Custody documentation, etc.). If not completed, format of results will be left to program discretion.**

The laboratory shall perform data reduction and shall report sample analysis data and quality control information similar to that designated in the CLP SOW, Rev. 10/92. The sample analysis data package shall include all documentation, data reporting forms and raw data similar to those specified in CLP SOW, Rev. 10/92.

All procedures used shall be clearly identified. All original raw data, forms, calculation worksheets, instrument read-outs, preparation forms, internal sample and/or extract chain of custody forms, strip charts and copies of pages from preparation and analysis logbooks shall be submitted. If originals were submitted in another data package, photocopies may be submitted with a record of the location of the originals.

All records of analysis and calculations shall be legible and be sufficient to recalculate all sample concentrations and QA audit results. QC reference samples or initial calibration standards shall be identified as to source, lot number and sample number.

Results will be reported in µg/L.

10. **Other (use additional sheets or attach supplementary information, as needed):**

All original sample tags, chain of custody forms, SAS packing lists, airbills and any other original receiving or transmittal forms or copies of receiving logbook pages pertaining to this SAS shall be submitted to the Region within the time frame listed in section 6 above. Photocopies may be submitted with a record of the location of the originals.

Payment to laboratories for this SAS analysis may be reduced if all procedures noted above are not followed and all required deliverables noted above are not supplied. The Region or its contractors shall not be charged further for the provision of required deliverables within this agreement.

11. **Name of sampling/shipping contact and phone number:**
David Shekoski (414)272-2426

I. DATA REQUIREMENTS

Parameter	Required Detection Limits	Precision Desired
Nitrate	130 µg/L	+/- 20 percent

II. QC REQUIREMENTS

As required by the EPA Method 300.

Audit	Frequency of Audits	Limits

Method Blank	At least one per group of 10 or at least twice	concentration < detection limit
Matrix Spike	At least one per group of 10 or fewer samples	80-120% recovery
Laboratory control sample	At least one per group of 10 or fewer samples	80-120% recovery
Lab Duplicate	At least one per group of 10 or fewer samples	+/- 20% RPD

III. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Take corrective action. Contact the Region for problems that might result in the delay of reporting sample results.

5/016-6/96

U.S. Environmental Protection Agency Region V
SFD/Contracts Mgmt. Section
77 West Jackson, SM-5J
Chicago, Illinois 60604
PHONE: (312) 886-1488 FAX: (312) 886-0753

SAS Number
Sulfate- Water

SPECIAL ANALYTICAL SERVICES
Client Request

[X] Regional Transmittal

A. EPA Region/Client: Region V
B. RSCC Representative: C. Moore
C. Telephone Number: (312) 886-1488
D. Date of Request: September 1997
E. Site Name: Penta Wood Products

Acting Technical Project Manager (TPO): C. Moore
(312) 886-1488

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delays in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. **General description of analytical service requested:**

   Analysis of sulfate in groundwater samples. Sample results will be reported as mg/L. Samples will be unfiltered.

2. **Definition and number of work units involved (specify whether whole samples or fractions; whether aqueous or soil and sediments; and whether low, medium, or high concentration):**

   Analyze 28 groundwater samples. This number is inclusive of QA/QC samples (duplicates, blanks and MS/MSD).

3. **Purposes of analysis (specify whether Superfund [Remedial or Enforcement], RCRA, NPDES, etc.):**

   Superfund-Remedial

4. **Estimated date(s) of collection:**

   2000.

5. **Estimated date(s) and method of shipment:**

   Method of shipment will be by overnight carrier.

6. **Number of days analysis and data required after laboratory receipt of samples:**

   The laboratory will be required to provide results within 28 days of receipt of samples.

7. **Analytical protocol required (attach copy if other than a protocol currently used in this program):**

   Analytical protocol taken from EPA Method 300 with special instructions as noted in Section 8.

   Samples stored at 4 C until analysis and validation of results.

   Note: Laboratory data rejection and non-payment will be recommended if methods other than those specified in this document are used.

8. **Special technical instruction (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):**

The detection limit for sulfate shall be less than or equal to 10 mg/L.

Sulfate standards shall be prepared daily from stock solutions.

Samples with sulfate exceeding that of the highest calibration standard shall be diluted and re-analyzed.

Follow protocol according to the EPA Method 300.

All QA/QC requirementsshall be performed and reported as recommended in the method. The procedures, frequencies and acceptance criteria used shall be the same as those recommended in the method or referenced in the method.

9. Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain of Custody documentation, etc.). If not completed, format of results will be left to program discretion.

The laboratory shall perform data reduction and shall report sample analysis data and quality control information similar to that designated in the CLP SOW, Rev. 10/92. The sample analysis data package shall include all documentation, data reporting forms and raw data similar to those specified in CLP SOW, Rev. 10/92.

All procedures used shall be clearly identified. All original raw data, forms, calculation worksheets, instrument read-outs, preparation forms, internal sample and/or extract chain of custody forms, strip charts and copies of pages from preparation and analysis logbooks shall be submitted. If originals were submitted in another data package, photocopies may be submitted with a record of the location of the originals.

All records of analysis and calculations shall be legible and be sufficient to recalculate all sample concentrations and QA audit results. QC reference samples or initial calibration standards shall be identified as to source, lot number and sample number.

Results will be reported in mg/L.

10. Other (use additional sheets or attach supplementary information, as needed):

All original sample tags, chain of custody forms, SAS packing lists, airbills and any other original receiving or transmittal forms or copies of receiving logbook pages pertaining to this SAS shall be submitted to the Region within the time frame listed in section 6 above. Photocopies may be submitted with a record of the location of the originals.

Payment to laboratories for this SAS analysis may be reduced if all procedures noted above are not followed and all required deliverables noted above are not supplied. The Region or its contractors shall not be charged further for the provision of required deliverables within this agreement.

11. Name of sampling/shipping contact and phone number:
David Shekoski (414)272-2426

I. DATA REQUIREMENTS

Parameter •	Required Detection Limits	Precision Desired
Sulfate	10 mg/L	+/- 20 percent

II. QC REQUIREMENTS

As required by the EPA Method 300.

Audit	Frequency of Audits	Limits

Method Blank	At least one per group of 20 or at least twice	concentration < detection limit
Matrix Spike	At least one per group of 10 or fewer samples	80-120% recovery
Laboratory control sample	At least one per group of 20 or fewer samples	80-120% recovery
Lab Duplicate	At least one per group of 10 or fewer samples	+/- 20% RPD
Analytical Spike	At least one per group of 10 or fewer samples	85-115% recovery
Initial and continuing calibration blank	At start of analysis run followed by at least 1 per 10	concentration < detection limit
CRDL Standard	At least one per group of 10 or fewer samples	80-120% recovery

III. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Take corrective action. Contact the Region for problems that might result in the delay of reporting sample results.

5/016-6/96

U.S. Environmental Protection Agency Region V
SFD/Contracts Mgmt. Section
77 West Jackson, SM-5J
Chicago, Illinois 60604
PHONE: (312) 886-1488 FAX: (312) 886-0753

SAS Number
Methane- Water

SPECIAL ANALYTICAL SERVICES
Client Request

[X] Regional Transmittal

A. EPA Region/Client: Region V
B. RSCC Representative: C. Moore Acting Technical Project Manager (TPO): C. Moore
C. Telephone Number: (312) 886-1488 (312) 886-1488
D. Date of Request: September 1997
E. Site Name: Penta Wood Products

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delays in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. **General description of analytical service requested:**

   Analysis of methane in groundwater samples using gas chromatography. Sample results will be reported as µg/L. Low detection limits are required.

2. **Definition and number of work units involved (specify whether whole samples or fractions; whether aqueous or soil and sediments; and whether low, medium, or high concentration):**

   Analyze 28 water samples. This number is inclusive of QA/QC samples (duplicates, blanks and MS/MSD).

3. **Purposes of analysis (specify whether Superfund [Remedial or Enforcement], RCRA, NPDES, etc.):**

   Superfund-Remedial

4. **Estimated date(s) of collection:**

   2000.

5. **Estimated date(s) and method of shipment:**

   Method of shipment will be by overnight carrier.

6. **Number of days analysis and data required after laboratory receipt of samples:**

   The holding time is not to exceed 14 days from sample collection.

   The laboratory will be required to provide results within 28 days of receipt of samples.

7. **Analytical protocol required (attach copy if other than a protocol currently used in this program):**

   Analytical protocol taken from SW846 Method 8015 with special instructions as noted in Section 8.

   Samples will be preserved in the field with HCl to pH<2 and stored at 4 C until analysis and validation of results.

   Note: Laboratory data rejection and non-payment will be recommended if methods other than those specified in this document are used.

8. **Special technical instruction (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):**

The detection limit for methane shall be less than or equal to 10 µg/L. The most recent MDL study shall be enclosed.

The method recommended surrogate and internal standards shall be used and prepared at the recommended concentrations.

Use five calibration standards. The lowest standards should represent analyze concentrations near, but above, the respective method detection limit.

All QA/QC requirements (surrogates, matrix spike/matrix spike duplicates, lab blanks) shall be performed and reported as recommended in the method. The procedures, frequencies and acceptance criteria used shall be the same as those recommended in the method or referenced in the method.

9. **Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain of Custody documentation, etc.). If not completed, format of results will be left to program discretion.**

The laboratory shall perform data reduction and shall report sample analysis data and quality control information similar to that designated in the CLP SOW, Rev. 10/92. The sample analysis data package shall include all documentation, data reporting forms and raw data similar to those specified in CLP SOW, Rev. 10/92.

All procedures used shall be clearly identified. All original raw data, forms, calculation worksheets, instrument read-outs, preparation forms, internal sample and/or extract chain of custody forms, strip charts and copies of pages from preparation and analysis logbooks shall be submitted. If originals were submitted in another data package, photocopies may be submitted with a record of the location of the originals.

All records of analysis and calculations shall be legible and be sufficient to recalculate all sample concentrations and QA audit results. QC reference samples or initial calibration standards shall be identified as to source, lot number and sample number.

Results will be reported in µg/L.

10. **Other (use additional sheets or attach supplementary information, as needed):**

The laboratory is to conduct matrix spike and matrix spike duplicate (MS/MSD) analyses and report the results on the appropriate form.

All original sample tags, chain of custody forms, SAS packing lists, airbills and any other original receiving or transmittal forms or copies of receiving logbook pages pertaining to this SAS shall be submitted to the Region within the time frame listed in section 6 above. Photocopies may be submitted with a record of the location of the originals.

Payment to laboratories for this SAS analysis may be reduced if all procedures noted above are not followed and all required deliverables noted above are not supplied. The Region or its contractors shall not be charged further for the provision of required deliverables within this agreement.

11. **Name of sampling/shipping contact and phone number:**
David Shekoski (414)272-2426

I. **DATA REQUIREMENTS**

Parameter	Required Detection Limits	Precision Desired
Methane	10 µg/L	+/- 20 percent

II. QC REQUIREMENTS

As required by the SW846 Method 8015.

Audit	Frequency of Audits	Limits
Method Blank	at least one per group of 20 or fewer samples	concentration < detection limit
Laboratory control sample	at least one per group of 20 or fewer samples	within historical acceptance limits
Matrix Spike	at least one per group of 20 or fewer samples	within historical acceptance limits
Matrix Spike Duplicate	at least one per group of 20 or fewer samples	within historical acceptance limits

III. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Take corrective action. Contact the Region for problems that might result in the delay of reporting sample results.

5/016-6/96

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SFD/Contracts Mgmt. Section
77 West Jackson, SM-5J
Chicago, Illinois 60604
PHONE: (312) 886-1488 FAX: (312) 886-0753

SAS Number
Chloride- Water

SPECIAL ANALYTICAL SERVICES
Client Request

[X] Regional Transmittal

A. EPA Region/Client: Region V
B. RSCC Representative: C. Moore
C. Telephone Number: (312) 886-1488
D. Date of Request: September 1997
E. Site Name: Penta Wood Products

Acting Technical Project Manager (TPO): C. Moore
(312) 886-1488

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delays in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. **General description of analytical service requested:**

   Analysis of chloride in groundwater samples. Sample results will be reported as mg/L. Samples will be unfiltered.

2. **Definition and number of work units involved (specify whether whole samples or fractions; whether aqueous or soil and sediments; and whether low, medium, or high concentration):**

   Analyze 23 groundwater samples. This number is inclusive of QA/QC samples (duplicates, blanks and MS/MSD).

3. **Purposes of analysis (specify whether Superfund [Remedial or Enforcement], RCRA, NPDES, etc.):**

   Superfund-Remedial

4. **Estimated date(s) of collection:**

   2000.

5. **Estimated date(s) and method of shipment:**

   Method of shipment will be by overnight carrier.

6. **Number of days analysis and data required after laboratory receipt of samples:**

   The laboratory will be required to provide results within 28 days of receipt of samples.

7. **Analytical protocol required (attach copy if other than a protocol currently used in this program):**

   Analytical protocol taken from EPA Method 300 with special instructions as noted in Section 8.

   Samples stored at 4 C until analysis and validation of results.

   Note: Laboratory data rejection and non-payment will be recommended if methods other than those specified in this document are used.

8. **Special technical instruction (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):**

The detection limit for chloride shall be less than or equal to 10 mg/L.

Follow protocol according to the EPA Method 300.

All QA/QC requirementsshall be performed and reported as recommended in the method. The procedures, frequencies and acceptance criteria used shall be the same as those recommended in the method or referenced in the method.

9. Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain of Custody documentation, etc.). If not completed, format of results will be left to program discretion.

The laboratory shall perform data reduction and shall report sample analysis data and quality control information similar to that designated in the CLP SOW, Rev. 10/92. The sample analysis data package shall include all documentation, data reporting forms and raw data similar to those specified in CLP SOW, Rev. 10/92.

All procedures used shall be clearly identified. All original raw data, forms, calculation worksheets, instrument read-outs, preparation forms, internal sample and/or extract chain of custody forms, strip charts and copies of pages from preparation and analysis logbooks shall be submitted. If originals were submitted in another data package, photocopies may be submitted with a record of the location of the originals.

All records of analysis and calculations shall be legible and be sufficient to recalculate all sample concentrations and QA audit results. QC reference samples or initial calibration standards shall be identified as to source, lot number and sample number.

Results will be reported in mg/L.

10. Other (use additional sheets or attach supplementary information, as needed):

All original sample tags, chain of custody forms, SAS packing lists, airbills and any other original receiving or transmittal forms or copies of receiving logbook pages pertaining to this SAS shall be submitted to the Region within the time frame listed in section 6 above. Photocopies may be submitted with a record of the location of the originals.

Payment to laboratories for this SAS analysis may be reduced if all procedures noted above are not followed and all required deliverables noted above are not supplied. The Region or its contractors shall not be charged further for the provision of required deliverables within this agreement.

11. Name of sampling/shipping contact and phone number:
David Shekoski (414)272-2426

I. DATA REQUIREMENTS

Parameter	Required Detection Limits	Precision Desired
Chloride	10 mg/L	+/- 20 percent

II. QC REQUIREMENTS

As required by the EPA Method 300.

Audit	Frequency of Audits	Limits
Method Blank	At least one per group of 20 or at least twice	concentration < detection limit

Matrix Spike	At least one per group of 10 or fewer samples	90-110% recovery
Laboratory control sample	At least one per group of 20 or fewer samples	90-110% recovery
Lab Duplicate	At least one per group of 10 or fewer samples	+/- 20% RPD
Analytical Spike	At least one per group of 10 or fewer samples	85-115% recovery
Initial and continuing calibration blank	At start of analysis run followed by at least 1 per 10	concentration < detection limit
CRDL Standard	At least one per group of 10 or fewer samples	80-120% recovery

III. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Take corrective action. Contact the Region for problems that might result in the delay of reporting sample results.

5/016-6/96

U.S. Environmental Protection Agency Region V
SFD/Contracts Mgmt. Section
77 West Jackson, SM-5J
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PHONE: (312) 886-1488 FAX: (312) 886-0753

SAS Number
DRO- Soil

SPECIAL ANALYTICAL SERVICES
Client Request

[X] Regional Transmittal

A. EPA Region/Client: Region V
B. RSCC Representative: C. Moore
C. Telephone Number: (312) 886-1488
D. Date of Request: September 1997
E. Site Name: Penta Wood Products

Acting Technical Project Manager (TPO): C. Moore
(312) 886-1488

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delays in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. **General description of analytical service requested:**

   Analysis of diesel range organics (DRO) in soil samples using gas chromatography. Sample results will be reported as mg/kg.

2. **Definition and number of work units involved (specify whether whole samples or fractions; whether aqueous or soil and sediments; and whether low, medium, or high concentration):**

   Analyze 10 soil samples. This number is inclusive of QA/QC samples (duplicates, blanks and MS/MSD).

3. **Purposes of analysis (specify whether Superfund [Remedial or Enforcement], RCRA, NPDES, etc.):**

   Superfund-Remedial

4. **Estimated date(s) of collection:**

   2000.

5. **Estimated date(s) and method of shipment:**

   Method of shipment will be by overnight carrier.

6. **Number of days analysis and data required after laboratory receipt of samples:**

   The holding time is not to exceed 14 days from sample collection to extraction and 40 days from extraction to analysis.

   The laboratory will be required to provide results within 28 days of receipt of samples.

7. **Analytical protocol required (attach copy if other than a protocol currently used in this program):**

   Analytical protocol taken from SW846 Method 8015A with special instructions as noted in Section 8.

   Samples stored at 4 C until analysis and validation of results.

   Note: Laboratory data rejection and non-payment will be recommended if methods other than those specified in this document are used.

8. **Special technical instruction (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):**

The detection limit for DRO shall be less than or equal to 1.0 mg/kg. The contract laboratories most recent MDL study shall be enclosed with the response to the request for proposal.

All QA/QC requirements shall be performed and reported as recommended in the method. The procedures, frequencies and acceptance criteria used shall be the same as those recommended in the method or referenced in the method.

9. **Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain of Custody documentation, etc.). If not completed, format of results will be left to program discretion.**

The laboratory shall perform data reduction and shall report sample analysis data and quality control information similar to that designated in the CLP SOW, Rev. 10/92. The sample analysis data package shall include all documentation, data reporting forms and raw data similar to those specified in CLP SOW, Rev. 10/92.

All procedures used shall be clearly identified. All original raw data, forms, calculation worksheets, instrument read-outs, preparation forms, internal sample and/or extract chain of custody forms, strip charts and copies of pages from preparation and analysis logbooks shall be submitted. If originals were submitted in another data package, photocopies may be submitted with a record of the location of the originals.

All records of analysis and calculations shall be legible and be sufficient to recalculate all sample concentrations and QA audit results. QC reference samples or initial calibration standards shall be identified as to source, lot number and sample number.

Results will be reported in mg/kg.

10. **Other (use additional sheets or attach supplementary information, as needed):**

All original sample tags, chain of custody forms, SAS packing lists, airbills and any other original receiving or transmittal forms or copies of receiving logbook pages pertaining to this SAS shall be submitted to the Region within the time frame listed in section 6 above. Photocopies may be submitted with a record of the location of the originals.

Payment to laboratories for this SAS analysis may be reduced if all procedures noted above are not followed and all required deliverables noted above are not supplied. The Region or its contractors shall not be charged further for the provision of required deliverables within this agreement.

11. **Name of sampling/shipping contact and phone number:**
David Shekoski (414)272-2426

I. DATA REQUIREMENTS

Parameter	Required Detection Limits	Precision Desired
DRO	1.0 mg/kg	+/- 20 percent

II. QC REQUIREMENTS

As required by the USEPA Method 418.1.

Audit	Frequency of Audits	Limits
Method Blank	at least one per group of	concentration < detection limit

	20 or fewer samples	
Laboratory control sample	at least one per group of 20 or fewer samples	within historical acceptance limits
Matrix Spike	at least one per group of 20 or fewer samples	within historical acceptance limits
Matrix Spike Duplicate	at least one per group of 20 or fewer samples	within historical acceptance limits

III. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Take corrective action. Contact the Region for problems that might result in the delay of reporting sample results.

5/016-6/96

U.S. Environmental Protection Agency Region V
SFD/Contracts Mgmt. Section
77 West Jackson, SM-5J
Chicago, Illinois 60604
PHONE: (312) 886-1488 FAX: (312) 886-0753

SAS Number
TOC-Water

SPECIAL ANALYTICAL SERVICES
Client Request

[X] Regional Transmittal

A. EPA Region/Client: Region V
B. RSCC Representative: C. Moore — Acting Technical Project Manager (TPO): C. Moore
C. Telephone Number: (312) 886-1488 — (312) 886-1488
D. Date of Request: September 1997
E. Site Name: Penta Wood Products

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delays in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. **General description of analytical service requested:**

   Analysis of total organic carbon (TOC) in groundwater samples. Sample results will be reported in mg/L.

2. **Definition and number of work units involved (specify whether whole samples or fractions; whether aqueous or soil and sediments; and whether low, medium, or high concentration):**

   Analyze 23 groundwater samples. This number is inclusive of QA/QC samples (duplicates, blanks and MS/MSD).

3. **Purposes of analysis (specify whether Superfund [Remedial or Enforcement], RCRA, NPDES, etc.):**

   Superfund-Remedial

4. **Estimated date(s) of collection:**

   2000.

5. **Estimated date(s) and method of shipment:**

   Method of shipment will be by overnight carrier.

6. **Number of days analysis and data required after laboratory receipt of samples:**

   The laboratory will be required to provide results within 28 days of receipt of samples.

7. **Analytical protocol required (attach copy if other than a protocol currently used in this program):**

   Analytical protocol taken from SW846 Method 9060 with special instructions as noted in Section 8.

   Samples will be preserved in the field with H_2SO_4 to pH<2 and stored at 4 C until analysis and validation of results.

   Note: Laboratory data rejection and non-payment will be recommended if methods other than those specified in this document are used.

8. **Special technical instruction (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):**

The detection limit for TOC shall be less than or equal to 1 mg/L.

Follow protocol according to the SW846 Method 9060.

The calibration curve shall have at least five different levels, including a zero concentration standard.

All QA/QC requirements shall be performed and reported as recommended in the method. The procedures, frequencies and acceptance criteria used shall be the same as those recommended in the method or referenced in the method.

9. Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain of Custody documentation, etc.). If not completed, format of results will be left to program discretion.

The laboratory shall perform data reduction and shall report sample analysis data and quality control information similar to that designated in the CLP SOW, Rev. 10/92. The sample analysis data package shall include all documentation, data reporting forms and raw data similar to those specified in CLP SOW, Rev. 10/92.

All procedures used shall be clearly identified. All original raw data, forms, calculation worksheets, instrument read-outs, preparation forms, internal sample and/or extract chain of custody forms, strip charts and copies of pages from preparation and analysis logbooks shall be submitted. If originals were submitted in another data package, photocopies may be submitted with a record of the location of the originals.

All records of analysis and calculations shall be legible and be sufficient to recalculate all sample concentrations and QA audit results. QC reference samples shall be identified as to source, lot number and sample number.

Results will be reported in mg/L.

10. Other (use additional sheets or attach supplementary information, as needed):

All original sample tags, chain of custody forms, SAS packing lists, airbills and any other original receiving or transmittal forms or copies of receiving logbook pages pertaining to this SAS shall be submitted to the Region within the time frame listed in section 6 above. Photocopies may be submitted with a record of the location of the originals.

Payment to laboratories for this SAS analysis may be reduced if all procedures noted above are not followed and all required deliverables noted above are not supplied. The Region or its contractors shall not be charged further for the provision of required deliverables within this agreement.

11. Name of sampling/shipping contact and phone number:
David Shekoski (414)272-2426

I. DATA REQUIREMENTS

Parameter	Required Detection Limits	Precision Desired
TOC	1.0 mg/L	+/- 20 percent

II. QC REQUIREMENTS

As required by the SW846 Method 9060.

Audit	Frequency of Audits	Limits
Prep Blank	At least one per group of	concentration < detection limit

	20 or fewer samples	
Matrix Spike	At least one per group of 20 or fewer samples	75-125% recovery
Laboratory control sample	At least one per group of 10 or fewer samples	80-120% recovery
Duplicate	At least one per group of 20 or fewer samples	+/- 20% RPD

III. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Take corrective action. Contact the Region for problems that might result in the delay of reporting sample results.

