U-007-303.25

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REGULATORY COMPLIANCE PLAN FOR OPERABLE UNIT 5 (OU5) AND INTEGRATED DEMONSTRATION (ID) REMEDY SELECTION SOIL WASHING APRIL 1993 DRAFT

DOE-ORO/EPA

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REPORT

Regulatory Compliance Plan

For Operable Unit 5 (OU5) and

Integrated Demonstration (ID)

Remedy Selection

Soil Washing

April 1993

U.S. Department of Energy

Oak Ridge Operations Office

DRAFT

TABLE OF CONTENTS

		Page
List of Acronyms		iv
1.0	Introduction	1-1
	1.1 Purpose of Operable Unit 5 Soil Washing Regulatory Compliance Plan	1-1
	1.2 Site Description	1-1
	1.2.1 Site History	1-1
	1.2.2 Nature and Extent of Soil Contamination	1-2
2.0	Soil Washing Technology Description	2-1
	2.1 Physical Separation	2-1
	2.2 Chemical Separation	2-2
3.0	Purpose of the Soil Washing Demonstration	3-1
	3.1 Treatability Study Approach	3-1
	3.2 Purpose of Treatability Study	3-1
	3.3 Remedy Selection Testing	3-2
	3.4 Relationship of Treatability Data to FS Evaluation Criteria	3-2
4.0	Soil Washing Process Description	4-1
	4.1 Physical Separation	4-1
	4.2 Chemical Extraction Process	4-3
	4.3 Equipment Description	4-3
	4.3.1 Conveyor	4-4
	4.3.2 Trommel Screen	4-4
	4.3.3 Vibrating Screen	4-4
	4.3.4 Attrition Scrubber	4-4
	4.3.5 Multigravity Separator	4-5
	4.3.6 Hydrocycline	4-5
	4.3.7 Centrifuge	4-5
	4.4 Process and Reagent Storage Tanks	4-5
	4.4.1 Filter Press	4-6
	4.4.2 Heat Exchangers	4-6
	4.4.3 Reactor Vessels	4-6
	4.4.4 Pumps	4-7
5.0	Regulatory Requirements and Implementation	5-1
	5.1 CERCLA, Section 121	5-1
	5.2 Consent Agreement, Section XIII	5-1
	5.3 Ohio EPA Permits	5-2
	5.4 RCRA RD&D Permit	5-3
	5.5 NESHAP	5-5
	5.6 National Environmental Policy Act	5-6

TABLE OF CONTENTS
(Continued)

6.0 Handling and Storage of the Remedy Selection Testing Soil and Water 6-1
6.1 Treated Soil and Water Performance Assessment 6-1
6.2 Storing Treated Soil and Water 6-1
7.0 Meeting Regulatory Requirements and Guidance 7-1
7.1 Protecting Human Health and the Environment 7-1
7.2 Safety Evaluation 7-1
7.2.1 Industrial Safety 7-1
7.2.2 Radiation Protection 7-1
7.2.3 Wash Water Cleaning Operation 7-2
7.2.4 Soil Cleaning Operation 7-2
7.2.5 Soil Retrieval and Delivery 7-2
7.2.6 Contamination Levels/Dose Rates 7-2
7.2.7 Hazard Assessment 7-3
7.2.8 Fire Protection 7-3
7.3 Potential Safety Requirements 7-3
7.3.1 Industrial Safety 7-3
7.3.2 Soil Cleaning Operation 7-3
7.3.3 Soil Retrieval and Delivery 7-3
7.3.4 Removal/Remedial Activities 7-3
7.3.5 Contamination Levels/Dose Rates 7-3
7.3.6 Fire Protection 7-4
7.3.7 Exhaust Modification 7-4
7.3.8 Storage 7-4
7.3.9 Decontamination 7-4
References

Appendices

A. Appendix I - Initial Soils Characterization Data for the OU5 Soil Washing Treatability Project.

B. Appendix II - NESHAP Supporting Documentation Calculation of the Effective Dose Equivalent.

C. Appendix III - Supporting Documentation of NPDES Impact.

D. Appendix IV - Supporting Documentation for the NEPA Categorical Exclusion.

E. Appendix V - ARAR Document.

LIST OF ACRONYMS

μg/g	microgram/gram
ARAR	applicable or relevant and appropriate requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CWA	Clean Water Act
DOE	U.S. Department of Energy
EDE	effective dose equivalent
EPA	U.S. Environmental Protection Agency
FEMP	Fernald Environmental Management Project
FERMCO	Fernald Environmental Management Company of Ohio
FRP	fiberglass reinforced plastic
gpm	gallons per minute
HSL	Hazardous Substance List
ID	Integrated Demonstration
MGS	multigravity separator
mm	millimeter
Mtu	metric tons of uranium
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NPDES	National Pollution Discharge Elimination System
NRC	Nuclear Regulatory Commission
OEPA	Ohio Environmental Protection Agency
OSHA	Occupational Safety and Health Administration
OU5	Operable Unit 5
pCi/g	picocuries/gram
PEE	Preliminary Engineering Evaluation
PTI	Permit to Install
PTO	Permit to Operate
QA/QC	quality assurance/quality control
RD&D	Research, Development and Demonstration
RI/FS	Remedial Investigation and Feasibility Study
RAO	remedial action objectives
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RWP	Radiation Work Permit
SAR	Safety Analysis Report
TCLP	Toxicity Characteristics Leaching Procedure
TSD	treatment, storage, or disposal
TSWP	Treatability Study Work Plan
tph	tons per hour

1.0 INTRODUCTION

1.1 PURPOSE OF OPERABLE UNIT 5 SOIL WASHING REGULATORY COMPLIANCE PLAN

The Operable Unit 5 and Integrated Demonstration (ID) Regulatory Compliance Plan presents the regulatory compliance framework for conducting an on-site remedy selection soil washing demonstration for Operable Unit 5 soils. This document is intended to address the compliance issues relative to the soil washing demonstration in concurrence with the requirements of U.S. Environmental Protection Agency (EPA), the Ohio Environmental Protection Agency (OEPA), the U.S. Department of Energy (DOE), and other organizations involved in remediation at the Fernald Environmental Management Project (FEMP).

Because there are a large number of regulatory compliance issues involved in an on-site soil washing demonstration, Operable Unit 5/ID management understands the need and importance for a pro-active approach to develop and review technical and programmatic documents. Both federal and state regulatory agencies, as well as DOE, will need a clear understanding of the technical and regulatory aspects of the program. Consequently, this document will provide information relating to DOE, EPA, OEPA, and Fernald Environmental Management Company of Ohio (FEMCO).

The soil washing pilot plant demonstration (Remedy Selection testing) is in support of the Remedial Investigation and Feasibility Study (RI/FS) and in compliance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The Treatability Study Work Plan (TSWP) for Operable Unit 5 Soil Washing has been approved by both OEPA and EPA. The intent of this Remedy Selection testing is to evaluate a remedial alternative relative to the nine RI/FS evaluation criteria. This is outlined in Section 1.3.4 of the TSWP. To accomplish these goals and provide the necessary information, the relationship between the soil washing data generated and these evaluation criteria will be determined. A brief background of the FEMP and an overview of the Operable Unit 5/ID program is provided in the following paragraphs.

1.2 SITE DESCRIPTION

1.2.1 Site History

A variety of chemical and metallurgical processes were used at the FEMP for the manufacture of uranium products. These manufacturing processes occurred largely within the former production area, which covers approximately 136 acres near the center of the FEMP and consists of several processing plants and waste storage areas. The Pilot Plant was completed in 1951 and was the first operational facility at the FEMP. The Pilot Plant housed many different processes including thorium metal production, uranium metal production, and uranium hexafluoride reduction. The metals fabrication plant, Plant 6, began operations in 1952. The metal production plant, Plant 5; the green

salt plant, Plant 4; the recovery plant, Plant 8; the sampling plant, Plant 1; and the refinery (Plant 2/3) began operating in 1953. A uranium hexafluoride reduction plant, Plant 7, and the special products plant, Plant 9, were operational in 1954.

Production peaked in 1960 at approximately 10,000 metric tons of uranium (mtu) per year. A production decline began in 1964, reaching a low of about 1230 mtu in 1975. During the 1970s, consideration was given to closing the FEMP; therefore, capital improvements and staffing were minimized. In 1981 the FEMP began to accommodate increased production requirements. Production levels significantly increased and there was a rapid-staff buildup for several years; implementation of a major facilities restoration program followed. Then production ceased in the summer of 1989 to focus plant resources on the environmental restoration program. The FEMP was officially closed in June 1991.

1.2.2 Nature and Extent of Soil Contamination

Surface soil in the vicinity of the FEMP has become contaminated from a variety of sources. Overall, the site has received a dusting of airborne uranium from the stacks in the Production Area. Additional airborne material has been released in the Waste Storage Area by dust blown from the disposal pits and tracking of contamination by vehicles. The incinerator in the Sewage Treatment Plant Area was also a source of airborne contamination. Additionally, leaks and spills from processing activities within the former production area have resulted in soil contamination.

Currently, no standards exist for radiological contamination levels in soil (other than radium). Radiological contamination levels used as preliminary action levels for soil in uncontrolled areas of the FEMP are consistent with levels set by the Nuclear Regulatory Commission (NRC) in a branch technical position paper (NRC 1981) and published in the Federal Register on October 23, 1981. The levels are consistent with what is used throughout the DOE complex and are below the levels used for residual contamination in surface soil for most unrestricted locations in the United States. The levels are documented in FEMP site policy and procedures, which have been provided to the EPA. The remedial RI/FS process will aid in determining final cleanup levels, including radiological levels in soil. Cleanup levels will be based on considerations that include a risk basis, but will not be based solely on risk. Cleanup levels cannot be determined at the treatability study stage of the RI/FS process.

The value of 35 picocuries/gram (pCi/g) will be used as a preliminary action level in this treatability study. The work plan uses this level (35 pCi/g) to provide perspective for comparison to soil contamination levels to ensure that soil samples collected for use in the treatment tests exhibit significant contamination (it is desirable to test the effectiveness of treatment on significantly contaminated soil).

The data used to characterize the nature and extent of soil contamination at the FEMP were collected and analyzed from the spring of 1988 through 1990. In general, concentrations of total uranium in soil samples from outside the Production Area and the Waste Storage Area are below 35 pCi/g. The exceptions to this are in suspect areas, such as the Fire Training Area, the Sewage Treatment Plant Area, and the rubble mound west of the K-65 silos. Each of these areas has surface contamination in excess of 35 pCi/g of total uranium.

A large portion of the Production Area has total uranium concentrations in soil from 0.0 to 1.5 feet at greater than 50 microgram/gram (μg/g), which is roughly equivalent to 35 pCi/g. The total uranium concentrations for samples collected in the 1.5- to 3.0-foot interval illustrate that the uranium contamination is mainly a surface contamination problem. A comparison of the 50 μg/g contours indicates that below 1.5 feet, total uranium values greater than 50 μg/g are restricted to the northern end of Plant 6, scattered points around the garage and heavy equipment building, the Plant 2/3 area, the southwest corner of the Pilot Plant, the northwest corner of the maintenance building, and the southeast corner of Plant 9. Within the Production Area, leaks and spills from process equipment have resulted in deeper migration of contamination at higher concentrations than is due to airborne deposition. Although uranium is the indicator parameter for contamination at the FEMP, many samples have been analyzed for other radionuclides. To focus the investigation of this complex production network into a manageable technical framework, the Production Area was separated into four distinct quadrants.

Contaminated soils, which contained the maximum detected concentrations of 11 radionuclides in the Southeast Quadrant, were removed as part of a construction program that was initiated in August 1988 to connect the health and safety building with the services building. Soils located between these buildings were removed during the construction activities after initial sampling of these areas had been conducted under the RI/FS program.

The maximum total uranium value found in soils from throughout the Production Area was detected in a sample collected just below the concrete floor of the Plant 6 wastewater treatment area. More detailed information as to the extent and level of contamination, including summaries of other inorganics and organics, is given in the Treatability Study Work Plan for Operable Unit 5 Soil Washing.

Although the data used to develop the soil contour for uranium concentrations were collected and analyzed from the spring of 1988 through 1990, the intent of these figures and this summary table is to provide a brief overview of the contamination in site soils based on existing data. The work plan proposes further characterization of soils before collecting samples that will be used in the treatability testing. This ensures that samples are representative of site conditions.

In summary, uranium is the indicator parameter for contamination at the FEMP. Uranium has also been present in samples containing concentrations above background levels for other inorganic constituents including radionuclides and metals, and concentrations above detection limits for organics. The level of contamination in surface soil is generally less than the level of contamination of soil under or near certain process buildings. The highest levels of uranium have been detected near Plant 6 and Plant 2/3. Acids were used to digest or pickle material in these locations.

Organic contamination occurs near plants where chemicals were used for process development or in conjunction with machining and maintenance operations. The exceptions to this are the Fire Training Area, the graphite furnace and oil burner, and the coal pile.

2.0 SOIL WASHING TECHNOLOGY DESCRIPTION

Based on characterization data, it has been determined that a relatively large quantity of FEMP surface soils may contain radioactive components. In isolated cases, nonradioactive components may exist in conjunction with radioactive components. To address the cases where these components are present at levels exceeding risk-based action levels, soil washing was selected as the technology to be evaluated within this treatability study. Soil washing, if successful, produces large volumes of remediated soil that can be returned to the site from which it was excavated, while significantly reducing the final volume of material requiring selective handling. This soil may be designated a solid waste per State of Ohio applicable or relevant and appropriate requirements (ARARs) and may require an exemption from the OEPA before being returned to the site. The success of the technology must also be assessed based on the final volume of washing solutions requiring selective storage and/or disposal practices. In essence, the sum of the final soil and washing solution (leachate) volumes must be significantly less than the initial volume of contaminated soil. The overall implementability and effectiveness of this technology will be evaluated within the FS.

Soil washing is not a new technology but its application to a mixed waste (organics, inorganics, and radionuclides) contamination problem such as exists at the FEMP site extends the application of such a technology to a relatively new dimension. A review of soil washing technologies and their applicability to Superfund sites indicates that water washing with extractant reagents is applicable for cleaning nonvolatile hydrophilic and hydrophobic organics and heavy metals from soils. The report concludes that although extraction of organics and toxic metal contaminants from excavated sandy/silty soil that is low in clay and humus content has been successfully demonstrated at several pilot-plant test facilities; extraction from clay and humus soil fractions is more complicated.

2.1 PHYSICAL SEPARATION

Soil washing is a physical/chemical treatment process that initially involves the separation of a soil into different particle-size fractions. Those size fractions that actually constitute soil particles include clays (< 2 μm), silts (2-50 μm), and sands (50 μm to 2 millimeters [mm]). Other constituents of the soil may include cobbles and stones (2 mm to 50 mm) and rocks, debris, and trash (> 50 mm [2 inches]). All constituents of the soil may be contaminated with organics, metals and radionuclides. However, the soil particles (< 2 mm) are of primary concern, particularly those particle-size fractions that include the silts and clays (< 50 μm). It is within this size fraction that contaminants are bound to soil particles by specific mechanisms such as ionic, covalent, and hydrogen bonding, responsible for the absorption of metals and radionuclides (ionic species) and Van der Waals forces and nonspecific bonding, responsible for the affinity of organic molecules.

Soil washing techniques that employ the use of extraction reagents (such as proposed in this treatability plan) consist of soil excavation, aboveground treatment, isolation and removal or destruction of the contaminant, and redeposit of the cleaned soil. Techniques such as those used in solution mining and mineral extraction have been proposed for use in this soil washing operation for the removal of contaminants from soil. This process is accomplished through a combination of particle separation by size and/or density. The proposed process uses conventional equipment (e.g., hydroclones, hydrogravimetric separators, scalping screens, trommels, mineral jigs, and centrifuges) for scrubbing, size reduction, washing, and dewatering of soils. Large objects (e.g., rocks and debris) are removed by screening and then treated separately. The soil is mixed thoroughly with water and extraction agents to remove the contaminants from the soil. This is followed by solid/liquid separation where the coarse fraction of the soil is separated. The extraction agent with contaminant and smaller soil particles (clay and fine silt) undergoes further solid/liquid separation where fine soil fractions are separated as much as possible. The extraction agent is cleaned and recycled. The separated soil fraction undergoes posttreatment where it is cleaned of any residual extraction fluid. A more detailed description of this process is provided in Section 4.0.

2.2 CHEMICAL SEPARATION

Water and/or reagent formulas are used as the washing or leaching solutions in the extraction of organic compounds and inorganics and radionuclides from different soil size fractions. Water washing with extractive agents includes basic aqueous solutions (caustic, lime, slaked lime, or industrial alkali-based washing compounds); acidic aqueous solutions (sulfuric, hydrochloric, nitric, or carbonic acids); or solutions with surfactant or chelating agents. The removal of organics from soil can be enhanced by basic or surfactant solutions, while the extraction of metals is best facilitated by chelating agents or acid solutions.

The treatment technique basically mobilizes the contaminants physically by mass action, or chemically by complexing, chelating, reducing, oxidizing, or ion exchange mechanisms. The washing solution, which now contains the disassociated contaminants, is then separated from the soil/water slurry. The soil is monitored for the presence of residual contaminants and either returned to the site as decontaminated soil or washed further using additional reagent solutions. The washing solution or leachate, which now contains the contaminants, is processed through a series of chemical extraction steps (e.g., complexing, chelating, reducing, oxidizing, and/or exchange resins) to concentrate the contaminants into a finite volume of solution or onto a resin bed for ultimate disposal off site. The remaining solution is monitored to determine if the contaminants have been removed and is then either released to the site treatment works or further processed to remove residual contaminants.

3.0 PURPOSE OF SOIL WASHING DEMONSTRATION

3.1 TREATABILITY STUDY APPROACH

The EPA's "Guide for Conducting Treatability Studies Under CERCLA" (1989b) outlines the following three-tiered approach to conducting treatability studies for a Superfund site:

- Remedy screening
- Remedy selection
- Remedy design

The three tiers of treatability testing are divided into pre-Record of Decision (ROD) and post-ROD studies. The remedy screening and remedy selection testing are generally pre-ROD studies, and the remedy design studies are generally post-ROD. However, the appropriateness and levels of treatability testing required are flexible, and remedy design studies, on a site-specific basis, may be conducted before issuance of the ROD.

The remedy screening and remedy selection treatability studies provide the performance and cost data needed to (1) evaluate all potentially applicable treatment alternatives and (2) select an alternative for remedial action based on the nine RI/FS evaluation criteria. The detailed analysis of alternatives phase of the RI/FS follows the development and screening of alternatives and precedes the actual selection of a remedy in the ROD. During the detailed analysis, all remedial alternatives are evaluated based on nine RI/FS evaluation criteria.

3.2 PURPOSE OF TREATABILITY STUDY

The remedy selection soil washing demonstration generates the performance and cost data necessary for remedy evaluation in the detailed analysis of alternatives phases of the FS. The cost data developed in this tier should support cost estimates of +50 percent to -30 percent accuracy. The performance data will be used to determine whether this technology will meet remedial action objectives (RAOs). Remedy selection studies are typically small scale, incorporating generic tests using bench- or pilot-scale equipment in either the laboratory or the field. The study costs are higher than those encountered in the remedy screening tier and the tests require longer durations to complete. The levels of quality assurance/quality control (QA/QC) are moderate to high because the data from these studies will be used to support the ROD.

In the remedy design tier, detailed scale-up design, performance, and cost data are generated to implement and optimize the selected remedy. Remedy design studies are usually performed as part of remedy implementation on full-scale or near full-scale equipment. These studies should focus on optimizing process parameters, which are not a part of this treatability study. The levels of QA/QC are moderate to high and are typically vendor specific.

This treatability study will generate data for the detailed analysis of alternatives in the FS. A primary consideration is to integrate the soil washing treatability technology being evaluated in this study with other technology evaluations being conducted for on-site remediation of Operable Unit 5 soils.