5/016-6/96

U.S. Environmental Protection Agency Region V
SFD/Contracts Mgmt. Section
77 West Jackson, SM-5J
Chicago, Illinois 60604
PHONE: (312) 886-1488 FAX: (312) 886-0753

SAS Number
BTEX- Water

SPECIAL ANALYTICAL SERVICES
Client Request

[X] Regional Transmittal

A. EPA Region/Client: Region V
B. RSCC Representative: C. Moore Acting Technical Project Manager (TPO): C. Moore
C. Telephone Number: (312) 886-1488 (312) 886-1488
D. Date of Request: September 1997
E. Site Name: Penta Wood Products

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delays in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. **General description of analytical service requested:**

   Analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX) in groundwater samples using gas chromatography/mass spectrometry (GC/MS). Sample results will be reported as µg/L.

2. **Definition and number of work units involved (specify whether whole samples or fractions; whether aqueous or soil and sediments; and whether low, medium, or high concentration):**

   Analyze 80 groundwater samples. This number is inclusive of QA/QC samples (duplicates, blanks and MS/MSD).

3. **Purposes of analysis (specify whether Superfund [Remedial or Enforcement], RCRA, NPDES, etc.):**

   Superfund-Remedial

4. **Estimated date(s) of collection:**

   2000..

5. **Estimated date(s) and method of shipment:**

   Method of shipment will be by overnight carrier.

6. **Number of days analysis and data required after laboratory receipt of samples:**

   The holding time is not to exceed 14 days from sample collection.

   The laboratory will be required to provide results within 28 days of receipt of samples.

7. **Analytical protocol required (attach copy if other than a protocol currently used in this program):**

   Analytical protocol taken from SW846 Method 8260 with special instructions as noted in Section 8.

   Samples will be preserved in the field with HCl to pH<2 and stored at 4 C until analysis and validation of results.

   Note: Laboratory data rejection and non-payment will be recommended if methods other than those specified in this document are used.

8. **Special technical instruction (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):**

The detection limit for benzene shall be less than or equal to 0.1 µg/L. The detection limits for toluene, ethylbenzene, and xylenes shall be less than or equal to 1.0 µg/L. The most recent MDL study shall be enclosed.

The method recommended surrogate and internal standards shall be used and prepared at the recommended concentrations.

Use five calibration standards. The lowest standards should represent analyze concentrations near, but above, the respective method detection limit.

All QA/QC requirements (surrogates, matrix spike/matrix spike duplicates, lab blanks, GC/MS tuning) shall be performed and reported as recommended in the method. The procedures, frequencies and acceptance criteria used shall be the same as those recommended in the method or referenced in the method.

9. **Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain of Custody documentation, etc.). If not completed, format of results will be left to program discretion.**

The laboratory shall perform data reduction and shall report sample analysis data and quality control information similar to that designated in the CLP SOW, Rev. 10/92. The sample analysis data package shall include all documentation, data reporting forms and raw data similar to those specified in CLP SOW, Rev. 10/92.

All procedures used shall be clearly identified. All original raw data, forms, calculation worksheets, instrument read-outs, preparation forms, internal sample and/or extract chain of custody forms, strip charts and copies of pages from preparation and analysis logbooks shall be submitted. If originals were submitted in another data package, photocopies may be submitted with a record of the location of the originals.

All records of analysis and calculations shall be legible and be sufficient to recalculate all sample concentrations and QA audit results. QC reference samples or initial calibration standards shall be identified as to source, lot number and sample number.

Results will be reported in µg/L.

10. **Other (use additional sheets or attach supplementary information, as needed):**

The laboratory is to conduct matrix spike and matrix spike duplicate (MS/MSD) analyses and report the results on the appropriate form.

All original sample tags, chain of custody forms, SAS packing lists, airbills and any other original receiving or transmittal forms or copies of receiving logbook pages pertaining to this SAS shall be submitted to the Region within the time frame listed in section 6 above. Photocopies may be submitted with a record of the location of the originals.

Payment to laboratories for this SAS analysis may be reduced if all procedures noted above are not followed and all required deliverables noted above are not supplied. The Region or its contractors shall not be charged further for the provision of required deliverables within this agreement.

11. **Name of sampling/shipping contact and phone number:**
David Shekoski (414)272-2426

I. **DATA REQUIREMENTS**

Parameter	Required Detection Limits	Precision Desired
Benzene	0.1 µg/L	+/- 20 percent
Toluene	1.0 µg/L	
Ethylbenzene	1.0 µg/L	
Xylenes (total)	1.0 µg/L	

II. QC REQUIREMENTS

As required by the SW846 Method 8260.

Audit	Frequency of Audits	Limits
Method Blank	at least one per group of 20 or fewer samples	concentration < detection limit
Laboratory control sample	at least one per group of 20 or fewer samples	within historical acceptance limits
Matrix Spike	at least one per group of 20 or fewer samples	within historical acceptance limits
Matrix Spike Duplicate	at least one per group of 20 or fewer samples	within historical acceptance limits

III. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Take corrective action. Contact the Region for problems that might result in the delay of reporting sample results.

5/016-6/96

U.S. Environmental Protection Agency Region V
SFD/Contracts Mgmt. Section
77 West Jackson, SM-5J
Chicago, Illinois 60604
PHONE: (312) 886-1488 FAX: (312) 886-0753

SAS Number
Dioxanes and Furans in Solid Waste SAS

SPECIAL ANALYTICAL SERVICES
Client Request

[X] Regional Transmittal

A. EPA Region/Client: Region V
B Howard Pham Technical Project Manager (TPM): C. Moore
C. Telephone Number: (312) 353-2310 (312) 886-1488
D. Date of Request: May 7, 1999
E. Site Name: Penta Wood Products

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delays in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. **General description of analytical service requested:**

   Analysis of HxCDDs, HxCDFs, TCDDs, TCDFs, PeCDDs and PeCDFs. The concentrations will be analyzed in solid samples by gas chromatography/mass spectrometry (GC/MS). Sample results will be reported on a dry weight basis in µg/kg.

2. **Definition and number of work units involved (specify whether whole samples or fractions; whether aqueous or soil and sediments; and whether low, medium, or high concentration):**

   Analysis of a minimum of 20 soil samples plus QA/QC samples (duplicates and MS/MSD). All samples are low concentration soil samples.

3. **Purposes of analysis (specify whether Superfund [Remedial or Enforcement], RCRA, NPDES, etc.):**

   Superfund-Remedial

4. **Estimated date(s) of collection:**

   2000

5. **Estimated date(s) and method of shipment:**

   Method of shipment will be by overnight carrier.

6. **Number of days analysis and data required after laboratory receipt of samples:**

   The laboratory will be required to provide results within 28 days of receipt of samples.

7. **Analytical protocol required (attach copy if other than a protocol currently used in this program):**

   Analytical protocol taken from SW846 Method 8290.

   Samples will be stored at 4 C until analysis and validation of results.

   Note: Laboratory data rejection and non-payment will be recommended if methods other than those specified in this document are used.

8. **Special technical instruction (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):**

Follow protocol according to the SW846 Method 8280A. The initial calibration curve shall have five different levels of standards. The linearity of the inital calibration must be less than 15 percent RSD. The low standard should be a concentration at or near the reporting limit Dilute samples with sample concentrations greater than the highest standard. The holding time shall not exceed 30 days to extraction and 45 days to analysis from the date of sample extraction.

All QA/QC requirements (surrogates, Laboratory control sample, matrix spike/matrix spike duplicate, lab blanks, GC/MS Tuning, evauation of chromatographic resolution, retention time windows and calibration verification) shall be perfomed and reported as recommended in the method. The procedures, frequencies and acceptance criteria used shall be the same as those recommended in the method or referenced in the method.

9. **Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain of Custody documentation, etc.). If not completed, format of results will be left to program discretion.**

The laboratory shall perform data reduction and shall report sample analysis data and quality control information as designated in the SW846 Method 8290. The sample analysis data package shall include all documentation, data reporting forms and raw data as specified in the CLP SOW.

All procedures used shall be clearly identified. All original raw data, forms, calculation worksheets, instrument read-outs, preparation forms, internal sample and/or extract chain of custody forms, strip charts and copies of pages from preparation and analysis logbooks shall be submitted. If originals were submitted in another data package, photocopies may be submitted with a record of the location of the originals.

All records of analysis and calculations shall be legible and be sufficient to recalculate all sample concentrations and QA audit results. QC reference samples or initial calibration standards shall be identified as to source, lot number and sample number.

Results will be reported on a dry weight basis in µg/kg.

10. **Other (use additional sheets or attach supplementary information, as needed):**

The laboratory is to conduct matrix spike and matrix spike duplicate (MS/MSD) analyses and report the results on the appropriate form.

The laboratory should provide a summary of their most recent MDL study using those protocols. The laboratory shall adhere to chain-of-custody and document control procedures described in the SW846 Method 8290.

All original sample tags, chain of custody forms, SAS packing lists, airbills and any other original receiving or transmittal forms or copies of receiving logbook pages pertaining to this SAS shall be submitted to the Region within the time frame listed in section 6 above. Photocopies may be submitted with a record of the location of the originals.

Payment to laboratories for this SAS analysis may be reduced if all procedures noted above are not followed and all required deliverables noted above are not supplied. The Region or its contractors shall not be charged further for the provision of required deliverables within this agreement.

11. **Name of sampling/shipping contact and phone number:**
David Shekoski (414)272-2426

5/016-6/96

I. DATA REQUIREMENTS

Parameter	Detection Limit (µg/kg)	Precision Desired
Total TCDD	0.1	± 20 percent
Total TCDF	0.1	
Total PeCDD	0.1	
Total PeCDF	0.1	
Total HeCCD	0.1	
Total HeCCF	0.1	

Note: These are minimum requirements. Report actual detection limit(s) used, based on allowable methodology options.

II. QC REQUIREMENTS

As required by the SW846 Method 8290.

Audit	Frequency of Audits	Limits
Method Blank	at least one per group of 20 or fewer samples	concentration < detection limit
Laboratory control sample	at least one per group of 20 or fewer samples	% recovery within historical acceptance limits
MS/MSD	at least one per group of 20 or fewer samples	% recovery within historical acceptance limits
Surrogate spiking compounds	surrogates spiked into all samples (incl. QC samples)	% recoveries must be in control
Laboratory Control Sample	at least one per group of 20 or fewer samples	% recoveries must be in control

III. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Take corrective action. Contact the Region for problems that might result in the delay of reporting sample results.

5/016-6/96

U.S. Environmental Protection Agency Region V
SFD/Contracts Mgmt. Section
77 West Jackson, SM-5J
Chicago, Illinois 60604
PHONE: (312) 886-1488 FAX: (312) 886-0753

SAS Number
Dioxanes and Furans in Liquid Waste SAS

SPECIAL ANALYTICAL SERVICES
Client Request

[X] Regional Transmittal

A. EPA Region/Client: Region V
B Howard Pham Technical Project Manager (TPM): C. Moore
C. Telephone Number: (312) 353-2310 (312) 886-1488
D. Date of Request: May 7, 1999
E. Site Name: Penta Wood Products

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delays in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. **General description of analytical service requested:**

   Analysis of HxCDDs, HxCDFs, TCDDs, TCDFs, PeCDDs and PeCDFs. The concentrations will be analyzed in liquid samples by gas chromatography/mass spectrometry (GC/MS).

2. **Definition and number of work units involved (specify whether whole samples or fractions; whether aqueous or soil and sediments; and whether low, medium, or high concentration):**

   Analysis of a minimum of 20 water samples plus QA/QC samples (duplicates and MS/MSD). All samples are low concentration water samples.

3. **Purposes of analysis (specify whether Superfund [Remedial or Enforcement], RCRA, NPDES, etc.):**

   Superfund-Remedial

4. **Estimated date(s) of collection:**

   2000

5. **Estimated date(s) and method of shipment:**

   Method of shipment will be by overnight carrier.

6. **Number of days analysis and data required after laboratory receipt of samples:**

   The laboratory will be required to provide results within 28 days of receipt of samples.

7. **Analytical protocol required (attach copy if other than a protocol currently used in this program):**

   Analytical protocol taken from SW846 Method 8290.

   Samples will be stored at 4 C until analysis and validation of results.

   Note: Laboratory data rejection and non-payment will be recommended if methods other than those specified in this document are used.

8. **Special technical instruction (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):**

Follow protocol according to the SW846 Method 8280A. The initial calibration curve shall have five different levels of standards. The linearity of the inital calibration must be less than 15 percent RSD. The low standard should be a concentration at or near the reporting limit Dilute samples with sample concentrations greater than the highest standard. The holding time shall not exceed 30 days to extraction and 45 days to analysis from the date of sample extraction.

All QA/QC requirements (surrogates, Laboratory control sample, matrix spike/matrix spike duplicate, lab blanks, GC/MS Tuning, evauation of chromatographic resolution, retention time windows and calibration verification) shall be perfomed and reported as recommended in the method. The procedures, frequencies and acceptance criteria used shall be the same as those recommended in the method or referenced in the method.

9. Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain of Custody documentation, etc.). If not completed, format of results will be left to program discretion.

The laboratory shall perform data reduction and shall report sample analysis data and quality control information as designated in the SW846 Method 8290. The sample analysis data package shall include all documentation, data reporting forms and raw data as specified in the CLP SOW.

All procedures used shall be clearly identified. All original raw data, forms, calculation worksheets, instrument read-outs, preparation forms, internal sample and/or extract chain of custody forms, strip charts and copies of pages from preparation and analysis logbooks shall be submitted. If originals were submitted in another data package, photocopies may be submitted with a record of the location of the originals.

All records of analysis and calculations shall be legible and be sufficient to recalculate all sample concentrations and QA audit results. QC reference samples or initial calibration standards shall be identified as to source, lot number and sample number.

10. Other (use additional sheets or attach supplementary information, as needed):

The laboratory is to conduct matrix spike and matrix spike duplicate (MS/MSD) analyses and report the results on the appropriate form.

The laboratory should provide a summary of their most recent MDL study using those protocols. The laboratory shall adhere to chain-of-custody and document control procedures described in the SW846 Method 8290.

All original sample tags, chain of custody forms, SAS packing lists, airbills and any other original receiving or transmittal forms or copies of receiving logbook pages pertaining to this SAS shall be submitted to the Region within the time frame listed in section 6 above. Photocopies may be submitted with a record of the location of the originals.

Payment to laboratories for this SAS analysis may be reduced if all procedures noted above are not followed and all required deliverables noted above are not supplied. The Region or its contractors shall not be charged further for the provision of required deliverables within this agreement.

11. Name of sampling/shipping contact and phone number:
David Shekoski (414) 272-2426

5/016-6/96

I. DATA REQUIREMENTS

Parameter	Detection Limit (µg/L)	Precision Desired
Total TCDD	0.0063	± 20 percent
Total TCDF	0.0063	
Total PeCDD	0.0063	
Total PeCDF	0.0035	
Total HeCCD	0.0063	
Total HeCCF	0.0063	

Note: These are minimum requirements. Report actual detection limit(s) used, based on allowable methodology options.

II. QC REQUIREMENTS

As required by the SW846 Method 8290.

Audit	Frequency of Audits	Limits
Method Blank	at least one per group of 20 or fewer samples	concentration < detection limit
Laboratory control sample	at least one per group of 20 or fewer samples	% recovery within historical acceptance limits
MS/MSD	at least one per group of 20 or fewer samples	% recovery within historical acceptance limits
Surrogate spiking compounds	surrogates spiked into all samples (incl. QC samples)	% recoveries must be in control
Laboratory Control Sample	at least one per group of 20 or fewer samples	% recoveries must be in control

III. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Take corrective action. Contact the Region for problems that might result in the delay of reporting sample results.

5/016-6/96

U.S. Environmental Protection Agency Region V
SFD/Contracts Mgmt. Section
77 West Jackson, SM-5J
Chicago, Illinois 60604
PHONE: (312) 886-1488 FAX: (312) 886-0753

SAS Number
Hardness-Water

SPECIAL ANALYTICAL SERVICES
Client Request

[X] Regional Transmittal

A. EPA Region/Client: Region V
B. RSCC Representative: C. Moore — Acting Technical Project Manager (TPO): C. Moore
C. Telephone Number: (312) 886-1488 — (312) 886-1488
D. Date of Request: September 1997
E. Site Name: Penta Wood Products

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delays in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. **General description of analytical service requested:**

   Analysis of hardness in surface water samples. Sample results will be reported in µg/L as $CaCO_3$.

2. **Definition and number of work units involved (specify whether whole samples or fractions; whether aqueous or soil and sediments; and whether low, medium, or high concentration):**

   Analyze 75 water samples. This number is inclusive of QA/QC samples (duplicates, blanks and MS/MSD).

3. **Purposes of analysis (specify whether Superfund [Remedial or Enforcement], RCRA, NPDES, etc.):**

   Superfund-Remedial

4. **Estimated date(s) of collection:**

   2000.

5. **Estimated date(s) and method of shipment:**

   Method of shipment will be by overnight carrier.

6. **Number of days analysis and data required after laboratory receipt of samples:**

   The laboratory will be required to provide results within 7 days of receipt of samples.

7. **Analytical protocol required (attach copy if other than a protocol currently used in this program):**

   Analytical protocol taken from EPA Method 130.2 with special instructions as noted in Section 8.

   Samples will be preserved in the field with HNO_3 to pH<2, and stored at 4 C until analysis and validation of results.

   Note: Laboratory data rejection and non-payment will be recommended if methods other than those specified in this document are used.

8. **Special technical instruction (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):**

The detection limit for hardness shall be less than or equal to 500 µg/L.

Follow protocol according to the EPA Method 130.2.

All QA/QC requirements shall be performed and reported as recommended in the method. The procedures, frequencies and acceptance criteria used shall be the same as those recommended in the method or referenced in the method.

9. Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain of Custody documentation, etc.). If not completed, format of results will be left to program discretion.

The laboratory shall perform data reduction and shall report sample analysis data and quality control information similar to that designated in the CLP SOW, Rev. 10/92. The sample analysis data package shall include all documentation, data reporting forms and raw data similar to those specified in CLP SOW, Rev. 10/92.

All procedures used shall be clearly identified. All original raw data, forms, calculation worksheets, instrument read-outs, preparation forms, internal sample and/or extract chain of custody forms, strip charts and copies of pages from preparation and analysis logbooks shall be submitted. If originals were submitted in another data package, photocopies may be submitted with a record of the location of the originals.

All records of analysis and calculations shall be legible and be sufficient to recalculate all sample concentrations and QA audit results. QC reference samples or initial calibration standards shall be identified as to source, lot number and sample number.

Results will be reported in µg/L.

10. Other (use additional sheets or attach supplementary information, as needed):

All original sample tags, chain of custody forms, SAS packing lists, airbills and any other original receiving or transmittal forms or copies of receiving logbook pages pertaining to this SAS shall be submitted to the Region within the time frame listed in section 6 above. Photocopies may be submitted with a record of the location of the originals.

Payment to laboratories for this SAS analysis may be reduced if all procedures noted above are not followed and all required deliverables noted above are not supplied. The Region or its contractors shall not be charged further for the provision of required deliverables within this agreement.

11. Name of sampling/shipping contact and phone number:
David Shekoski (414)272-2426

I. DATA REQUIREMENTS

Parameter	Required Detection Limits	Precision Desired
Hardness	500 µg/L	+/- 20 percent

II. QC REQUIREMENTS

As required by the EPA Method 130.2.

Audit	Frequency of Audits	Limits
Method Blank	at least one per group of 20 or fewer samples	concentration < detection limit

Laboratory control sample	at least one per group of 20 or fewer samples	recovery within laboratory control limits
Matrix Spike	at least one per group of 10 or fewer samples	90-110% recovery

III. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Take corrective action. Contact the Region for problems that might result in the delay of reporting sample results.

5/016-6/96

U.S. Environmental Protection Agency Region V
SFD/Contracts Mgmt. Section
77 West Jackson, SM-5J
Chicago, Illinois 60604
PHONE: (312) 886-1488 FAX: (312) 886-0753

SAS Number
Alkalinity- Water

SPECIAL ANALYTICAL SERVICES
Client Request

[X] Regional Transmittal

A. EPA Region/Client: Region V
B. RSCC Representative: C. Moore — Acting Technical Project Manager (TPO): C. Moore
C. Telephone Number: (312) 886-1488 — (312) 886-1488
D. Date of Request: September 1997
E. Site Name: Penta Wood Products

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delays in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. **General description of analytical service requested:**

   Analysis of alkalinity in groundwater samples. Sample results will be reported as mg/L. Samples will be unfiltered.

2. **Definition and number of work units involved (specify whether whole samples or fractions; whether aqueous or soil and sediments; and whether low, medium, or high concentration):**

   Analyze 75 groundwater samples. This number is inclusive of QA/QC samples (duplicates, blanks and MS/MSD).

3. **Purposes of analysis (specify whether Superfund [Remedial or Enforcement], RCRA, NPDES, etc.):**

   Superfund-Remedial

4. **Estimated date(s) of collection:**

   2000..

5. **Estimated date(s) and method of shipment:**

   Method of shipment will be by overnight carrier.

6. **Number of days analysis and data required after laboratory receipt of samples:**

   The holding time is not to exceed 14 days from sample collection.

   The laboratory will be required to provide results within 28 days of receipt of samples.

7. **Analytical protocol required (attach copy if other than a protocol currently used in this program):**

   Analytical protocol taken from EPA Method 310.1 with special instructions as noted in Section 8.

   Samples stored at 4 C until analysis and validation of results.

   Note: Laboratory data rejection and non-payment will be recommended if methods other than those specified in this document are used.

8. **Special technical instruction (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):**

The detection limit for alkalinity shall be less than or equal to 5 mg/L.

Follow protocol according to the EPA Method 310.1.

Standardize the pH meter and titrant daily. Standardize the pH meter using at least 2 buffers which bracket the pH end point.

Analyze a check standard after every 10 samples to demonstrate pH meter stability.

All QA/QC requirementsshall be performed and reported as recommended in the method. The procedures, frequencies and acceptance criteria used shall be the same as those recommended in the method or referenced in the method.

9. **Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain of Custody documentation, etc.). If not completed, format of results will be left to program discretion.**

The laboratory shall perform data reduction and shall report sample analysis data and quality control information similar to that designated in the CLP SOW, Rev. 10/92. The sample analysis data package shall include all documentation, data reporting forms and raw data similar to those specified in CLP SOW, Rev. 10/92.

All procedures used shall be clearly identified. All original raw data, forms, calculation worksheets, instrument read-outs, preparation forms, internal sample and/or extract chain of custody forms, strip charts and copies of pages from preparation and analysis logbooks shall be submitted. If originals were submitted in another data package, photocopies may be submitted with a record of the location of the originals.

All records of analysis and calculations shall be legible and be sufficient to recalculate all sample concentrations and QA audit results. QC reference samples or initial calibration standards shall be identified as to source, lot number and sample number.

Results will be reported in mg/L.

10. **Other (use additional sheets or attach supplementary information, as needed):**

All original sample tags, chain of custody forms, SAS packing lists, airbills and any other original receiving or transmittal forms or copies of receiving logbook pages pertaining to this SAS shall be submitted to the Region within the time frame listed in section 6 above. Photocopies may be submitted with a record of the location of the originals.

Payment to laboratories for this SAS analysis may be reduced if all procedures noted above are not followed and all required deliverables noted above are not supplied. The Region or its contractors shall not be charged further for the provision of required deliverables within this agreement.

11. **Name of sampling/shipping contact and phone number:**
David Shekoski (414)272-2426

I. DATA REQUIREMENTS

Parameter	Required Detection Limits	Precision Desired
Alkalinity	5 mg/L	+/- 20 percent

II. QC REQUIREMENTS

As required by the EPA Method 310.1.

Audit	Frequency of Audits	Limits
Method Blank	At least one per group of 20 or at least twice	concentration < detection limit
Laboratory control sample	At least one per group of 20 or fewer samples	within laboratory control limits
Lab Duplicate	At least one per group of 10 or fewer samples	+/- 20% RPD
Analytical Spike Sample	At least one per group of 10 or fewer samples	75-125% recovery
CRDL Standard	At least one per group of 10 or fewer samples	80-120% recovery

III. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Take corrective action. Contact the Region for problems that might result in the delay of reporting sample results.

5/016-6/96

U.S. Environmental Protection Agency Region V
SFD/Contracts Mgmt. Section
77 West Jackson, SM-5J
Chicago, Illinois 60604
PHONE: (312) 886-1488 FAX: (312) 886-0753

SAS Number
SPLP extraction of Arsenic in soil

SPECIAL ANALYTICAL SERVICES
Client Request

[X] Regional Transmittal

A. EPA Region/Client: Region V
B. RSCC Representative: C. Moore
C. Telephone Number: (312) 886-1488
D. Date of Request: February 1999
E. Site Name: Penta Wood Products

Acting Technical Project Manager (TPO): C. Moore
(312) 886-1488

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delays in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. **General description of analytical service requested:**

   Extraction of soil samples for arsenic by Synthetic Precipitation Leaching Procedure (SPLP). Sample extracts will be analyzed in accordance with the SAS for Arsenic-SPLP extract.

2. **Definition and number of work units involved (specify whether whole samples or fractions; whether aqueous or soil and sediments; and whether low, medium, or high concentration):**

   Analyze 7 soil and concrete samples. This number is inclusive of QA/QC samples (duplicates).

3. **Purposes of analysis (specify whether Superfund [Remedial or Enforcement], RCRA, NPDES, etc.):**
   Superfund-Remedial

4. **Estimated date(s) of collection:**
   2000.

5. **Estimated date(s) and method of shipment:**

   Method of shipment will be by overnight carrier.

6. **Number of days analysis and data required after laboratory receipt of samples:**

   The laboratory will be required to provide the sample results within 28 days of receipt of samples.

7. **Analytical protocol required (attach copy if other than a protocol currently used in this program):**

   Analytical protocol is SW846 Method 1312 with special instructions as noted in Section 8.

   Samples will be stored at 4 C until analysis and validation of results.

   Note: Laboratory data rejection and non-payment will be recommended if methods other than those specified in this document are used.

8. **Special technical instruction (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):**

   The samples are from east of the Mississippi River; thus extraction fluid #1 shall be used.

The soil is a sand and is expected to be less than 1 cm in diameter and therefore will not require particle size reduction.

Use a minimum sample aliquot of SPLP extract to determine compliance with SPLP regulatory levels.

All QA/QC requirements shall be performed and reported as recommended in the method. The procedures, frequencies and acceptance criteria used shall be the same as those recommended in the method or referenced in the method.

9. Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain of Custody documentation, etc.). If not completed, format of results will be left to program discretion.

The laboratory shall perform data reduction and shall report sample extraction data and quality control information similar to that designated in the CLP SOW, Rev. 10/92. The sample data package shall include all documentation, data reporting forms and raw data similar to those specified in CLP SOW, Rev. 10/92.

All procedures used shall be clearly identified. All original raw data, forms, calculation worksheets, preparation forms, sample and/or extract chain of custody forms, strip charts and copies of pages from preparation and logbooks shall be submitted. If originals were submitted in another data package, photocopies may be submitted with a record of the location of the originals.

All records shall be legible and be sufficient to recalculate all sample concentrations and QA audit results.

10. Other (use additional sheets or attach supplementary information, as needed):

All original sample tags, chain of custody forms, SAS packing lists, airbills and any other original receiving or transmittal forms or copies of receiving logbook pages pertaining to this SAS shall be submitted to the Region within the time frame listed in section 6 above. Photocopies may be submitted with a record of the location of the originals.

Payment to laboratories for this SAS analysis may be reduced if all procedures noted above are not followed and all required deliverables noted above are not supplied. The Region or its contractors shall not be charged further for the provision of required deliverables within this agreement.

11. Name of sampling/shipping contact and phone number:
David Shekoski (414) 272-2426

I. DATA REQUIREMENTS

Parameter	Required Detection Limits	Precision Desired
SPLP Arsenic	NA	NA

II. QC REQUIREMENTS

As required by the SW846 Method 1312.

Audit	Frequency of Audits	Limits
SPLP Extraction		
Prep Blank for Extract Fluid #1 (see Method 1312)	Each set of solid samples prepared	< 0.5 ug/L

III. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Take corrective action. Contact the Region for problems that might result in the delay of reporting sample results.

5/016-6/96

U.S. Environmental Protection Agency Region V
SFD/Contracts Mgmt. Section
77 West Jackson, SM-5J
Chicago, Illinois 60604
PHONE: (312) 886-1488 FAX: (312) 886-0753

SAS Number
Arsenic-SPLP extract

SPECIAL ANALYTICAL SERVICES
Client Request

[X] Regional Transmittal

A. EPA Region/Client: Region V
B. RSCC Representative: C. Moore
C. Telephone Number: (312) 886-1488
D. Date of Request: February 1999
E. Site Name: Penta Wood Products

Acting Technical Project Manager (TPO): C. Moore
(312) 886-1488

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delays in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. **General description of analytical service requested:**

   Analysis of aqueous arsenic extract generated from SPLP extraction of soil samples. Sample results will be reported in µg/L

2. **Definition and number of work units involved (specify whether whole samples or fractions; whether aqueous or soil and sediments; and whether low, medium, or high concentration):**

   Analyze 7 aqueous samples. This number is inclusive of QA/QC samples (duplicates, blanks and MS/MSD).

3. **Purposes of analysis (specify whether Superfund [Remedial or Enforcement], RCRA, NPDES, etc.):**

   Superfund-Remedial

4. **Estimated date(s) of collection:**

   2000.

5. **Estimated date(s) and method of shipment:**

   Method of shipment will be by overnight carrier.

6. **Number of days analysis and data required after laboratory receipt of samples:**

   The laboratory will be required to provide results within 28 days of receipt of samples.

7. **Analytical protocol required (attach copy if other than a protocol currently used in this program):**

   Analytical protocol taken from SW846 Method 6010/7000 Series with special instructions as noted in Section 8.

   The SPLP samples will be extracted and preserved in accordance with SW846 Method 1312.

   Note: Laboratory data rejection and non-payment will be recommended if methods other than those specified in this document are used.

8. **Special technical instruction (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):**

The detection limit for metals shall be as listed below (Section I- Data Requirements). The contract laboratories most recent MDL study shall be enclosed with the response to the request for proposal.

Follow protocol according to the SW846 Method 6010/7000 Series. Dilute samples with sample concentrations greater than the highest standard.

All QA/QC requirements shall be performed and reported as recommended in the method. The procedures, frequencies and acceptance criteria used shall be the same as those recommended in the method or referenced in the method.

9. **Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain of Custody documentation, etc.). If not completed, format of results will be left to program discretion.**

The laboratory shall perform data reduction and shall report sample analysis data and quality control information similar to that designated in the CLP SOW, Rev. 10/92. The sample analysis data package shall include all documentation, data reporting forms and raw data similar to those specified in CLP SOW, Rev. 10/92.

All procedures used shall be clearly identified. All original raw data, forms, calculation worksheets, instrument read-outs, preparation forms, internal sample and/or extract chain of custody forms, strip charts and copies of pages from preparation and analysis logbooks shall be submitted. If originals were submitted in another data package, photocopies may be submitted with a record of the location of the originals.

All records of analysis and calculations shall be legible and be sufficient to recalculate all sample concentrations and QA audit results. QC reference samples or initial calibration standards shall be identified as to source, lot number and sample number.

Results will be reported in µg/L.

10. **Other (use additional sheets or attach supplementary information, as needed):**

The laboratory is to conduct matrix spike and matrix spike duplicate (MS/MSD) analyses and report the results on the appropriate form.

All original sample tags, chain of custody forms, SAS packing lists, airbills and any other original receiving or transmittal forms or copies of receiving logbook pages pertaining to this SAS shall be submitted to the Region within the time frame listed in section 6 above. Photocopies may be submitted with a record of the location of the originals.

Payment to laboratories for this SAS analysis may be reduced if all procedures noted above are not followed and all required deliverables noted above are not supplied. The Region or its contractors shall not be charged further for the provision of required deliverables within this agreement.

11. **Name of sampling/shipping contact and phone number:**
David Shekoski (414)272-2426

I. DATA REQUIREMENTS

Parameter	Required Detection Limits (µg/L)	Precision Desired
Arsenic	2.0	+/-20%

II. QC REQUIREMENTS

As required by the SW846 Method 6010/7000 Series.

Audit	Frequency of Audits	Limits
Method Blank	at least one per group of 20 or fewer samples	concentration < detection limit
Laboratory control sample	at least one per group of 20 or fewer samples	+/- 20% recovery
Matrix Spike	at least one per group of 20 or fewer samples	80-120% recovery
Matrix Spike Duplicate	at least one per group of 20 or fewer samples	80-120% recovery; <20% RPD

III. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Take corrective action. Contact the Region for problems that might result in the delay of reporting sample results.

5/016-6/96

U.S. Environmental Protection Agency Region V
SFD/Contracts Mgmt. Section
77 West Jackson, SM-5J
Chicago, Illinois 60604
PHONE: (312) 886-1488 FAX: (312) 886-0753

SAS Number
pH-Soil

SPECIAL ANALYTICAL SERVICES
Client Request

[X] Regional Transmittal

A. EPA Region/Client: Region V
B. RSCC Representative: C. Moore — Acting Technical Project Manager (TPO): C. Moore
C. Telephone Number: (312) 886-1488 — (312) 886-1488
D. Date of Request: September 1997
E. Site Name: Penta Wood Products

Please provide below a description of your request for Special Analytical Services under the Contract Laboratory Program. In order to most efficiently obtain laboratory capability for your request, please address the following considerations, if applicable. Incomplete or erroneous information may result in delays in the processing of your request. Please continue response on additional sheets, or attach supplementary information as needed.

1. **General description of analytical service requested:**

   Analysis of pH in soil/sediment samples. Sample results will be reported in pH units.

2. **Definition and number of work units involved (specify whether whole samples or fractions; whether aqueous or soil and sediments; and whether low, medium, or high concentration):**

   Analyze 10 soil/sediment samples. This number is inclusive of QA/QC samples (duplicates, blanks).

3. **Purposes of analysis (specify whether Superfund [Remedial or Enforcement], RCRA, NPDES, etc.):**

   Superfund-Remedial

4. **Estimated date(s) of collection:**

   October 1997.

5. **Estimated date(s) and method of shipment:**

   Method of shipment will be by overnight carrier.

6. **Number of days analysis and data required after laboratory receipt of samples:**

   Analyze sample pH immediately upon receipt at the laboratory.

   The laboratory will be required to provide results within 7 days of receipt of samples.

7. **Analytical protocol required (attach copy if other than a protocol currently used in this program):**

   Analytical protocol taken from SW846 Method 9045 with special instructions as noted in Section 8.

   Samples will be stored at 4 C until analysis and validation of results.

   Note: Laboratory data rejection and non-payment will be recommended if methods other than those specified in this document are used.

8. **Special technical instruction (if outside protocol requirements, specify compound names, CAS numbers, detection limits, etc.):**

The detection limit for pH shall be less than or equal to 0.1 pH units.

Follow protocol according to the SW846 Method 9045.

All QA/QC requirements shall be performed and reported as recommended in the method. The procedures, frequencies and acceptance criteria used shall be the same as those recommended in the method or referenced in the method.

9. Analytical results required (if known, specify format for data sheets, QA/QC reports, Chain of Custody documentation, etc.). If not completed, format of results will be left to program discretion.

The laboratory shall perform data reduction and shall report sample analysis data and quality control information similar to that designated in the CLP SOW, Rev. 10/92. The sample analysis data package shall include all documentation, data reporting forms and raw data similar to those specified in CLP SOW, Rev. 10/92.

All procedures used shall be clearly identified. All original raw data, forms, calculation worksheets, instrument read-outs, preparation forms, internal sample and/or extract chain of custody forms, strip charts and copies of pages from preparation and analysis logbooks shall be submitted. If originals were submitted in another data package, photocopies may be submitted with a record of the location of the originals.

All records of analysis and calculations shall be legible and be sufficient to recalculate all sample concentrations and QA audit results. QC reference samples shall be identified as to source, lot number and sample number.

Results will be reported in pH units.

10. Other (use additional sheets or attach supplementary information, as needed):

All original sample tags, chain of custody forms, SAS packing lists, airbills and any other original receiving or transmittal forms or copies of receiving logbook pages pertaining to this SAS shall be submitted to the Region within the time frame listed in section 6 above. Photocopies may be submitted with a record of the location of the originals.

Payment to laboratories for this SAS analysis may be reduced if all procedures noted above are not followed and all required deliverables noted above are not supplied. The Region or its contractors shall not be charged further for the provision of required deliverables within this agreement.

11. Name of sampling/shipping contact and phone number:
David Shekoski (414)272-2426

I. DATA REQUIREMENTS

Parameter	Required Detection Limits	Precision Desired
pH	0.1 pH units	+/- 20 percent

II. QC REQUIREMENTS

As required by the SW846 Method 9045.

III. ACTION REQUIRED IF LIMITS ARE EXCEEDED:

Take corrective action. Contact the Region for problems that might result in the delay of reporting sample results.

Appendix B
Sample Shipment Documentation

APPENDIX B

Sample Shipment Documentation

Sample Documentation

Sample Identification System

A sample numbering system devised by CH2M HILL will be used to identify each sample, including duplicates and blanks. The sample designation system can be found in Section 3 of the FSP. A list of sample identification numbers will be maintained in the field logbook by the field activity manager.

Sample Documentation Instructions

Sample Tag (Figure 1)

1. Enter date of sampling.
2. Enter time of sampling (military time only).
3. Specify "grab" or "composite" sample with an "X."
4. Enter CH2M HILL sample identification code.
5. Obtain signature of sample team leader.
6. Indicate preservative used (if any) with an "X."
7. Specify all parameters for analysis by placing an "X" to the right of each one.
8. Indicate the sample number. For analysis through the CLP, record the number from the stick-on labels. For SAS analyses through a contractor-procured laboratory, record the unique CH2M HILL sample number.
9. Indicate case number (e.g., Case No. 1234).
10. Leave BLANK (for laboratory use only).
11. Enter any desired analyses not listed on menu (e.g., PCBs, ammonia, sulfide, etc.) and mark box with an "X."

Combined Chain-of-Custody and Traffic Report Forms for SAS (Figure 2)

1. Project Code: Leave Blank.
2. Account Code: Leave Blank.

3. Regional Information: If sampling is in support of oversight activities, indicate here. If this is an enforcement site, record "TGB102." If not, record "TFA102."

4. Non-Superfund program: If sampling is not done under the Superfund program, enter the name of the program (e.g., RCRA).

5. Site Name, City, State: Complete as instructed.

6. Site Spill ID: Enter ID code provided by the office.

7. Region No.: Enter "Region 5."

8. Sampling Company: Enter "CH2M HILL."

9. Sampler Information: Complete as instructed.

10. Type of Activity:
    - SF—Superfund lead
    - PRP—PRP lead
    - ST—State lead
    - FED—Federal lead
    - PA—Preliminary assessment
    - SSI—Screening site investigation
    - LSI—Listing site investigation
    - RIFS—Remedial Investigation/Feasibility Study
    - RD—Remedial design
    - O&M—Operation & Maintenance
    - NPLD—National Priorities List delete
    - CLEM—Classic emergency
    - REMA—Removal assessment
    - REM—Removal
    - OIL—Oil response
    - UST—Underground storage tank response

11. Shipping Information: Complete as instructed.

12. Ship To: Enter laboratory name, address, and sample recipient/custodian.

13. Case No.: Complete as instructed.

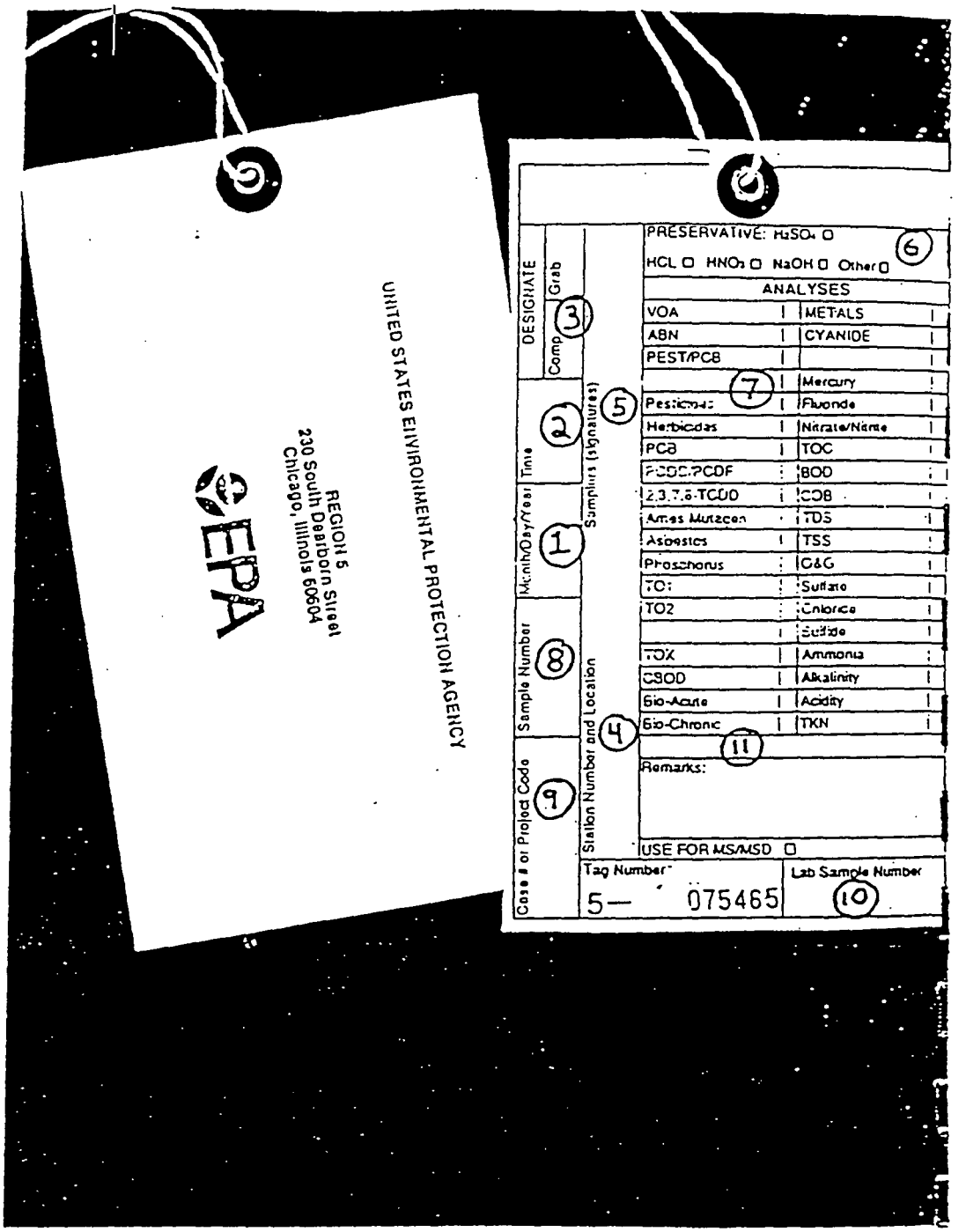
14. Sample Numbers: For routine organic/inorganic samples, enter the CLP numbers from the "stick-on" labels. For SAS samples shipped to a CH2M HILL-procured laboratory, enter the unique CH2M HILL-generated sample number.

15. Sample Information: Complete as instructed.

16. Regional Specific Tracking Number or Tag Number: Enter sample tag number(s).

17. Station Location Number: Enter sample identifier (as defined in the QAPjP).

18. Time/Date: Complete as instructed. Use military time.



NOTE: For purposes of illustration forms are reproduced at 70% of original size.

Figure 1

SAS Combined Chain-of-Custody and Traffic Report Forms

EPA United States Environmental Protection Agency
Contract Laboratory Program

Special Analytical Services
Packing List/Chain of Custody

SAS No	Case No.

1. Project Code	Account Code	2. Region No.	Sampling Co.	4. Date Shipped	Carrier
Regional Information		Sampler *(Name)*		Airbill Number	
Non-Superfund Program		Sampler Signature		5. Ship To	
Site Name		3. Purpose* Lead: SF, PRP, ST, FED; Early Action: CLEM, PA, REM; SI, ESI, RI, OIL, UST; Long-Term Action: FS, RD, RA, O&M, NPLD			
City, State	Site Spill ID			ATTN:	

6. Matrix *(Enter in Column A)*
1. Surface Water
2. Ground Water
3. Leachate
4. Field QC
5. Soil/Sediment
6. Oil
7. Waste
8. Other *(Specify in Column A)*

7 Preservative *(Enter in Column D)*
1 HCl
2 HNO3
3 NAHSO4
4 H2SO4
5 NAOH
6 Ice Only
7 Other *(Specify in Column D)*
N Not Preserved

Sample Numbers (From Labels)	A Matrix (from Box 6) Other	B Conc.: Low Med High	C Sample Type Comp./ Grab	D Preservative (from Box 7) Other	E Analysis	F Regional Specific Tracking Number or Tag Numbers	G Station Location Identifier	H Mo/Day/ Year/Time Sample Collection	I Sampler Initials	J Field QC Qualifier B=Blank S=Spike D=Duplicate R=Rinsate PE=Perform. eval. N=Not a QC Sample

Shipment for SAS Complete? (Y / N)	Page of	Sample(s) to be Used for Laboratory QC	Additional Sampler Signatures	Chain of Custody Seal Number(s)

CHAIN OF CUSTODY RECORD

Relinquished by: *(Signature)*	Date/Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date/Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date/Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date/Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date/Time	Received for Laboratory by: *(Signature)*	Date/Time	Remarks Is custody seal intact? Y / N / none	

DISTRIBUTION: White - Region Copy; Yellow - Data User**; Gold - Lab Copy for Return to Region; Pink - Lab Copy for Return to Data User**

EPA Form 9110-3

SEE REVERSE FOR ADDITIONAL STANDARD INSTRUCTIONS
*SEE REVERSE FOR PURPOSE CODE DEFINITIONS

A21-012-7 REV. 3/84

Figure 2

19. Sampler Initials: OPTIONAL.
20. Corresponding CLP Organic/Inorganic Sample Number: Enter CLP sample number (from "stick-on" labels) of corresponding sample from same location. Not applicable to SAS forms.
21. Designated Field QC: Indicate QC status when applicable (field blanks, trip blanks, duplicates, MS/MSD, etc.)
22. Sampling Status: Is the sampling for this Case/SAS complete? Circle one.
23. Page 1 of ____: Record number of documents enclosed in cooler.
24. MS/MSD and/or Duplicate: List samples.
25. Additional Samplers Signatures: OPTIONAL.
26. Chain-of-Custody Seal No.: Enter the numbers that appear on the custody seals to be used to seal the cooler (there should be two).
27. "Relinquished by" and "time/Date": Complete as instructed. Use military time.

Distribution: For RAS, the Laboratory Copy and Laboratory Copy for Return to SMO are included with the shipment. The Region Copy and SMO Copy are returned to the office. For SAS, the Laboratory Copy for Return to Region and Laboratory Copy for Return to Data User are included with the shipment. The Region Copy and Data User Copy are returned to the CH2M HILL office.

Notice of Transmittal (Figure 3)

1. Enter the name of team leader.
2. Enter team leader's firm name.
3. Enter CH2M HILL project number.
4. Enter case number.
5. Enter date.
6. Enter number of samples shipped.
7. Enter matrix of samples.
8. Enter the site name in words.
9. Enter the location of the site (city, state).

Packaging and Shipping Procedures

Low-Concentration Samples

1. Prepare coolers for shipment.
   - Tape drains shut.
   - Affix "This Side Up" labels on all four sides and "Fragile" labels on at least two sides of each cooler.

- Place mailing label with laboratory address on top of coolers.
- Fill bottom of coolers with about 3 inches of vermiculite or use preformed poly-foam liner.
- Place appropriate traffic reports, SAS packing lists, or regional field sheets and chain-of-custody records with corresponding custody seals on top of each cooler.