The Treatability Study Work Plan for Operable Unit 5 Soil Washing outlines the objectives, procedures, and techniques for conducting screening of soil washing technologies in support of the RI/FS as well as the objectives of the ID program. The data resulting from this screening will be used to support the FS by establishing or identifying the following:

- Proof of principle for each technology's applicability to Operable Unit 5
- Compliance of technology with ARARs
- Fate and transport modeling
- Leachability data to support residual risk calculations in support of the effectiveness criteria evaluation for the detailed evaluation of alternatives
- Refinement of process requirements for cost estimation purposes
- Initial database for use in subsequent bench- and pilot-scale studies used in support of remedial design

3.3 REMEDY SELECTION TESTING

The remedy selection component of the Operable Unit 5/ID program incorporates specific equipment (e.g., multigravity separator, hydrocyclone, attrition scrubber, trommel screen, and filter presses) in the soil washing system. Only the most successful chemical extracting solutions, as derived from bench-scale treatability studies, are incorporated into this system. It is expected that a combination of chemical extractants will be necessary to remove the metals and organic compounds from the soil. Each soil size fraction, dispersing solution, and washing solution will be collected and analyzed for selected contaminants.

3.4 RELATIONSHIP OF TREATABILITY DATA TO FS EVALUATION CRITERIA

The following information will be obtained or can be calculated as a result of the treatability study testing:

- Volume of soils requiring disposal relative to the initial volume of untreated waste
- Amount of contaminant removed from soil, extractants, and wash water
- Cost of implementing the technology
- Volume of wash water for treatment and/or disposal relative to the initial volume of untreated waste
- Volume of extracting reagents for disposal relative to the initial volume of untreated waste
- Volume of soil in which uranium content was reduced to $\leq$35 pCi/g

This information will be used to evaluate the soil washing technology and compare it to other soil remedial technologies during the detailed analysis of alternatives phase of the RI/FS. The ability of soil washing to provide protection of human health and the environment will be determined by

considering such factors as the results of Toxicity Characteristics Leaching Procedure (TCLP) of the leachate, which establishes cross-media impacts, and the percent removal of soil contamination, which establishes the potential risk reduction. In addition, the overall assessment of human health and environmental protection will incorporate the assessment of long-term effectiveness, short-term effectiveness, and compliance with ARARs. Compliance with chemical-specific ARARs will be determined by whether the leachate meets or exceeds established or proposed discharge standards, and whether the treated soil meets or exceeds established cleanup levels. Treatability testing parameters that will be evaluated to assess the ability of soil washing to provide long-term effectiveness and permanence include the effectiveness of the process to permanently reduce radionuclide, organic, and inorganic contaminant concentrations in soil. These parameters will permit the assessment of residual risk remaining from untreated waste or treatment residuals at the conclusion of remedial activities. The effectiveness of soil washing will also be evaluated via TCLP testing to determine the concentration of leachable contaminants remaining in the treated soil.

The ability of soil washing to reduce the toxicity, mobility, or volume of contaminated waste will be measured by parameters such as TCLP leachate analysis, which will determine toxicity and mobility reduction; percent volume reduction; and percent contaminant removal in the treated soils, which will assess the reduction of toxicity.

Short-term effectiveness is impacted primarily by volume reduction, which indicates the amount of waste that must be treated and the amount of treated waste that must be handled and will require disposal. The volume of soil that requires handling and treatment will impact the operation and maintenance requirements during implementation of the technology.

The implementability of soil washing is influenced primarily by the volume of waste to be handled. As with implementability, cost is also impacted by the volume of waste to be treated. The final two evaluation criteria, state and community acceptance, are influenced by the results of all the data and by the other seven criteria as well.

The information required from the soil washing treatability study for use in the detailed analysis will be generated utilizing various analytical methods and various tiers of treatability testing. Various media (i.e., initial soil, treated soil, and washing solution) will be tested for radionuclide, organic, and other inorganic parameters for the remedy selection stage of the treatability study.

4.0 PROCESS DESCRIPTION

Soil washing is a physical/chemical treatment process that initially involves the separation of soil into different particle-size fractions. Reagent formulations in the washing solutions are used in the extraction of radionuclides, and organic and inorganic compounds from these different size fractions. The contaminants may be separated from the wash stream into a concentrated residue for further treatment (e.g., stabilization or vitrification).

The technology for the Fernald Environmental Management Project (FEMP) CRU5 Soil Washing Process is based upon these physical and chemical separation principles to remove uranium contamination. The contaminated soil is first separated by size fractions to remove mainly large uncontaminated particles, and some discreet uranium particles from the remaining soil fractions. These soil fractions contain concentrations of uranium bonded to individual particles. These soil fractions are treated using a combination of physical separation techniques and chemical extracting agents to remove uranium from the soil. The uranium and related metals dissolved or displaced into the extracting solution are treated via precipitation and/or ion exchange processes. The resulting residue is dewatered and drummed as a process stream. The process can effectively reduce the volume of contaminated solids to be treated as waste.

The process initially operates in the batch mode, treating one drum of contaminated soil per batch. This is to control the material as it passes through each operation of the treatment process for data collection purposes. This aids in process optimization as well as data collection purposes.

4.1 PHYSICAL SEPARATION STEPS

The contaminated soil is introduced to the process one drum at a time. This soil is transferred from the drum to the covered conveyor (H-1001) where it is transported to the trommel screen (S-1001) for initial aggregate dispersion. The trommel screen uses high pressure water wash to disperse aggregates into discreet particles. This also separates material greater than 4.75 millimeters (mm) from material less than 4.75 mm. The material greater than 4.75 mm is monitored for radioactivity and discharged into an empty drum as a processed stream (PS1). The less than 4.75 mm is discharged to a bowl pump (P-1001). The slurry is fed to a two-deck, wet vibrating screen (S-1002).

Two cycle operations take place at the vibrating screen. The first cycle operation separates the soil into three size fractions:

- greater than 2 mm,
- less than 2 mm but greater than 150 μm,

- and less than 150 μm

The less than 150 μm and most of the water pass to an agitated holding tank (T-1001) where they are held. To break up aggregates and to attrite uranium films that may be bound to particles, the two larger soil fractions are consolidated into one and discharged to the attrition scrubber (S-1003) where they are scrubbed using a low concentration of dispersant/extractant. The process operates at a high soils to water concentration (ideally 60-80 percent, more realistically 40-60 percent). The effluent from the attrition scrubber discharges to a holding tank (T-1003). The less than 150 μm soil slurry is pumped to the hydroclones (S-1005). In the hydroclone, the soil is separated into two soil-size fractions:

- greater than 20 μm,
- and less than 20 μm

The greater than 20 μm soil-size fraction (20-150 μm) is removed and transferred to an agitated holding tank T-1005, or T-1003. If T-1005 is used this soil slurry is pumped (P-1006) to the attrition scrubber, or to T-1003.

The less than 20 μm soil slurry coming off the hydroclones is pumped back to holding tank (T-1006) as a process stream (PS4).

Second cycle screening operations require removal of the 100-mesh (150 μm) lower screen on S-1002. Upon removal of this screen, the slurry from tank T-1003 if pumped back to the vibrating screen, via P-1004 where it is separated, and the > 2mm size fraction is radiologically checked and collected as the gravel process stream (PS2). The less than 2 mm soil is transferred to an agitated tank; (probably T-1001, after the < 150 μm has been pumped to a subsequent step in the process).

The slurries in tank T-1001 are pumped to a multigravity separator (MGS) (S-1004) where the materials are separated based upon specific gravities of particles. The heavier particulate uranium is theoretically removed and drummed for analysis. The lighter contaminated soil is then discharged to an agitated tank T-1004 for holding before pumping (P-1005) to the extraction vessel (V-1001).

The larger particles in tank T-1004 may then be pumped to a dewatering operation for phase separation, or the slurry may be directed to the extraction vessel (V-1001). The residual water is either recycled back to the trommel screen for reuse in subsequent tests, or is collected for water treatment (precipitation/ion exchange). The solids are radiologically checked and collected for analysis as the 2 mm to 20 μm soil process stream (PS3). The soil process stream may be slurried and pumped to extraction vessels V-1001 or V-1002.

4.2 EXTRACTION STEPS

The extraction process will be used to aid in the further removal of uranium bonded to the soil particles. The system consists of a pair of reactor vessels (V-1001 and V-1002) constructed of different materials, but of similar configuration. V-1001 is a glass-lined steel-jacketed vessel used for higher temperature processing with inorganic acids. V-1002 is used for dilute caustic and ambient temperature operations. The two process streams PS3 (2mm - 20 μm) and PS4 (less than 20 μm) are transferred separately through a heat exchanger (E-1001), if required, and then into the appropriate vessel (V-1001 or V-1002). The heat exchanger used high pressure steam to provide the heat transfer media. The extraction temperature will be approximately 40 degrees Celsius. Vessel V-1001 will also be heated, using steam. The slurry in the tank is agitated and the extracting agent is added from the appropriate reagent feed carboy or tank.

The mixture is agitated for 30 to 60 minutes. Upon completion of the extraction process the vessel is allowed to cool to 100 degrees fahrenheit or less (if necessary). After cooling, the slurry is pumped to a filter press (S-1007). All filter cloths will be changed between batch runs to ensure no cross contamination occurs. The filtrate is collected in a drum as process water and pumped via pump P-1014 to vessel T-1014 for further processing. The filter cake is discharged to bowl pump P-1013 where it is reslurried and transferred to T-1012 for cake washing. The washed cake is returned to the filter press for solid/liquid separation. The cake is collected as a separate process stream. The purpose of these operations is to remove residual corrosive materials and contaminants from the cake. The collected extracting agent and water from the cake wash are treated by precipitation (T-1014). The precipitant reagents are metered from tank T-1011 to T-1014 by pump P-1012. If required, the treated solids may be reslurried and introduced through the heat exchanger and into the extraction vessels for a second extraction process.

The precipitated residue and the liquid are separated by filtration in the filter press S-1007. Again the filter plates and cloths may be changed before filtration to minimize the spread of radioactive contaminants. The effluent liquid is sampled, and if it is non-radioactive, it is sent to the wastewater treatment plant for treatment and disposal. The residue is collected as a separate process stream (PS5), and drummed for analysis.

4.3 EQUIPMENT DESCRIPTION

4.3.1 Conveyor

The materials handling conveyor H-1001 is a standard solids conveyor. It is 1.5 feet wide by 15 feet ling by 0.5 feet deep. The conveyor has a maximum capacity of 160 tons per hour (tph). Its

operational period will only last long enough to transport the feed soil to the trommel screen. The conveyor is equipped with belt and pulley guards to minimize operator contact with the moving parts of the system.

4.3.2 Trommel Screen

In the trommel screen S-1001 large particles are fed to the hopper at a rate of 0.25 cubic yards every eight minutes. High pressure water is added to help break down soil aggregates and wash oversize material in the trommel section. Lifter bars are provided to assist in breaking down clay. The oversize fraction is discharged from the trommel and an internal ring at the end of the trommel serves as a trap. The material smaller than 3/16 inches passes through the trommel screen and is sluiced and conveyed by flights positioned on the inside of the outer trommel. Tailings flow down and out the discharge chute by gravity.

4.3.3 Vibrating Screen

The wet vibrating (oscillating) screen S-1001 uses vibrational and oscillating force and different mesh screens to separate soils by particle size. Two decks of screens are used to provide three cuts of material. The screens are removable so that operations may be repeated to obtain a different set of cuts. The screen is tilted so that separated material flows gravimetrically off the screen.

4.3.4 Attrition Scrubber

The attrition scrubber S-1003, in conjunction with a dispersant/extractant removes surface films from individual soil particles/sand and breaks up aggregates. The unit operates at 60 to 80 percent solids. Scrubbing is accomplished by grain-to-grain attrition in the zone between the two particle surfaces, by oppositely pitched propellers. This differential in pitch causes optimum circulation of the mass while the low rpm minimized the shearing action of the propellers on the soil particles.

4.3.5 Multigravity Separator

The MGS (S-1004) is essentially a shaking table rolled into a drum shape. This is a far greater separating surface for the particles in a much more compact space. Rotating the drum exerts centrifugal forces on the particles flowing over the drum surface. A rotating mechanism removes the concentrate from the drum surface. The MGS is used to separate the heavy particulate uranium from the soil fines.

4.3.6 Hydroclone

The hydroclone S-1005 is used to force cuts in soil particles by vortex action. The throughput and the cyclone diameter determine the cutpoint of the particles submitted to the unit. Hydroclones are useful for classification and desliming operations of particles.

4.3.7 Centrifuge

The centrifuge, located in place of the dewatering device (S-1006) will be used to provide soil fraction size cut at 20 μm. In addition, the greater than 20 μm soil size fraction will have a solids concentration of approximately 3000 G's (25HP main drive electric motor). Its stainless steel construction has a variable speed frequency controller, and is equipped with a 7.5HP electric motor driven viscotherm back drive that has a differential speed range from 0-15 rpm. The process rate is approximately 25 gpm.

4.4 PROCESS AND REAGENT STORAGE TANKS

Process tanks T-1001, T-1003, T-1004, T-1005, T-1006, T-1007, T-1009, T-1011, T-1012, and T-1013 are fiberglass reinforced plastic (FRP) tanks equipped with nozzles, agitator mounts, top clean-outs, and bottom drains. All process tanks will be equipped with level indicators and alarms. Samples taken from each tank will be withdrawn through the three-way valve in the bottom of each tank. All tanks will be equipped with agitators and baffles to ensure proper mixing and to maintain proper dispersions of solids. All tanks have 500-gallon capacities, except for tanks T-1005, T-1010, and T-1012/T-1001 which are 100, 100, and 50 gallons, respectively.

The reagent storage tanks are different materials, dependent upon the reagent each will contain. T-1001 is a 50-gallon tank. It is an FRP tank equipped with agitators, nozzles, agitator mounts, and a 3-inch bottom drain. T-1008 is a 100-gallon tank. T-1007 is also an FRP-lined tank of 50-gallon capacity equipped with an agitator, nozzles, and drain. T-1014 is a 500-gallon glass-lined tank. Reagent drums (drums sent directly from the vendor) may be used in lieu of the storage tanks.

All tanks, except the glass-lined, have cone bottoms for ease of draining and are mounted on support stands designed for each tank. All tank agitators are rubber-coated as required to provide corrosion protection. All tanks, except reagent feed tanks, are equipped with vent lines for pressure relief. Except for the glass-lined tanks, all tanks are equipped with internal baffles.

4.4.1 Filter Presses

The filter press S-1007 is used to dewater the soil that has been treated by the separation and extraction processes, and to dewater the sludge from the precipitation operation. This press is a 6-cubic foot press equipped with two sets of plates. The first set of plates is chemical resistant for use in separating the treated soil from the extracting agent. The second set of plates is used for dewatering the sludge from the precipitation process. To minimize the handling of a potentially corrosive filter cake, the press is equipped with a plate shaker.

4.4.2 Heat Exchangers

The in-line heat exchanger E-1001 is used to preheat the material prior to introduction into the reactor vessel V-1001. Due to the low heat transfer coefficient in this vessel, preheating the material minimizes heat-up time for the process. This is a plate open channel heat exchanger (500,000 btu). The heat exchanger handles liquids containing up to 15 percent solids.

4.4.3 Reactor Vessels

The reactor vessels are of different materials for use with different extracting agents. Vessel V-1001 is a 500-gallon glass-lined, metal-jacketed reactor with a glass-covered agitator. This vessel is designed for elevated temperature processing with inorganic acids. The jacket is heated with steam E-1002. The vessel is insulated to minimize heat losses to the air and is equipped with a temperature indicator. The internal tank pressure cannot exceed 90 pounds per square inch (psi), and the jacket pressure cannot exceed 85 psi. Vessel V-1002 is a 500-gallon, FRP tank, non-jacketed, equipped with a rubber-coated agitator, nozzles, clean-out port, and bottom drain. The tank has a level indicator and alarm. The vessel has internal baffles. The operating temperature of this vessel should not exceed 60 degrees Celsius for more than 5 minutes.

4.4.4 Pumps

Three types of pumps are used for material transfers for the soil washing process:

- the positive displacement,
- bowl,
- and centrifugal pumps

The positive displacement pumps (P-1002, P-1006, P-1009A, P-1009B, P-1015A, and P-1015B) are used to transfer slurries of 30 to 35 percent solids or less at 50 gallons per minute (gpm). The housings are polyethylene of PVDF. Pumps P-1004, P-1005, and P-1007 are slurry pumps. Pumps P-1009 and P-1013 are vertical slurry or bowl pumps. These pumps accepts material into the feed inlet, and water is added to obtain an acceptable pumping slurry. These pumps are motor powered.

Pumps P-1008 and P-1011 are centrifugal pumps, and pumps P-1010 and P-1014 are acid-resistant centrifugal pumps.

5.0 REGULATORY REQUIREMENTS AND IMPLEMENTATION

The regulatory requirements discussed in this section are for the remedy selection testing of the soil washing treatability study for Operable Unit 5. The Treatability Study Work Plan for Operable Unit 5 Soil Washing describes the study, and partially addresses the regulatory requirements for the soil washing demonstration at FEMP. This compliance document supports this work plan by specifically addressing those regulatory requirements for the on-site soil washing demonstration. Appendix I summarizes in tabular form the regulatory requirements addressed in this compliance plan.

5.1 CERCLA, SECTION 121

Soil washing is the primary treatment technology currently being investigated for remediating Operable Unit 5 soil. The Operable Unit 5/ID soil washing program is therefore a primary step in a CERCLA remedial action because it will provide data to demonstrate feasibility and to determine which treatment alternative will be used for full-scale remediation. Consequently, Section 121(e) of CERCLA (40 CFR 330.400(e)) applies. This section states the following:

> " (e) Permits and enforcement-.
> (1) No Federal, State, or local permit shall be required for the portion of any removal or remedial action conducted entirely on site, where such remedial action is selected and carried out in compliance with this section."

Although no permits are required for the Operable Unit 5/ID Program, CERCLA and the USEPA - DOE Amended Consent Agreement make it clear that the substantive requirements of the appropriate permits, that would otherwise be required, must be submitted. These permits and their substantive requirements are discussed later in this document.

5.2 CONSENT AGREEMENT, SECTION XIII. PERMITS

This section of the Consent Agreement, as amended under CERCLA Sections 120 and 106(a), states:

> "A. U.S. EPA and U.S. DOE recognize, under Section 121(d) and 121(e)(1) of CERCLA, 42 U.S.C. 9621(d) and 9621(e)(1) and the NCP, that portions of the response actions under this Agreement and conducted entirely on the Site are exempt from the procedural requirement to obtain Federal, State, or local permits. U.S. DOE must satisfy the Federal and State standards, requirements, criteria, or limitations that would have been included in any such permit to the extent required by CERCLA and the NCP.

B. When U.S. DOE proposes a response action to be conducted entirely on the Site, which in the absence of Section 121(e)(1) of CERCLA and the NCP would require a Federal or State permit, U.S. DOE shall include in its submittal to U.S. EPA:

1.1 Identification of each permit that would otherwise be required;

1.2 Identification of the standards, requirements, criteria, or limitations that would have had to have been met to obtain each such permit; and

1.3 Explanation of how the response action will meet the standards, requirements, criteria, or limitations identified in item 2 above.

Consequently, supporting documentation, containing the above information, has been included in the following sections for each requirement or permit that may have been required in the absence of the exclusion.

Appendix II contains analyses of the three soils included in the treatability study. These analysis were used in estimating the type and concentration of constituents that could be transferred to the air and process waters. These estimates were used in evaluating compliance with regulatory requirements.

5.3. OHIO EPA PERMITS

A) Air Permits to Install

Requirement:

Pursuant to OAC 3745-31-02 an Air Permit to Install (APTI) would be required for the Soil Washing Facility.

Pursuant to 3745-31-05, the Director of OEPA will issue an APTI provided the installation of the source will not prevent or interfere with the attainment or maintenance of applicable ambient air quality standards and will not result in the violation of emission standards adopted by OEPA. Pursuant to 3745-31-05, the sources must employ best available technology.

Compliance Strategy:

While the Soil Washing Facility consists of numerous pieces of physical separation equipment; each potentially requiring a PTI, it is assumed that the system could be permitted as a whole as all pieces of equipment operate together. Emissions from the Soil Washing Facility will be contained within the Plant 8 building. These emissions will be exhausted through a portable HEPA filtration system. Ambient air quality will not be impacted by these emissions.
Supporting Documentation is provided in Appendix III.

B) **Air Permits to Operate**

Requirement:

Pursuant to OAC 3745-35-02 an Air Permit to Operate (APTO) would be required for the Soil Washing Facility.

Pursuant to 3745-35-02, the Director of OEPA will issue an APTO provided the source was constructed in accordance with the terms and conditions of the Permit to Install, or if exempted from a PTI, meets the substantive requirements of a PTI.

Compliance Strategy:

Emissions will be exhausted through a portable HEPA filtration system thus satisfying BAT requirements.