2. Arrange decontaminated sample containers in groups by sample number.
3. Mark volume levels on bottles with a grease pencil.
4. Secure appropriate sample tags around lids of containers with string or wire.
5. Secure container lids with strapping tape.
6. Arrange containers in front of assigned coolers.
7. Affix appropriate adhesive labels from assigned traffic report to each container. Protect with clear label protection tape.
8. Seal each container within a separate plastic bag.
9. Arrange containers in coolers so that they do not touch.
10. If ice is required to preserve the samples, cubes should be repackaged in double ziploc bags and placed on and around the containers (especially on VOA vials).
11. Fill remaining spaces with vermiculite (or place poly-foam liner cover on top of samples).
12. Sign chain-of-custody form (or obtain signature) and indicate the time and date it was relinquished to Federal Express.
13. Separate copies of forms. Seal proper copies within a large ziploc bag and tape to inside lid of cooler. Distribute remaining copies as indicated in the following sections.
14. Close lid and latch.
15. Carefully peel custody seals from backings and place intact over lid openings (right front and left back). Cover seals with clear protection tape.
16. Tape cooler shut on both ends, making several complete revolutions with strapping tape. **Do not** cover custody seals.
17. Relinquish to Federal Express. Place airbill receipt inside the mailing envelope and send to the sample documentation coordinator along with the other documentation.

FIGURE 3
Notice of Transmittal

Date: _____

To: CH2M HILL
411 E. Wisconsin Ave., Suite 1600
P.O. Box 2090
Milwaukee, WI 53201-2090

Attn: Cherie Wilson

From: _____ _____
(name) (firm)

CH2M HILL Project No.: _____

Enclosed are appropriate copies of the sample documentation forms completed under Case No. _____ for the _____, 19_____ shipment of _____ _____ (qty) (matrix) samples from the _____ site located in _____, _____.

FIELD SAMPLING PLAN

Penta Wood Products
Town of Daniels, Wisconsin

Remedial Action Construction

WA No. 040-RDRD-05WE/Contract No. 68-W6-0025
November 1999

SECTION 1

Summary of Sampling Activities

This Field Sampling Plan defines procedures that will be used to perform the remedial construction and start-up sampling and analysis field activities at the Penta Wood Products (PWP) site in accordance with Work Assignment No. 040-RDRD-05WE Statement of Work (SOW). Soil and groundwater at this inactive wood treatment facility are contaminated with pentachlorophenol, arsenic, and fuel oil. Failure of a wastewater lagoon retaining wall has allowed the transport of contaminants into an offsite wetland.

Site investigation activities, removal actions, and remedial treatability studies have been conducted for the USEPA Remedial Branch by PWP, the Wisconsin Department of Natural Resources (WDNR), the USEPA Region V Emergency Response Branch (ERB), the USEPA Emergency Response Team (ERT), and CH2M HILL.

Sampling activities include:

- Sampling of visibly stained concrete for arsenic analysis
- Soil sampling below visibly stained concrete for arsenic, PCP and DRO
- Soil sampling for arsenic in Area 1 (ACZA Treatment Area)
- Soil sampling for arsenic contamination in Area 12 (Northeast Wooded Area)
- Verification soil sampling for arsenic in areas to be solidified
- Verification soil sampling for arsenic, PCP, and, as appropriate, DRO
- Verification SPLP sampling of solidified soil and concrete
- Groundwater sampling for PCP, selected metals, and natural attenuation parameter concentrations
- Sampling of treatment system water
- Sampling of treatment system residuals and LNAPL contaminant concentrations
- Sampling of unsaturated zone pore water contaminant concentrations
- Sampling of soil gas

SECTION 2

Sampling Network and Rationale

2.1 Project Objective

The primary objective of the RA is to construct the Remedial Action to meet the remediation goals specified in the ROD. The specific objectives of the remedial construction and start-up sampling and analysis are:

- Determine whether visibly stained concrete meets the arsenic performance criteria
- Determine whether soil below visibly stained concrete exceeds performance criteria for arsenic, PCP and DRO
- Delineate the extent of soil with arsenic exceeding 200 mg/kg in Area 1 (ACZA Treatment Area)
- Delineate extent of arsenic contamination in Area 12 (Northeast Wooded Area)
- Verify that soil exceeding the 200 mg/kg performance criteria for solidification has been sufficiently excavated
- Verify that soil exceeding the arsenic, PCP and DRO performance criteria for excavation and consolidation has been sufficiently excavated
- Verify that solidified soil and concrete meets the performance criteria
- Determine existing groundwater contaminant and natural attenuation parameter concentrations
- Evaluate treatment system contaminant removal effectiveness
- Evaluate treatment system residuals and LNAPL contaminant concentrations
- Determine baseline unsaturated zone pore water contaminant concentrations
- Balance bioventing system air flow rates, determine baseline soil gas conditions and determine bioventing blower operation on-off duration

2.2 Project Approach

2.2.1 Stained Concrete Sampling

Concrete surfaces will be visually inspected prior to demolition for signs of staining. Concrete identified as visibly stained will be sampled and analyzed for arsenic. Concrete with less than 200 mg/kg arsenic will be disposed in the CAMU. Concrete exceeding the performance criteria of 200 mg/kg will be stabilized prior to disposal in the CAMU. It will

be tested following solidification and must meet compressive strength criteria and the SPLP leachate must be less than 0.5 mg/l.

The visibly stained concrete will be broken into pieces of about 1 cm. in diameter and placed in the sample jar. The number of samples is unknown at this time and will depend on the amount of staining observed during concrete demolition.

2.2.2 Delineation of Extent of Arsenic Soil Contamination

Prior to soil excavation and consolidation in the CAMU or solidification, further delineation of the extent of arsenic contamination will be performed in two areas, Area 1 and Area 12.

Area 1 is the former ACZA Treatment Area. The full horizontal and vertical extent of the soil exceeding the solidification criteria of 200 mg/kg arsenic has not been defined. The approach to defining this area will be to augment previous sample results in this area with 5 new hand auger borings to a depth of 10 ft. bgs. Figure 2-1 presents the proposed locations of the borings. Samples will be collected at 2 foot intervals for a total of 25 soil samples. Samples will be analyzed onsite for arsenic using a portable XRAY fluorescence meter. Offsite confirmation analysis will be performed for 10 % of the samples (i.e. 3 samples). Additional sampling may be needed if these samples are unsuccessful in fully delineating the horizontal and vertical extent of arsenic exceeding 200 mg/kg.

The delineated area exceeding 200 mg/kg will be excavated, solidified and disposed in the arsenic portion of the CAMU. Following excavation, soil verification analysis will be performed as described below.

Area 12 is the Northeast Wooded Area. Additional sampling prior to excavation is planned in this area to more precisely delineate the area of arsenic exceeding background concentrations to minimize the clearing of mature trees in this area. It is thought that portions of this area outside of surface erosional pathways will not exceed background arsenic and will not require excavation. Soil samples will be collected from 20 locations along several transects across erosional features (Figure 2-2). Samples will be collected from the upper 6 inches of soil. Samples will be analyzed onsite for arsenic using atomic adsorption (AA) analysis. Offsite confirmation analysis will be performed for 10 % of the samples (i.e. 2 samples). Additional sampling may be needed if these samples are unsuccessful in fully delineating the extent of arsenic exceeding background.

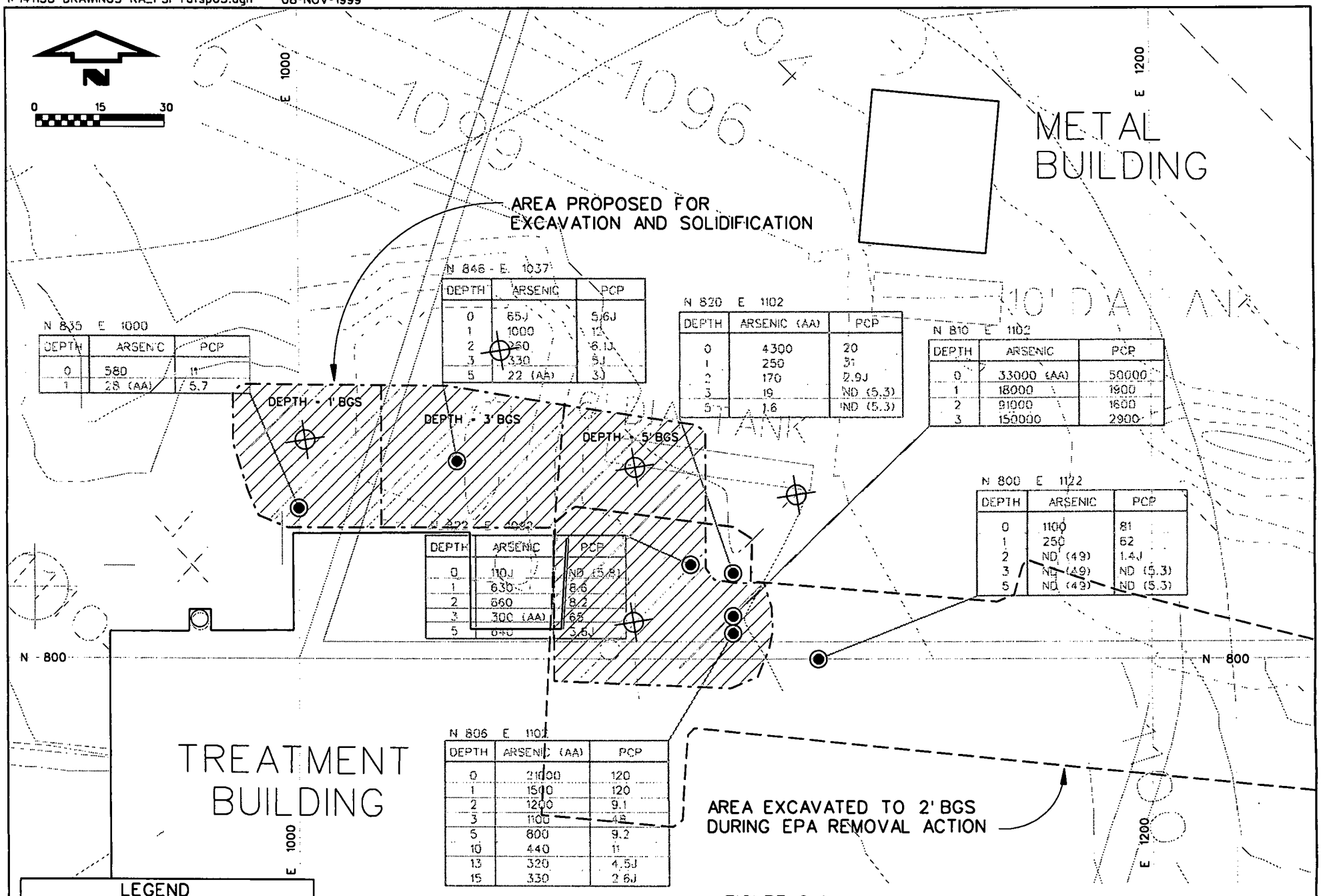
The delineated area exceeding background will be excavated and disposed in the arsenic portion of the CAMU. Following excavation, soil verification analysis will be performed as described below.

2.2.3 Soil Verification Sampling and Analysis

Soil verification sampling will be performed to verify that sufficient soil excavation has been performed for the following areas:

- Soil below visibly stained concrete
- Soil exceeding 200 mg/kg total arsenic

I: 141158 DRAWINGS RA_FSP rafsp03.dgn 08-NOV-1999



N 835 E 1000

DEPTH	ARSENIC	PCP
0	580	11
1	28 (AA)	5.7

N 846 - E 1037

DEPTH	ARSENIC	PCP
0	65J	5.6J
1	1000	13
2	260	6.1J
3	330	5J
5	22 (AA)	3J

N 820 E 1102

DEPTH	ARSENIC (AA)	PCP
0	4300	20
1	250	31
2	170	2.9J
3	19	ND (5.3)
5	1.6	ND (5.3)

N 810 E 1102

DEPTH	ARSENIC	PCP
0	33000 (AA)	50000
1	18000	1900
2	91000	1600
3	150000	2900

N 822 E 1062

DEPTH	ARSENIC	PCP
0	110J	ND (5.8)
1	630	8.6
2	660	8.2
3	300 (AA)	65
5	640	5.6J

N 800 E 1122

DEPTH	ARSENIC	PCP
0	1100	81
1	250	62
2	ND (49)	1.4J
3	ND (49)	ND (5.3)
5	ND (49)	ND (5.3)

N 806 E 1102

DEPTH	ARSENIC (AA)	PCP
0	21000	120
1	1540	120
2	1200	9.1
3	1100	48
5	800	9.2
10	440	11
13	320	4.5J
15	330	2.6J

FIGURE 2-1
1994 ARSENIC AND PCP CONCENTRATIONS (mg/kg) AND PROPOSED SOIL BORINGS IN AREA 1
PENTA WOOD PRODUCTS RA CONSTRUCTION FSP

CH2MHILL

LEGEND

- LYSIMETER LOCATION
- INFILTRATION TEST BORING LOCATION
- UNCONFINED MONITORING WELL LOCATION
- CONFINED MONITORING WELL LOCATION

MAXIMUM ARSENIC IN SOILS TO 5' BGS

- ○ ND @ 49 mg/kg, UNLESS VALUE IS GIVEN
- ● 50 TO 100 Mg/kg
- ▲ 101 TO 380 mg/kg
- ■ > 380 mg/kg
- 170 ARSENIC CONCENTRATION IN mg/kg
- (1') DEPTH AT WHICH SAMPLE IS AT INDICATED CONCENTRATION RANGE.
- 2' AREA AND DEPTH OF SOIL REMOVED: CONCENTRATION INDICATED BY SYMBOL WAS REMOVED
- —— ND, 100 OR 380 mg/kg ARSENIC CONTOUR
- BUILDING HAS BEEN REMOVED
- PROPOSED RA SURFACE (0 - 6") SOIL SAMPLE LOCATION

NOTE:

DASHED CONTOUR LINES HAVE BEEN ADJUSTED TO CONFORM WITH SURVEYED LOCATIONS OF SEDIMENT SAMPLES AND THE DESCRIPTIONS PROVIDED BY THE SURVEYORS. THE CONTOURS MAY NOT REFLECT ACTUAL TOPOGRAPHY IN THIS AREA.

N

0 100' 200'

AREA 12
SOIL EXCAVATION AREA

AREA 6
SOIL SOLIDIFICATION AREA

WOOD CHIP AREA

WOOD CHIP PILE

CONCRETE BIOPAD

SEE FIGURE 5-5 AND FIGURE 5-6 FOR BLOWUP OF THIS AREA.

FORMERLY ERTs DECON PAD

N 2400 N 2200 N 2000 N 1800 N 1600 N 1400 N 1200 N 1000 N 800 N 600

E -200 E 0 E 200 E 400 E 600 E 800 E 1000 E 1200 E 1400 E 1600 E 1800 E 2000 E 2200 E 2400 E 2600

FIGURE 2-2
SHALLOW SOIL/SEDIMENT ARSENIC CONCENTRATIONS AND PROPOSED SOIL SAMPLE LOCATIONS
PENTA WOOD PRODUCTS RA CONSTRUCTION FSP

CH2MHILL

- Soil exceeding background arsenic
- Soil exceeding PCP performance criteria of 2.1 mg/kg (or 0.9 mg/kg if achievable) and DRO criteria of 100 mg/kg

Verification samples will be collected from the soil following excavation of each of the 19 excavation areas (Figure 2-3). The number of soil samples collected will be based on the *Guidance Document for Verification of Soil Remediation, Michigan Department of Natural Resources, April 1994, Revision 1*. This guidance was chosen because of the lack of detailed Wisconsin guidance and use of the guidance by WDNR on other Wisconsin sites. Samples for verification of the adequacy of soil excavation will be performed using onsite AA analysis for arsenic and GC/MS analysis for PCP. Confirmation of onsite analysis will be performed by offsite analysis of 10 % of the samples. DRO analysis will be performed on the 10% of samples analyzed offsite and on stained soils.

The grid interval, sample collection and decision criteria for additional soil excavation and verification sampling are in accordance with the referenced Michigan guidance, with some minor modifications discussed below. The verification process includes the following steps:

- Determine grid spacing
- Determine sample locations within each area for initial sampling
- Determine whether Additional Samples are needed
- Perform additional excavation and verification sampling if needed

2.2.3.1 Grid Spacing

The MDEQ guidance presents 3 different methods for determining grid spacing based on the size of the site. The grid spacing is determined for small sites(<0.25 acres) based on tables of the number of bottom and sidewall samples. Algorithms for determining grid intervals for medium (10,890 to 130,680 sf) and large sites (> 130,680 sf) are:

Medium site grid interval = 0.25 x square root of (area in sf / 3.14)

Large site grid interval = square root of (area in sf x 3.14 / length of site in ft)

The table values and algorithms were used to set the number of samples and grid intervals for each of the 19 areas to be excavated. Table 2-1 presents the grid intervals and number of samples for each area.

Six of the 19 areas are classified as small sites. For these sites, the grid interval is determined by taking the square root of the site area divided by the number of bottom samples presented in Table 1 of the guidance. The grid interval ranges from 20 to 30 feet for these small sites. For the medium and large sites, the grid interval ranges from 28 to 89 feet. These intervals will be rounded to the nearest 10 feet for ease of implementation in the field.

2.2.3.2 Initial Sampling Locations

In accordance with the guidance, 12 samples or 25% of the grid stations, whichever is larger will be sampled initially. This will provide a sample pool sufficiently large for statistical analysis. If statistical analysis shows that additional samples are needed, additional

sampling can be conducted easily because the analysis and data evaluation will be performed onsite.

The majority of the samples will be taken from the bottom of the excavation. A minimum of 4 samples will be taken from the sidewalls (i.e. the excavation perimeter). Additional sidewall samples were allocated to areas that had long or unusual shapes.

Bottom sample locations will be located at grid nodes. The MDEQ guidance document suggests that the grid origin be selected at the southwest corner and the grid nodes to be sampled seleceted randomly. This approach will be modified to avoid the potential problem of clustering of sample locations. Randomness is addressed by randomly selecting the grid origin and orientation. The grid nodes to be sampled are evenly spaced across the grid. An example of the layout of the grid and selection of grid nodes for sampling is presented in Figure 2-4. In this example for Area 25, 8 bottom samples were evenly distributed at grid nodes across a randomly oriented 30-foot grid. The 4 perimeter samples were located at equal distances along the perimeter to make sure all sidewalls were sampled. The first perimeter sample was determined by selecting a random number for the distance from an arbritary origin on the perimeter.

2.2.3.3 Evaluation of Additional Sampling Needs

Summary statistics will be generated for the target analytes (e.g., arithmetic mean, standard deviation, the 95th UCL of the mean, standard error etc.). For the areas designated as arsenic solidification areas, the 95th UCL of the mean arsenic concentration will be compared to the performance criteria of 200 mg/kg. If the UCL is less than 200 mg/kg, the excavation of the area will be considered to be complete. The 95th UCL is calculated as follows:

$$95^{th}\ UCL = mean + (t \times Sx);$$

where: t = t distribution value at a significance value of 0.05 for n-1 degrees of freedom and

Sx = standard error of mean

For the areas designated as PCP contamination only, the 95th UCL of the mean PCP concentration will be compared to the performance criteria of 2.1 mg/kg (a PCP criteria of 0.9 mg/kg may be substituted for the 2.1 mg/kg criteria if it is easily achievable). If the UCL is less than 2.1 mg/kg, the excavation of the area will be considered to be complete.

If these evaluations indicate that the 95th UCL exceeds the performance criteria, the number of additional samples needed to achieve the 95th confidence interval will be calculated. The formula for determining the additional samples needed (U.S. EPA. Test Methods for Evaluating Solid Waste Physical /Chemical Methods, SW 846, July 1982.) is:

$$n = (t\ value^2) \times variance/(0.9\text{-}mean)^2$$

If the additional number of samples is reasonable, they will be evenly distributed acrossthe remaining unsampled grid locations. The results will be pooled with the initial data set and the 95th UCL recalculated. If the number of samples is unreasonably large, additional

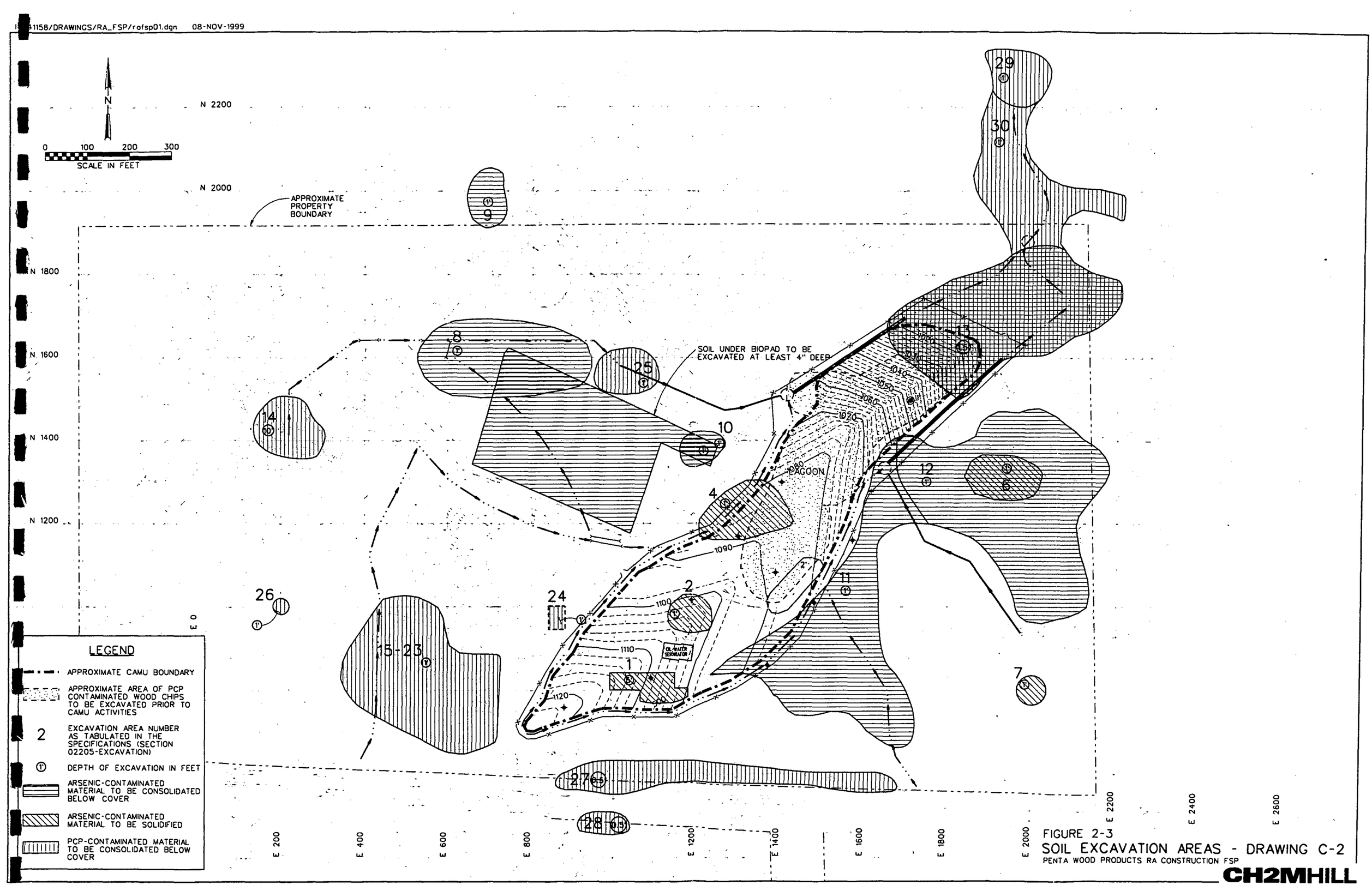


FIGURE 2-3
SOIL EXCAVATION AREAS - DRAWING C-2
PENTA WOOD PRODUCTS RA CONSTRUCTION FSP

CH2MHILL

TABLE 2-1
Soil Verification Samples
Penta Wood Products Remedial Action Sampling and Analysis Plan

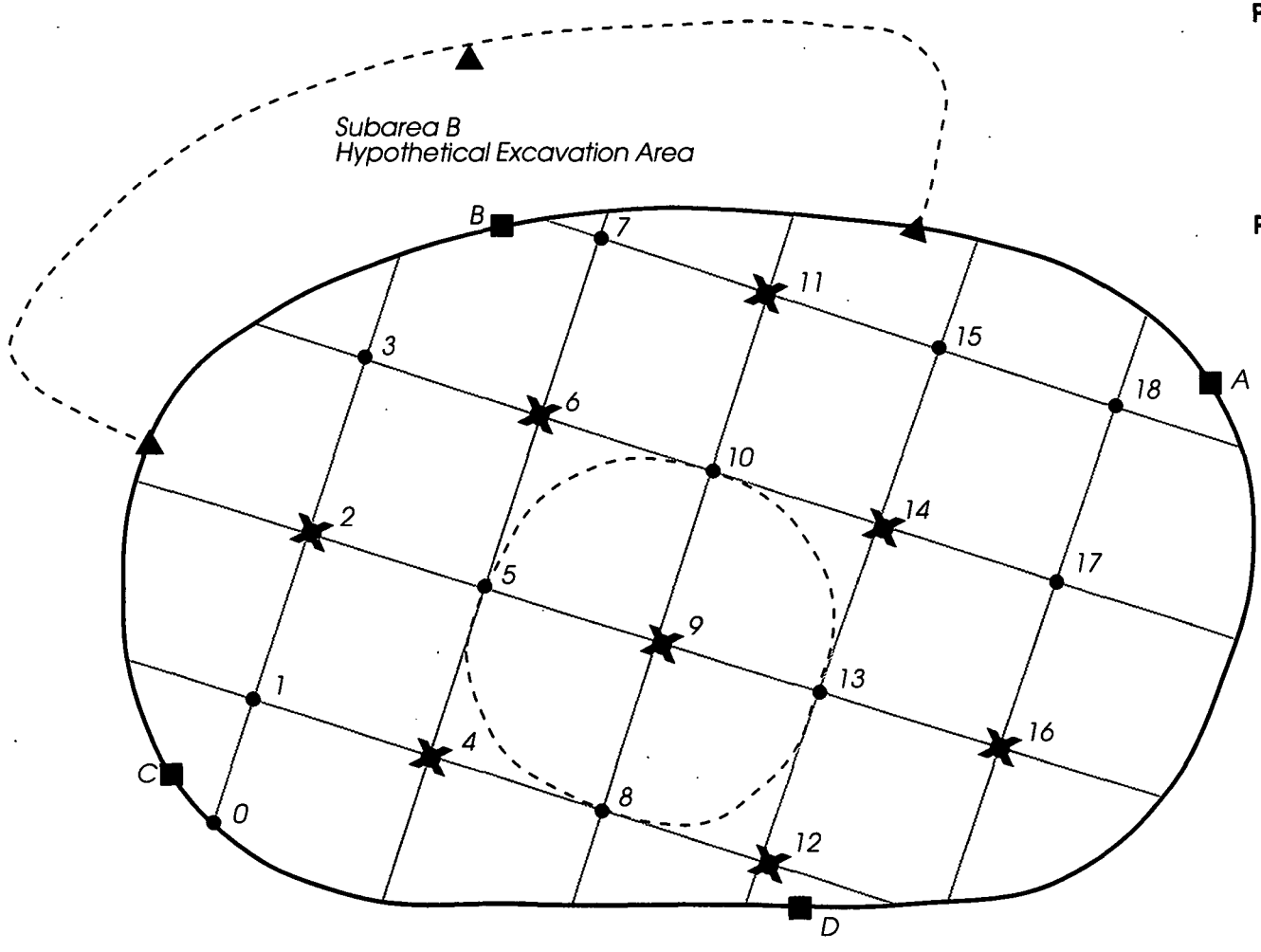
		Approximate Dimensions[a] (ft)					Verification Samples								
							Small Sites			Medium and Large Sites					
Location		Diameter	Length	Width	Perimeter	Area (sf)	Bottom Samples a.	Grid Interval (ft)	Sidewall Samples b.	Grid Interval (ft)	25% of Grid Squares	Bottom Samples c.	Sidewall Samples c.	Total Initial Samples	Confirmation Samples
Areas of Arsenic Contamination to be Solidified and Consolidated in Arsenic CAMU Area															
1	ACZA Treatment area of CAMU		140	40	360	5,200	7	27	4	-	-	-	-	11	
2	SW area of CAMU		100	190	410	15,100	-		-	31	4	8	4	12	
4	Central area of CAMU		110	220	460	22,500	-		-	38	4	8	4	12	
6	NE wooded area		180	150	580	23,700	-		-	38	4	8	4	12	
7	East wooded area	80			251	3,900	6	25	4	-	-	-	-	10	
												Subtotal for arsenic field screening analysis		57	6
Areas of Arsenic Contamination to be Consolidated in Arsenic CAMU Area															
	Biopad		295	430		126,850	-		-	89	4	8	4	12	
8	NW of Biopad		180	410	810	64,600	-		-	64	4	8	4	12	
9	North site perimeter		140	90	400	12,600	-		-	28	4	8	4	12	
10	Biopad Drainage Area				310	3,700	6	25	4	-	-	-	-	10	
11	SE of CAMU				1,150	118,000	-		-	86	4	7	5	12	
12	NE wooded area				1,570	162,000	-		-	57	13	13	6	19	
												Subtotal for arsenic AA analysis		77	8
Areas of PCP and Arsenic Contamination to be Consolidated in PCP CAMU Area															
13	Lagoon washout area				1,260	114,400	-		-	85	4	6	6	12	
												Subtotal for As AA and PCP GCMS analysis		12	1
Areas of PCP Contamination to be Consolidated in PCP CAMU Area															
14	Wood Chip Pile		100	150	440	19,500	-		-	35	4	8	4	12	
15-23	Combined Areas 15 to 23				1,250	97,200	-		-	78	4	6	6	12	
24	"Stained Area 18"		60	50	220	2,300	5	21	4	-	-	-	-	9	
25	North of Biopad		100	150	400	14,200	-		-	30	4	8	4	12	
26	East of sawdust pile	40	40	30	126	1,200	3	20	4	-	-	-	-	7	
27	North side of Old State Route 70		60	830	1,710	40,400	-		-	50	4	4	8	12	
28	South side of Old State Route 70		50	130	310	6,300	8	28	4	-	-	-	-	12	
30	Lagoon washout area south of wetland		330	150	1,200	52,400	-		-	57	4	6	6	12	
												Subtotal for PCP GCMS analysis		88	9
													Total for All Areas	234	23

[a]Area based on CAD system calculation from drawing of site excavation areas.

a. Small site bottom samples from Table 1, Verification of Soil Remediation Guidance Document, MDEQ April 1994 Revision 1.

b. Small area sidewall samples based on sidewall area of less than 500 sf (Table 2 of MDEQ Soil Verification of Soil Remediation Guidance Document.

c. Medium and large site bottom and sidewall samples are the greater of 12 or 25% of grid nodes. The proportion of bottom to sidewall samples is based on shape of area and allowing a minimum of 4 sidewall samples.



Phase 1

Grid Interval _____ 30'
Grid Nodes _____ 18
Initial Bottom Samples __ 8
Initial Sidewall Samples __ 4
Example Result: 95% UCL > 2.1 ug/kg PCP

Phase 2

Examples:

1.) Node 9 PCP = 10 mg/kg PCP.
Sample Nodes 5, 8, 10, 13.
Result: PCP @ nodes 5, 8, 10, 13 < 2.1 mg/kg.
Excavate Subarea 9.
Resample node 9 at new depth and pool result with previous data.

2.) Perimeter
Sample B = 10 mg/kg PCP.
Sample midway between adjacent perimeter samples and outward the same distance.
Result: PCP at new locations < 2.1 mg/kg.
Excavate Subarea B.

NORTH

0 30'
SCALE IN FEET

Bottom Sample Location

Equally Spaced Perimeter Sample Location

Hypothetical Additional Permitter Sample Location

FIGURE 2-4
Example Soil Verification Sampling of Area 25
Penta Wood Products RA Construction QAPP

excavation of areas of elevated contamination, as discussed below, will be performed prior to re-sampling.

Areas of arsenic soil contamination for excavation and consolidation within the CAMU are considered sufficiently excavated when the arsenic concentration does not exceed background. This will be determined through a statistical evaluation of the means of the background samples and the samples collected after excavation. A one tailed t-test at a 95% confidence interval will be used to assess the difference of the means. If the mean of the sample population is less than or equal to the mean of the background population at 95% confidence , the excavation of the area will be considered complete.

2.2.3.4 Additional Excavation

When the excavation performance criteria are exceeded, additional excavation will be performed. The grid nodes adjacent to the sampled nodes causing the exceedance will be sampled so that the area representing the "hot spot" requiring excavation is defined. The radius of excavation around the contaminated sample points is equal to the grid interval. Figure 2-4 presents an example of a hypothetical occurrence of a "hot spot". Once the area is excavated to a deeper depth (typically an additional 1 foot would be excavated), the grid node would be resampled. The new data would be pooled with the previous data and the 95th UCL re-calculated. Table 2-2 presents hypothetical data and the calculations for this example. In the example, the 95th UCL no longer exceeds the performance criteria for PCP and the area would be considered completed.

Figure 2-4 also presents an example when an area exceeds the performance criteria because of an elevated perimeter sample. In this case additional samples are collected at distances equal to one half the distance between perimeter samples, along the perimeter and outward from the perimeter. Assuming additional exceedances are not found, the subarea enclosed within the additional samples would be excavated. If additional exceedances are found, the outlined procedure is repeated until the 95th UCL of the mean falls below the performance criteria.

2.2.4 Groundwater Sampling

Groundwater sampling of 19 monitoring wells will be conducted to establish a baseline of groundwater contaminants and natural attenuation parameters prior to start-up of the groundwater collection and treatment system.

2.2.5 Treatment System Sampling

The effectiveness of the treatment system will be evaluated through the collection of treatment system influent samples, samples of water within the treatment train, samples of the treatment system effluent and samples from within the infiltration basin. Multiple samples from each location are planned during the start-up to allow on-going evaluation of system performance. In addition sampling of treatment system residuals, including filters, spent GAC and LNAPL will be performed to evaluate disposal options.

2.2.6 Lysimeter Sampling

Sampling of two existing lysimeters is planned to allow evaluation of baseline contaminant and natural attenuation parameter conditions in the unsaturated zone prior to operation of the bioventing system.

2.2.7 Soil Gas Sampling

Sampling of soil gas in the unsaturated zone piezometers is planned to allow flow balancing of the bioventing system and to allow evaluation of oxygen uptake during start-up.

2.3 Contaminants of Concern

Contaminants of concern (COC) are defined as those most likely to contribute to risk as a result of exposure. The USEPA and WDNR have established that the primary COCs at the PWP site are PCP, arsenic, benzene, naphthalene and DRO. Other contaminants will be sampled in addition to these to allow evaluation of natural attenuation and address specific concerns in individual environmental media.

2.4 Sampling Locations

Table 2-3 is a summary of the sampling and analysis activities proposed for the remedial action construction field activities. Figures 2-1 and Figure 2-2 present sampling locations for arsenic soil samples. Soil verification sampling will be conducted in the areas shown in Figure 2-3. Groundwater monitoring wells, residential wells, treatment system sample ports, lysimeters and soil gas peizometers to be sampled will be located in the field.

TABLE 2-2
Example PCP Soil Verification Sampling Results
Area 25
RA Sampling
Penta Wood Products

PHASE 1

Phase 1 Samples	Sample Type	Hypothethical PCP (mg/kg)
01	Bottom	0.50
02	Bottom	0.60
03	Bottom	0.10
04	Bottom	0.20
05	Bottom	0.10
06	Bottom	0.30
07	Bottom	10.00
08	Bottom	0.60
09	Perimeter	0.20
10	Perimeter	0.40
11	Perimeter	0.30
12	Perimeter	0.10

Phase 1 Statistics	
PCP Residential Criteria = 0.9 mg/kg	
Mean	1.1167
Standard Error	0.8093
Median	0.3
Mode	0.1
Standard Deviation	2.8035
Sample Variance	7.8597
Kurtosis	11.867
Skewness	3.4376
Range	9.9
Minimum	0.1
Maximum	10
Sum	13.4
Count	12
95% Upper Confidence Limit a.	2.57
Re-estimate of Number of samples b.	540

Phase 2
Assume Area around Sample 07 is excavated and area re-sampled.
Sample 07 is replaced with sample 13 at a concentration of 1.3 mg/kg.

Phase 1 Samples	Sample Type	Hypothethical PCP (mg/kg)
01	Bottom	0.50
02	Bottom	0.60
03	Bottom	0.10
04	Bottom	0.20
05	Bottom	0.10
06	Bottom	0.30
13	Bottom	1.30
08	Bottom	0.60
09	Perimeter	0.20
10	Perimeter	0.40
11	Perimeter	0.30
12	Perimeter	0.10

Phase 2 Statistics	
PCP Residential Criteria = 0.9 mg/kg	
Mean	0.3917
Standard Error	0.0981
Median	0.3
Mode	0.1
Standard Deviation	0.3397
Sample Variance	0.1154
Kurtosis	4.3613
Skewness	1.8893
Range	1.2
Minimum	0.1
Maximum	1.3
Sum	4.7
Count	12
95% Upper Confidence Limit a.	0.57
Re-estimate of Number of samples b.	1

Reference: U.S. EPA .Test Methods for Evaluating Solid Waste Physical /Chemical Methods, SW 846, July 19
a. t value for 95% probability and 11 degrees of freedom is 1.796. UCL = mean + (1.796 x standard error).
b. $n = (t\ value^2) \times variance/(0.9\text{-}mean)^2$

TABLE 2-1
Summary of Remedial Construction Sampling and Analysis Activities

Sample Matrix	Locations	Analytical Parameters	Field Samples	QC Samples			Total Samples
				FB	Dup	MS/D	
Concrete Slabs	Visually stained concrete from any of the 16 concrete slab demolitions	Arsenic	TBD				TBD
Soil-Verification below visually stained concrete slabs	Verification below visually stained concrete slabs.	Arsenic, PCP, and DRO	TBD				TBD
Soil Sampling Prior to Excavation and Solidification	Area 1 (ACZA Treatment Area); 5 borings to 10' below ground sampled at 2' intervals	Onsite Arsenic (XRF)	25	0	3	2	30
Soil Sampling Prior to Excavation and Consolidation	Area 12 (NE wooded area); samples of the upper 1 foot of soil	Arsenic	20	0	2	1	23
Soil-Verification for Solidification	ACZA Treatment area of CAMU, SW area of CAMU, Central area of CAMU, NE wooded area and East wooded area	Onsite Arsenic (XRF)	33	0	4	2	39
Soil-Verification for Consolidation	Biopad, Area 8 (NW of Biopad), Area 9 (North site perimeter), Area 10 (Biopad Drainage Area), Area 11 (SE of CAMU), Area 12 (NE wooded area),	Arsenic	77	0	8	4	89
	Area 13 (Lagoon washout area)	Arsenic, PCP and DRO	12	0	2	1	15
	Area 14 (Wood chip pile), Combined Areas 15-23, Area 24 ("Stained area 18"), Area 25 (North of Biopad), Area 26 (East of sawdust pile), Area 27 (North Side of Old State Rt. 70), Area 28 (South side of Old State Rt. 70), and Area 30 (Lagoon washout area south of wetland	PCP and DRO	88	0	9	5	102
Solidified Soil and Concrete	Composite of Solidified Soil at rate of 1/ 500 cy	SPLP-Arsenic	5	0	1	1	7
Groundwater—Existing Monitoring Wells	MW-1, MW-2, MW-3, MW-4, MW-5, MW-6S, MW-7, MW-8, MW-9, MW-10, MW-10S, MW-11, MW-12, MW-13, MW-14, MW-15, MW-16, MW-17, MW-19	PCP, total arsenic, total copper, total iron, total manganese, total zinc, dissolved iron, dissolved arsenic, dissolved manganese, BTEX, naphthalene	19	2	2	2	25
		Natural attenuation-	19	1	1	2	23

TABLE 2-1
Summary of Remedial Construction Sampling and Analysis Activities

Sample Matrix	Locations	Analytical Parameters	Field Samples	QC Samples FB	QC Samples Dup	QC Samples MS/D	Total Samples
		laboratory analysis: nitrate, sulfate, sulfide, chloride methane, BTEX, carbon dioxide, TOC, ferrous iron, alkalinity, hardness.					
		Natural attenuation-field analyses: DO, pH, Redox potential, conductivity, temperature	19	0	2	0	21
Treatment System Influent and Effluent Sampling	EW-2, EW-3,EW-4,EW-5, EW-6, EW-7, EW-10,	PCP, total arsenic, total copper, total iron, total manganese, total zinc, dissolved iron, dissolved arsenic, dissolved manganese, alkalinity, hardness, BTEX, naphthalene		2	2	1	19
	Combined Influent, Influent to GAC Vessel 1, Influent to GAC Vessel 2, Effluent from GAC Vessel 2, Infiltration Basin	PCP, total arsenic, total copper, total iron, total manganese, total zinc, dissolved iron, dissolved arsenic, dissolved manganese, alkalinity, hardness, BTEX, naphthalene		3	3	2	33
Spent activated charcoal, bag filters and activated clay	Groundwater Treatment System	PAHs, HxCDDs, HxCDFs, PeCDDs, PeCDFs, TCDDs, TCDFs, PCP, Phenol, 2,3,4,6-Tetrachlorophenol, 2,4,6-Trichlorophenol, 2,4-Dimethylphenol	TBD				TBD

TABLE 2-1
Summary of Remedial Construction Sampling and Analysis Activities

Sample Matrix	Locations	Analytical Parameters	Field Samples	QC Samples			Total Samples
				FB	Dup	MS/D	
Waste-LNAPL	LNAPL Storage Tank	PAHs, HxCDDs, HxCDFs, PeCDDs, PeCDFs, TCDDs, TCDFs, PCP, Phenol, 2,3,4,6-Tetrachlorophenol, 2,4,6-Trichlorophenol, 2,4-Dimethylphenol	TBD				TBD
Unsaturated Zone Pore Water—Existing Lysimeters	LY-02 and LY-03	PCP, nitrate, sulfate, sulfide, manganese, chloride, methane, BTEX, carbon dioxide, TOC, ferrous iron, alkalinity.	2	1	1	1	5
		Natural attenuation-field analyses: DO, pH, Redox potential, conductivity, temperature	2	0	1	0	3
Bioventing Soil Gas Analysis	Unsaturated Zone piezometer nests: List the 7 piezometer nests of 3 wells each.	O_2, CO_2, temperature, humidity, air pressure	21	0	2	0	23

PCP = Pentachlorophenol
TBD = To be determined
TPH = Total Petroleum Hydrocarbons
TOC - Total Organic Carbon
HxCDD = Hexachlorodibenzo-p-dioxins
PeCDD = Pentachlorodibenzo-p-dioxins
TCDD = Tetrachlorodibenzo-p-dioxins
HxCDF = Hexachlorodibenzofurans
PeCDF = Pentachlorodibenzofurans
TCDF = Tetrachlorodibenzofurans

SECTION 3

Sampling Custody Procedures

3.1 Sample Identification System

A sample numbering system devised by CH2M HILL will be used to identify each sample, including duplicates and blanks. A Sample Management Office (SMO) number and a Central Regional Laboratory (CRL) number will be assigned to each sample to be analyzed by an offsite laboratory. (Refer to the *User's Guide to the Contract Laboratory Program* for an explanation of the SMO numbers. Refer to the CRL *Sample Handling Manual* for an explanation of the CRL number.) The field activity manager will maintain a listing of sample identification numbers in the sampling logbook. Each CH2M HILL sample number will consist of three components.

Each sample will have a three-digit, project identification code (identifying PWP as Penta Wood Products), followed by a two-digit code corresponding to the media, and a three-digit, sequential sample number. Sample numbers will be reserved for the different media to be sampled. They will not be repeated within a sample station, media, or among differing media. Duplicate samples will not be distinguished within the sample numbers, but will be distinguished through the subsample identification within the sample tracking and data management systems. This is done so that no bias is given to the samples during analysis. The media codes and reserved sample numbers are as follows:

- SS—Surface (0 to 2 feet) Soil Sample
- SB—Subsurface Soil (>2 Feet) Soil Sample
- MW—Monitoring Well Groundwater Sample
- LY—Lysimeter Sample
- IF—Influent to Treatment System Sample
- EF—Efffluent from Treatment System Sample
- TR—Treatment Residuals Sample
- LN—LNAPL Sample
- SG—Soil Gas Sample

Examples of sample numbers are as follows:

- PWPMW0101—Groundwater sample collected from PWP sample location MW01, sample number 01
- PWPSB1011 - 5.0—Subsurface soil sample collected from PWP sample location SB10, sample number 11, collection starting at 5 feet bgs

3.2 Initiation of Field Custody Procedures

For samples collected for analysis, the USEPA Region 5 chain-of-custody protocols will be followed, as described in the *National Enforcement Investigations Center (NEIC) Policies and Procedures*, USEPA-330/9-78-DDI-R, Rev. June 1985. Custody procedures are described in Section 6 of the QAPjP.

3.3 Field Activity Documentation and Logbook

A field logbook will be initiated at the start of the first onsite activity and will record onsite activities during the RA. The field logbook is a controlled document that becomes part of the permanent site file. Because information contained in the field logbook may be admitted as evidence in cost recovery or other legal proceedings, it is important that this document be well maintained. The following activities and events will be recorded in the field logbook:

- Arrival and departure of site visitors
- Arrival and departure of equipment
- Sample pickup including chain-of-custody form number, carrier, date, and time
- Start or completion of borehole and monitoring well installation; sampling activities
- Health and safety issues

The field logbook will consist of a bound notebook with consecutively numbered pages that cannot be removed. The logbook cover will indicate the following:

- Project name and USEPA work assignment number
- Project number
- Site manager's name
- Sequential log book number
- Project start date
- Project end date

Daily entries will be made during periods of site activity. Entries will be recorded in ink; no erasures are permitted. Each page will be initialed. Incorrect entries will be stricken with a single line and initialed. At the beginning of each entry, the date, start time, weather conditions, and names of site personnel and visitors present will be recorded. Entries will include the following:

- Summaries of daily site activities
- References to other project notebooks kept onsite such as the geologist's field book
- Photographic records including a description of each record and points of interest; videotapes, slides, or photographs taken onsite or at monitoring stations will be numbered to correspond to logbook entries; photographic records will also include the photographer's name, date, time, site location, site description, and weather condition

3.4 Sample Shipment and Transfer of Custody

Sample handling, shipping, and custody procedures are provided in Section 6 of the QAPP.

SECTION 4

Sample Containers and Maximum Holding Times

4.1 Sample Containers

The contaminant-free sample containers (bottles) used for this sampling effort will be prepared by the subcontract laboratory according to the procedures specified in USEPA's *Specifications and Guidance for Obtaining Contaminant-Free Sample Containers*, April 1990. Bottles used for the sampling activity will not contain target organic and inorganic contaminants exceeding the level specified in the above mentioned document. Specifications for the bottles will be verified by checking the supplier's certified statement and analytical results for each bottle lot.

Field blanks, trip blanks, etc., will be used to monitor for contamination. Corrective actions will be taken as soon as a problem is identified and may include discontinuing the use of a specific bottle lot, contacting the bottle supplier(s) for retesting the representative bottle from a suspect lot, resampling the suspected samples, and validating the data, taking into account that the contaminants could be introduced by the laboratory (i.e., common lab solvents, sample handling artifacts, etc.); as a bottle QC problem, an educated determination of whether the bottles and data are still usable must be made.

For the Fund-lead projects, the corrective actions will be conducted in a comprehensive manner to avoid the use of identified contaminated lot(s) for other projects, and to ensure that if the bottle supplier(s) is deemed unresponsive or unable to provide cleaned bottles as specified, other USEPA projects are not negatively affected by the use of noncompliant bottles.

4.2 Sample Preservation and Holding Time

Table 4-1 summarizes the requirements for sample containers, preservatives, and sample holding times. Sample containers will be certified by the laboratories as precleaned. The laboratory will be prepared preservatives using reagent-grade chemicals and add them to the sample bottles prior to shipment to the field site. Samples will be stored on ice to 4°C for preservation.