C) **Wastewater Permits to Install**

Requirement:

Pursuant to OAC 3745-31-02 a Wastewater Permit to Install (WPTI) would be required for the precipitation/ion exchange portion of the soil washing facility.

Pursuant to 3745-31-05, the Director of OEPA will issue a WPTI provided the installation will not prevent or interfere with the attainment or maintenance of applicable ambient water quality standards and will not result in the violation of any laws associated with effluent standards adopted by U. S. EPA or result in the violation of an applicable NPDES permit. Pursuant to 3745-31-05, the installations must employ best available technology.

Compliance Strategy:

The precipitation/flocculation/ion exchange associated with the soil washing facility is preliminary to the final treatment the wastewater will undergo. Soil washing effluents and rinse water from soil washing runs will combine with other routine FEMP wastewaters for treatment through the Plant 8 sump treatment system consisting of precipitation, sedimentation and filtration through rotary vacuum filters. This will satisfy BAT requirements for any inorganic contaminants.

Process water from the washing of soils containing hazardous waste will be retained pending characterization to ensure that hazardous waste constituents have been removed.

D) **NPDES Permit**

Requirement:

The FEMP will be required to maintain compliance with the site NPDES permit; Permit No. 1IO00004*CD effective February 12, 1990 (modified July 15, 1991).

The FEMP must comply with all the terms and conditions, including effluent limitations, of the effective NPDES permit. This includes notification requirements under 40 CFR 122.42 for CWA Section 307 toxic pollutants.

Compliance Strategy:

The FEMP will comply with all the terms and conditions, including effluent limitations, of the effective NPDES permit. Treatment is being provided which will insure compliance with effluent limitations. Samples will be collected for other Section 307 toxic metals in recognition of notification requirements under 40 CFR 122.42 for CWA Section 307 toxic pollutants. A modification to the site NPDES permit would not be required as the character of the FEMP wastewater is not being significantly altered. Supporting documentation is provided in Appendix IV.

5.4 RCRA RD&D PERMIT

Requirement:

Pursuant to Section 3005(g) a RCRA Research Demonstration and Development Permit may be required if the soil washing study involves the treatment of soils containing hazardous waste.

One of the three soils to be tested through the soil washing operation contains a hazardous waste; therefore the OU5 soil washing treatability study may be considered a RCRA RD&D project. OAC 3745-61-04 (F) provides relief from permitting requirements provided that the treatment is part of a treatability study, and that certain guidelines regulating the operation of the treatability study are adhered to throughout the duration of the study. It is the intent of the soil washing demonstration for Operable Unit 5 to adhere to these guidelines to alleviate the necessity for an RD&D permit.

Compliance Strategy:

The FEMP will adhere to the guidelines provided by OAC 3745-51-04 (F), which exempt treatability studies from the requirements of OAC 3745-50-40 to 3745-50-70, Chapters 3745-51 to 3745-59, and Chapter 119 of the Revised Code or to the notification requirements of Section 3010 of RCRA. The following is a list of those guidelines.

1. No less than 45 days before conducting the treatability studies the facility notifies the Regional Administrator or State Director, in writing, that it intends to conduct treatability studies under this paragraph.

2. The laboratory or testing facility performing the treatability study has an EPA identification number.

   note- the treatability study will be performed at the FEMP whose EPA ID number is OH6890008976

3. No more than a total of 250 kg of hazardous waste is subjected to initiation of treatment in a single day.

4. The quantity of waste stored at the facility for the purpose of evaluation in treatability studies does not exceed 1000kg, the total of which can include 500 kg of soil, water, or debris contaminated with acute hazardous waste or 1kg of acute hazardous waste.

note - The FEMP has submitted a Part B permit application for the storage of hazardous wastes. Although the facility stores in excess of 1,000kg of hazardous waste, these wastes are stored in warehouses addressed through the Part B Permit Application. At no time will the FEMP store in excess of 1,000 kg of treatability study soils containing hazardous waste within the confines of the OU5/ID soil washing facility.

5. No more than 90 days has elapsed since the treatability study for the sample was completed, or no more than one year has elapsed since the generator shipped the sample to the laboratory or testing facil-ity, whichever date occurs first.

note - As appropriate, unused sample and hazardous residues will be moved into RCRA storage within 90 days of completion of treatment.

6. The treatability study does not involve the placement of hazardous waste on the land surface or open burning of hazardous waste.

7. The facility maintains records for 3 years following completion of the treatability study that shows compliance with the treatment rate limits. The following information must be included:

i) the name address and EPA ID number of the generator or sample collector of each waste sample;
ii) date the shipment was received;
iii) quantity of waste in storage each day;
iv) the quantity of waste accepted;
v) the date the treatability study was initiated and the amount of waste treated each day;
vi) the date the treatability study was concluded;
vii) the date any unused sample was returned to the generator, or if sent to a designated facility, the name and EPA ID number of the facility.

8. The facility keeps on site the treatability study contract and all shipping papers associated with the transport of treatability study samples to and from the facility for a period of three years from the completion date of each treatability study.

9. The facility prepares and submits a report by March 15 of each calendar year that estimates the number of studies and the amount of waste expected to be used in the treatability study during the current year and includes the following information from the previous calendar year.

i) the name address and EPA ID number of the facility conducting the treatability study;
ii) the types and (by process) of treatability studies conducted;
iii) the name and address of persons for whom studies are being conducted (include their USEPA ID number);
iv) the total quantity of waste in storage each day;
v) the quantity and types of waste subjected to the treatability study;

v) the quantity and types of waste subjected to the treatability study;
vi) when each treatability study was conducted;
vii) the final disposition of residues and unused sample from each treatability study.

10. The facility determines whether any unused sample or residues generated by the treatability study are hazardous waste under rule OAC 3745-51-03 and if so, are subject to rules OAC 3745-50-40 to 3745-50-70 and Chapters 3745-51 to 3745-59 and 3745-65 to 3745-69 unless the samples or residues are returned to the sample originator under the exemption in paragraph (E) of this rule.

11. The facility notifies the director in writing when the facility is no longer planning to conduct any treatability studies at the site.

Additional operation of the soil washing pilot plant will be conducted in support of objectives of the ID program. At that time, an evaluation of the operating parameters will be performed. In the event that the operating conditions are not in compliance with the above treatability exemption status guidelines, an evaluation will be made to determine the need to address the requirements of an RD&D permit.

5.5 NESHAP

A) **National Emission Standards for Hazardous Air Pollutants (NESHAP) - Subpart H - Radionuclides Other than Radon**

Requirement:

Because the soil excavation activity and soil washing activities are possible sources of radionuclide emissions, a (NESHAP) evaluation will be required for these activities. This evaluation will estimate the effective dose equivalent (EDE) to the nearest off-site receptor from the combined excavation/soil washing activities. An EDE in excess of 0.1 mrem would require a formal application.

Compliance Strategy:

A modeling run using CAP88-PC in accordance with 40 CFR 61.93 has established an effective dose equivalent (EDE) such that formal application and monitoring will not be required.

B) **National Emission Standards for Hazardous Air Pollutants (NESHAP) - Subpart Q - Radon**

Requirement:

The FEMP, as a DOE facility, must comply with the radon standard of 20 pCi/m^2-sec.

Compliance Strategy:

There are no formal application or reporting requirements. The FEMP, as a facility, must meet the pCi/m -sec standard.

5.6 NATIONAL ENVIRONMENTAL POLICY ACT

Requirement:

Pursuant to 10 CFR 1021, Implementing Regulations for the National Environmental Policy Act (NEPA) an appropriate NEPA evaluation must be completed during the design stage of each FEMP project.

The appropriate level of NEPA documentation (Categorical Exclusion, Environmental Assessment, Environmental Impact Statement) must be determined based on the scope of the project and potential environmental impacts.

Compliance Strategy:

A new 10 CFR 1021 ruling concerning Categorical Exclusions (CAT.EX) for bench or pilot scale studies was approved April 24, 1992 and became effective May 26, 1992. CAT.EXs concerning bench and small pilot facilities are applicable to the Operable Unit 5/ID demonstrations. NEPA determinations and documentation will be provided by Operable Unit 5 personnel through the Fernald CERCLA activities. A CAT.EX is being processed to meet the NEPA requirement (Appendix V).

6.0 HANDLING AND STORAGE OF REMEDY SELECTION TESTING SOIL AND WATER

6.1 TREATED SOIL AND WATER PERFORMANCE ASSESSMENT

The Operable Unit 5/ID soil washing demonstration will include extensive testing concerning the quality, consistency, homogeneity, leachability, and contaminant concentrations of the treated soil, residue and water. Complete Hazardous Substance List (HSL) and TCLP analyses will be performed on all out put soil that may contain hazardous waste. Solid residue from the treatment of all soils will be characterized to determine whether the residue is hazardous waste. In addition, to ensure appropriate disposition, process waters from the testing of soils containing hazardous waste will be stored pending characterization to ensure hazardous waste constituents have been adequately removed.

Full analytical parameters are described in the Treatability Study Work Plan for Operable Unit 5 Soil Washing.

6.2 STORING TREATED SOIL AND WATER

The treated soil will be stored in the FEMP Controlled Holding Area (building 64) and managed in accordance with the FEMP drum management plan pending characterization. If determined to be hazardous waste, the materials will be moved, within 90 days, to a RCRA storage warehouse.

Unless suspected to contain listed RCRA constituents, process water will be immediately discharged to the wastewater treatment system. If suspected to contain listed hazardous waste constituents the water will be moved, within three days of generation, to the Controlled Holding Area and held until characterized. If water is determined to contain no RCRA hazardous waste it will be discharged into the FEMP wastewater treatment system. If the water is determined to contain hazardous waste it will be moved to a RCRA storage warehouse.

7.0 MEETING REGULATORY REQUIREMENTS AND GUIDANCE

7.1 PROTECTING HUMAN HEALTH AND THE ENVIRONMENT

The Operable Unit 5/ID process will be a very effective tool in remediating the large quantities of soils at the FEMP. Separation and containment of the radioactive and nonradioactive contaminants from soils will significantly reduce the potential for these pollutants to be transported via other environmental media within or outside the FEMP site.

In the demonstration phase all by-products of the soil washing operation will be packed in 55-gallon drums until analyzed and appropriate disposition determined. Recycling of the treated water will minimize the amount of fresh water required by the system. Treated soil, water, and off-gases will be monitored to ensure compliance with environmental regulations. However, in a full-scale system, clean soil will be returned to the environment and wash water will be released to the on-site wastewater treatment system. Residual contaminants including radionuclides, heavy metals, and organics will be contained for subsequent treatment and/or disposal at a hazardous waste regulated facility.

The Operable Unit 5/ID soil washing process should be an efficient process to remediate the large volumes of soil containing low-level radioactive, inorganic, and organic contaminants at the Fernald site in an environmentally safe manner, minimizing final waste storage volume and long-term costs.

7.2 SAFETY EVALUATION

The assumptions for the project in the Preliminary Engineering Evaluation (PEE) for the Operable Unit 5/ID Program are:

- An inventory of the material within Plant 8
- Radiological surveys of Plant 8
- Walkdowns of the proposed work area
- Process flow charts and descriptions for the soil washing process

The primary safety assumptions used to determine both the preliminary project safety recommendations for the use of Plant 8 as the Operable Unit 5/ID soil washing demonstration site are outlined in the following sections.

7.2.1 Industrial Safety

- Construction work and Operable Unit 5/ID soil washing operations will be performed according to Occupational Safety and Health Administration (OSHA) regulations (e.g., 29 CFR 1910.120) and the appropriate DOE ARARs and FERMCO procedures identified for OUs.

- Appropriate operating procedures will be developed and followed for the equipment, electrical cables, etc. associated with operation of the soil washing system.

7.2.2 Radiation Protection

- Personnel will adhere to the requirements stipulated in the Radiation Work Permit (RWP) for this area and the activities that will be associated with it. The RWP will be written in adherence to the appropriate ARARs and FERMCO procedures identified for operable units.

7.2.3 Wash Water Cleaning Operation

- The dose rates associated with the wash water are expected to be inconsequential (within the FEMP discharge limits) with no significant contribution to the general area dose rate.

- Any ion-exchange resin and other filters related to this operation will be replaced when the water concentration starts to rise (normally between 0 and 2 parts per billion [ppb] uranium) or approaches 20 ppb uranium, so the dose rates associated with this material are expected to be low; thus this material makes no contribution to the general area dose rate. However, this will be evaluated when the system is in operation.

- Activities associated with the operation and maintenance of the wash water treatment operation, including characterization and disposal of resins, will be performed in accordance with the FEMP Waste Analysis Plan, and appropriate and applicable DOE/FERMCO procedures.

7.2.4 Soil Cleaning Operation

- Adequate staging and storage areas (conforming to ARARs, specifically RCRA storage requirements) will be developed to handle both the inputs (contaminated) and the outputs (both clean and contaminated) associated with the Operable Unit 5/ID soil washing demonstration.

- The dose rates associated with the contaminated soil should be inconsequential; therefore, they will not contribute significantly to the general area dose rate.

- Activities associated with the operation and maintenance of the soil cleaning operation will be performed in accordance with the work plan and FEMP procedures to ensure personnel and operational safety.

7.2.5 Soil Retrieval and Delivery

- The retrieval and delivery operations related to this activity will be performed under the auspices of the DOE/FERMCO industrial and radiological safety programs.

- No major contaminants that cannot be handled by soil washing (radiological or chemical; e.g., high organic loading) are anticipated to be found during the retrieval process.

- Activities associated with the retrieval and delivery of soil to Plant 8 will be performed in accordance with the work plan and FEMP procedures.

7.2.6 Contamination Levels/Dose Rates

- The Radiation Assessment is in process; however, Radiological Engineering has stated that they feel there are no radiological concerns in the Plant 8 drum reconditioning area. Due to the nature and location of the current process (equipment to be removed), the Plant 8 drum reconditioning annex is a radiological controlled area.

- The Plant 8 drum reconditioning area contains two pieces of equipment that contain contamination levels beyond the acceptable amount as determined by Radiological Engineering. At this time, the two pieces of equipment have been posted by Radiological Engineering. Any further action to be taken (if any) regarding the two contaminated pieces of equipment will be determined by Radiological Engineering.

7.2.7 Hazard Assessment

- Plant 8 is included in a Site Safety Analysis Report (SAR) document currently being developed.

7.2.8 Fire Protection

- A Plant 8 walkdown was performed by the Ralph M. Parsons Company. Following the Plant 8 walkdown Parsons stated "that the building has a full fire protection sprinkler system; therefore, additional fire protection system modifications should not be necessary." (Reference DC No. 05DI08189201)

7.3 POTENTIAL SAFETY REQUIREMENTS

Based on the aforementioned assumptions, potential major preliminary safety requirements set for this scope of work potentially include:

7.3.1 Industrial Safety

- An eyewash and shower must be available in the event that personnel become contaminated.

7.3.2 Soil Cleaning Operation

- The "clean" soil (<35 pCi/g dry weight) from the soil cleaning operation will be kept on site and stored as such or used as backfill for other construction activities. Contaminated soils awaiting soil washing will be stored in containers. Likewise, the contaminated washed soils will be stored in containers until final disposition is determined.

7.3.3 Soil Retrieval and Delivery

- Complete HSL and TCLP analyses will be done on all soils used to quantify and qualify chemical contaminants in the soil.

7.3.4 Contamination Levels/Dose Rates

- Periodic radiological surveys, in accordance with DOE Order 5480.11, will be performed in the work areas, bathrooms, and break areas frequently enough to detect an increase in the radiation levels. Dose rates should be particularly noted. If any increase is detected, it will be immediately investigated by health physics and the necessary steps will be taken to correct the situation.

- Periodic contamination surveys must be performed in the work areas, bathrooms, and break areas frequently enough to detect an increase in the radiation levels. If any increase is detected, it will be immediately investigated by health physics and the necessary steps will be taken to correct the situation. Please note that any loose contamination in the bathroom or break area constitutes an unacceptable condition that must be corrected immediately. The work area must be decontaminated as required by health physics.

7.3.6 Fire Protection

- Additional fire protection system modifications should not be necessary.

7.3.7 Exhaust Modification

- HEPA filters will be utilized over portions of the system where dry materials will be managed for fugitive emissions control.

7.3.8 Storage

- All drums will be managed according to the Drum Management Procedure.

7.3.9 Decontamination

- The decontamination, transportation, and storage of the Plant 9 equipment must be performed according to applicable DOE/FERMCO procedures and ARARs as identified for response actions identified for Operable Unit 3.

APPENDIX I

OU5/ID TREATABILITY STUDY DELIVERABLES

OU5/ID Treatability Study Deliverables

DELIVERABLE REQUIRED:	Yes	No	JUSTIFICATION	IMPLEMENTATION STRATEGY
EPA Deliverables:				
OU 1 Treatability Study Work Plan (WP) - Bench Scale Vitrification (MAWS) with Permit Information Summary attachment	X		The Consent Agreement requires work plans for data used in support of the ROD.	Previous Work Plan submittals done in accordance with U.S. EPA Document No. EPA/540/2-89/058, "Guide for Conducting Treatability Studies Under CERCLA," Interim Final dated 1989.
Air Emission Permit to Install (PTI)		n/a	Not required under CERCLA which governs the OU5/ID program; however, the essence of the requirements will be met by the equivalent information provided in the information summary.	Information generally presented in a PTI is presented in the Regulatory Compliance Plan.
Air Emission Permit to Operate (PTO)		n/a	Not required under CERCLA which governs the OU5/ID Program; however, the essence of the requirements will be met by the equivalent information provided in the information summary.	Information generally presented in a PTO is provided in the Regulatory Compliance Plan.
NESHAP		n/a	Not required under CERCLA per PEAPR dated 4/30/92; however, an explanation of how the applicable subparts H & Q are met will be presented in the information summary.	The OU5/ID treatability study will not exceed the FEMP's discharge limits. Supporting documentation is presented in the Regulatory Compliance Plan.
NPDES Permit		X	The existing FEMP site-wide NPDES permit is adequate per PEAPR dated 4/30/92. Any water discharged from the OU5/ID treatability study will comply with the permit.	The OU5/ID treatability study will not alter the FEMP's discharge such that a modification of the NPDES permit is required. Supporting documentation is provided in the Regulatory Compliance Plan.
Water Discharge Permit to Install (PTI)		n/a	Not required per CERCLA Section 121 which governs the OU5/ID treatability study, However, the essence of the requirements will be met by the equivalent information provided in the Regulatory Compliance Plan.	The OU5/ID treatability study will not significantly alter the FEMP's discharge. Supporting documentation is presented in the Regulatory Compliance Plan.
RCRA Research, Development, and Demonstration Permit		n/a	Not required per CERCLA Section 121 which governs the OU5/ID treatability study. However, the substantive requirements will be met by the equivalent information provided in the Regulatory Plan.	It is the intent of the DOE to conduct the treatability study exempt from the procedural requirements of OAC 3745-50-40 to 3745-50-70, chapters 3745-51 to 3745-59, chapters 3745-65 to 3745-69 and the notification requirements of Section 3010 of RCRA. All work will be performed on site in support of the RI/FS process. The substantive requirements of the Ohio Administrative Code will be complied with relative to the management of hazardous waste associated with the treatability study.