TABLE 4-1
Sample Containers, Preservatives, and Holding Times

Analysis	Container	Preservation/Storage	Maximum Hold Time
Soil PCP	4-oz. amber glass jar [a]	4°C protect from light	7 days to extraction and 40 days from extraction to analysis
Soil DRO	4-oz. amber glass jar [a]	4°C	14 days to extraction and 40 days from extraction to analysis
Solid Waste-PCP, 2,4-Dimethylphenol, Phenol, 2,3,4,6-Tetrachlorophenol, 2,4,6-Trichlorophenol	4-oz. amber glass jar [a]	4°C protect from light	7 days to extraction and 40 days from extraction to analysis
Soilds Waste - PCDDs and PCDFs	4-oz. amber glass jar [a]	4°C protect from light	30 days to extraction and 45 days from extraction to analysis
Solid Waste -PAHs	4-oz. amber glass jar [a]	4°C protect from light	7 days to extraction and 40 days from extraction to analysis
SPLP Solid Waste/Concrete –Arsenic, (Total)	4-8 oz.amber glass jar [a]	4°C	6 months
Soil—Arsenic	4-oz. amber glass jar [a]	4°C	6 months
Soil—pH	4-oz. amber glass jar [a]	4°C	Analyze immediately
Water/Liquid Waste —PCP, 2,4-Dimethylphenol, Phenol, 2,3,4,6-Tetrachlorophenol, 2,4,6-Trichlorophenol	1-liter amber glass bottle [a]	4°C protect from light	7 days to extraction and 40 days from extraction to analysis
Water/Liquid Waste PAHs	1-liter amber glass bottle [a]	4°C protect from light	7 days to extraction and 40 days from extraction to analysis
Water/Liquid Waste-PCDDs and PCDFs	1-liter amber glass jar [a]	4°C protect from light	30 days to extraction and 45 days from extraction to analysis
Water—Arsenic, Copper, Iron, Manganese, Zinc	500-mL polyethylene bottle	HNO_3, pH<2, 4°C	6 months
SPLP Water/Liquid Waste – Arsenic (Total)	500-mL polyethylene bottle	HNO_3, pH<2, 4°C	6 months
Water—Nitrate, Sulfate, Chloride	1-liter poly	4°C	
Water—Sulfide	1-liter amber glass jar [a]	4°C, NaOH, pH > 9, Zinc acetate	48 hours
Water—Methane	3x40 mL vials [a]	HCl, pH<2, 4°C, protect from light	14 days
Water—Manganese	100 mL poly	HNO_3, pH<2, 4°C	6 months

TABLE 4-1
Sample Containers, Preservatives, and Holding Times

Analysis	Container	Preservation/Storage	Maximum Hold Time
Water—TOC	100 mL poly	H_2SO_4, pH<2, 4°C	28 days
Water—BTEX	3x40 mL vials [a]	HCl, pH<2, 4°C, protect from light	14 days
Water—Alkalinity	250 mL poly	4°C	14 days
Water—Iron (soluble)	100 mL poly	HNO_3, pH<2, 4°C	6 months
Water—Hardness	100 mL poly	HNO_3, pH<2, 4°C	6 months

[a] – Teflon-lined cap or septa.
PCP = Pentachlorophenol.
TOC = Total Organic Carbon.
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes.
SPLP = Synthethic Precipitation Leachate Procedure. PCDD = Polychlorinated Dibenzo-p-Dioxines PCDF = Polychlorinated DibenzoFurans

SECTION 5

Sample Handling, Packaging and Shipment

Sample handling, packaging, and shipping procedures are described in Section 6 of the QAPP.

SECTION 6

Decontamination Procedures

This section presents the general guidelines for the decontamination of personnel, sampling and monitoring equipment, and sample bottles.

The following equipment will be onsite:

- High-pressure liquid chromatography (HPLC)-grade or American Society for Testing Materials (ASTM) Type 2-grade water
- 2.5 percent by weight trisodium phosphate (TSP) and water solution
- Large plastic pails or tubs for TSP and water; scrub brushes; squirt bottles for TSP, methanol, and water; plastic bags and sheets
- Holding tanks for storage of purge water prior to testing and disposal

Note: Solutions of TSP and HPLC or ASTM Type 2-grade water will be used for decontamination.

6.1 Personnel Decontamination

The following decontamination procedures will be performed by site personnel after completion of tasks whenever the potential for contamination exists and when leaving the contaminated area.

1. Wash boots in TSP solution, then rinse with water. If disposable latex booties are worn over boots in the work area, rinse with TSP solution, remove, and discard.
2. Wash outer gloves in TSP solution, rinse, remove, and discard.
3. Remove respirator if worn.
4. Remove disposable coveralls (e.g., Tyveks®) and discard.
5. Remove inner gloves and discard.
6. At the end of the work day, shower entire body, including hair
7. Sanitize respirator if worn.

6.2 Sampling Equipment Decontamination

The soil sampling equipment will be decontaminated between each sample collection using the following procedures:

1. Scrape soils from sampler.

2. Wash sampler in a 2.5 percent by weight solution of nonphosphate detergent, such as Liquinox or an equivalent, in tap water.
3. Rinse with tap water.
4. Spray rinse with HPLC or ASTM Type 2-grade water.
5. Place on plastic and allow to air dry.

All other sampling equipment will be decontaminated between sampling locations by the following procedures:

1. Wash contaminated equipment contact surfaces with 7.5 percent nonphosphate detergent solution.
2. Rinse with potable water.
3. Spray rinse with 10 percent MeOH solution.
4. Rinse with HPLC or ASTM Type 2-grade water and air dry.

6.3 Monitoring Equipment Decontamination

Monitoring equipment will be decontaminated between sampling locations (borings, wells, etc.) by the following procedures:

1. Wipe all contaminated surfaces that had possible contact with contaminated materials with a paper towel dampened with TSP solution.
2. Wipe all surfaces that may have had contact with contaminated materials with a paper towel dampened with potable water.
3. Wipe with a towel dampened with HPLC-grade or ASTM Type 2-grade water.
4. Dispose of all used paper towels as specified in Section 11 of the FSP.

SECTION 7

Sampling Equipment and Field Procedures

7.1 Soil Sampling Procedures

7.1.1 Surface Soil

Surface soils may be collected using a wide variety of equipment. Spoons, shovels, hand augers, push tubes, and posthole diggers made of the appropriate material may be used to collect surface soil samples.

Surface samples are removed from the ground and placed in pans, where they may be mixed thoroughly before sample containers are filled. If a thick, matted root zone is encountered at the surface, it should be removed before the sample is collected.

7.1.2 Sample Mixing

It is extremely important that soil samples for non-VOC analysis be mixed as thoroughly as possible to ensure that the sample is homogeneous and representative of the interval sampled. After collection, all sample handling should be minimized. Personnel should use extreme care to ensure that samples are not contaminated. If samples are placed in an ice chest, personnel should ensure that melted ice cannot cause sample containers to become submerged, as this may result in sample cross-contamination. Plastic bags, such as Zip-Lock® bags, should be used when small sample containers are placed in ice chests to prevent cross-contamination.

7.1.3 Subsurface Soil Sampling

Samples will be collected using a hand-held soil corer or posthole digger. The probe hole will be advanced up to 10 ft bgs. The sample at each interval is transferred to a clean bowl and mixed. The required volume is then placed in the appropriate sample jar.

7.2 Treatment System Water Sample Collection

Water samples will be collected from several sample ports within the treatment system. The sample will be collected by opening the sample port valve, letting water purge from the valve area for about 15 seconds and then filling the sample bottle.

7.3 Groundwater / LNAPL Thickness Measurements

Groundwater elevations will be measured during the RA to monitor changes in gradients over time. Water level measurements will be conducted before the wells are purged. All measurements will be made within a 1-day period. Elevations will be measured with a conductivity-based electronic water level measuring device. The electronic device emits an

audible signal when the probe touches the water. The depth measurement is read from the top of the inner casing at the tick mark. The procedures used to measure static water levels are as follows:

1. Lower the decontaminated probe into the well by unrolling cable from the hand-held reel.
2. Continue lowering until a signal is emitted indicating that the water table has been reached.
3. Read measurements directly to the nearest 0.01 foot. The length of cable in the well from the top of casing or other reference point to the probe (depth to the water table) will be subtracted from the measuring point elevation to determine the groundwater level elevation.
4. Decontaminate water level indicator equipment between wells. Detergent and solvent rinses will only be performed if visible contamination remains on the probe.

Several monitoring wells in the gully area between the oil/water separator and lagoon have light, non-aqueous phase liquids (LNAPL) present. The thickness of the LNAPL will be measured in the same manner as groundwater levels using an oil/water interface probe. The electronic device gives off a beeping tone when it comes in contact with the LNAPL. At the LNAPL water interface the instrument sounds a continuous tone. These measurements are taken to the top of the protective casing.

7.4 Monitoring Well Sampling

7.4.1 Well Development

Before groundwater sampling begins, wells will be purged of stagnant water.

Wells screened in low permeability formations (i.e., wells that can be purged dry) will be purged as follows:

1. Pump or bail the well dry.
2. Measure the field parameters for every well volume purged. The measurements indicate stable groundwater conditions when there is less than a 10 percent variability of parameters among 3 well volumes.
3. Wait 15 minutes, allowing the well to recover after purging. When the well recovers to 80 percent of its original level or when a sufficient volume of water exists for the intended analysis, the sampling may begin.

Wells screened in permeable formations will be purged as follows:

1. Begin pumping the well at a low flow rate of less than 300 mL per minute.
2. Measure field parameters every minute or half well volume.

3. When the field parameters agree within 10% or the previous two readings the well is ready to be sampled.

4. Limit the amount of air and turbulence into the formation during purging to prevent potential alteration of the samples.

7.4.2 Groundwater Field Parameter Measurements

Field parameters of pH, temperature, specific conductance, ORP and DO will be measured while redeveloping the existing wells. The procedures to perform those field analyses are described in the SOPs.

SECTION 8

Quality Control Sample Procedures

Each of the offsite laboratories identified in the QAPjP has a QC program to ensure the reliability and validity of the analyses being performed. QC procedures for pH, DO, specific conductance, and temperature measurements include calibrating the instruments as described in Section 7.0 of the QAPjP, measuring duplicate samples and checking the reproducibility of the measurements by taking multiple readings from a single sample. Field sampling precision and bias will be evaluated by collecting field duplicate and field blanks for laboratory analysis. The number and frequency of QC sample collection is summarized in Table 2-1.

8.1 Field Blank

Field blanks will be collected for both groundwater samples. The sample bottles will be labeled as described in Section 3.1.1 of this plan. The samples will be preserved and stored in the same manner as the groundwater samples. The frequency of collection is listed in Table 2-1.

8.2 Field Duplicates

Field duplicate samples will be collected and analyzed to determine the precision of field sampling. Groundwater field duplicate samples will be collected by alternately filling first the sample bottle for one analysis and then the duplicate bottle for one analysis. This procedure will be followed until the bottles for all analyses are filled.

Soil/sediment field duplicate samples will be collected by placing the soil in a stainless steel bowl, mixing the sample by stirring, and then filling the individual sample and duplicate containers from the bowl.

8.3 Matrix Spike / Matrix Spike Duplicate

Matrix spike/matrix spike duplicate (MS/MSD) samples will be collected for the parameters listed in Table 2-3. Two extra volumes of sample are required. Sample containers will be filled in the same manner as field duplicate samples. The frequency for collection of MS/MSD samples is listed in Table 2-3.

SECTION 9

Field Measurements/Screening

Field measurement and screening techniques for pH, conductivity and temperature, DO, PID monitoring, water level measurement, and well purging are provided in the SOPs.

SECTION 10

Preventive Maintenance Procedures/Schedule

Field team members will refer to the field procedure SOP or the manufacturers' instrument manuals for the appropriate preventive maintenance procedures and frequency for the field equipment used at the site.

SECTION 11

Storage and Disposal of Investigation Derived Wastes, Decontamination Fluids, and Purge Water

The waste materials generated during a field investigation are known as Investigation Derived Wastes (IDW). Some of the waste materials may be hazardous wastes which must be properly disposed in accordance with USEPA regulations.

11.1 Types of Investigation-Derived Waste

Materials which may become IDW requiring proper treatment, storage and disposal are:

- Personnel protective equipment (PPE). This includes disposable coveralls, gloves, booties, respirator canisters, etc.
- Disposable equipment (DE). This includes plastic ground and equipment covers, aluminum foil, Teflon® tubing, broken or unused sample containers, sample container boxes, tape, etc.
- Soil cuttings from drilling or hand auguring.
- Groundwater obtained through well development or well purging.
- Cleaning fluids such as spent solvent and washwater.

11.2 Management of Non-Hazardous Investigation-Derived Waste

See the Site Management Plan.

11.3 Management of Hazardous Investigation-Derived Waste

See the Site Management Plan

Standard Operating Procedures

Standard Operating Procedures

pH

Temperature and Conductivity

Redox

PID Monitoring

Field Filtering

Dissolved Oxygen

Water Level Measurement and Well Purging

Soil Vapor Parameters

Soil Gas Pressure

X-Ray Fluorescence

pH

Field Measurement of pH

Purpose

To provide a general guideline for field measurement of pH in water samples.

Scope

Standard field pH determination techniques for use on surface water and groundwater samples.

Equipment / Materials

- pH buffer solution for pH 4, 7, and 10
- Deionized water in squirt bottle
- pH meter
- Combination electrodes
- Beakers
- Solution of HCl
- Glassware that has been washed with soap and water, rinsed twice with hot water, and rinsed twice with deionized water

Procedures / Guidelines

Calibration

Calibrate unit before initial daily use and at least once every 4 hours or every 5 samples, whichever is less. Calibrate with at least two solutions. Clean probe according to manufacturer's recommendations. Run duplicate samples once every 10 samples or every 4 hours.

1. Note source of pH buffers, date of preparation, expiration date, and prepared by whom.
2. Note pH instrument number, model number, and manufacturer.
3. Rinse electrode with deionized water.
4. Place electrode in pH 7 buffer solution.
5. Allow meter to stabilize and then press the "yes" key to accept reading.
6. Rinse electrode with deionized water and place it in a pH 4 or pH 10 buffer solution.
7. Allow meter to stabilize again and then press the "yes" key to accept reading. Record the slope reading (example: "SLP 98.5").
8. Rinse electrode with deionized water, and place in pH 7 buffer. If meter reading is not 7.0, repeat sequence.

Procedure

1. Before going into the field:
   a. Check batteries.
   b. Do a quick calibration at pH 7 and 4 to check electrode.
   c. Obtain fresh standard solutions.
2. Calibrate meter using calibration procedure.
3. Pour sample into a clean beaker.
4. Rinse electrode with deionized water between samples.
5. Immerse electrode in solution. Record pH reading.
6. Recheck calibration with pH 7 buffer solution after every 5 samples.

General

1. When calibrating meter, use pH buffers 4 and 7 for samples with pH < 8, and buffers 7 and 10 for samples with pH > 8. If meter will not read pH 4 or 10, something may be wrong with electrode.
2. Measurement of pH is temperature dependent. Therefore, temperatures of buffers and samples should be within about 2°C. For refrigerated or cool samples, use refrigerated buffers to calibrate pH meter.
3. Weak organic and inorganic salts, oil, and grease interfere with pH measurements. If oil or grease are visible, note it on the data sheet. Clean electrode with soap and water, and rinse with a 10 percent solution of HCl. Then recalibrate meter.
4. Following field measurements:
   a. Report any problems
   b. Compare with previous data
   c. Clean all dirt off of the meter and from inside the case
   d. Store electrode in pH 4 buffer solution
5. Accuracy and precision are dependent on the instrument used. Refer to manufacturer's manual. Expected accuracy and precision are ± 0.1 pH unit.

Attachments

- pH meter calibration sheet

Key Checks / Items

- Check batteries
- Calibrate

Preventive Maintenance

- Refer to operation manual for recommended maintenance.
- Check batteries. Have a replacement set on hand.

Conductivity and Temperature

Field Measurement of Conductivity and Temperature

Purpose

To provide a general guideline for field measurement of specific conductivity and temperature.

Scope

Standard field conductivity and temperature techniques for use on groundwater samples.

Equipment / Materials

- Conductivity meter and electrode
- Distilled water in squirt bottle
- Standard Potassium Chloride (KCl) Solution (0.01 N)

Procedures / Guidelines

References

Methods for Chemical Analysis of Water and Wastes, EPA Method 120.1, 1983

YSI Models 33 and 33M S-C-T Meters, Instructions, November 1987, Item 021470, Yellow Springs Instrument Company, Yellow Springs, Ohio, or equivalent.

Sensitivity

1 μmho/cm at 25°C

Range

0.1 to 100,000 μmho/cm

Reagents

Distilled water in squirt bottle and standard potassium chloride solution

Reagent Preparation

1. Stock potassium chloride (KCl) solution (1.00 N): Dissolve 74.555 g KCl in distilled water and dilute to 1,000 mL in a volumetric flask.

2. Standard potassium chloride solution (0.01 N): Dilute 10.0 mL of stock 1.00 N KCl solution to 1,000 mL with distilled water using a volumetric pipet and flask.

Apparatus

- Conductivity meter and electrodes
- Beakers or jars, plastic or glass
- Spare size D, alkaline batteries

Calibration Procedure (most models)

1. Switch mode to Off and unplug the probe; turn the adjustment screw to correct meter zero until the meter needle coincides with the zero on the conductivity scale.

2. Switch mode to Redline; turn the adjustment screw to correct meter redline until the meter needle coincides with the redline on the meter face. If this cannot be accomplished, replace the batteries.

3. Plug the probe into the probe jack.

4. Place the probe in the 0.01 N standard potassium chloride solution. Record temperature (°C) and conductance (μmho/cm).

5. Correct conductivity reading for temperature. This value must correspond (±10 percent) to the expected value in Table 1. If the calibration fails, then appropriate corrective action must be performed and the instrument recalibrated.

   Note: Before each sampling event, calibrate the temperature probe against an NIST, ASTM, or equivalent thermometer standard.

Operation Procedure (most models)

1. Perform calibration at beginning and end of the day.

2. Switch mode to Temperature. Allow time for the probe temperature to come to equilibrium with that of the water before reading. Read the temperature on the bottom scale of the meter in degrees Celsius.

3. Switch mode to X100. If the reading is below 50 on the 0 to 500 range (5.0 on the 0 to 50 mS/m range), switch to X10. If the reading is still below 50 (5.0 mS/m), switch to the X1 scale. Read the meter scale and multiply the reading by the mode factor. The answer is expressed in μohms/cm. Measurements are not temperature compensated.

4. When measuring on the X100 and X10 scales, depress the CELL TEST button. The meter reading should fall less than 2 percent; if greater, the probe is fouled and the measurement is in error. Clean the probe and remeasure.

Operating Suggestions

- Obstructions near the probe can disturb readings.
- When the calibration test indicates low readings, the probable cause is dirty electrodes. Hard water deposits, oil, and organic matter are the most likely contaminants.
- Caution: Do not touch the electrodes inside the probe. The plating material is soft and can be scraped off.
- If cleaning does not restore the probe performance, replatinizing may be required. Always rinse the probe thoroughly in tap water, then in distilled or DI water after cleaning and before storage. Note that it is best to store conductivity cells in DI water. Collect rinsate water for storage pursuant to the Waste Management Plan.
- Most problems in obtaining good records with monitoring equipment are related to electrode fouling and to inadequate sample circulation.

Calibration Frequency

At the beginning and end of the day or after maintenance, recharge battery after each use. Factory checkout and calibration shall be yearly or when malfunctioning.

Calculations

Calculate conductivity using the formula:

$$G_{25} = \frac{G_T}{[1 + 0.02\,(T - 25)]}$$

where,

G_{25} = conductivity at 25°C, μmho/cm
T = temperature of sample, °C
G_T = conductivity of sample at temperature T, μmho/cm

Quality Control Requirements

The accuracy of conductivity measurements will be assessed by measurement with a 0.01 N standard KCl solution before sample analysis and at the end of the day. Accuracy of measurements will be ±5 percent of the standard. Precision will be assessed by analysis of multiple measurements that will have a relative percent difference of ≤15 percent. The thermometer on the conductivity meter will be checked before each sampling event for accuracy against an NIST, ASTM, or equivalent thermometer standard. Accuracy of the measurement shall be ±1°C.

Preventive Maintenance

- Field equipment is inspected in the warehouse prior to delivery to the field.
- The only maintenance required is battery replacement every 200 h.
- Recalibration should be done at the factory.

Redox

Field REDOX (Oxidation/Reduction) Measurement SOP

Purpose

To provide a general guideline for field measurement of oxidation/reduction potential in water.

Scope

Standard method of field REDOX measuring techniques.

Equipment/Materials

- pH meter with millivolt mode setting (1mV sensitivity)
- Platinum combination electrodes
- Beaker or other container to hold sample
- Distilled water
- Operation manual

Procedures/Guidelines

1. Calibrate the meter using the calibration procedure outlined in the operation manual
2. Pour the sample into a clean beaker
3. Immerse the electrode in the sample allowing several minutes for the electrode to equilibrate. Make sure the electrode is completely submerged. The level of electrode solution must be about 1-inch above the sample being measured.
4. Record the mV reading, temperature and pH
5. Rinse the electrode with deionized water between samples. If electrode appears oily, clean with mild soap and water, and rinse with distilled water. Recalibrate.

Note: oils and grease can interfere with measurement. If visible, note it in the field logbook.

Key Checks/Items

- pH meter with millivolt scale
- Follow manufacturer's instructions for setup and use
- Keep electrodes clean
- Clean probe with deionized water when done

Preventive Maintenance

Refer to operation manual for recommended maintenance

Check batteries, have a replacement set on hand

PID Monitoring

PHOTOIONIZATION DETECTOR (PID) MONITORING: OVM

I. Purpose

To provide general guidelines for the calibration and use of the OVM photoionization detector.

II. Scope

This is a general guideline for the field use of an OVM. For specific instructions, refer to the operations manual.

III. Equipment/Materials

- OVM 158
- Operation manual
- Charging unit
- Probe
- Span gas for calibration, typically 100 PPM isobutylene
- "Zero" calibration gas
- Calibration gas regulator
- "T" tubing assembly to supply calibration gas to the instrument at ambient pressure
- A bottle of aluminum oxide for lamp cleaning (a screw driver will be needed to open the unit)

IV. Procedures/Guidelines

ONLY PROPERLY TRAINED PERSONNEL SHOULD USED THIS INSTRUMENT. FOR SPECIFIC INSTRUCTIONS, SEE OPERATION MANUAL.

A. Turn instrument on

1. Power up the instrument by plugging in the power plug attached to the back, or connecting the charger cable to the recharge port.

2. Press "ON/OFF" key to light lamp and start pump. "LAMP OUT" will be displayed if lamp is not functioning.

B. Zero and Calibrate

Note: It is assumed that RF and lamp are set to the proper settings, and span gas programmed in the instrument is correct. If not, refer to the operation manual.

1. Press "MODE/STORE" key.
2. Using "-/CRSR" key, scroll through menu until display reads "RESET TO CALIBRATE".
3. Press "RESET" key.
4. Press "-/CRSR" key in response to "RESTORE BACKUP" prompt.
5. Using the "T" connector, connect the "zero" calibration gas cylinder to the instrument probe and open the valve (or zero with ambient air).
6. Press "RESET" key to begin zeroing the instrument. When done, display should read "SPAN PPM= ___ + TO CONTINUE".
7. Close valve and disconnect zero gas cylinder.
8. Press "+/INC" key.
9. Connect span gas cylinder to the instrument probe using the "T" connector and open the valve.
10. Press "RESET" key.
11. When calibration is complete, display will read "RESET TO CALIBRATE". Press "MODE/STORE" key. Display should read close the concentration of the span gas.
12. Close valve and disconnect span gas cylinder.
13. OVM will be operating in the survey mode.

C. Sampling with the OVM

1. When calibration is complete and the "MODE/STORE" key is pressed (step

11 above), the OVM will be operating in the normal survey mode.

2. When monitoring is done, press "ON/OFF" key.
3. Disconnect the power plug in back of the unit, plug in the cord from the battery charger and recharge the battery overnight.

V. Attachments

None

VI. Key Checks/Items

- Zero and calibrate
- Recharge unit after use
- Clean lamp as needed

VII. Preventative Maintenance

A complete preventative maintenance program is beyond the scope of this document. For specific instructions, refer to the operations manual.

A complete spare OVM should be available on site whenever field operations require this instrument.

Occasional cleaning of the lamp with aluminum oxide powder should be performed as needed.

Charge batteries daily.

Occasionally allow the batteries to totally discharge before recharging to prevent battery memory from occurring.