OU5/ID Treatability Study Deliverables

DELIVERABLE REQUIRED:	Yes	No	JUSTIFICATION	IMPLEMENTATION STRATEGY
Removal Site Evaluation - OU5/ID Operation		n/a	The OU5/ID project is a CERCLA/RCRA treatability demonstration which is part of the RI/FS process and does not require an RSE.	n/a
Removal Site Evaluation - OU5/ID Facility Preparation	X		An RSE is required for projects handling construction debris.	Existing FEMP RSE format.
RCRA Determination	X		Input soils, process waters, and residues will be characterized in accordance with the requirements of 40 CFR 262.11.	The management of treatability study materials pending RCRA characterization is described in the Regulatory Compliance Plan.
Quality Assurance Plan	X		Consent Agreement requires QAPjP adherence if data is to be used in RI/FS.	QAPjP
Engineering Evaluation/Cost Analysis		X	Generally required of removal actions or projects, but not research and development programs because this information is being developed for use in other projects.	n/a
DOE NEPA DELIVERABLES:				
Categorical Exclusion	X		A new 10 CFR 1021 ruling which provides CAT.EX categories that are applicable the OU5/ID study was approved April 24, 1992 and became effective May 26, 1992. The categories deal with bench and small pilot facilities.	The NEPA categorical exclusion is described in the Regulatory Compliance Plan.
Environmental Assessment (EA)		X	This is not required since CAT. EX will apply to the OU5/ID project.	n/a
Environmental Impact Statement (EIS)		X	This is not required since EA is not required.	n/a
Finding of No Significant Impact (FONSI)		X	This is not required since EA is not required.	n/a

OU5/ID Treatability Study Deliverables

DELIVERABLE REQUIRED:	Yes	No	JUSTIFICATION	IMPLEMENTATION STRATEGY
DOE HEALTH AND SAFETY DELIVERABLES:				
Safety Analysis Safety Assessment (SA)	X		DOE Order 5481.1B, "Safety Analysis and Review System," requires that potential hazards be systematically identified; potential hazards analyzed; reasonable measures taken to eliminate, control or mitigate the hazards, including compliance with commitments made in NEPA documents; and there is documented management authorization of the DOE operation based upon an objective assessment of the Safety Analysis.	Safety Assessment was prepared per SP-A-01-013. It is expected that no further documentation will be required based on preliminary evaluations enclosed in the Regulatory Compliance Plan. The Safety assessment for the OU5/ID Soil Treatability Study (January, 1993) is maintained on-site in the OU5/ID treatability study files.
Preliminary Safety Analysis Report (PSAR) Final Safety Analysis Report (FSAR)		X	DOE Order 5481.1B, "Safety Analysis and Review System," requires that potential hazards be systematically identified; potential hazards analyzed; reasonable measures taken to eliminate, control or mitigate the hazards, including compliance with commitments made in environmental assessments and impact statements; and there is documented management authorization of the DOE operation based upon an objective assessment of the Safety Analysis.	Safety Analysis was prepared per SP-A-01-013. It is expected that no further documentation will be required based on preliminary evaluations enclosed in the Regulatory Compliance Plan.
Risk Assessment (RA)	X		FEMP site procedures require a RA for every project. The QA level for the project is determined by the RA.	Risk Assessment and Management System Manual, SM-0001. The Risk Assessment For the OU5/ID Soil Treatability Study (January, 1993) is maintained on site in the OU5/ID treatability Study files.
Health and Safety Plan	X		Health and safety plans are required for CERCLA related projects at FEMP.	Standard FEMP format that is consistent with OSHA requirements in 29 CFR 1910.120.
OTHER FEMP RELATED DOCUMENTS				
• FEMP Work Permit • Confined Work Space Permit • Radiation Worker Survey Permit Material Evaluation Form (MEF)	X		These are documents that are normally handled as routine with construction projects at FEMP and are therefore not separately listed. These documents cover the characterization of the feed materials and residues per the requirements in the Consent Decree and RCRA regulations.	FEMP procedures. FEMP Procedure SSOP002.

REFERENCES

A. "Proposal/Implementation Plan for a Minimum Additive Waste Stabilization (MAWS) Program for Technology Demonstration and Process Development". February 1992. FEMP.

B. Engineering Evaluation/Cost Analysis Waste Pit Area Storm Water Runoff Control. August 1990. U.S. DOE - ORO.

C. Safe Shutdown Decommissioning & Decontamination Plan. June 1990 Draft. U.S. DOE - ORO.

D. Feed Materials Production Center Annual Environmental Report for Calendar Year 1989. October 1990. U.S. DOE - ORO.

E. "Office of Technology Development Technical Task Plan, FEMP-OWV1, Minimum Additive Waste Stabilization (MAWS) Program". February 1992.

F. "Delisting Assessment Study for the Contents of Waste Pit 5 at FEMP". Draft dated February 1992.

G. U.S. Environmental Protection Agency, Petitions to Delist Hazardous Wastes; A Guidance Manual. Publication EPA/530-SW-85-003, NTIS Publication PB85-194488. April 1985.

H. RI/FS Treatability Work Plan for OU 1.

I. "Implementation Plan for Safety Analysis at the FEMP". WEMCO:P:92-244, March 16, 1992. H. Daugherty, WEMCO, to R. Tiller, DOE-FO.

J. "Preliminary Engineering Evaluation Minimum Additive Waste Stabilization (MAWS)". WMCO Subcontract No.2-21487, April 1992.

K. Soil Removal, Pit 5 Interim Remediation Report.

L. R.L. Cropper (PARSONS) to A.S. Rogers (WEMCO), April 1992. Record of Telephone Conversation.

M. Rogers, A.S. Radiological Survey Report, Plant 9. March 14, 1992.

N. General Design Criteria. DOE Order 6430.1A.

O. U.S. EPA Document No. EPA/540/2-89/058, "Guide for Conducting Treatability Studies Under CERCLA," Interim Final dated 1989.

P. Consent Agreement As Amended Under CERCLA Sections 120 and 106 (a), Administrative Docket Number: V-W-90-C-057.

APPENDIX II

INITIAL SOILS CHARACTERIZATION DATA FOR THE OU5 SOIL WASHING TREATABILITY PROJECT

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
Remedial Investigation/Feasibility Study

TO: D. E. Ridenour

FROM: M. A. Krstich

SUBJECT: INITIAL SOIL CHARACTERIZATION DATA FOR AIR EMISSIONS ESTIMATION FROM THE OU5 SOIL WASHING PILOT PLANT OPERATION IN BUILDING 8

Attached are representative analyses for three of the four soils to be tested in the OU5 soil washing pilot plant operation in building 8. Two soils are from the Integrated Demonstration program and are identified as sample numbers 100272 (ID-B) and 100279 (ID-A). A complete characterization is provided for both of these soils which include TCLP and HSL analyses of volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), PCBs/pesticides, metals, and radionuclides. Copies of these analyses indicate TCLP analysis as a water matrix, and HSL analysis as a soil matrix.

Also attached are preliminary VOC and SVOC analyses of the third soil that will be tested in the process. This soil is unique to the OU5 soil washing treatability study and is identified as sample number 075607 (OU5-A). Soil samples have been sent to IT's RSL laboratory in Oak Ridge, TN for complete characterization similar to that noted for the ID soils. The fourth soil (OU5-B) to be used in the test has yet to be determined.

The attached analyses should be sufficient information to evaluate the potential for air emmissions from the process. When further chemical characterizations are conducted on the OU5-A and OU5-B soils, the results will be forwarded to you upon my receipt.

ADVANCED SCIENCES, INC/IT CORPORATION
11003 HAMILTON CLEVES ROAD • P.O. BOX 475 • ROSS, OHIO 45061 (513) 738-3100

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

100272

Lab Name: ECOTEK Contract: 2-15521

Lab Code: ECOTEK Case No.: 1792 SAS No.: SDG No.: 272

Matrix: (soil/water) SOIL Lab Sample ID: 179201

Sample wt/vol: 5.1 (g/mL) G Lab File ID: F41227

Level: (low/med) LOW Date Received: 12/14/91

% Moisture: not dec. 12. Date Analyzed: 12/30/91

Column: (pack/cap) PACK Dilution Factor: 0.99

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	CHLOROMETHANE	11.	U
74-83-9	BROMOMETHANE	11.	U
75-01-4	VINYL CHLORIDE	11.	U
75-00-3	CHLOROETHANE	11.	U
75-09-2	METHYLENE CHLORIDE	6.	U
67-64-1	ACETONE	17.	B
75-15-0	CARBON DISULFIDE	6.	U
75-35-4	1,1-DICHLOROETHENE	6.	U
75-34-3	1,1-DICHLOROETHANE	6.	U
540-59-0	1,2-DICHLOROETHENE (TOTAL)	6.	U
67-66-3	CHLOROFORM	6.	U
107-06-2	1,2-DICHLOROETHANE	6.	U
78-93-3	2-BUTANONE	11.	U
71-55-6	1,1,1-TRICHLOROETHANE	6.	U
56-23-5	CARBON TETRACHLORIDE	6.	U
108-05-4	VINYL ACETATE	11.	U
75-27-4	BROMODICHLOROMETHANE	6.	U
78-87-5	1,2-DICHLOROPROPANE	6.	U
10061-01-5	CIS-1,3-DICHLOROPROPENE	6.	U
79-01-6	TRICHLOROETHENE	6.	U
124-48-1	DIBROMOCHLOROMETHANE	6.	U
79-00-5	1,1,2-TRICHLOROETHANE	6	U
71-43-2	BENZENE	6.	U
10061-02-6	TRANS-1,3-DICHLOROPROPENE	6.	U
75-25-2	BROMOFORM	6.	U
108-10-1	4-METHYL-2-PENTANONE	11.	U
591-78-6	2-HEXANONE	11.	U
127-18-4	TETRACHLOROETHENE	6.	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	6.	U
108-88-3	TOLUENE	6.	U
108-90-7	CHLOROBENZENE	6.	U
100-41-4	ETHYLBENZENE	6.	U
100-42-5	STYRENE	6.	U
1330-20-7	XYLENE (TOTAL)	6.	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

100272

Lab Name: ECOTEK Contract: 2-15521

Lab Code: ECOTEK Case No.: 1792 SAS No.: SDG No.: 272

Matrix: (soil/water) SOIL Lab Sample ID: 179201

Sample wt/vol: 5.1 (g/mL) G Lab File ID: F41227

Level: (low/med) LOW Date Received: 12/14/91

% Moisture: not dec. 12. Date Analyzed: 12/30/91

Column: (pack/cap) PACK Dilution Factor: 0.99

Number TICs found: 1

CONCENTRATION UNITS
(ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	- -	UNKNOWN	23.77	60.	BJ
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FORM I VOA-TIC 1/87 Rev.

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
4335
100272

Lab Name: ECOTEK Contract: 02-15521

Code: ECOTEK Case No.: 1792 SAS No.: SDG No.: 272

Matrix: (soil/water) WATER Lab Sample ID: 179201

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: C0379

Level: (low/med) LOW Date Received: 12/14/91

% Moisture: not dec. 100. Date Analyzed: 12/31/91

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 4

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	108-21-4	Acetic acid, 1-methylethyl e	16.65	10.	J
2.	- -	UNKNOWN	18.47	6.	J
3.	637-78-5	Propanoic acid, 1-methylethy	21.07	70.	J
4.	638-11-9	Butanoic acid, 1-methylethyl	25.31	100.	J
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
4335
100272

Lab Name: ECOTEK Contract: 2-15521

Lab Code: ECOTEK Case No.: 1792 SAS No.: SDG No.: 272

Matrix: (soil/water) WATER Lab Sample ID: 179201

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: C0379

Level: (low/med) LOW Date Received: 12/14/91

% Moisture: not dec. 100. Date Analyzed: 12/31/91

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	11.	B
67-64-1	Acetone	10.	U
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene	5.	U
75-34-3	1,1-Dichloroethane	5.	U
540-59-0	1,2-Dichloroethene (total)	5.	U
67-66-3	Chloroform	5.	U
107-06-2	1,2-Dichloroethane	5.	U
78-93-3	2-Butanone	10.	U
71-55-6	1,1,1-Trichloroethane	5.	U
56-23-5	Carbon Tetrachloride	5.	U
108-05-4	Vinyl Acetate	10.	U
75-27-4	Bromodichloromethane	5.	U
78-87-5	1,2-Dichloropropane	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	5.	U
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene	5.	U
10061-02-6	trans-1,3-Dichloropropene	5.	U
75-25-2	Bromoform	5.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	5.	U
79-34-5	1,1,2,2-Tetrachloroethane	5.	U
108-88-3	Toluene	5.	U
108-90-7	Chlorobenzene	5.	U
100-41-4	Ethylbenzene	5.	U
100-42-5	Styrene	5.	U
1330-20-7	Xylene (total)	5.	U

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1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

100272

Lab Name: ECOTEK Contract: 2-15521

Lab Code: ECOTEK Case No.: 1792 SAS No.: SDG No.: 272

Matrix: (soil/water) SOIL Lab Sample ID: 179201

Sample wt/vol: 30.3 (g/mL) G Lab File ID: E2655

Level: (low/med) LOW Date Received: 12/14/91

% Moisture: not dec. 13. dec. 0. Date Extracted: 12/23/91

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 12/30/91

GPC Cleanup: (Y/N) N pH: 6.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	370.	U
111-44-4	bis(2-Chloroethyl)ether	370.	U
95-57-8	2-Chlorophenol	370.	U
541-73-1	1,3-Dichlorobenzene	370.	U
106-46-7	1,4-Dichlorobenzene	370.	U
100-51-6	Benzyl alcohol	370.	U
95-50-1	1,2-Dichlorobenzene	370.	U
95-48-7	2-Methylphenol	370.	U
108-60-1	bis(2-Chloroisopropyl)ether	370.	U
106-44-5	4-Methylphenol	370.	U
621-64-7	N-Nitroso-di-n-propylamine	370.	U
67-72-1	Hexachloroethane	370.	U
98-95-3	Nitrobenzene	370.	U
78-59-1	Isophorone	370.	U
88-75-5	2-Nitrophenol	370.	U
105-67-9	2,4-Dimethylphenol	370.	U
65-85-0	Benzoic acid	1800.	U
111-91-1	bis(2-Chloroethoxy)methane	370.	U
120-83-2	2,4-Dichlorophenol	370.	U
120-82-1	1,2,4-Trichlorobenzene	370.	U
91-20-3	Naphthalene	370.	U
106-47-8	4-Chloroaniline	370.	U
87-68-3	Hexachlorobutadiene	370.	U
59-50-7	4-Chloro-3-methylphenol	370.	U
91-57-6	2-Methylnaphthalene	370.	U
77-47-4	Hexachlorocyclopentadiene	370.	U
88-06-2	2,4,6-Trichlorophenol	370.	U
95-95-4	2,4,5-Trichlorophenol	1800.	U
91-58-7	2-Chloronaphthalene	370.	U
88-74-4	2-Nitroaniline	1800.	U
131-11-3	Dimethylphthalate	370.	U
208-96-8	Acenaphthylene	370.	U
606-20-2	2,6-Dinitrotoluene	370.	U

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

100272

Lab Name: ECOTEK Contract: 2-15521

Lab Code: ECOTEK Case No.: 1792 SAS No.: SDG No.: 272

Matrix: (soil/water) SOIL Lab Sample ID: 179201

Sample wt/vol: 30.3 (g/mL) G Lab File ID: E2655

Level: (low/med) LOW Date Received: 12/14/91

% Moisture: not dec. 13. dec. 0. Date Extracted: 12/23/91

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 12/30/91

GPC Cleanup: (Y/N) N pH: 6.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-09-2	3-Nitroaniline	1800.	U
83-32-9	Acenaphthene	370.	U
51-28-5	2,4-Dinitrophenol	1800.	U
100-02-7	4-Nitrophenol	1800.	U
132-64-9	Dibenzofuran	370.	U
121-14-2	2,4-Dinitrotoluene	370.	U
84-66-2	Diethylphthalate	370.	U
7005-72-3	4-Chlorophenyl-phenylether	370.	U
86-73-7	Fluorene	370.	U
100-01-6	4-Nitroaniline	1800.	U
534-52-1	4,6-Dinitro-2-methylphenol	1800.	U
86-30-6	N-Nitrosodiphenylamine	370.	U
101-55-3	4-Bromophenyl-phenylether	370.	U
118-74-1	Hexachlorobenzene	370.	U
87-86-5	Pentachlorophenol	1800.	U
85-01-8	Phenanthrene	370.	U
120-12-7	Anthracene	370.	U
86-74-8	Carbazole	370.	U
84-74-2	Di-n-butylphthalate	370.	U
206-44-0	Fluoranthene	370.	U
129-00-0	Pyrene	370.	U
85-68-7	Butylbenzylphthalate	370.	U
91-94-1	3,3'-Dichlorobenzidine	750.	U
56-55-3	Benzo(a)anthracene	370.	U
117-81-7	bis(2-Ethylhexyl)phthalate	370.	U
218-01-9	Chrysene	370.	U
117-84-0	Di-n-octylphthalate	370.	U
205-99-2	Benzo(b)fluoranthene	370.	U
207-08-9	Benzo(k)fluoranthene	370.	U
50-32-8	Benzo(a)pyrene	370.	U
193-39-5	Indeno(1,2,3-cd)pyrene	370.	U
53-70-3	Dibenz(a,h)anthracene	370.	U
191-24-2	Benzo(g,h,i)perylene	370.	U

(1) - Cannot be separated from diphenylamine

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

100272

Lab Name: ECOTEK Contract: 2-15521

Lab Code: ECOTEK Case No.: 1792 SAS No.: SDG No.: 272

Matrix: (soil/water) SOIL Lab Sample ID: 179201

Sample wt/vol: 30.3 (g/mL) G Lab File ID: E2655

Level: (low/med) LOW Date Received: 12/14/91

% Moisture: not dec. 13. dec. 0. Date Extracted: 12/23/91

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 12/30/91

GPC Cleanup: (Y/N) N pH: 6.0 Dilution Factor: 1.00

Number TICs found: 8

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	- -	UNKNOWN	6.43	400.	BJ
2.	- -	UNKNOWN	6.78	600.	J
3.	- -	UNKNOWN	7.20	500.	J
4.	- -	UNKNOWN	8.65	1000.	BJ
5.	- -	UNKNOWN	9.28	2000.	J
6.	- -	UNKNOWN	9.47	300.	BJ
7.	123-79-5	Hexanedioic acid, dioctyl es	25.29	1000.	J
8.	- -	UNKNOWN HYDROCARBON	26.12	200.	J
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18

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

100272

Lab Name: ECOTEK Contract: 2-15521

Lab Code: ECOTEK Case No.: 1792 SAS No.: SDG No.: 272

Matrix: (soil/water) WATER Lab Sample ID: 179201T

Sample wt/vol: 836.0 (g/mL) ML Lab File ID: B2645

Level: (low/med) LOW Date Received: 12/14/91

% Moisture: not dec. 100. dec. 0. Date Extracted: 12/26/91

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 12/27/91

GPC Cleanup: (Y/N) N pH: 6.3 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-95-2	Phenol	11.	U
111-44-4	bis(2-Chloroethyl)ether	11.	U
95-57-8	2-Chlorophenol	11.	U
541-73-1	1,3-Dichlorobenzene	11.	U
106-46-7	1,4-Dichlorobenzene	11.	U
100-51-6	Benzyl alcohol	11.	U
95-50-1	1,2-Dichlorobenzene	11.	U
95-48-7	2-Methylphenol	11.	U
108-60-1	bis(2-Chloroisopropyl)ether	11.	U
106-44-5	4-Methylphenol	11.	U
621-64-7	N-Nitroso-di-n-propylamine	11.	U
67-72-1	Hexachloroethane	11.	U
98-95-3	Nitrobenzene	11.	U
78-59-1	Isophorone	11.	U
88-75-5	2-Nitrophenol	11.	U
105-67-9	2,4-Dimethylphenol	11.	U
65-85-0	Benzoic acid	55.	U
111-91-1	bis(2-Chloroethoxy)methane	11.	U
120-83-2	2,4-Dichlorophenol	11.	U
120-82-1	1,2,4-Trichlorobenzene	11.	U
91-20-3	Naphthalene	11.	U
106-47-8	4-Chloroaniline	11.	U
87-68-3	Hexachlorobutadiene	11.	U
59-50-7	4-Chloro-3-methylphenol	11.	U
91-57-6	2-Methylnaphthalene	11.	U
77-47-4	Hexachlorocyclopentadiene	11.	U
88-06-2	2,4,6-Trichlorophenol	11.	U
95-95-4	2,4,5-Trichlorophenol	55.	U
91-58-7	2-Chloronaphthalene	11.	U
88-74-4	2-Nitroaniline	55.	U
131-11-3	Dimethylphthalate	11.	U
208-96-8	Acenaphthylene	11.	U
606-20-2	2,6-Dinitrotoluene	11.	U

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

100272

Lab Name: ECOTEK Contract: 2-15521

Lab Code: ECOTEK Case No.: 1792 SAS No.: SDG No.: 272

Matrix: (soil/water) WATER Lab Sample ID: 179201T

Sample wt/vol: 886.0 (g/mL) ML Lab File ID: E3645

Level: (low/med) LOW Date Received: 12/14/91

% Moisture: not dec. 100. dec. 0. Date Extracted: 12/26/91

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 12/27/91

GPC Cleanup: (Y/N) N pH: 6.3 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
99-09-2	3-Nitroaniline	55.	U
83-32-9	Acenaphthene	11.	U
51-28-5	2,4-Dinitrophenol	55.	U
100-02-7	4-Nitrophenol	55.	U
132-64-9	Dibenzofuran	11.	U
121-14-2	2,4-Dinitrotoluene	11.	U
84-66-2	Diethylphthalate	11.	U
7005-72-3	4-Chlorophenyl-phenylether	11.	U
86-73-7	Fluorene	11.	U
100-01-6	4-Nitroaniline	55.	U
534-52-1	4,6-Dinitro-2-methylphenol	55.	U
86-30-6	N-Nitrosodiphenylamine	11.	U
101-55-3	4-Bromophenyl-phenylether	11.	U
118-74-1	Hexachlorobenzene	11.	U
87-86-5	Pentachlorophenol	55.	U
85-01-8	Phenanthrene	11.	U
120-12-7	Anthracene	11.	U
86-74-8	Carbazole	11.	U
84-74-2	Di-n-butylphthalate	11.	U
206-44-0	Fluoranthene	11.	U
129-00-0	Pyrene	11.	U
85-68-7	Butylbenzylphthalate	11.	U
91-94-1	3,3'-Dichlorobenzidine	23.	U
56-55-3	Benzo(a)anthracene	11.	U
117-81-7	bis(2-Ethylhexyl)phthalate	11.	U
218-01-9	Chrysene	11.	U
117-84-0	Di-n-octylphthalate	11.	U
205-99-2	Benzo(b)fluoranthene	11.	U
207-08-9	Benzo(k)fluoranthene	11.	U
50-32-8	Benzo(a)pyrene	11.	U
193-39-5	Indeno(1,2,3-cd)pyrene	11.	U
53-70-3	Dibenz(a,h)anthracene	11.	U
191-24-2	Benzo(g,h,i)perylene	11.	U

(1) - Cannot be separated from diphenylamine

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

100272

Lab Name: ECOTEK Contract: 2-15521

Lab Code: ECOTEK Case No.: 1792 SAS No.: SDG No.: 272

Matrix: (soil/water) WATER Lab Sample ID: 179201T

Sample wt/vol: 986.0 (g/mL) ML Lab File ID: E2645

Level: (low/med) LOW Date Received: 12/14/91

% Moisture: not dec. 100. dec. 0. Date Extracted: 12/26/91

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 12/27/91

GPC Cleanup: (Y/N) N pH: 6.3 Dilution Factor: 1.00

Number TICs found: 4

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	- -	UNKNOWN	6.07	9.	J
2.	- -	UNKNOWN	6.42	10.	J
3.	- -	UNKNOWN	8.70	200.	BJ
4.	- -	UNKNOWN	10.63	10.	J
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1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

100272

Lab Name: ECOTEK Contract: 2-15521

Lab Code: ECOTEK Case No.: 1792 SAS No.: SDG No.: 272

Matrix: (soil/water) SOIL Lab Sample ID: 179201

Sample wt/vol: 30. (g/mL) G Lab File ID: DF150

Level: (low/med) LOW Date Received: 12/14/91

% Moisture: not dec. 13. dec. 0. Date Extracted: 12/23/91

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 1/ 8/92

GPC Cleanup: (Y/N) N pH: 6.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	ALPHA-BHC	9.1	U
319-85-7	BETA-BHC	9.1	U
319-86-8	DELTA-BHC	9.1	U
58-89-9	GAMMA-BHC	9.1	U
76-44-8	HEPTACHLOR	9.1	U
309-00-2	ALDRIN	9.1	U
1024-57-3	HEPTACHLOR EPOXIDE	9.1	U
959-98-8	ENDOSULFAN I	9.1	U
60-57-1	DIELDRIN	18.	U
72-55-9	4,4'-DDE	18.	U
72-20-8	ENDRIN	18.	U
33213-65-9	ENDOSULFAN II	18.	U
72-54-8	4,4'-DDD	18.	U
1031-07-8	ENDOSULFAN SULFATE	18.	U
50-29-3	4,4'-DDT	18.	U
72-43-5	METHOXYCHLOR	91.	U
53494-70-5	ENDRIN KETONE	18.	U
5103-71-9	ALPHA CHLORDANE	91.	U
5103-74-2	GAMMA CHLORDANE	91.	U
8001-35-2	TOXAPHENE	180.	U
12674-11-2	AROCLOR-1016	91.	U
11104-28-2	AROCLOR-1221	91.	U
11141-16-5	AROCLOR-1232	91.	U
53469-21-9	AROCLOR-1242	91.	U
12672-29-6	AROCLOR-1248	91.	U
11097-69-1	AROCLOR-1254	180.	U
11096-82-5	AROCLOR-1260	180.	U
7421-~~36-5~~-93-4	Endrin Aldehyde	18.	U

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

100272T

Lab Name: ECOTEK Contract: 2-15521

Lab Code: ECOTEK Case No.: 1792 SAS No.: SDG No.: 272

Matrix: (soil/water) WATER Lab Sample ID: 179201T

Sample wt/vol: 952. (g/mL)ML Lab File ID: DF131

Level: (low/med) LOW Date Received: 12/14/91

% Moisture: not dec.100. dec. 0. Date Extracted: 12/26/91

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 1/ 7/92

GPC Cleanup: (Y/N) N pH: 6.3 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	ALPHA-BHC	.053	U
319-85-7	BETA-BHC	.053	U
319-86-8	DELTA-BHC	.053	U
58-89-9	GAMMA-BHC	.053	U
76-44-8	HEPTACHLOR	.053	U
309-00-2	ALDRIN	.053	U
1024-57-3	HEPTACHLOR EPOXIDE	.053	U
959-98-8	ENDOSULFAN I	.053	U
60-57-1	DIELDRIN	.11	U
72-55-9	4,4'-DDE	.11	U
72-20-8	ENDRIN	.11	U
33213-65-9	ENDOSULFAN II	.11	U
72-54-8	4,4'-DDD	.11	U
1031-07-8	ENDOSULFAN SULFATE	.11	U
50-29-3	4,4'-DDT	.11	U
72-43-5	METHOXYCHLOR	.53	U
53494-70-5	ENDRIN KETONE	.11	U
5103-71-9	ALPHA CHLORDANE	.53	U
5103-74-2	GAMMA CHLORDANE	.53	U
8001-35-2	TOXAPHENE	1.1	U
12674-11-2	AROCLOR-1016	.53	U
11104-28-2	AROCLOR-1221	.53	U
11141-16-5	AROCLOR-1232	.53	U
53469-21-9	AROCLOR-1242	.53	U
12672-29-6	AROCLOR-1248	.53	U
11097-69-1	AROCLOR-1254	1.1	U
11096-82-5	AROCLOR-1260	1.1	U
7421-~~36~~-93-4	Endrin Aldehyde	.11	U

RB 1/14/92

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

100272

Lab Name: ECOTEK_LSI Contract: 2-15521

Lab Code: ECOTEK Case No.: 1792 SAS No.: SDG No.: 272

Matrix (soil/water): SOIL Lab Sample ID: 179201

Level (low/med): LOW Date Received: 12/14/92

% Solids: 87.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	13500		*	P
7440-36-0	Antimony	3.0	U	N	P
7440-38-2	Arsenic	6.9	U	N	F
7440-39-3	Barium	108			P
7440-41-7	Beryllium	0.85	B		P
7440-43-9	Cadmium	0.23	U		P
7440-70-2	Calcium	50800		E*	P
7440-47-3	Chromium	17.7		*	P
7440-48-4	Cobalt	10.3	B		P
7440-50-8	Copper	29.1		E*	P
7439-89-6	Iron	22600		E*	P
7439-92-1	Lead	13.8		*	P
7439-95-4	Magnesium	16100		*	P
7439-96-5	Manganese	574		E	P
7439-97-6	Mercury	0.03	B		CV
7440-02-0	Nickel	22.6			P
7440-09-7	Potassium	1600		*	P
7782-49-2	Selenium	0.69	U	N	F
7440-22-4	Silver	1.1	U		P
7440-23-5	Sodium	142	B	E	P
7440-28-0	Thallium	0.46	U		F
7440-62-2	Vanadium	25.9		E*	P
7440-66-6	Zinc	71.3		E*	P

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FORM I - IN

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U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

100272

Lab Name: ECOTEK_LSI Contract: NA

Lab Code: ECOTEK Case No.: 1792 SAS No.: NA SDG No.: 272

Matrix (soil/water): WATER Lab Sample ID: 179201

Level (low/med): LOW Date Received: 12/14/91

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	482			P
7440-36-0	Antimony	13.0	U		P
7440-38-2	Arsenic	12.0	U		P
7440-39-3	Barium	2050			P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	1.0	U		P
7440-70-2	Calcium	652000			P
7440-47-3	Chromium	4.0	U		P
7440-48-4	Cobalt	3.0	U		P
7440-50-8	Copper	2.0	U		P
7439-89-6	Iron	32.6			P
7439-92-1	Lead	30.6			P
7439-95-4	Magnesium	19400			P
7439-96-5	Manganese	1220			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	12.5			P
7440-09-7	Potassium	3940			P
7782-49-2	Selenium	60.0	U		P
7440-22-4	Silver	19.6			P
7440-28-0	Thallium	40.0	U		P
7440-62-2	Vanadium	2.0	U		P
7440-66-6	Zinc	1060			P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

EcoTek LSI
EcoTek Laboratory Services Incorporated

ANALYTICAL RESULTS
LSDG: 1792

WEMCO ID	LAB SAMPLE ID	UNITS	VOL. or SIZE	COUNTER % EFFICIENCY	COUNT TIME	BKG COUNTS	BKG SIGMA	TPU at OSL	REQUIRED DETECTION LIMITS	ANALYST INITIALS	CHEMICAL RECOVERY	% MOIST.
0272	179201	PCI/G	1.0 G	21	1000 m	3	2	N/A	1.0 PCI/G	WBS	16	N/A
0272	179201	PCI/G	1.0 G	21	1000 m	0	0	N/A	1.0 PCI/G	WBS	16	N/A
OMPOSITE 274-5-6	179205	PCI/G	1.0 G	19	1000 m	2	1	N/A	1.0 PCI/G	WBS	18	N/A
OMPOSITE 274-5-6	179205	PCI/G	1.0 G	19	1000 m	0	0	N/A	1.0 PCI/G	WBS	18	N/A
0272	179201	PCI/G	1.0 G	15	1000 m	0	0	14	1.0 PCI/G	WBS	76	N/A
0272	179201	PCI/G	1.0 G	15	1000 m	0	0	14	1.0 PCI/G	WBS	76	N/A
0272	179201	PCI/G	1.0 G	15	1000 m	0	0	14	1.0 PCI/G	WBS	76	N/A
OMPOSITE 274-5-6	179205	PCI/G	1.0 G	14	1000 m	0	0	14	1.0 PCI/G	WBS	84	N/A
OMPOSITE 274-5-6	179205	PCI/G	1.0 G	14	1000 m	0	0	14	1.0 PCI/G	WBS	84	N/A
OMPOSITE 274-5-6	179205	PCI/G	1.0 G	14	1000 m	0	0	14	1.0 PCI/G	WBS	84	N/A
0272	179201	UG/L	1 ML	N/A	N/A	N/A	N/A	3	1.0 UG/L	WBS	N/A	N/A
OMPOSITE 274-5-6	179205	UG/L	1 ML	N/A	N/A	N/A	N/A	3	1.0 UG/L	WBS	N/A	N/A

EcoTek LSI
EcoTek Laboratory Services Incorporated

ANALYTICAL RESULTS
LSDG: 1792

WEMCO ID	LAB SAMPLE ID	UNITS	VOL. or SIZE	COUNTER % EFFICIENCY	COUNT TIME	BKG COUNTS	BKG SIGMA	TPU at OSL	REQUIRED DETECTION LIMITS	ANALYST INITIALS	CHEMICAL RECOVERY	% MOIST.
00272	179201	PCI/G	1.0 G	9.7	2000 M	580	24	0	1.0 PCI/L	HMW	N/A	N/A
omposite 274-5-6	179205	PCI/G	1.0 G	11.5	2000 M	440	21	1	1.0 PCI/L	HMW	N/A	N/A
00272	179201	PCI/G	1.0 G	37.4	2000 M	2800	53	1	4.0 PCI/L	HMW	N/A	N/A
omposite 274-5-6	179205	PCI/G	1.0 G	34.7	2000 M	3300	57	1	4.0 PCI/L	HMW	N/A	N/A
00272	179201	PCI/L	1000 ML	21	30 M	3	2	NA	1.0 PCI/L	WBS	0.46	N/A
omposite 274-5-6	179205	PCI/L	1000 ML	22	30 M	5.1	2	NA	1.0 PCI/L	WBS	0.75	N/A

EcoTek LSI
EcoTek Laboratory Services Incorporated

ANALYTICAL RESULTS
LSDG: 1792

WEMCO ID	LAB SAMPLE ID	RELEASE #	DATE COLLECTED	DATE RECEIVED	DATE ANALYZED	METHOD	MATRIX	PARAMATER	ACTIVITY	ONE-SIGMA COUNTING ERROR	MDA
100272	179201	602.3.40	12/12/91	12/14/91	1/31/92	RL-2302	SOIL	GROSS ALPHA	68	0.3	0.3
Composite 274-5-6	179205	602.3.40	12/12/91	12/14/91	1/31/92	RL-2302	SOIL	GROSS ALPHA	60	0.4	0.2
100272	179201	602.3.40	12/12/91	12/14/91	1/31/92	RL-2302	SOIL	GROSS BETA	46	0.3	0.2
Composite 274-5-6	179205	602.3.40	12/12/91	12/14/91	1/31/92	RL-2302	SOIL	GROSS BETA	50	0.3	0.2
100272	179201	602.3.40	12/12/91	12/14/91	1/23/92	RL-TEMP	TCLP LEACHATE	RADIUM-226	ND	NA	1.8
Composite 274-5-6	179205	602.3.40	12/12/91	12/14/91	1/23/92	RL-TEMP	TCLP LEACHATE	RADIUM-226	ND	NA	1.6

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

100279

Lab Name: ECOTEK LSI. Contract: 2-15521

Lab Code: ECOTEK Case No.: 2130 SAS No.: SDG No.: 279

Matrix: (soil/water) SOIL Lab Sample ID: 213001

Sample wt/vol: 5.060 (g/mL) G Lab File ID: F41349

Level: (low/med) LOW Date Received: 02/22/92

% Moisture: not dec. 13. Date Analyzed: 02/26/92

GC Column: 1%SP1000 ID: 2.00 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	CHLOROMETHANE	11.	U
74-83-9	BROMOMETHANE	11.	U
75-01-4	VINYL CHLORIDE	11.	U
75-00-3	CHLOROETHANE	11.	U
75-09-2	METHYLENE CHLORIDE	11.	U
67-64-1	ACETONE	11.	U
75-15-0	CARBON DISULFIDE	11.	U
75-35-4	1,1-DICHLOROETHENE	11.	U
75-34-3	1,1-DICHLOROETHANE	11.	U
540-59-0	1,2-DICHLOROETHENE (TOTAL)	11.	U
67-66-3	CHLOROFORM	11.	U
107-06-2	1,2-DICHLOROETHANE	11.	U
78-93-3	2-BUTANONE	11.	U
71-55-6	1,1,1-TRICHLOROETHANE	11.	U
56-23-5	CARBON TETRACHLORIDE	11.	U
75-27-4	BROMODICHLOROMETHANE	11.	U
78-87-5	1,2-DICHLOROPROPANE	11.	U
10061-01-5	CIS-1,3-DICHLOROPROPENE	11.	U
79-01-6	TRICHLOROETHENE	11.	U
124-48-1	DIBROMOCHLOROMETHANE	11.	U
79-00-5	1,1,2-TRICHLOROETHANE	11.	U
71-43-2	BENZENE	11.	U
10061-02-6	TRANS-1,3-DICHLOROPROPENE	11.	U
75-25-2	BROMOFORM	11.	U
108-10-1	4-METHYL-2-PENTANONE	11.	U
591-78-6	2-HEXANONE	11.	U
127-18-4	TETRACHLOROETHENE	11.	U
79-34-5	1,1,2,2-TETRACHLOROETHANE	11.	U
108-88-3	TOLUENE	11.	U
108-90-7	CHLOROBENZENE	11.	U
100-41-4	ETHYLBENZENE	11.	U
100-42-5	STYRENE	11.	U
1330-20-7	XYLENE (TOTAL)	11.	U
108-05-4	VINYL ACETATE	11.	U

58

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

279

Name: ECOTEK LSI. Contract: 2-15521

Lab Code: ECOTEK Case No.: 2130 SAS No.: SDG No.: 279

Matrix: (soil/water) WATER Lab Sample ID: 213001Z

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: C0767

Level: (low/med) LOW Date Received: 02/27/92

% Moisture: not dec._____ Date Analyzed: 03/05/92

GC Column: 1%SP1000 ID: 2.00 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	19.	B
67-64-1	Acetone	10.	U
75-15-0	Carbon Disulfide	10.	U
75-35-4	1,1-Dichloroethene	10.	U
75-34-3	1,1-Dichloroethane	10.	U
540-59-0	1,2-Dichloroethene (total)	10.	U
67-66-3	Chloroform	10.	U
107-06-2	1,2-Dichloroethane	10.	U
78-93-3	2-Butanone	10.	U
71-55-6	1,1,1-Trichloroethane	10.	U
56-23-5	Carbon Tetrachloride	10.	U
75-27-4	Bromodichloromethane	10.	U
78-87-5	1,2-Dichloropropane	10.	U
10061-01-5	cis-1,3-Dichloropropene	10.	U
79-01-6	Trichloroethene	10.	U
124-48-1	Dibromochloromethane	10.	U
79-00-5	1,1,2-Trichloroethane	10.	U
71-43-2	Benzene	10.	U
10061-02-6	trans-1,3-Dichloropropene	10.	U
75-25-2	Bromoform	10.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	10.	U
79-34-5	1,1,2,2-Tetrachloroethane	10.	U
108-88-3	Toluene	10.	U
108-90-7	Chlorobenzene	10.	U
100-41-4	Ethylbenzene	10.	U
100-42-5	Styrene	10.	U
1330-20-7	Xylene (total)	10.	U
108-05-4	Vinyl Acetate	10.	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

279

Name: ECOTEK LSI. Contract: 2-15521

Lab Code: ECOTEK Case No.: 2130 SAS No.: SDG No.: 279

Matrix: (soil/water) WATER Lab Sample ID: 213001Z

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: C0767

Level: (low/med) LOW Date Received: 02/27/92

% Moisture: not dec._____ Date Analyzed: 03/05/92

GC Column: 1%SP1000 ID: 2.00 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 3

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	108-21-4	Acetic acid, 1-methylethyl e	17.81	20.	J N
2.	637-78-5	Propanoic acid, 1-methylethy	21.68	30.	J N
3.	638-11-9	Butanoic acid, 1-methylethyl	25.96	50.	J N
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1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
100279

Lab Name: ECOTEK LSI. Contract: 2-15521

Lab Code: ECOTEK Case No.: 2130 SAS No.: SDG No.: 279

Matrix: (soil/water) SOIL Lab Sample ID: 213001

Sample wt/vol: 5.060 (g/mL) G Lab File ID: F41349

Level: (low/med) LOW Date Received: 02/22/92

% Moisture: not dec. 13 Date Analyzed: 02/26/92

GC Column: 1%SP1000 ID: 2.00 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
3.				
4.				
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29.				
30.				