Field Filtering

FIELD FILTERING of AQUEOUS SAMPLES

I. Purpose

To provide a general guideline for the field filtering of water samples for dissolved metals analysis.

II. Scope

Standard method of field filtering techniques.

III. Equipment/Materials

- nitric acid (HNO_3) solution.
- DI water
- ml Disposable filter systems with 0.45 cellulose acetate filters
- Glass fiber prefilters
- Vacuum source

IV. Procedures/Guidelines

A. FILTER STAND METHOD

1. Prepare HNO_3 solution: Add about 900 ml of DI water to a 1 liter Erlenmeyer flask. Using a graduated cylinder, add 100 ml concentrated HNO_3 to the DI water while stirring.
2. Attach a vacuum source (pump, syringe, etc.) to the funnel/receiver assembly.
3. Flush the entire filter system with 10% HNO_3 solution. Open assembly, discard rinsate and reassemble unit.
4. Flush the entire filter system with demonstrated analyte free deionized water. Open assembly, discard rinsate and reassemble unit.
5. Filter sample and transfer to polyethylene bottle (with preservative) for shipment.

6. Discard filter assembly and prefilter.

B. IN-LINE DISPOSABLE FILTER METHOD

1. With the peristaltic pump running, purge the inlet and outlet tubing with distilled water. Make sure all of the distilled water is out of the tubing before filtering the sample .
2. Submerge the inlet tube from the peristaltic pump into the sample to be filtered.
3. Attach a new in-line filter to the outlet tube of the peristaltic pump making sure the sample flow is in the same direction as the arrow on the filter housing.
4. Turn on the peristaltic pump and discard a small amount of the initial sample that flows out of the filter. Pump the remainder of the filtered sample into a clean bottle.
5. Add the required preservative to the filtered sample.
6. Discard the filter.
7. Repeat Step 1 or remove the peristaltic pump tubing and replace with new.

V. Attachments

None.

VI. Key Checks/Items

- HNO_3 solution for cleaning
- All purge water must be distilled or deionized
- Preserve samples when done

Dissolved Oxygen

Dissolved Oxygen Measurements in Water

Purpose

To provide a general guideline for field measurement of dissolved oxygen in water.

Scope

Measurement of dissolved oxygen in groundwater samples.

Equipment / Materials

- DO meter and membrane probe
- YSI submersible stirrer, if available
- Spare size C, carbon zinc batteries
- Spare membranes and KCl

Procedures/Guidelines

References

Methods for Chemical Analysis of Water and Wastes, EPA Method 360.1, 1983

YSI Model 51B Dissolved Oxygen Meter, Instruction Manual, November 1989, Yellow Springs Instrument Company, Yellow Springs, Ohio, or equivalent.

Range

0 to 15 mg/L

Meter Setup (most models)

1. With switch in the Off position, adjust the meter pointer to zero with the screw in the center of the meter panel. Readjustment may be necessary if the instrument position is changed.

2. Switch to Zero and adjust to zero with the Zero control knob.

3. Switch to Full Scale and adjust the Full Scale knob until the meter needle aligns with the "15" mark on the mg/L scale.

4. Attach the prepared probe to the Probe connector of the instrument and adjust the retaining ring finger tight.

5. Before calibrating allow 15 minutes for optimum probe stabilization. Repolarize whenever the instrument has been Off or the probe has been disconnected.

Calibration (most models)

1. Switch to Calib O2 position.

2. Place the probe in moist air. This can be accomplished in two ways: (a) place the probe in the calibration bottle along with a few drops of water, or (b) the probe can also be wrapped loosely in a damp cloth taking care not to touch the membrane. Wait about 10 minutes for temperature stabilization. This may be done simultaneously while the probe is stabilizing.

3. With the Calib knob, set the meter pointer to the mark for the local altitude. Be sure the reading is steady. Recalibration is recommended when altitude is changed. A 1,000-foot altitude change can result in a 3 percent error (0.3 @ 10 mg/L).

The probe is now calibrated and should hold this calibration value for many measurements. Calibration can be disturbed by physical shock, touching the membrane, or drying out of the electrolyte.

Operation Procedure (most models)

With the meter prepared for use and the probe calibrated, place the probe in the sample to be measured and provide stirring.

1. Stirring for the 5739 probe can best be accomplished with a YSI submersible stirrer. If the stirrer is not used, provide manual stirring by raising and lowering the probe about 1 ft/sec.

2. Allow sufficient time for probe to stabilize to sample temperature and DO.

3. Turn the switch to Temp and read temperature from the lower meter scale. Set the O2 Solubility Factor dial to the observed temperature.

4. Turn the switch to Read O2 and read the DO value in mg/L directly from the meter.

Operating Suggestions

- Membranes will last indefinitely, depending on usage. Average replacement is 2 to 4 weeks. However, should the electrolyte be allowed to evaporate and an excessive amount of bubbles form under the membrane, or the membrane becomes damaged, thoroughly flush the reservoir with KCl and install a new membrane.

- Replace the membrane if erratic readings are observed or calibration is not stable.

- Detailed instructions regarding care and preparation of the probe are listed in the YSI instruction manual.

Calibration Frequency

At the beginning and end of the day or after maintenance, recharge battery after each use. Factory checkout and calibration shall be yearly or when malfunctioning.

Preventive Maintenance

- Field equipment is inspected in the warehouse prior to delivery in the field.
- Inspect the membrane for damage before use. Replace as necessary or at least every four weeks.
- Check batteries daily.

Water Level Measurement and Well Purging

Water Level Measurement and Well Purging

Before sampling begins, wells will be purged a minimum of 5 well volumes or until purged dry to remove stagnant water using the dedicated sampling system. The following sampling procedures will be used to collect groundwater samples from the monitoring wells:

1. Unlock lock on steel access lid on concrete vault surrounding monitoring well casing. If lock is rusted or corroded, replace it with a new lock.
2. Open protective casing, scan airspace for volatile organic vapors. Lubricate lock and hinges on vault cover with graphite lubricant.
3. Remove cover and open well cap.
4. Obtain and record PID readings at the well head and in the breathing zone. Upgrade to next level of protection if reading is above action level (see Health and Safety Plan).
5. Determine the depth to water in the well to the nearest 0.01 foot using an electronic water level indicator. The electronic meter consists of a tape with a contact electrode or probe suspended from an insulated cable, a reel, and an ammeter or small light or beeper. When the electrode or probe comes into contact with the water, an electrical circuit is completed, activating the meter light or beeper. The light, beeper, or ammeter may be located on the cable reel. Determine the depth of water using the following steps:
   - Lower the electrode or probe into the well by pulling the cable from the hand-held reel.
   - Continue lowering until completion of the circuit is indicated by illumination of the small light, a beep, or deflection of the ammeter needle.
   - Measure the length of cable in the well from the marked edge on the top of casing to the probe (depth to the water table) to the nearest 0.01 foot and subtract this length from the top of casing elevation to determine the water table elevation.
   - Record depth in the field logbook
6. Calculate the volume of water in the well.
7. Close monitoring well cap.
8. Hook up the pump in the monitoring well to the controller/compressor unit.
9. Purge the well using low flow techniques by removing water at a rate of approximately 300 ml/min. Keep track of the amount of water purged by filling and counting 5-gallon buckets. Disposal of purge water will follow procedures in the waste disposal plan.
10. Record field parameter readings every minute or half purge volume in the field log book. Purging will continue until three consecutive field parameter readings agree within 10 percent.
11. After the requisite volume has been purged, the samples can be collected.

Soil Vapor Parameters

Soil Vapor Parameter Measurement SOP

Purpose

The purpose of this procedure is to monitor oxygen, carbon dioxide, methane, lower explosive limit (LEL), and total organic hydrocarbon concentrations in soil vapor.

Scope

Standard field procedure for measuring oxygen, carbon dioxide, methane, lower explosive limit, total organic hydrocarbon concentrations in soil vapor.

Requirements

Measuring points are shallow (vadose zone only) and intermediate depth (deep vadose zone within the LNPL) piezometers

Sampling Equipment

- Landtec GA-90 gas analyzer (oxygen, carbon dioxide, LEL, and methane) and a MultiRAE organic vapor analyzer with photoionization detector PID
- 1 scfm vapor sampling vacuum pump
- Tygon and Teflon tubing, tubing connections
- 2-inch slip sleeve with gasket and labcock connections for measuring wells normally used for groundwater level measurements and/or sampling

Operating Procedures

1. Calibrate equipment according to manufacturer's instructions
2. Connect magnehelic gauge with Tygon tubing to the labcock valve on the top of the piezometer. If well, connect gauge to the labcock connection to the slip sleeve. Record pressure indication on gauge
3. Open labcock valve
4. Connect air sampling pump to well or piezometer and purge for 5 minutes
5. While air sampling pump is running, use Landtec GA-90 gas analyzer to measure oxygen, carbon dioxide, methane, and LEL
6. While air sampling pump is running, use the organic vapor analyzer to measure total vapor hydrocarbons
7. Repeat steps at other locations
8. Record readings

Soil Gas Pressure

Soil Gas Pressure Measurement SOP

Purpose

The purpose of this procedure is measure soil gas pressure at piezometers.

Scope

Standard field procedure for measuring soil gas pressures in piezometers.

Requirements

Soil gas pressure can be measured in piezometers screened in the vadose zone or monitoring wells open to the vadose zone. Screen depth of the well being used for measurement should be known beforehand. In addition, care should be exercised in making sure that an airtight seal between the gauge and the well exists.

Sampling Equipment

- 0 to 1 inch water Dwyer magnehelic gauge
- Miscellaneous Tygon and Teflon tubing, tubing connections
- 2-inch slip sleeve with gasket and labcock connections for measuring wells normally used for groundwater level measurements and/or sampling

Operating Procedures

1. Connect magnehelic gauge with Tygon tubing to the labcock valve on the top of the piezometer. If measuring pressure at a monitoring well, connect the gauge to the labcock connected to the slip sleeve.
2. Open labcock valve and measure soil pressure reading on gauge
3. Close the labcock valve and disconnect tubing from the labcock
4. Record pressure measurement
5. Plot readings on figure that shows monitoring point locations

X-Ray Fluorescence

TABLE OF CONTENTS

TABLE OF CONTENTS (cont'd)

TABLE OF CONTENTS (cont'd)

COMPLETE REWRITE, REVISION 1.0, DECEMBER, 1992

SUPERCEDES: SOP #1713, REVISION 0, 8/31/92

1.0 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to serve as a guide to the start-up, check out, operation, calibration, and routine use of the Spectrace 9000 field portable x-ray fluorescence instrument for field use in screening hazardous or potentially hazardous inorganic materials. It is not intended to replace or diminish the use of the Spectrace 9000 Operating Instructions. The Operating Instructions contain additional information for optimizing instrument performance and for utilizing different applications.

The procedures contained herein are general operating guidelines which may be changed as required, depending on site conditions, equipment limitations, limitations imposed by Quality Assurance\Quality Control (QA\QC) procedure or other protocol limitations. In all instances, the procedures finally employed should be documented and included in any or all final reports. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

1.1 Principles of Operation

X-ray Fluorescence (XRF) spectroscopy is a non destructive qualitative and quantitative analytical technique used to determine the chemical composition of samples. In a source excited XRF analysis, primary X-rays emitted from a sealed radioisotope source are utilized to irradiate samples. During interaction with samples, source X-rays may either undergo scattering (dominating process) or absorption by sample atoms in a process known as the photoelectric effect (absorption coefficient). This phenomenon originates when incident radiation knocks out an electron from the innermost shell of an atom creating a vacancy. The atom is excited and releases its surplus energy almost instantly by filling the vacancy with an electron from one of the higher energy shells. This rearrangement of electrons is associated with the emission of X-rays characteristic (in terms of energy) of the given atom. This process is referred to as emission of fluorescent X-rays (fluorescent yield). The overall efficiency of the fluorescence process is referred to as excitation efficiency and is proportional to the product of the absorption coefficient and the fluorescent yield.

1.1.1 Characteristic X-rays

The Spectrace 9000 utilizes characteristic X-ray lines originating from the innermost shells of the atoms: K, L, and occasionally M. The characteristic X-ray lines of the K series are the most energetic lines for any element and, therefore, are the preferred analytical lines. The K lines are always accompanied by the L and M lines of the same element. However, with energies much lower than those of the K lines, they can usually be neglected for those elements for which the K lines are analytically useful. For heavy elements such as cerium (Ce) (atomic number [Z]=58), to uranium (U, Z=92), the L lines are the preferred lines for analysis. The L_α and L_β lines have almost equal intensities, and the choice of one or the other depends on what interfering lines might be present. A source just energetic enough to excite the L lines will not excite the K lines of the same element. The M lines will appear together with the L lines.

The Spectrace 9000 Operating Instructions contain a table that identifies the X-rays (K or L) and elements measured for each excitation source.

An X-ray source can excite characteristic X-rays from an element only if the source energy is greater than the absorption edge energy for the particular line group of the element (e.g., K absorption edge, L absorption edge, M absorption edge). The absorption edge energy is somewhat greater than the corresponding line energy. Actually, the K absorption edge energy is approximately the sum of the K, L, and M line energies, and the L absorption edge energy is approximately the sum of the L and M line energies of the particular element.

Energies of the characteristic fluorescent X-rays are converted (within the detector) into a train of electric pulses, the amplitudes of which are linearly proportional to the energy. An electronic multichannel analyzer (electronic unit) measures the pulse amplitudes, which is the basis of a qualitative X-ray analysis. The number of counts at a given energy is representative of element concentration in a sample and is the basis for quantitative analysis.

1.1.2 Scattered X-rays

The source radiation is scattered from the sample by two physical processes: coherent or elastic scattering (no energy loss), and Compton or inelastic scattering (small energy loss). Thus, source backscatter (background signal) actually consists of two components with X-ray lines close together. The higher energy line is equal to the source energy. Since the whole sample takes part in scattering, the scattered X-rays usually yield the most intense lines in the spectrum. Furthermore, the scattered X-rays have the highest energies in the spectrum and, therefore, contribute most of the total measured intensity signal.

1.2 Sample Types

Solid and liquid samples can be analyzed for elements aluminum (Al) through uranium (U) with proper X-ray source selection and instrument calibration. Typical environmental applications are:

- Heavy metals in soil (in-situ or samples collected from the surface or from bore hole drillings, etc.), sludges, and liquids (e.g., lead (Pb) in gasoline)
- Light elements in liquids (e.g., phosphorus [P], sulphur [S], and chlorine [Cl] in organic solutions)
- Heavy metals in industrial waste stream effluents

The Spectrace 9000 can be powered from a 115-volt (or 220-volt) wall outlet or from its 4-hour capacity battery. It can be operated in temperatures ranging from 32 to 120° Fahrenheit (F). Furthermore, the probe and electronic unit may be exposed to a light rain. However, additional protection is provided when the system (electronic unit and probe) is contained in the optional water repellant carrying case.

5.2 Equipment and Apparatus List

5.2.1 Spectrace 9000 Analyzer System

The complete Spectrace 9000 Analyzer System includes:

- Analyzer unit for data acquisition, processing, and display
- Hand-held probe including:
  - High-resolution HgI_2 detector
  - Three excitation sources (^{55}Fe, ^{109}Cd, ^{241}Am)
  - Safety cover
- Probe laboratory stand with the following:
  - Base for table top use
  - Safety shield over sample
  - Positioning fixtures for standard 30-mm and 40-mm X-ray sample cups
- Interconnecting cable
- RS-232C Serial I/O Interface cable
- Two blank check samples
- Pure element check samples
- Battery charger
- Battery pack
- System carrying/shipping case
- Spectrace 9000 Operating Instructions, application software, and utilities software. The application software is specific to each unit and cannot be interchanged between different units. The software is identified by the serial number of the unit.

5.2.2 Optional Items

- 31-mm diameter sample cups
- XRF polypropylene film, 0.2 mil thick
- Field carrying case
- Peripheral devices such as a printer and IBM compatible Personal Computer (PC)
- Spare probe window assembly
- Spare battery pack, charger, and charger adaptor (required to charge spare battery outside of electronic unit)

See the Spectrace 9000 Accessories Price List for additional options.

For mobile lab or laboratory X-ray sample preparation accessories (such as drying ovens, grinders, sieves, etc.), consult general laboratory equipment suppliers.

5.2.3 Limits and Precautions

The probes should be handled in accordance with the following radiological control practices.

1. The probe should always be in contact with the surface of the material being analyzed, and that material should completely cover the probe opening (aperture) when the sources are exposed. Do not remove a sample or move the probe while the indicators show SOURCE ON.

   SOURCE ON indicators are:

   - the message on the screen "SOURCE ON"
   - the flashing light at the base of the probe.

2. When the sources are exposed, under no circumstances should the probe be pointed at the operator or surrounding personnel.

3. Do not place any part of the operator's or co-worker's bodies in line of exposure when the sources are exposed or partially covered.

4. The probe must be covered with the safety cover or laboratory safety shield when not in use.

5.4.2 Further Information and Troubleshooting

Refer to the Spectrace 9000 Operating Instructions for additional detailed operational and/or maintenance and troubleshooting instructions. If no solution is found in the manual, contact Spectrace Instruments for assistance.

An instrument log should be maintained to document specific corrective actions taken to alleviate any instrumental problems, or for recording any service that has been performed.

6.0 REAGENTS

Generally, calibration standards are not necessary for site screening and extent of contamination analyses with the Spectrace 9000. Optionally, an application (only the Soil Sample application will be discussed here) can be optimized or verified to be 1:1 proportional to another analytical (reference) method (see Section 9.3 and 10.1). This can be done by analyzing a set of Site-Specific Calibration Standards (SSCS) and performing a regression analysis on the reference (dependent) and the Spectrace 9000 results (independent) for each element of concern. In an application, any element's calibration can be adjusted by entering the desired slope and offset (intercept) in the Adjust Calibration menu. If any element's calibration has been adjusted in an application, "adj" will appear on the results screen. An adjusted element calibration can always be changed back to the initial slope and offset values of 1 and 0, respectively.

6.1 Site-Specific Calibration Standards (SSCS)

SSCS must be representative of the matrix to be analyzed by XRF. The concentration of the target elements in the SSCS should be determined by independent AA or ICP analyses that meet acceptable quality levels for referee data.

6.1.1 SSCS Sampling

See Section 4.2 on sample representivity. The SSCS samples must be representative of the matrix to be analyzed by XRF. It senseless to collect SSCS samples in the site containment area if you are interested in investigating off-site contaminant migration. The matrices may be different and could affect the accuracy of the XRF results. If there are two different matrices on site, collect two sets of SSCS samples.

A full range of target element concentrations is needed to provide a representative calibration curve. Mixing high and low concentration soils to provide a full range of target element concentrations is not recommended due to heterogeneity problems. Unlike liquid samples, solid samples cannot be diluted and re-analyzed.

Additionally, collect several SSCS samples in the concentration range of interest. If the action level of the site is 500 mg/kg, use of several SSCS samples will tend to improve the XRF analytical accuracy in this concentration range.

Generally, a minimum of seven appropriate SSCS samples should be taken. A minimum sample size of 4 oz. is recommended. A larger size sample should be taken to compensate for sites with greater content of nonrepresentative material such as rocks and/or organic debris. Standard glass sampling jars should be used.

6.1.2 SSCS Preparation

The SSCS samples should be either air dried overnight, or oven dried at less than 105° C. Oven drying invalidates mercury analysis. Aluminum drying pans or large plastic weighing boats for air drying may be used. After drying, remove all large organic debris and non-representative material (twigs, leaves, roots, insects, asphalt, rocks, etc.).

The sample should be sieved through a 10-mesh stainless steel sieve. Clumps of soil and sludge should be broken up against the sieve using a stainless steel spoon. Pebbles and organic matter remaining in the sieve should be discarded. The undersize fraction of the material constitutes the sample.

Although a maximum final particle size of 10-mesh is normally recommended, a smaller particle size may be desired. The sample should be mixed by dividing the sieved soil into quarters and physically mixing opposite quarters with a clean stainless steel spoon. Recombine and repeat the quartering and mixing procedure three times. Place the sieved sample in a clean glass sample jar and label it with both the site name and sample identification information.

The stainless steel sieves should be decontaminated using soap and water. They should be dried between samples.

One or more plastic XRF sample cups should be filled with the sieved soil for each SSCS sample. A piece of 0.2-mil polypropylene film should be cut and stretched (wrinkle-free) over the top of the X-ray sample cup and then sealed using the plastic securing ring. The cup should be labeled using both the site name and specimen identification information.

Either the XRF sample cup or the balance of the prepared sample is submitted to the approved laboratory for AA or ICP analysis of the requested element(s).

7.0 PROCEDURE

7.1 Prerequisites

If the Spectrace 9000 will be used in a location where AC power outlets are conveniently accessible, connect the battery charger to the electronic unit and plug the charger cord into the outlet. The probe cable must be connected before switching on the power. Plugging and unplugging this cable with the power on can damage the detector.

To connect the battery, set the electronics unit on its face and use a flat blade screwdriver to loosen the two one-quarter turn fasteners on the back. Remove the battery pack. Inside, find the cord with the red cap covering the three-pronged plug. Remove the cap and plug it into the battery pack. Put the battery pack into the unit and tighten the fasteners.

Apply power to the Spectrace 9000 by pressing the <ON> button. The electronic unit may not come on with the battery charger hooked up if the battery has been totally drained. The drained battery may require a 10 minute charge prior to startup. In a few seconds the display shows the version of software. If necessary, adjust the contrast knob located on the underside of the front display. This knob can be turned so far that the display appears blank.

The initial screen displays for about 10 seconds and then a prompt will ask if the time and date are set correctly. The date MUST be set correctly otherwise serious errors in source-decay compensation can result. Additionally, results tables include the time and date of analysis. The main menu appears after the time and date screens.

If a "battery low" message appears, recharge or change the battery before proceeding, or operate the unit using line voltage.

Allow the Spectrace 9000 to warm up for approximately 30 minutes after it has been turned on before performing analysis.

7.1.1 Gain Control

Automatic gain compensation is a feature of both Soil and Thin Samples applications, which allows operation of the instrument over a wide range of ambient temperatures and from one day to another without standardization. To maintain gain control compensation, it is necessary to occasionally operate with a minimum acquisition time of 50 seconds on the Cd-109 source. If the automatic gain control fails or is out of range, an error message will appear on the screen. If the error message continues to appear after repeat analyses, then the Cd-109 measurement time should be checked and/or an energy calibration should be performed. If the problem continues, contact Spectrace Instruments for help.

7.1.2 Setting Data and Spectrum Store/Send Mode

The Set store/send modes option is located in the More screen which can be accessed from the main menu. Data and/or Spectrum storage must be enabled for automatic on-board storing to occur. Sufficient memory is available to store up to 300 sets of analysis results and up to 120 spectra (40 samples since each sample has three spectra). When the available memory is full, the respective spectra or results storage mode is automatically disabled. The spectra or results memory must be cleared (deleted) and the respective store mode enabled before results and/or spectra can be stored again.

7.2 General Keys and Menu Software

This section outlines the general keys and basic menu software. Flow charts which describe the menu structure in detail are located on pages 4-13 through 4-17 in the Spectrace 9000 *Operating Instructions*.

7.2.1 The Keyboard

The row of numeric keys under the LCD screen performs functions defined by labels (a menu) written to the bottom line of the display by the Spectrace 9000 software. As the operator moves through the various menus, the keys are redefined to provide an efficient user interface.

The keypad to the right of the screen is used for numeric entry. The <Cont/Pause> key (referred to as the <Cont>) is used:

- to enter information as an <Enter> key
- to begin an analysis
- to pause an analysis in progress

The left arrow <-> key is used to edit entries before pressing <Cont>.

7.2.2 The Measure (Ready) Screen

This main menu selection displays the application name, revision date, measurement time for each source, and accesses other options (see flow diagrams in Spectrace 9000 Operating Instructions).

7.2.3 The Choose an Application Screen

This main menu selection lists the applications currently loaded in the unit. Applications are selected and source measurement times may be modified in this screen (see flow diagrams in Spectrace 9000 Operating Instructions).

7.2.4 The Review Stored Results Screen

This main menu selection lists the stored results. *Up* and *Down* scroll are used on many screens. When *Up* and *Down* are displayed, pressing the <0> (zero) key will toggle to *PgUP* and *PgDN* for rapid movement through long lists. Stored results may be reviewed, deleted, or downloaded to the COM port (see flow diagrams in Spectrace 9000 Operating Instructions).