1D
SEMI-VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

279

Name: SIDTEK LBL. Contract: 2-19521

Lab Code: SIDTEK Case No.: 2170 SAS No.: SDG No.: 279

Matrix: (soil/water) SOIL Lab Sample ID: 213041

Sample wt/vol: 30.0 (g/mL) G Lab File ID: A2497

Level: (low/med) LOW Date Received: 02/22/92

% Moisture: 13. decanted: (Y/N) N Date Extracted: 02/26/92

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 03/10/92

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-09-2	3-Nitroaniline	960.	U
83-32-9	Acenaphthene	380.	U
51-28-5	2,4-Dinitrophenol	960.	U
100-02-7	4-Nitrophenol	960.	U
132-64-9	Dibenzofuran	380.	U
121-14-2	2,4-Dinitrotoluene	380.	U
84-66-2	Diethylphthalate	380.	U
7005-72-3	4-Chlorophenyl-phenylether	380.	U
86-73-7	Fluorene	380.	U
100-01-6	4-Nitroaniline	960.	U
534-52-1	4,6-Dinitro-2-methylphenol	960.	U
86-30-6	N-Nitrosodiphenylamine	380.	U
101-55-3	4-Bromophenyl-phenylether	380.	U
118-74-1	Hexachlorobenzene	380.	U
87-86-5	Pentachlorophenol	960.	U
85-01-8	Phenanthrene	380.	U
120-12-7	Anthracene	380.	U
86-74-8	Carbazole	380.	U
84-74-2	Di-n-butylphthalate	130.	130
206-44-0	Fluoranthene	65.	J
129-00-0	Pyrene	380.	U
85-68-7	Butylbenzylphthalate	380.	U
91-94-1	3,3'-Dichlorobenzidine	380.	U
56-55-3	Benzo(a)anthracene	380.	U
218-01-9	Chrysene	380.	U
117-81-7	bis(2-Ethylhexyl)phthalate	380.	U
117-84-0	Di-n-octylphthalate	380.	U
205-99-2	Benzo(b)fluoranthene	380.	U
207-08-9	Benzo(k)fluoranthene	380.	U
50-32-8	Benzo(a)pyrene	380.	U
193-39-5	Indeno(1,2,3-cd)pyrene	380.	U
53-70-3	Dibenz(a,h)anthracene	380.	U
191-24-2	Benzo(g,h,i)perylene	380.	U

1) - Cannot be separated from diphenylamine

0.62

2

SEMI-VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

279

Lab Name: ECOTEK LBI. Contract: 2-15521

Lab Code: ECOTEK Case No.: 2170 SAS No.: SDG No.: 279

Matrix: (soil/water) SOIL Lab Sample ID: 017001

Sample wt/vol: 30.0 (g/mL) G Lab File ID: AL497

Level: (low/med) LOW Date Received: 02/22/92

% Moisture: 13. decanted: (Y/N) N Date Extracted: 02/28/92

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 03/10/92

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	380.	U
111-44-4	bis(2-Chloroethyl)ether	380.	U
95-57-8	2-Chlorophenol	380.	U
541-73-1	1,3-Dichlorobenzene	380.	U
106-46-7	1,4-Dichlorobenzene	380.	U
100-51-6	Benzyl alcohol	380.	U
95-50-1	1,2-Dichlorobenzene	380.	U
95-48-7	2-Methylphenol	380.	U
108-60-1	2,2'-oxybis(1-Chloropropane)	380.	U
106-44-5	4-Methylphenol	380.	U
621-64-7	N-Nitroso-di-n-propylamine	380.	U
67-72-1	Hexachloroethane	380.	U
98-95-3	Nitrobenzene	380.	U
78-59-1	Isophorone	380.	U
88-75-5	2-Nitrophenol	380.	U
105-67-9	2,4-Dimethylphenol	380.	U
111-91-1	bis(2-Chloroethoxy)methane	380.	U
65-85-0	Benzoic acid	380.	U
120-83-2	2,4-Dichlorophenol	380.	U
120-82-1	1,2,4-Trichlorobenzene	380.	U
91-20-3	Naphthalene	380.	U
106-47-8	4-Chloroaniline	380.	U
87-68-3	Hexachlorobutadiene	380.	U
59-50-7	4-Chloro-3-methylphenol	380.	U
91-57-6	2-Methylnaphthalene	380.	U
77-47-4	Hexachlorocyclopentadiene	380.	U
88-06-2	2,4,6-Trichlorophenol	380.	U
95-95-4	2,4,5-Trichlorophenol	960.	U
91-58-7	2-Chloronaphthalene	380.	U
88-74-4	2-Nitroaniline	960.	U
131-11-3	Dimethylphthalate	380.	U
208-96-8	Acenaphthylene	380.	U
606-20-2	2,6-Dinitrotoluene	380.	U

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

100279 RE

Lab Name: ECOTEK LSI. Contract: 2-15521

Lab Code: ECOTEK Case No.: 2130 SAS No.: SDG No.: 279

Matrix: (soil/water) SOIL Lab Sample ID: 213001R

Sample wt/vol: 31.0 (g/mL) G Lab File ID: AF00259

% Moisture: 13. decanted: (Y/N) N Date Received: 02/22/92

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 03/13/92

Concentrated Extract Volume: 5000.0 (uL) Date Analyzed: 03/25/92

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.0 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	1.9	U
319-85-7	beta-BHC	1.9	U
319-86-8	delta-BHC	1.9	U
58-89-9	gamma-BHC	1.9	U
76-44-8	Heptachlor	1.9	U
309-00-2	Aldrin	1.9	U
1024-57-3	Heptachlor epoxide	1.9	U
959-98-8	Endosulfan I	1.9	U
60-57-1	Dieldrin	3.7	U
72-55-9	4,4'-DDE	3.7	U
72-20-8	Endrin	3.7	U
33213-65-9	Endosulfan II	3.7	U
72-54-8	4,4'-DDD	3.7	U
1031-07-8	Endosulfan Sulfate	3.7	U
50-29-3	4,4'-DDT	3.7	U
72-43-5	Methoxychlor	19.	U
53494-70-5	Endrin ketone	3.7	U
7421-93-4	Endrin aldehyde	3.7	U
5103-71-9	alpha-Chlordane	1.9	U
5103-74-2	gamma-Chlordane	1.9	U
8001-35-2	Toxaphene	190.	U
12674-11-2	Aroclor-1016	37.	U
11104-28-2	Aroclor-1221	74.	U
11141-16-5	Aroclor-1232	37.	U
53469-21-9	Aroclor-1242	37.	U
12672-29-6	Aroclor-1248	37.	U
11097-69-1	Aroclor-1254	42.	J P
11096-82-5	Aroclor-1260	37.	U

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

100279Y

Lab Name: ECOTEK LSI. Contract: 2-15521

Lab Code: ECOTEK Case No.: 2130 SAS No.: SDG No.: 279

Matrix: (soil/water) WATER Lab Sample ID: 213001Y

Sample wt/vol: 1014.0 (g/mL) ML Lab File ID: AF00060

% Moisture: _____ decanted: (Y/N)___ Date Received: 02/22/92

Extraction: (SepF/Cont/Sonc) SEPF Date Extracted: 03/02/92

Concentrated Extract Volume: 10000.0 (uL) Date Analyzed: 03/10/92

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 5.0 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	.049	U
319-85-7	beta-BHC	.049	U
319-86-8	delta-BHC	.049	U
58-89-9	gamma-BHC	.049	U
76-44-8	Heptachlor	.049	U
309-00-2	Aldrin	.049	U
1024-57-3	Heptachlor epoxide	.049	U
959-98-8	Endosulfan I	.049	U
60-57-1	Dieldrin	.099	U
72-55-9	4,4'-DDE	.099	U
72-20-8	Endrin	.099	U
33213-65-9	Endosulfan II	.099	U
72-54-8	4,4'-DDD	.099	U
1031-07-8	Endosulfan Sulfate	.099	U
50-29-3	4,4'-DDT	.099	U
72-43-5	Methoxychlor	.49	U
53494-70-5	Endrin ketone	.099	U
7421-93-4	Endrin aldehyde	.099	U
5103-71-9	alpha-Chlordane	.049	U
5103-74-2	gamma-Chlordane	.049	U
8001-35-2	Toxaphene	4.9	U
12674-11-2	Aroclor-1016	.99	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	.99	U
53469-21-9	Aroclor-1242	.99	U
12672-29-6	Aroclor-1248	.99	U
11097-69-1	Aroclor-1254	.99	U
11096-82-5	Aroclor-1260	.99	U

FORM I PEST 3/90

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

100279

Lab Name: ECOTEK LSI. Contract: 2-15521

Lab Code: ECOTEK Case No.: 2130 SAS No.: SDG No.: 279

Matrix: (soil/water) SOIL Lab Sample ID: 213001

Sample wt/vol: 30.0 (g/mL) G Lab File ID: AF00049

% Moisture: 13. decanted: (Y/N) N Date Received: 02/22/92

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 02/28/92

Concentrated Extract Volume: 5000.0 (uL) Date Analyzed: 03/09/92

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.0 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	1.9	U
319-85-7	beta-BHC	1.9	U
319-86-8	delta-BHC	1.9	U
58-89-9	gamma-BHC	1.9	U
76-44-8	Heptachlor	1.9	U
309-00-2	Aldrin	1.9	U
1024-57-3	Heptachlor epoxide	1.9	U
959-98-8	Endosulfan I	1.9	U
60-57-1	Dieldrin	3.8	U
72-55-9	4,4'-DDE	3.8	U
72-20-8	Endrin	3.8	U
33213-65-9	Endosulfan II	3.8	U
72-54-8	4,4'-DDD	3.8	U
1031-07-8	Endosulfan Sulfate	3.8	U
50-29-3	4,4'-DDT	3.8	U
72-43-5	Methoxychlor	19.	U
53494-70-5	Endrin ketone	3.8	U
7421-93-4	Endrin aldehyde	3.8	U
5103-71-9	alpha-Chlordane	1.9	U
5103-74-2	gamma-Chlordane	1.9	U
8001-35-2	Toxaphene	190.	U
12674-11-2	Aroclor-1016	38.	U
11104-28-2	Aroclor-1221	77.	U
11141-16-5	Aroclor-1232	38.	U
53469-21-9	Aroclor-1242	38.	U
12672-29-6	Aroclor-1248	38.	U
11097-69-1	Aroclor-1254	63.	
11096-82-5	Aroclor-1260	38.	U

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

100279

Lab Name: ECOTEK_LSI Contract: 2-15521

Lab Code: ECOTEK Case No.: 279 SAS No.: NA SDG No.: 2130

Matrix (soil/water): SOIL Lab Sample ID: 213001

Level (low/med): LOW Date Received: 02/22/92

% Solids: 87.1

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	7940			P
7440-36-0	Antimony	2.5	U	N	P
7440-38-2	Arsenic	7.5		*	P
7440-39-3	Barium	86.8			P
7440-41-7	Beryllium	0.80	B		P
	Boron	1.4		*	P
7440-43-9	Cadmium	0.74	B		P
7440-70-2	Calcium	5600		*	P
7440-47-3	Chromium	14.3			P
7440-48-4	Cobalt	6.9	B		P
7440-50-8	Copper	22.0		*	P
7439-89-6	Iron	16000			P
7439-92-1	Lead	41.2			P
7439-95-4	Magnesium	2540			P
7439-96-5	Manganese	516			P
7439-97-6	Mercury	0.08	B		CV
7439-98-7	Molybdenu	1.8		*	P
7440-02-0	Nickel	17.0			P
7440-09-7	Potassium	586	B		P
7782-49-2	Selenium	9.9	U	N	P
7440-21-3	Silicon	724		*	P
7440-22-4	Silver	0.75	B		P
7440-23-5	Sodium	51.1	B		P
7440-28-0	Thallium	1.1	U		F
7440-62-2	Vanadium	21.4			P
7440-66-6	Zinc	77.7			P
57125	Cyanide	0.17	B		NR *

Color Before: BROWN Clarity Before: NA Texture: MEDIUM

Color After: YELLOW Clarity After: CLEAR Artifacts:

Comments:

* See Case Narrative

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1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

100279T

Lab Name: ECOTEK_LSI Contract: 2-15521
Lab Code: ECOTEK Case No.: 279 SAS No.: NA SDG No.: 2130
Matrix (soil/water): WATER Lab Sample ID: 213001T
Level (low/med): LOW Date Received: 02/22/92
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	2370		E	P
7440-36-0	Antimony	11.0	U		P
7440-38-2	Arsenic	12.0	U		P
7440-39-3	Barium	4840			P
7440-41-7	Beryllium	1.2	B		P
	Boron	3450			P
7440-43-9	Cadmium	2.3	B		P
7440-70-2	Calcium	269000		E	P
7440-47-3	Chromium	9.0	B		P
7440-48-4	Cobalt	2.0	U		P
7440-50-8	Copper	2.0	U		P
7439-89-6	Iron	175		E	P
7439-92-1	Lead	18.0			P
7439-95-4	Magnesium	38800			P
7439-96-5	Manganese	281		E	P
7439-97-6	Mercury	0.10	U		CV
7439-98-7	Molybdenu	4.0	U		P
7440-02-0	Nickel	15.1	B		P
7440-09-7	Potassium	4660	B		P
7782-49-2	Selenium	22.0	U		P
7440-21-3	Silicon	3360		E	P
7440-22-4	Silver	3.0	U		P
7440-23-5	Sodium	1430000		E	P
7440-28-0	Thallium	41.0	U		P
7440-62-2	Vanadium	1.0	U		P
7440-66-6	Zinc	3600		E	P
57125	Cyanide	5	U		NR *

Color Before: COLORLESS Clarity Before: CLEAR Texture: NA
Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:
* See Case Narrative.

ANALYTICAL RESULTS
LSDG: 2130

ARCO ID	LAB SAMPLE ID	PARAMETER	REL. #	DATE COLL.	DATE REC.	DATE ANAL.	METHOD	MATRIX	ACTIVITY	ONE-SIGMA COUNTING ERROR	MDA	UNITS	VOL. or SIZE	COUNTER EFFICIENCY	COUNT TIME	BKG COUNTS	BKG SIGMA	TPU or OSL	REQUIRED DETECTION LIMITS	ANLST INITIAL	CHEM. REC.	% MOIST.
0279	213001	CESIUM-137	03	2/19/92	2/22/92	3/23/92	RL-2151	LEACHATE	ND	NA	3.8	PCI/L	0.46 L	2.5	1000 M	176	13	NA	20 PCI/L	HMW	NA	NA
0279	213001	GROSS ALPHA	03	2/19/92	2/22/92	4/6/92	RL-2302	LEACHATE	270	1.1	2.1	PCI/L	150 ML	22	1000 M	300	17	4	1.0 PCI/L	HMW	NA	NA
0279	213001	GROSS BETA	03	2/19/92	2/22/92	4/6/92	RL-2302	LEACHATE	120	1.1	1.7	PCI/L	150 ML	36	1000 M	1770	42	9	4.0 PCI/L	HMW	NA	NA
0279	213001	NEPTUNIUM-237	03	2/19/92	2/22/92	4/1/92	RL-TEMP	LEACHATE	1.4	0.2	0.1	PCI/L	200 ML	14	1000 M	1	1	12	1.0 PCI/L	HMW	100	NA
0279	213001	PLUTONIUM-238	03	2/19/92	2/22/92	4/8/92	RL-2325	LEACHATE	ND	NA	0.4	PCI/L	200 ML	12	1000 M	4	2	NA	1.0 PCI/L	HMW	57	NA
0279	213001	PLUTONIUM-239/240	03	2/19/92	2/22/92	4/8/92	RL-2325	LEACHATE	ND	NA	0.1	PCI/L	200 ML	12	1000 M	0	0	NA	1.0 PCI/L	HMW	57	NA
0279	213001	RUTHENIUM-106	03	2/19/92	2/22/92	3/23/92	RL-2151	LEACHATE	ND	NA	34	PCI/L	0.46 L	2.6	1000 M	211	15	NA	150 PCI/L	HMW	NA	NA
0279	213001	STRONTIUM-90	03	2/19/92	2/22/92	3/17/92	RL-TEMP	LEACHATE	4.2	0.8	2.7	PCI/L	1000 ML	39	100 M	140	12	18	5.0 PCI/L	HMW	0.98	NA
0279	213001	TECHNETIUM-99	03	2/19/92	2/22/92	3/25/92	RL-2317	LEACHATE	ND	NA	29	PCI/L	100 ML	50	60 M	27	5	NA	10 PCI/L	WBS	0.99	NA
0279	213001	THORIUM-228	03	2/19/92	2/22/92	4/5/92	RL-2318	LEACHATE	ND	NA	0.12	PCI/L	200 ML	18	1000 M	1	1	NA	1.0 PCI/L	WBS	69	NA
0279	213001	THORIUM-230	03	2/19/92	2/22/92	4/5/92	RL-2318	LEACHATE	ND	NA	0.15	PCI/L	200 ML	18	1000 M	1	1	NA	1.0 PCI/L	WBS	69	NA
0279	213001	THORIUM-232	03	2/19/92	2/22/92	4/5/92	RL-2318	LEACHATE	ND	NA	0.12	PCI/L	200 ML	18	1000 M	1	1	NA	1.0 PCI/L	WBS	69	NA
0279	213001	TOTAL URANIUM	03	2/19/92	2/22/92	4/7/92	RL-2323	LEACHATE	770	27	10	UG/L	50 ML	NA	NA	NA	NA	4	NA	GSS	NA	NA
0279	213001	URANIUM-234	03	2/19/92	2/22/92	4/5/92	RL-2322	LEACHATE	320	21	0.05	PCI/L	200 ML	19	1000 M	0	0	7	1.0 PCI/L	WBS	66	NA
0279	213001	URANIUM-235/236	03	2/19/92	2/22/92	4/5/92	RL-2322	LEACHATE	9.0	0.7	0.05	PCI/L	200 ML	19	1000 M	0	0	8	1.0 PCI/L	WBS	66	NA
0279	213001	URANIUM-238	03	2/19/92	2/22/92	4/5/92	RL-2322	LEACHATE	340	23	0.05	PCI/L	200 ML	19	1000 M	1	1	7	1.0 PCI/L	WBS	66	NA
0279	213001	CESIUM-137	03	2/19/92	2/22/92	4/6/92	RL-2151	SOIL	0.21	0.025	0.001	PCI/G	68.41 G	2.4	1000 M	1889	43	12	0.02 PCI/G	HMW	NA	NA
0279	213001	GROSS ALPHA	03	2/19/92	2/22/92	4/17/92	RL-2302	SOIL	570	2	1.5	PCI/G	0.3 G	23	2000 M	1560	39	0.4	1.0 PCI/G	LBA	NA	NA
0279	213001	GROSS BETA	03	2/19/92	2/22/92	4/17/92	RL-2302	SOIL	250	1	0.6	PCI/G	0.3 G	37	2000 M	1820	43	0.6	4.0 PCI/G	LBA	NA	NA
0279	213001	NEPTUNIUM-237	03	2/19/92	2/22/92	4/23/92	RL-TEMP	SOIL	2.3	0.1	0.05	PCI/G	1.0 G	15	1000 M	3	2	6	1.0 PCI/G	HMW	71	NA
0279	213001	PLUTONIUM-238	03	2/19/92	2/22/92	3/26/92	RL-2325	SOIL	0.34	0.07	0.10	PCI/G	1.0 G	16	1000 M	3	2	19	1.0 PCI/G	LBA	32	NA
0279	213001	PLUTONIUM-239/240	03	2/19/92	2/22/92	3/26/92	RL-2325	SOIL	0.11	0.04	0.08	PCI/G	1.0 G	16	1000 M	1	1	33	1.0 PCI/G	LBA	32	NA
0279	213001	RUTHENIUM-106	03	2/19/92	2/22/92	4/6/92	RL-2151	SOIL	ND	NA	0.31	PCI/G	68.41 G	NA	1000 M	681	26	NA	0.17 PCI/G	HMW	NA	NA
0279	213001	STRONTIUM-90	03	2/19/92	2/22/92	4/5/92	RL-TEMP	SOIL	ND	NA	2.0	PCI/G	1.04 G	NA	60 M	176	13	NA	5.0 PCI/G	WBS	0.46	NA
0279	213001	TECHNETIUM-99	03	2/19/92	2/22/92	3/25/92	RL-2317	SOIL	9.0	2.2	3.3	PCI/G	1.0 G	50	60 M	26	5	25	10 PCI/L	WBS	0.85	NA
0279	213001	THORIUM-228	03	2/19/92	2/22/92	4/7/92	RL-2318	SOIL	2.2	0.2	0.05	PCI/G	1.0 G	14	1000 M	6	2	8	1.0 PCI/G	LBA	86	NA
0279	213001	THORIUM-230	03	2/19/92	2/22/92	4/7/92	RL-2318	SOIL	19	2.7	0.01	PCI/G	1.0 G	14	1000 M	0	0	7	1.0 PCI/G	LBA	86	NA
0279	213001	THORIUM-232	03	2/19/92	2/22/92	4/7/92	RL-2318	SOIL	2.1	0.2	0.01	PCI/G	1.0 G	14	1000 M	0	0	8	1.0 PCI/G	LBA	86	NA
0279	213001	TOTAL URANIUM	03	2/19/92	2/22/92	4/1/92	RL-2323	SOIL	360	12	2.0	UG/G	0.5 G	NA	NA	NA	NA	3	0.1 UG/G	GSS	NA	NA
0279	213001	URANIUM-234	03	2/19/92	2/22/92	4/1/92	RL-2322	SOIL	190	15	0.66	PCI/G	0.1 G	16	1000 M	1	1	8	1.0 PCI/G	LBA	36	NA
0279	213001	URANIUM-235/236	03	2/19/92	2/22/92	4/1/92	RL-2322	SOIL	6.8	0.9	0.76	PCI/G	0.1 G	16	1000 M	2	1	14	1.0 PCI/G	LBA	36	NA
0279	213001	URANIUM-238	03	2/19/92	2/22/92	4/1/92	RL-2322	SOIL	200	16	0.66	PCI/G	0.1 G	16	1000 M	1	1	8	1.0 PCI/G	LBA	36	NA

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

075607

Lab Name: DATACHEM LABS Contract: 3555

Lab Code: DATAC Case No.: AS011 SAS No.: _____ SDG No.: ASIV11

Matrix: (soil/water) SOIL Lab Sample ID: CLP10247

Sample wt/vol: 1.0 (g/mL) G Lab File ID: MW27CLP247

Level: (low/med) LOW Date Received: 05/09/92

% Moisture: not dec. 17 Date Analyzed: 05/19/92

GC Column: PACK ID: 2.00 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	60	U
74-83-9	Bromomethane	60	U
75-01-4	Vinyl Chloride	60	U
75-00-3	Chloroethane	60	U
75-09-2	Methylene Chloride	60	U
67-64-1	Acetone	60	U
75-15-0	Carbon Disulfide	60	U
75-35-4	1,1-Dichloroethene	60	U
75-34-3	1,1-Dichloroethane	60	U
540-59-0	1,2-Dichloroethene (total)	60	U
67-66-3	Chloroform	60	U
107-06-2	1,2-Dichloroethane	60	U
78-93-3	2-Butanone	60	U
71-55-6	1,1,1-Trichloroethane	60	U
56-23-5	Carbon Tetrachloride	60	U
75-27-4	Bromodichloromethane	60	U
78-87-5	1,2-Dichloropropane	60	U
10061-01-5	cis-1,3-Dichloropropene	60	U
79-01-6	Trichloroethene	3600	E
124-48-1	Dibromochloromethane	60	U
79-00-5	1,1,2-Trichloroethane	60	U
71-43-2	Benzene	60	U
10061-02-6	trans-1,3-Dichloropropene	60	U
75-25-2	Bromoform	60	U
108-10-1	4-Methyl-2-Pentanone	60	U
591-78-6	2-Hexanone	60	U
127-18-4	Tetrachloroethene	360	
79-34-5	1,1,2,2-Tetrachloroethane	60	U
108-88-3	Toluene	60	U
108-90-7	Chlorobenzene	60	U
100-41-4	Ethylbenzene	60	U
100-42-5	Styrene	60	U
1330-20-7	Xylene (total)	60	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

075607

Lab Name: DATACHEM LABS Contract: 3555

Lab Code: DATAC Case No.: AS011 SAS No.: _____ SDG No.: ASIV11

Matrix: (soil/water) SOIL Lab Sample ID: CLP10247

Sample wt/vol: 1.0 (g/mL) G Lab File ID: MW27CLP247

Level: (low/med) LOW Date Received: 05/09/92

% Moisture: not dec. 17 Date Analyzed: 05/19/92

GC Column: PACK ID: 2.00 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

075607

Lab Name: DATACHEM LABS Contract: 3555

Lab Code: DATAC Case No.: AS011 SAS No.: _____ SDG No.: ASIS11

Matrix: (soil/water) SOIL Lab Sample ID: CLP10247

Sample wt/vol: 1000 (g/mL) G Lab File ID: JN15CLP247

Level: (low/med) LOW Date Received: 05/09/92

% Moisture: 17 decanted: (Y/N) N Date Extracted: 05/19/92

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 05/29/92

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 8.2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	400	U
111-44-4	bis(2-Chloroethyl)Ether	400	U
95-57-8	2-Chlorophenol	400	U
541-73-1	1,3-Dichlorobenzene	400	U
106-46-7	1,4-Dichlorobenzene	400	U
95-50-1	1,2-Dichlorobenzene	400	U
95-48-7	2-Methylphenol	400	U
108-60-1	2,2'-oxybis(1-Chloropropane)	400	U
106-44-5	4-Methylphenol	400	U
621-64-7	N-Nitroso-Di-n-Propylamine	400	U
67-72-1	Hexachloroethane	400	U
98-95-3	Nitrobenzene	400	U
78-59-1	Isophorone	400	U
88-75-5	2-Nitrophenol	400	U
105-67-9	2,4-Dimethylphenol	400	U
111-91-1	bis(2-Chloroethoxy)Methane	400	U
120-83-2	2,4-Dichlorophenol	400	U
120-82-1	1,2,4-Trichlorobenzene	400	U
91-20-3	Naphthalene	130	J
106-47-8	4-Chloroaniline	400	U
87-68-3	Hexachlorobutadiene	400	U
59-50-7	4-Chloro-3-Methylphenol	400	U
91-57-6	2-Methylnaphthalene	220	J
77-47-4	Hexachlorocyclopentadiene	400	U
88-06-2	2,4,6-Trichlorophenol	400	U
95-95-4	2,4,5-Trichlorophenol	960	U
91-58-7	2-Chloronaphthalene	400	U
88-74-4	2-Nitroaniline	960	U
131-11-3	Dimethyl Phthalate	400	U
208-96-8	Acenaphthylene	400	U
606-20-2	2,6-Dinitrotoluene	400	U
99-09-2	3-Nitroaniline	960	U
83-32-9	Acenaphthene	46	J

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

075607

Lab Name: DATACHEM LABS Contract: 3555

Lab Code: DATAC Case No.: AS011 SAS No.: _____ SDG No.: ASIS11

Matrix: (soil/water) SOIL Lab Sample ID: CLP10247

Sample wt/vol: 1000 (g/mL) G Lab File ID: JW15CLP247

Level: (low/med) LOW Date Received: 05/09/92

% Moisture: 17 decanted: (Y/N) N Date Extracted: 05/19/92

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 05/29/92

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 8.2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	960	U
100-02-7	4-Nitrophenol	960	U
132-64-9	Dibenzofuran	95	J
121-14-2	2,4-Dinitrotoluene	400	U
84-66-2	Diethylphthalate	400	U
7005-72-3	4-Chlorophenyl-phenylether	400	U
86-73-7	Fluorene	63	J
100-01-6	4-Nitroaniline	960	U
534-52-1	4,6-Dinitro-2-Methylphenol	960	U
86-30-6	N-Nitrosodiphenylamine (1)	400	U
101-55-3	4-Bromophenyl-phenylether	400	U
118-74-1	Hexachlorobenzene	400	U
87-86-5	Pentachlorophenol	960	U
85-01-8	Phenanthrene	830	
120-12-7	Anthracene	49	J
86-74-8	Carbazole	400	U
84-74-2	Di-n-Butylphthalate	110	BJ
206-44-0	Fluoranthene	800	
129-00-0	Pyrene	880	
85-68-7	Butylbenzylphthalate	400	U
91-94-1	3,3'-Dichlorobenzidine	400	U
56-55-3	Benzo(a)Anthracene	340	J
218-01-9	Chrysene	480	
117-81-7	bis(2-Ethylhexyl)Phthalate	190	BJ
117-84-0	Di-n-Octyl Phthalate	400	U
205-99-2	Benzo(b)Fluoranthene	580	
207-08-9	Benzo(k)Fluoranthene	340	J
50-32-8	Benzo(a)Pyrene	410	
193-39-5	Indeno(1,2,3-cd)Pyrene	390	J
53-70-3	Dibenz(a,h)Anthracene	400	U
191-24-2	Benzo(g,h,i)Perylene	460	

(1) - Cannot be separated from Diphenylamine

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

075607

Lab Name: DATACHEM LABS Contract: 3555

Lab Code: DATAC Case No.: AS011 SAS No.: _____ SDG No.: ASIS11

Matrix: (soil/water) SOIL Lab Sample ID: CLP10247

Sample wt/vol: 1000 (g/mL) G Lab File ID: JW15CLP247

Level: (low/med) LOW Date Received: 05/09/92

% Moisture: 17 decanted: (Y/N) N Date Extracted: 05/19/92

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 05/29/92

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 8.2

Number TICs found: 17

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNSATURATED OXYHYDROCARBON	29.92	1100	J
2.	ALKYL ACETATE	30.42	320	J
3.	UNSATURATED OXYHYDROCARBON	30.69	220	J
4.	UNSATURATED OXYHYDROCARBON	31.06	320	J
5.	POLYCYCLIC HYDROCARBON	31.34	130	J
6.	UNSATURATED OXYHYDROCARBON	31.37	90	J
7.	UNSATURATED OXYHYDROCARBON	31.46	430	J
8.	UNSATURATED OXYHYDROCARBON	31.72	160	J
9.	UNSATURATED OXYHYDROCARBON	31.74	180	J
10.	UNSATURATED OXYHYDROCARBON	31.84	390	J
11.	POLYCYCLIC HYDROCARBON	32.06	170	J
12.	UNSATURATED HYDROCARBON	32.42	100	J
13.	UNSATURATED HYDROCARBON	32.64	330	J
14.	UNSATURATED OXYHYDROCARBON	32.87	170	J
15.	POLYCYCLIC HYDROCARBON	32.86	190	J
16.	UNSATURATED OXYHYDROCARBON	33.89	160	J
17.	POLYCYCLIC OXYHYDROCARBON	34.06	520	J

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

279Y

Lab Name: ECOTEK LEI. Contract: 2-.5501

Lab Code: ECOTEK Case No.: 2170 SAS No.: SDG No.: 279

Matrix: (soil/water) WATER Lab Sample ID: 213991Y

Sample wt/vol: 1000.0 (g/mL) ML Lab File ID: A0914

Level: (low/med) LOW Date Received: 02/22/92

% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 03/07/92

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 03/12/92

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 5.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-95-2	Phenol	9.	U
111-44-4	bis(2-Chloroethyl)ether	9.	U
95-57-8	2-Chlorophenol	9.	U
541-73-1	1,3-Dichlorobenzene	9.	U
106-46-7	1,4-Dichlorobenzene	9.	U
100-51-6	Benzyl alcohol	9.	U
95-50-1	1,2-Dichlorobenzene	9.	U
95-48-7	2-Methylphenol	9.	U
108-60-1	2,2'-oxybis(1-Chloropropane)	9.	U
106-44-5	4-Methylphenol	9.	U
621-64-7	N-Nitroso-di-n-propylamine	9.	U
67-72-1	Hexachloroethane	9.	U
98-95-3	Nitrobenzene	9.	U
78-59-1	Isophorone	9.	U
88-75-5	2-Nitrophenol	9.	U
105-67-9	2,4-Dimethylphenol	9.	U
111-91-1	bis(2-Chloroethoxy)methane	9.	U
65-85-0	Benzoic acid	9.	U
120-83-2	2,4-Dichlorophenol	9.	U
120-82-1	1,2,4-Trichlorobenzene	9.	U
91-20-3	Naphthalene	9.	U
106-47-8	4-Chloroaniline	9.	U
87-68-3	Hexachlorobutadiene	9.	U
59-50-7	4-Chloro-3-methylphenol	9.	U
91-57-6	2-Methylnaphthalene	9.	U
77-47-4	Hexachlorocyclopentadiene	9.	U
88-06-2	2,4,6-Trichlorophenol	9.	U
95-95-4	2,4,5-Trichlorophenol	23.	U
91-58-7	2-Chloronaphthalene	9.	U
88-74-4	2-Nitroaniline	23.	U
131-11-3	Dimethylphthalate	9.	U
208-96-8	Acenaphthylene	9.	U
606-20-2	2,6-Dinitrotoluene	9.	U

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

279Y

Name: ECOTEK LBI. Contract: 2-17521

Lab Code: ECOTEK Case No.: 2130 SAS No.: SDG No.: 279

Matrix: (soil/water) WATER Lab Sample ID: 213001Y

Sample wt/vol: 1090.0 (g/mL) ML Lab File ID: AC914

Level: (low/med) LOW Date Received: 02/22/92

% Moisture: _____ decanted: (Y/N)___ Date Extracted: 03/03/92

Concentrated Extract Volume: 1000.0 (uL) Date Analyzed: 03/12/92

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 5.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
99-09-2	3-Nitroaniline	23.	U
83-32-9	Acenaphthene	9.	U
51-28-5	2,4-Dinitrophenol	23.	U
100-02-7	4-Nitrophenol	23.	U
132-64-9	Dibenzofuran	9.	U
121-14-2	2,4-Dinitrotoluene	9.	U
84-66-2	Diethylphthalate	9.	U
7005-72-3	4-Chlorophenyl-phenylether	9.	U
86-73-7	Fluorene	9.	U
100-01-6	4-Nitroaniline	23.	U
534-52-1	4,6-Dinitro-2-methylphenol	23.	U
86-30-6	N-Nitrosodiphenylamine	9.	U
101-55-3	4-Bromophenyl-phenylether	9.	U
118-74-1	Hexachlorobenzene	9.	U
87-86-5	Pentachlorophenol	23.	U
85-01-8	Phenanthrene	9.	U
120-12-7	Anthracene	9.	U
86-74-8	Carbazole	9.	U
84-74-2	Di-n-butylphthalate	9.	U
206-44-0	Fluoranthene	9.	U
129-00-0	Pyrene	9.	U
85-68-7	Butylbenzylphthalate	9.	U
91-94-1	3,3'-Dichlorobenzidine	9.	U
56-55-3	Benzo(a)anthracene	9.	U
218-01-9	Chrysene	9.	U
117-81-7	bis(2-Ethylhexyl)phthalate	1.8	JBO
117-84-0	Di-n-octylphthalate	9.	U
205-99-2	Benzo(b)fluoranthene	9.	U
207-08-9	Benzo(k)fluoranthene	9.	U
50-32-8	Benzo(a)pyrene	9.	U
193-39-5	Indeno(1,2,3-cd)pyrene	9.	U
53-70-3	Dibenz(a,h)anthracene	9.	U
191-24-2	Benzo(g,h,i)perylene	9.	U

B - Cannot be separated from diphenylamine

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

279

Lab Name: ECOTEK LTD. Contract: 2-15921

Lab Code: ECOTEK Case No.: 0130 SAS No.: SDG No.: 279

Matrix: (soil/water) SOIL Lab Sample ID: 013001

Sample wt/vol: 30.0 (g/mL) G Lab File ID: A0497

Level: (low/med) LOW Date Received: 02/22/92

% Moisture: 13. decanted: (Y/N) N Date Extracted: 02/28/92

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 03/10/92

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.0

Number TICs Found: 13

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	- -	UNKNOWN	10.69	400.	BJ
2.	- -	UNKNOWN	12.09	500.	J
3.	- -	UNKNOWN	12.68	200.	BJ
4.	- -	UNKNOWN	27.46	80.	J
5.	- -	UNKNOWN	30.93	100.	J
6.	- -	UNKNOWN	33.94	100.	J
7.	- -	UNKNOWN	34.10	80.	J
8.	- -	UNKNOWN HYDROCARBON	34.90	80.	BJ
9.	- -	UNKNOWN HYDROCARBON	35.92	80.	BJ
10.	- -	UNKNOWN HYDROCARBON	37.13	80.	BJ
11.	- -	UNKNOWN	39.37	100.	J
12.	- -	UNKNOWN HYDROCARBON	40.29	200.	J
13.	- -	UNKNOWN HYDROCARBON	44.87	300.	J
14.					
15.					
16.					
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30.					
31.					

FORM I SVOA-TIC

APPENDIX III

NESHAP SUPPORTING DOCUMENTATION
CALCULATION OF THE EFFECTIVE DOSE EQUIVALENT

From: Robert Roulston SRI/EC&QA WEMCO:EC&QA(SC):92-227

Date: 08/28/92

Subject: PROJECT EVALUATION FOR AIR/WATER PERMIT/NOTIFICATION REQUIREMENTS (PEAPR): 92-053

To : Jim Golden

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PEN #: 92-053 Date Received: 08/27/92 NEPA Tracking #: _____
Project #: _____ Project Engineer: Jim Golden
Project Name: Req. Compliance Plan for OU4 & IDRS - soil washing
Project Description:
Draft Env. Compliance Plan for Integrated Demonstration Remedy Selection

==========

The above project has been reviewed for regulatory impacts or permit requirements. Any modifications or changes to the existing project will need re-examination.

	Yes	No	CERCLA Exempt	Insufficient Information	Requirement
A.	_	_	X	_	An Air Permit To Operate is required.
B.	_	_	X	_	An Air Permit to Install is required.
C.	_	_	X	_	A notification of Project completion is required for NESHAP - Sbpt H reporting purposes.
D.	_	X	_	_	A NESHAP - Sbpt Q, Radon emissions application is required.
E.	_	X	_	_	A NESHAP - Sbpt M, Notice of Intention (NOI) for asbestos removal is required.

NOTE: Any encounter(s) with asbestos during the instllation or implementation of this project shall require submittal(s) of NOI(s), even though an initial determination may have indicated that no NOI for asbestos removal was required.

F.	_	X	_	_	A Wetlands Impact Evaluation is required.
G.	_	X	_	_	A Wastewater Permit to Install is required.
H.	_	X	_	_	A Safe Drinking Water Plan Approval is required.
I.	_	X	_	_	A NPDES/CWA Impact Analysis is required.

Appendices are enclosed for those items for which a review, permit or notification is required. These appendices detail the information required in order to complete the appropriate review, permit or notification documents. Please complete the appendicies and return them to SRI so the appropriate action may be taken.

Evaluated by: Robert K Roulston
Robert Roulston

c: P.B. Spotts Central Files
SC/PEAPR File

Additional Information/Requirements:

Project is a treatability study and will be run for only a short period. As a CERCLA response action, it needs to meet the substantive, but not the administrative, requirements of state and federal environmental regulations.

The soil to be treated was reportedly collected from an area near the northwest corner of Building 12, northwest of Plant 1, and inside the north fenceline of the Sanitary Sewage Treatment plant. None of these areas is identified as being a site where asbestos containing material was disposed. The plan involves no demolition or renovation. Thus, the NESHAP requirements of Subpart M (Asbestos) should have no impact.

Wastewater from this study is to be drummed and analyzed, with no release to the plant wastewater system. The project is planned to occur entirely within plant 8, so that there should be no wetland impact. Thus, no NPDES or CWA impact should occur.

Soils are reported stored in a moist condition. All handling of soil will involve water, which should serve to reduce fugitive dust emissions. Substantive requirements for an OEPA air permit would require that BACT be applied: covered conveyors, screens, drum dumping and mixers, with ventilation through a particulate collection device would meet BACT. As there are concerns that radionuclides might be part of the dust, the dust collector should end with a High Efficiency Particulate Air (HEPA) unit.
Stack monitoring may be required, in line with the NESHAP Subpart H requirements, if average estimated emissions without the BACT system in place, sould be modeled to indicate a greater than 0.1 mrem dose to the maximally exposed off site individual.

FILE: C7

4335

From: P. B. Spotts/6932

WEMCO:EC(AWRC):92-295

Date: October 29, 1992

Subject: AIR EMISSION ESTIMATES FROM OU5 SOIL WASHING PILOT PLANT

To : D. E. Ridenour

Reference: Memorandum, M. A. Krstich to D. E. Ridenour, "INITIAL SOIL CHARACTERIZATION DATA FOR AIR EMISSION ESTIMATION FROM THE OU5 SOIL WASHING PILOT PLANT OPERATION IN BUILDING 8," undated.

Using the sample analysis attached to the reference memo I have repaired some simple emission calculations to identify potential emission concerns.

Particulate/Radionuclide emissions:

Assumptions:

- Throughput of one, 250 Kg, batch per week.
- The material processed will be continuously wetted.
- Emissions from this operation will emulate those of "Material Handling, conveying and transfer," RACM, 2.1.3-3. Emission factor of 0.3 lb/ton ($1.5(10)^{-4}$ Kg/Kg).
- Emission reduction due to continuously wetting the material will be the equivalent of "water spraying", reduction efficiency of 70%.

Annual emissions:

Throughput, 250 Kg/wk X 52 wk/yr = 13,000 Kg

Particulate emissions, 13,000 Kg/yr X $1.5(10)^{-4}$ Kg/Kg = 1.95 Kg/yr
= 1,950 gm/yr

Total Uranium is 2.0 μg/gm and 2.08 pCi/gm

Potential U emission: 2.0 μg/gm X 1,950 gm/yr = 3,900 μg/yr

Potential Radionuclide emissions:

2.08 pCi/gm X 1,950 gm/yr = 4,056 pCi/yr

Modeling results from CAP88PC are:

Source impact; $1.52(10)^{-9}$ mRem/year Effective Dose Equivalent (EDE)

Off-site impact; $1.70(10)^{-10}$ mRem/year (EDE)

Volatile Organic Compounds (VOC) Emissions:

The estimated maximum potential daily emissions of VOC is less than the Threshold Limit Value (TLV) for chemicals listed in the ACGIH, 1991-1992 TLV's for Chemical Substances in the Work Environment.