7.3.3 Blank (Zero) Sample Check

The blank (Zero) sample check is performed to monitor the instrument's zero drift in the selected application. The blank sample check and the *Aquire Background Data* operation (discussed below) only apply to the application currently selected. This should be done once at the beginning of the day, after an energy calibration, after loading an application, and whenever the instrument exhibits a persistent drift on a blank or low-level sample.

Mount the probe in the laboratory stand and select the *Soil Samples* application. Disable the display thresholds. This will permit results less than one standard deviation (STD) to be displayed (even negatives). Measure the quartz blank provided with the unit (or a "clean" sand sample) using a minimum acquisition time of 60 seconds for each source. Review the results table. Most (95%) of the elemental results for elements number 24 (Cr) and higher in the periodic table should be within 2 standard deviations of zero ($0 \pm 2 \cdot |STD|$), and all of them (99%) should be within 3 standard deviations ($0 \pm 3 \cdot |STD|$). Repeat the measurement if the unit fails to meet these specifications. If several elements continue to be significantly out of these specifications, check the probe window and the blank sample for contamination or perform the *Acquire background data* operation located in the Measure (Ready) screen option. Perform the blank (Zero) sample check again. Save the results and spectra for documentation. Enable the display thresholds prior to sample analysis after the blank sample check procedure is completed.

7.3.4 Target Element Response Check

The purpose of the target element response check is to ensure that the instrument and the selected application are working properly prior to performing sample analysis. This check should be performed at the beginning of the day. Use low, mid, and high samples, or standards with known concentrations for some or all of the target elements to be checked. Select a low sample near the quantitation limit of the target elements. Select a mid sample near the site action level and a high sample near the maximum concentration of the target elements expected on site.

These samples should be measured using the same source acquisition times that will be used for sample analysis. Save the sample check results and spectra for documentation.

7.4 Selecting Source Measuring Time

The source measuring time may be modified under the Measure screen. Zero (seconds) measuring time should never be selected for any source for any application. Generally, the element detection limit is reduced by 50 percent for every four-fold (x4) increase in source measuring time. Although counting statistics improve as measurement time increases, the

practical limit for typical applications is 600 to 800 seconds. The elements are grouped together according to the radioisotope used for their excitation with typical minimum detection limits shown in Sections 7.4.2. and 7.4.3.

Automatic gain compensation is a feature of both the Soil and Thin Samples applications which allows operation of the instrument over a wide range of ambient temperatures and from one day to another without standardization. To maintain this gain control compensation, it is necessary to occasionally operate with a minimum acquisition time of 50 seconds on the Cd-109 source.

The *Real/live* option toggles between real time (true clock time) and live time (total time the instrument is counting). The latter adds time to the analysis to correct for the time the system is busy processing pulses.

7.4.1 Minimum Source Measuring Times

A minimum measuring time (real or live) of 15 seconds for the Fe-55 source, 30 seconds for the Cd-109 source, and 10 seconds for the Am-241 source is recommended when using the Soil Samples application. Measuring times for a source that excites a target element can be increased if lower detection limits are required.

When using the Thin Samples application, the measuring time for any source may be reduced to 10 seconds if the source does not excite a target element since this application does not correct for interelement effects. If a source excites a target element, a minimum measuring time (real or live) of 60 seconds for the Fe-55 source, 60 seconds for the Cd-109 source, and 120 seconds for the Am-241 source is recommended.

A minimum of 60 seconds is recommended for the Cd-109 source when using the PbK in Paint application.

7.4.2 Typical Minimum Detection Limits (MDLs) for the Soil Samples Application

For source measuring times of 60 seconds, typical element MDLs (in milligram per kilogram, mg/kg) for the Soil Samples application are:

Source	Element	MDL (mg/kg)
Fe-55	Potassium (K)	325
	Calcium (Ca)	150
	Titanium (Ti)	110
	Chromium (CrLo)	180
Cd-109	Chromium (CrHi)	525
	Manganese (Mn)	410

	Iron (Fe)	225
	Cobalt (Co)	205
	Nickel (Ni)	125
	Copper (Cu)	90
	Zinc (Zn)	70
	Mercury (Hg)	60
	Arsenic (As)	50
	Selenium (Se)	35
	Lead (Pb)	30
	Rubidium (Rb)	10
	Strontium (Sr)	10
	Zirconium (Zr)	10
	Molybdenum (Mo)	10
Am-241	Cadmium (Cd)	180
	Tin (Sn)	100
	Antimony (Sb)	65
	Barium (Ba)	20

NOTE: These typical MDLs are provided as an aid for selecting source measurement times; observed values for a given situation may vary depending on the matrix of the soil standard used to calculate MDLs, age of sources, moisture content, and other factors discussed in Section 4.

Generally, the detection limit is reduced by 50 percent for every four-fold (x4) increase in source measuring time. Additionally, more elements may be added to the Soil Samples application. Contact Spectrace Instruments for information about modifications to applications.

7.4.3 Typical Minimum Detection Limits (MDLs) for the Thin Samples Application

For source measuring times of 200 seconds for the Fe-55 and Cd-109 sources, and 800 seconds for the Am-241 source, typical element MDLs (in microgram per square centimeter, $\mu g/cm^2$) for the Thin Samples application are:

Source	Element	MDL ($\mu g/cm^2$)
Fe-55	Potassium (K)	0.40
	Calcium (Ca)	0.20
	Titanium (Ti)	0.15
	Chromium (CrLo)	0.40
Cd-109	Chromium (CrHi)	0.90
	Manganese (Mn)	0.65
	Iron (Fe)	0.65
	Cobalt (Co)	0.50
	Nickel (Ni)	0.30
	Copper (Cu)	0.65

	Zinc (Zn)	0.40
	Mercury (Hg)	0.45
	Arsenic (As)	0.40
	Selenium (Se)	0.15
	Lead (Pb)	0.50
	Rubidium (Rb)	0.10
	Strontium (Sr)	0.10
	Zirconium (Zr)	0.15
	Molybdenum (Mo)	0.10
Am-241	Cadmium (Cd)	2.5
	Tin (Sn)	2.5
	Antimony (Sb)	1.5
	Barium (Ba)	0.70

NOTE: These typical MDLs are provided as an aid for selecting source measurement times; observed values for a given situation may vary depending on the thin sample standard used to calculate MDLs, age of sources, and other factors discussed in Section 4.

Generally, the detection limit is reduced by 50 percent for every four-fold (x4) increase in source measuring time. Use of thick filters or filters with high background or contamination will result in higher MDLs and require a background subtraction. Additionally, more elements may be added to the Thin Samples application. Contact Spectrace Instruments for information about modifications to applications.

7.5 Sample Handling and Presentation

When making XRF measurements, be sure to maintain constant measurement geometry in order to minimize variations in analysis results. Document any anomalies in measurement geometry, sample surface morphology, moisture content, sample grain size, and matrix (see Section 4.0).

7.5.1 Soil Samples

Soil samples may be analyzed either in-situ or in prepared X-ray sample cups. The Soil Samples application assumes the sample to be infinitely thick. For in-situ measurements this is almost always the case. However, for sample cup measurements it is advisable to fill the cup nearly full and tap it on the bench to compact the soil. This ensures that the sample is as uniformly thick as possible from analysis to analysis. The Spectrace 9000 laboratory stand and safety shield should be used when analyzing sample cups.

The definition of the PMDL is three times the calculated standard deviation value.

The definition of the PMQL is 10 times the calculated standard deviation value.

9.1.2 The Method Minimum Detection Limit (MMDL) and Method Quantitation Limit (MQL)

The MMDL and MQL may be calculated from the measurement of either a low or blank sample, (or a SSCS selected as described in section 6.1), at the start and end of sample analysis, and after approximately every tenth sample (a daily total of seven measurements is recommended). Alternatively, the quartz blank or "clean" sand may be used if a blank soil or sediment sample is unavailable.

Disable the display thresholds. This will permit results less then one standard deviation (STD) to be displayed (even negatives). Measure the sample using the same application and measuring time used for the samples. Enable the display thresholds prior to analyzing the next sample.

The sample standard deviation of the mean for each target element is calculated. If the standard deviation has a fractional component, round up to the next whole number prior to calculating the MMDL and MQL.

The definition of the MMDL is three times the calculated standard deviation value.

The definition of the MQL is 10 times the calculated standard deviation value.

9.2 Reporting Results

All raw XRF data should be reported including the individual results of multiple analyses of samples and sampling points. The average and concentration range of each multiple analysis should also be reported.

A "reported" value for each analysis or average of multiple analyses should be processed in the following manner.

1. Round the value to the same degree of significance contained in the SSCS sample assay values (usually two) if the element's calibration has been adjusted (see Section 6.0).

2. Report all values less than the MMDL as not detected (ND).

3. Flag and note all values greater than or equal to the MMDL and less than the MQL (usually with a "J" next to the reported value).

4. Report all values equal to or greater than the MQL and within the linear calibration range (if the element's calibration has been adjusted [see section 6.0]).

5. Flag and note all values above the linear calibration range (greater than the highest SSCS used in the calibration adjustment procedure) if SSCS were used and the calibration was adjusted.

9.3 Accuracy

Accuracy, relative to a specific digestion method and elemental analysis procedure, is determined by submitting an XRF analyzed sample (prepared sample cups may be submitted) for AA or ICP analysis at a laboratory.

The on-site analysis of soils by XRF instrumentation should be considered a screening effort only (QA1 data). Data derived from the instrument should be used with discretion. Confirmatory analyses on a subset of the screening samples (minimum 10 percent) can be used to determine the quality of the screening data (QA2 data). The confirmation samples should ideally be selected randomly from the sample set and include a number of samples at or near the critical level. The results of the metal analysis (dependent) and the XRF analysis (independent) are evaluated with a regression analysis. The correlation factor (R^2) should be 0.7 or greater.[3]

XRF results may be multiplied by the slope prior to substitution for metal analysis results in contouring, kriging programs, or removal volume estimates. Correcting the XRF results based on confirmatory analyses should only be undertaken after careful consideration. It must be understood that the confirmatory analysis (AA or ICP) is an estimate of the concentration of metal contamination and is dependent upon the specific instrumentation and sampling methodology used. Since XRF is a total elemental technique, any comparison with referee results must account for the possibility of variable extraction, dependent upon the digestion method used and its ability to dissolve the waste or mineral form in question.

9.3.1 Matrix Considerations

Other types of QA/QC verification should include verification that the instrument calibration is appropriate for the specific site to be assessed. This includes verification of potential multiple soil matrix types that may exist at a site. Matrix differences which affect the XRF measurement include large variations in calcium content, which may be encountered when going from siliceous to calcareous soils, as well as large variations in iron content.

10.0 DATA VALIDATION

10.1 Confirmation Samples

Confirmation samples are recommended at a minimum rate of 10 percent and are required if QA2 data objectives have been established for site activities.[2] Ideally, the sample cup that was analyzed by XRF should be the same sample that is submitted for AA/ICP analysis. When confirming an in-situ analysis, collect a sample from a 6-inch by 6-inch area for both an XRF measurement and confirmation analysis.

The XRF and metals results are analyzed with a regression analysis using a statistical program such as SAS® or Statgraphics® with the intercept calculated in the regression. The correlation factor between XRF and AA/ICP data must be 0.7 or greater for QA2 data objectives.[2]

10.2 Recording Results

Record all results and monitoring activities in a laboratory or field notebook. Alternatively, record results electronically on a hard drive or floppy disk.

10.3 Downloading Stored Results and Spectra

Results (analytical reports) and spectra which have been stored in the Spectrace 9000 internal memory should be downloaded and captured in disk files on a PC (see section 5). Spectrace Instruments provides software for this purpose. Additionally, they provide software to prepare results or spectra for importing into a spreadsheet. Refer to the instructions provided with the programs for details on their operation.

Alternatively, other software with terminal data logging capabilities may be used to capture results and spectra to disk files.

After capturing results to a file, print a copy and save both the disk files and the printout for future reference and documentation purposes.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA, corporate and/or any other applicable health and safety practices.

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APPENDIX A
Figures
SOP #1713
December, 1992

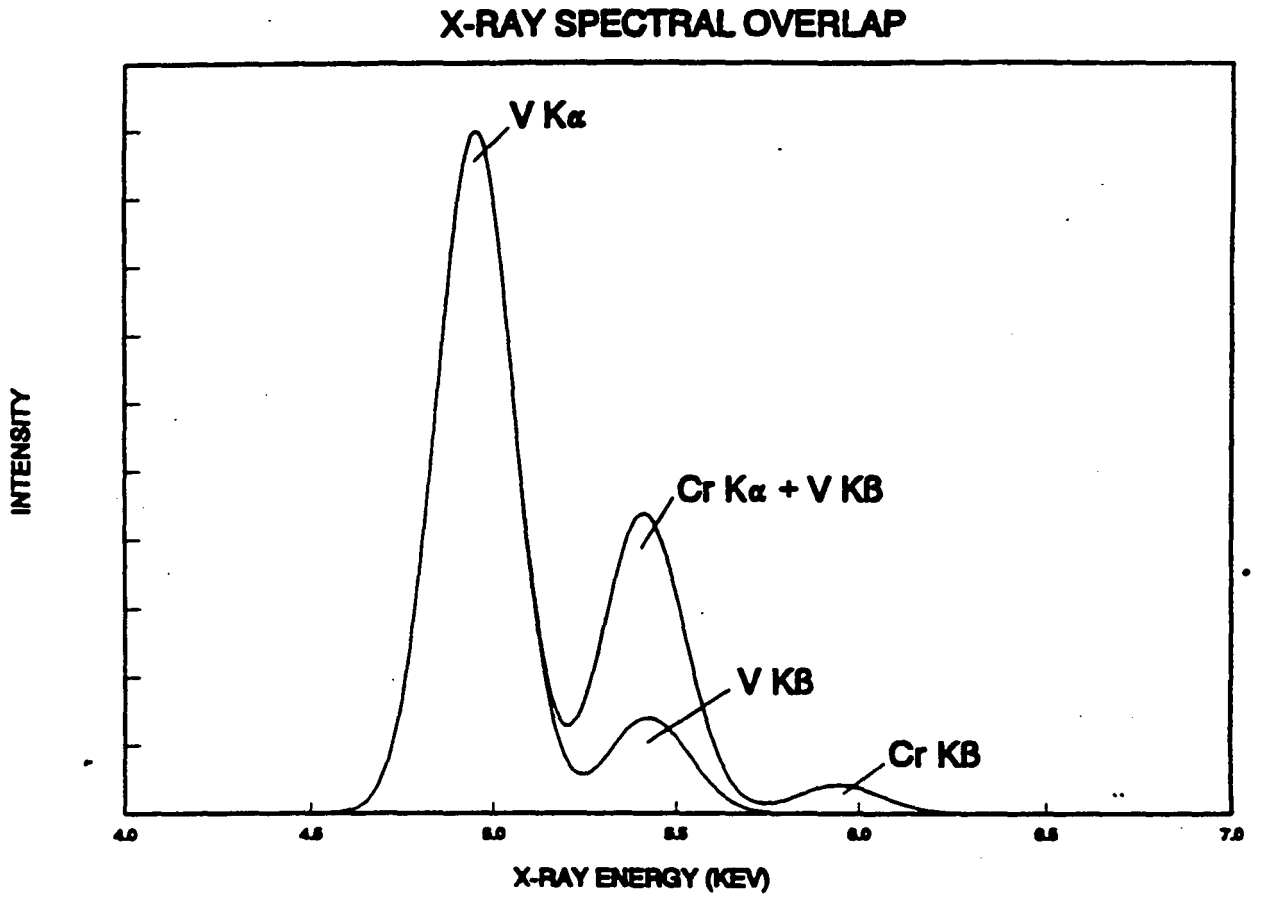

FIGURE 1. X-Ray Spectral Plot Showing Overlap of Vanadium K_α X-Rays in the Chromium K_α Measurement Region.

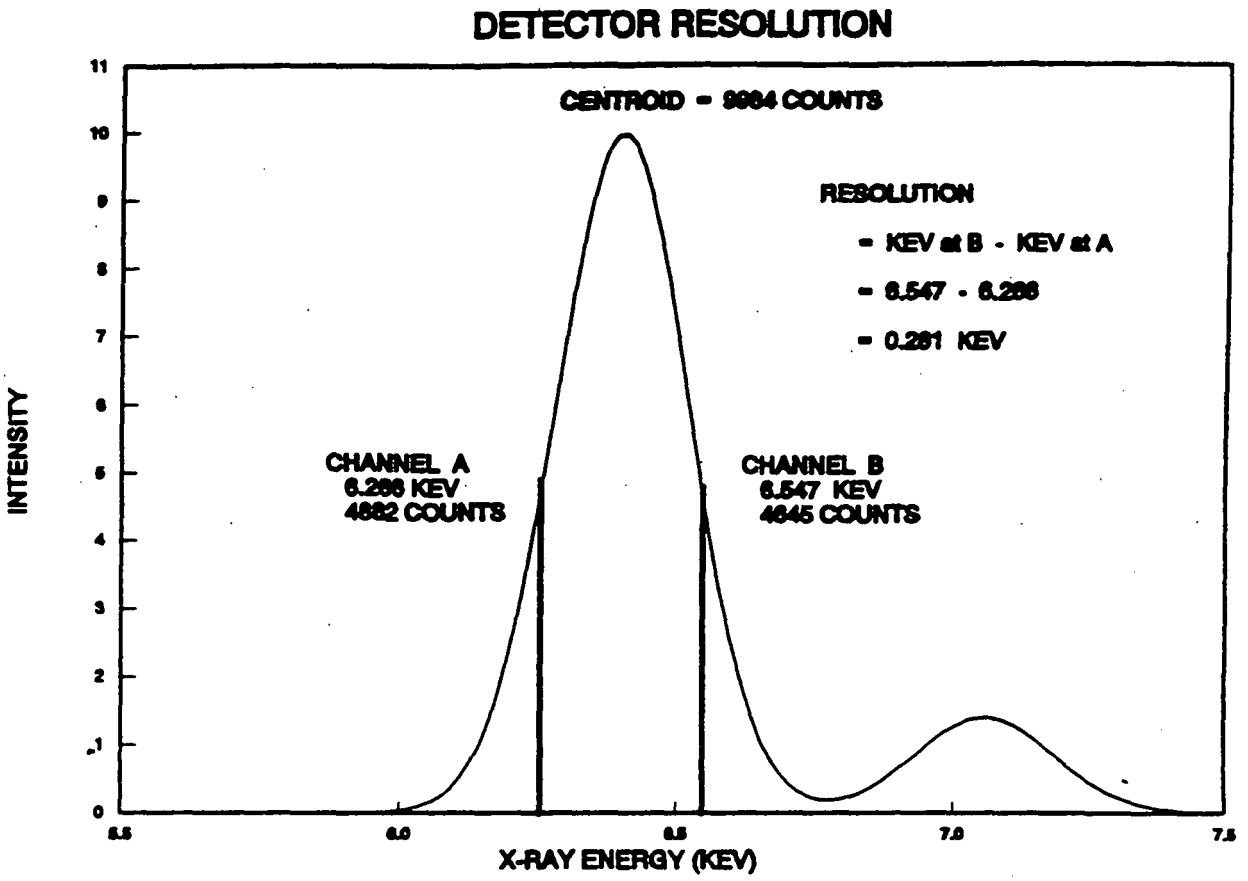

FIGURE 2. Iron X-Ray Spectrum Illustrating Detector Resolution Measurement.

DATA MANAGEMENT PLAN

Penta Wood Products
Town of Daniels, Wisconsin

Remedial Construction

WA No. 040-RDRD-05WE/Contract No. 68-W6-0025
November 1999

1.0 Introduction

This Data Management Plan (DMP) outlines the procedures for storing, handling, accessing, and securing data collected during the Penta Wood Products (PWP) Remedial Action (RA) construction. Data gathered during the RA field investigation will be compiled, and the data gathered during previous site investigations will be consolidated and compiled into a project environmental database system which can be used to evaluate site conditions and data trends. This DMP will serve as a guide for all database users. The DMP is subject to future revision to allow the database management system to be modified as it is developed and maintained.

Data management for the PWP project has the following objectives:

- Establish a controlled, functional, and efficiently operated data management system and accompanying procedures to manage, analyze, document, and transfer the environmental data that are collected and generated in support of the RA
- Maintain a usable and accurate database throughout the life of the PWP project
- Process specific data requests in support of the RA
- Transfer the database or specific data components to other parties, as appropriate
- Archive the database and related documentation upon project closeout

2.0 Data Types

RA activities performed at the PWP site will involve accessing a number of different types of data collected or retained for a variety of uses. The following description of the project database's contents is based on the available data and data to be collected as part of the RA.

3.0 Data Tracking and Management

3.1 Hard Copy

Measurements made during field data collection activities will be recorded in field logbooks. Field data will be reduced and summarized, and will be stored with the field logbooks.

All raw analytical laboratory data is stored as the original hard copy. Hard copy information includes chain-of-custody forms, analytical bench sheets, instrument printouts and chromatograms, certificates of analyses, and QA/QC report summaries.

3.2 Data Input Procedures

Sampling information, analytical results, applicable QA/QC data, and data validation qualifiers will be entered into an environmental database for storage and retrieval during data evaluation and report development. The data will be electronically entered into the database from files received from the analytical laboratory. The data entry will be checked

by printing out data reports and manually comparing them to the validated summary analytical forms received from the USEPA validators. CH2M HILL will evaluate the validation summary forms.

3.3 Computer Database

The computer database system uses Structured Query Language (SQL) combined with a macro-programming language and software tools for building menus, on-line forms, and report formats. The database will be based on a relational model, in which independent tables containing fields of data can be linked through selected fields that are common to two or more tables. This database design allows inclusion of the historical data. It also allows users to effectively conduct trend analysis and generate a variety of data reports that aid data interpretation and report generation.

3.4 Access and Security

The database must be protected from unauthorized access, tampering, accidental deletions or additions, and data or program loss that can result from power outages or hardware failure. The following procedures will be adopted to ensure this protection:

- A copy of the master database will be stored on the local area network (LAN) file server computer and will be protected with file passwords known only to the Data Administrator. The Data Administrator is the only person who will be authorized to modify the master database.
- The master database will be archived onto 3.5-inch diskettes and stored at a secure location. The disks will be backed up whenever changes are made to the master database. Before archiving, the data will be compressed to reduce storage using the PKZIP utility from PKWARE, Inc.
- A copy of the master database will be placed on the LAN under a directory with limited "read only" access rights to users, which will permit readers to only copy or view the data. Whenever the master database is modified, it will be recopied to the LAN to ensure that the current copy is available to users.

The LAN copy of the master database will be backed up through the standard LAN backup procedures that are administered by the Regional Computer Center support staff. These backups occur each day.

3.5 Documentation

Documentation of data management activities is critical because it provides:

- A hard copy record of project data management activities
- Reference information critical for database users
- Evidence that the activities have been properly planned, executed, and verified
- Continuity of data management operations when personnel changes occur

This DMP will serve as the initial general documentation of the project data management efforts. Additional documentation will also be maintained to document specific issues such

as database structure definitions, database inventories, database maintenance, user requests, database issues and problems, and client contact.

3.6 Evidence File

The final evidence file will be the central repository for all documents that constitute evidence relevant to sampling and analysis activities. CH2M HILL is the custodian of the evidence file and maintains the contents of the evidence files for the RA, including all relevant records, reports, logs, field notebooks, pictures, subcontractor reports, and data reviews in a secured, limited access area under the custody of CH2M HILL.

All records will be kept by CH2M HILL until project completion and project closeout. As necessary, records may be transferred to an offsite records storage facility. The records storage facility must provide secure, access controlled storage of records. Records of raw analytical laboratory data, quality assurance data, and reports will be kept by the subcontract laboratory for a minimum of 5 years.

4.0 Presentation of Site Characterization and Remediation Verification Data

Depending on the data user needs, data presentation may consist of, but not be limited to, any of the following formats:

- Spreadsheet presentations of data summaries or raw data
- Figures showing concentration isopleths, location-specific concentrations, or risk-based concentration isopleths
- Tables providing statistical evaluation results or calculation results
- Presentation tools such as ARCINFO or other similar analysis/presentation aids