Conclusions:

Emissions of particulate/radionuclides/VOC's for this process would be minimal and of no special regulatory concern.

Phillip Spotts, Manager
Air/Water/CERCLA Integration

Attachment

c: S. M. Beckman
F. L. Johnston

AWRC Files
Central Files

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

S Y N O P S I S R E P O R T

Non-Radon Individual Assessment
Oct 28, 1992 2:06 pm

Facility: FEMP
Address:
City:
State: OH Zip:

Effective Dose Equivalent (mrem/year)
1.52E-09

Source impact

At This Location: 1 Meters East
Source Category:
Source Type: Stack
Emission Year:

Comments:

Dataset Name: soilwash
Dataset Date: Oct 28, 1992 2:05 pm
Wind File: WNDFILES\CVG8589.WND

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 1 Meters East
Lifetime Fatal Cancer Risk: 1.11E-14

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	2.50E-10
BREAST	2.81E-10
R MAR	1.54E-09
LUNGS	1.93E-10
THYROID	2.42E-10
ENDOST	2.09E-08
RMNDR	1.91E-09
EFFEC	1.52E-09

RADIONUCLIDE EMISSIONS DURING THE YEAR

Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
U-234	Y	1.00	6.6E-13	6.6E-13
U-235	Y	1.00	7.6E-13	7.6E-13
U-238	Y	1.00	6.6E-13	6.6E-13

SITE INFORMATION

Temperature: 10 degrees C
Precipitation: 100 cm/y
Mixing Height: 1000 m

SOURCE INFORMATION

Source Number: 1

Stack Height (m): 1.00
Diameter (m): 1.00

Plume Rise Pasquill Cat:	A	B	C	D	E	F	G
Zero:	0.00	0.00	0.00	0.00	0.00	0.00	0.00

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	0.700	0.399	0.442
Fraction From Assessment Area:	0.300	0.601	0.558
Fraction Imported:	0.000	0.000	0.000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

1

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

S Y N O P S I S R E P O R T

Non-Radon Individual Assessment
Oct 28, 1992 1:59 pm

Facility: FEMP
Address:
City:
State: OH Zip:

Effective Dose Equivalent (mrem/year)
1.70E-10

At This Location: 850 Meters East Offsite input
Source Category:
Source Type: Stack
Emission Year:

Comments:

Dataset Name: soilwash
Dataset Date: Oct 28, 1992 1:59 pm
Wind File: WNDFILES\CVG8589.WND

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 850 Meters East
Lifetime Fatal Cancer Risk: 2.20E-15

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	2.09E-12
BREAST	2.35E-12
R MAR	1.32E-11
LUNGS	1.31E-09
THYROID	2.03E-12
ENDOST	1.79E-10
RMNDR	1.64E-11
EFFEC	1.70E-10

RADIONUCLIDE EMISSIONS DURING THE YEAR

Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
U-234	Y	1.00	6.6E-13	6.6E-13
U-235	Y	1.00	7.6E-13	7.6E-13
U-238	Y	1.00	6.6E-13	6.6E-13

SITE INFORMATION

Temperature: 10 degrees C
Precipitation: 100 cm/y
Mixing Height: 1000 m

SOURCE INFORMATION

Source Number: 1

Stack Height (m): 10.00
Diameter (m): 1.00

Plume Rise Pasquill Cat:	A	B	C	D	E	F	G
Zero:	0.00	0.00	0.00	0.00	0.00	0.00	0.00

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	0.700	0.399	0.442
Fraction From Assessment Area:	0.300	0.601	0.558
Fraction Imported:	0.000	0.000	0.000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

850

CHEMICAL	CAS NO	CONC ug/Kg	WEEKLY mg/wk	DAILY mg/dy	TLV mg/m3
ACENAPHTHENE	83-32-9	46	11.5	2.3	•
AROCLOR	11097-69-	63	15.8	3.15	*
BENZO(a)PYRANE	50-32-5	410	102.5	20.5	*
BENZO(b)FLUORANTH	205-99-2	580	145.0	29	*
BENZO(g,h,i)PERYLE	191-24-2	460	115.0	23	•
CHYSENE	218-01-9	480	120.0	24	*
DIBENZOFURAN	132-64-9	95	23.8	4.75	•
FLUORANTHENE	206-44-0	800	200.0	40	*
NAPHTHALENE	91-20-3	130	32.5	6.5	52
PHENANTHRENE	85-01-8	830	207.5	41.5	*
PYRENE	129-00-0	880	220.0	44	•
TETRACHLOROETHENE	127-18-4	360	90.0	18	4170
TRICHLOROETHENE	79-01-6	3600	900.0	180	269

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

S Y N O P S I S R E P O R T

Non-Radon Individual Assessment
Mar 2, 1993 1:25 pm

Facility: FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
Address: P.O. BOX 398704
7400 WILLEY ROAD
City: CINCINNATI
State: OH Zip: 45239-8704

Effective Dose Equivalent
(mrem/year)

6.53E-03

At This Location: 850 Meters East Northeast

Source Category: REMEDIATION SITE
Source Type: Stack
Emission Year: 1993

Comments: MONITORING REQ. DETERMINATION FOR OU5 SOIL WASHING PILOT PLANT, IMPACT AT FENCE LINE

Dataset Name: OU5_SOIL_WASH_MO
Dataset Date: Mar 2, 1993 1:25 pm
Wind File: WNDFILES\FEMP8791.WND

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 850 Meters East Northeast
Lifetime Fatal Cancer Risk: 8.54E-08

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	5.07E-05
BREAST	5.71E-05
R MAR	3.38E-04
LUNGS	5.16E-02
THYROID	4.93E-05
ENDOST	4.60E-03
RMNDR	4.21E-04
EFFEC	6.53E-03

RADIONUCLIDE EMISSIONS DURING THE YEAR 1993

Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
U-235	Y	1.00	5.8E-06	5.8E-06
U-238	Y	0.30	5.8E-06	5.8E-06
U-234	Y	0.30	5.8E-06	5.8E-06

SITE INFORMATION

Temperature: 13 degrees C
Precipitation: 97 cm/y
Mixing Height: 965 m

SOURCE INFORMATION

Source Number: 1

Stack Height (m): 10.00
Diameter (m): 1.00

Plume Rise Pasquill Cat:	A	B	C	D	E	F	G
Zero:	0.00	0.00	0.00	0.00	0.00	0.00	0.00

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	0.700	0.399	0.442
Fraction From Assessment Area:	0.300	0.601	0.558
Fraction Imported:	0.000	0.000	0.000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

850

FILE: B-6.7.8

4335

Fernald Environmental
FERMCO
Restoration Management Corporation

INTEROFFICE MEMORANDUM

To:	Dave Ridenour	Date:	January 5, 1993
Location:	Fernald	Reference:	DE-AC05-920R21972
From:	Phillip Spotts	FERMCO #:	M:RTP:93-007
Location:	Fernald	Client:	DOE
Extension:	6932	Subject:	Determination of Compliance with Best Available Technology (BAT) for the OU5/ID Soils Washing Project

cc: Steve Beckman, Doug Gerrick, Jack Hughes, Frank Johnston, P&R Files - OU5, Dimitri Georgopoulos, Jim Golden, Kim Neufer, RTP Files

Reference: Memorandum, P. Spotts to D. Ridenour, "Use of HEPA filter system in OU5/ID Soils Washing Project," dated December 9, 1992.

In my referenced memorandum I stated was not able to evaluate the proposed system for compliance with BAT until I had a chance to review the final drawings. Since then I have been able to review the drawings you provided and have determined that the system as presented does meet the criteria for BAT. BAT for this project includes the use of HEPA filters for dust control and by keeping the processed material adequately wet to reduce dust creation.

This determination is valid only for the system as I reviewed it. If there are any changes to the system, either physical or process changes, that would potentially increase or qualitatively change the emissions, a reassessment of compliance will be required.

If you have any questions please call me at X6932.

DOCUMENT\MEMOS\

Fernald Environmental
FERMCO
Restoration Management Corporation

INTEROFFICE MEMORANDUM

To:	Phil Spotts	Date:	February 19, 1993
Location:	MS 65	Reference:	
From:	David E. Ridenour	FERMCO #:	M:CRU5:93-107
Location:	MS 52-4	Client:	DOE DE-AC05-92OR21972
Extension:	6772	Subject:	Review of Air Permitting for OU5/ID Soils Washing Project

c: File Record Storage Copy 10
Doug Gerrick
Jim Golden
Jack Hughes
Kim Neufer
Larry Stebbins
Central Files

The OU5/ID Soils Washing Project will use Portable High Efficiency Particle Air (HEPA) Filters in Plant 8 (old drum reconditioning area) to control possible dust emissions from the soil washing process.

Data on the constituents of the soils to be treated was previously provided and, your analysis/worst case calculations showed very minimal amount of any material of concern would be in the air coming off of this project.

Your approval to operate the Portable HEPA Filter System as BAT for dust control on this project is requested.

David E. Ridenour, Sr. Project Engineer

Concurrence: _____
P. Spotts

DER:gmb

Fernald Environmental
FERMCO
Restoration Management Corporation

INTEROFFICE MEMORANDUM

To:	Kathy Nickel	Date:	March 3, 1993
Location:	MS 52-5	Reference:	
From:	Phil Spotts	FERMCO #:	M:RTP:(PR):93-227
Location:	MS 65	Client:	DOE DE-AC05-92OR21972
Extension:	738-6932	Subject:	**NESHAP MONITORING REQUIREMENT DETERMINATION FOR OU5 SOIL WASHING PILOT PLANT**

c: File Record Storage Copy 106.4.8
Steve Beckman
Frank Johnston
Dave Ridenour
PR File

During recent discussions concerning the OU5 Soil Washing project, I was asked to evaluate the impact on the project of using portable HEPA filters instead of the existing in-place HEPA filter. This question was addressed, however, there was one point that was not addressed. The existing in-place HEPA filter had an in-stack radionuclide monitor installed; the portable HEPAs do not. During a previous NESHAP evaluation of this project, I evaluated the requirement for the submission of a NESHAP approval. Because the control device had a monitor installed, I did not evaluate the NESHAP requirement for continuous monitoring. As the portable HEPAs do not have monitoring, the need for must be evaluated.

Using the methodology required by NESHAP Subpart H, the results of a CAP88PC run estimates an Effective Dose Equivalent (EDE) of **0.00653 mrem/year**. Any source with an EDE less than 0.01 mrem/year is not required to have continuous monitoring installed. Therefore, NESHAP monitoring is not required for this project.

If you have any questions, please feel free to contact me at X6932.

PBS:mhv

APPENDIX IV

SUPPORTING DOCUMENTATION FOR NPDES IMPACT

FILE 8
B-C,7,8

4335

REGULATORY
COMPLIANCE SECTION

From: D. E. Ridenour (6772)

WEMCO:E(PM4):92-554

Date: November 30, 1992

DEC 3 12 30 PM '92

Subject: **WATER PERMITTING FOR OU5/ID SOILS WASHING PROJECT**

To : F. Johnston:

The OU5/ID Soils Washing Project will generate quantities of wash, rinse and decontaminate water. This water must be disposed after each sample run and equipment cleaning is completed.

The planned course of action is to collect the water from all project sources, perform analysis for contaminates of concern an then discharge the water shown to be non-RCRA to the Plant 8 general sump.

In the event a water sample indicates concentrations of substances requiring its classification as a RCRA material, the entire batch will be held for disposal as a RCRA material and will not be discharged into the general sump.

Your approval to operate as outlined above is requested.

D. E. Ridenour, Sr. Project Engineer

Concurred: F. Johnston

Date: 12/3/92

DER:gmb

c: D. J. Georgopoulos
D. Gerrick
J. W. Golden
J. R. Hughes
K. Knufer

Central Files

Fernald Environmental
FERMCO
Restoration Management Corporation

INTEROFFICE MEMORANDUM

To:	F. Johnston	Date:	February 19, 1993
Location:	MS 65	Reference:	
From:	David E. Ridenour	FERMCO #:	M:CRU5:93-108
Location:	MS 52-4	Client:	DOE DE-AC05-92OR21972
Extension:	6772	Subject:	**Water Permitting For OU5/ID Soils Washing Project**

c: File Record Storage Copy 10
D. Gerrick
J. W. Golden
J. R. Hughes
K. Knufer
L. Stebbins

The OU5/ID Soils Washing Project will generate quantities of wash, rinse and decontaminate water. This water must be disposed after each sample run and equipment cleaning is completed.

The proposed course of action is to discharge the water from all project sources known to be non-RCRA to the Plant 8 general sump.

In the event the initial soil sample analysis or a reagent indicates concentrations of substances requiring its classification as a RCRA material, the entire batch will be held for disposal as a RCRA material and will not be discharged into the general sump.

Your approval to operate as outlined above is requested.

David E. Ridenour,
Sr. Project Engineer

Concurrence:_____
F. Johnston

DER:gmb

Fernald Environmental
FERMCO
Restoration Management Corporation

INTEROFFICE MEMORANDUM

To:	Dave Ridenour 1 MAR 93	Date:	February 24, 1993
Location:	MS 52-4	Reference:	M:CRU5:93-108
From:	Frank Johnston FLJ 2/24/93	FERMCO #:	M:RTP:(PR):93-212
Location:	MS 65	Client:	DOE DE-AC05-920R21972
Extension:	8644	Subject:	Wastewater Discharges from ID Soil Washing Project

c: File Record Storage Copy 106.4.8
PR Files

D. Gerrick
K. Knufer
L. Stebbins
P. B. Spotts
S. M. Beckman

I will concur with the method for discharging the wastewater from the ID soil washing runs described in the referenced memo (attached) for only the ID soils and with the following conditions:

1) Discharged wastewater must receive treatment through the Plant 8 Sump Treatment system (precipitation/filtration).

2) A wastewater sample, after each run, must be collected and analyzed for the groups of metals listed below. The wastewaters are not required to be held. These samples can be collected while the discharge is occurring.

   <u>CWA Section 307 toxics</u>: antimony, arsenic, beryllium, cadmium, mercury, selenium, thallium, zinc

   <u>NPDES regulated</u>: chromium, nickel, lead, silver, and copper

   The FEMP analytical laboratories should be able to support this effort.

The wastewater discharged from the OU5 soil runs will be evaluated separately. Please contact me when data are available to determine the discharge requirements for the OU5 soil washing wastewaters.

APPENDIX V

SUPPORTING DOCUMENTATION FOR THE NEPA CATEGORICAL EXCLUSION

DOE F 1325.8 (5-83)

4335

United States Government

Department of Energy

Fernald Field Office

memorandum

DATE: APR 0 2 1993
DOE-1538-93

REPLY TO ATTN OF: FN:Skintik

SUBJECT: CATEGORICAL EXCLUSION DETERMINATION (CX 410) - COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT RESOURCE CONSERVATION AND RECOVERY ACT UNIT 5 (CRU 5) REMEDIAL INVESTIGATION/FEASIBILITY STUDY SOIL WASHING TREATABILITY STUDY

Carol Borgstrom, EH-25, FORS

The subject categorical exclusion (attachment) under Section D of the Department of Energy's National Environmental Policy Act Guidelines has been approved and is being forwarded for your review.

The Department of Energy, Fernald Field Office (DOE-FN) requests that you notify us within two weeks, in accordance with the Interim Procedural Guidelines for implementation of SEN-15-90, whether you have any objection to this determination.

If you have any questions, please contact Ed Skintik at 513 648-3151.

Tom Rowland
Thomas J. Rowland
Acting Manager

Attachment: As Stated

cc w/att:

R. S. Scott, EM-20, FORS
K. A. Hayes, EM-424, TREV
L. Harris, EM-431, TREV
C. J. Brown, FERMCO/51-7

5 10 38 AM '93

IEPA COMPLIANCE

104

Recycled and Recyclable

M-733 DOE (REV. 8/8/92)

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

CATEGORICAL EXCLUSION (CX) DETERMINATION

CERCLA RCRA Unit 5 (CRU5) RI/FS Soil Washing Treatability Study
NEPA Document No. 410
Fernald Environmental Management Project (FEMP), Fernald, Ohio

Proposed Action

The United States Department of Energy (DOE) proposes to perform a Soil Washing Treatability Study in support of the CRU5 RI/FS at the Fernald Environmental Management Program (FEMP). A RI/FS has been initiated to develop the remedial actions at the FEMP. This study will involve the removal of contaminants from soils using physical/chemical processes. It is intended to confirm the feasibility of soil washing and provide preliminary process design information.

Location

The proposed action will take place at the former Drum Reconditioning Area located in Building 8C. Plant 8 is located in the southwest quarter of the FEMP process area. The 1050 acre FEMP site is located 18 miles northwest of downtown Cincinnati, Ohio.

Background

A variety of chemical and metallurgical processes were used at the FEMP for the manufacture of uranium products. These manufacturing processes occurred largely within the former production area, which covers approximately 136 acres near the center of the FEMP and consists of several processing plants and waste storage areas. As a result of these processes, ground water and soil in some areas within the vicinity of the FEMP have become contaminated. Also, airborne deposition of uranium from the production area has occurred over the site. Additional airborne material has been released in the waste storage area by fugitive emissions from the waste pits. The incinerator in the sewage treatment plant area was also a source of airborne contamination.

Based on characterization data (1988 RI/FS Work Plan and the 1989-1990 Additional Suspect Areas Addendum to the RI/FS Work Plan), it has been determined that soils in the CRU5 contain radioactive components as well as other inorganic and organic constituents of concern. The technical strategy adopted under the RI/FS was to divide the site into five operable units to facilitate the remedial actions. CRU5 consists of the groundwater, surface water, sediments, flora, fauna, and soils not included in the definitions of CRU 1-4.

Several viable treatment technologies have been identified for the remediation of soils. A literature review has been completed for the soil washing process. This review revealed that water washing with extraction agents is applicable for cleaning nonvolatile hydrophilic and hydrophobic organics and heavy metals from soils (U.S. EPA, 1989, "Summary of Treatment Technology Effectiveness for Contaminated Soil," EPA, Office of Emergency and Remedial Response, Washington, DC.) and has been successfully used on soil contaminated with radionuclides. However, this has been largely limited to the mining industry. Information was

not found on its application to the specific soils and contaminants (e.g. radionuclides, inorganics and organics) that are found at the FEMP. Therefore, due to the lack of information available to adequately address the overall effectiveness of this process, as well as the other EPA remedy evaluation criteria necessary during the detailed analysis of alternatives, a decision was made to proceed with treatability testing of the soil washing process at the FEMP.

The EPA's "Guide for Conducting Treatability Studies Under CERCLA" (1989b) outlines a three-tiered approach (remedy screening, remedy selection and remedy design) to conducting treatability studies for a Superfund site. This NEPA document requests approval for the remedy selection phase.

Description of Proposed Action

The objective of the proposed action is to assess the performance of the soil washing technology on CRU5 soil in support of the RI/FS. This new soil remediation technology has the potential to reduce clean-up cost and time required through effective soil treatment and waste management.

Soil washing has been selected as a treatment technology to be considered for the remediation of CRU5 soils. Soil washing involves dislodging contaminants bound to soil particles by a physical/chemical process using aqueous washing solutions. The experimental design of the proposed action will focus on washing soils contaminated with (1) radionuclides and (2) radionuclides plus inorganic and organic constituents. The work plan for the treatability study has been prepared in accordance with EPA's "Guide for Conducting Treatability Studies Under CERCLA" (EPA 1989b) and the Fernald RI/FS Quality Assurance Project Plan (QAPP) (DOE 1988).

Four soil sample locations will be used for the Treatability Study. Two of the four locations were selected based on moderate to high levels of uranium (250-500 $\mu g/g$) and essentially no organic and inorganic contaminants. These samples will be labeled ID-A and ID-B. The other two locations contain inorganic and organic constituents as well as radionuclides, and these samples will be labeled OU5-A and OU5-B. These four soils are considered to be representative of the contamination problem at the FEMP.

The equipment for the soil washing treatability study will be mounted on steel skids in the Drum Reconditioning Area within Plant 8C. The skids will be joined by flexible connectors to allow for easy rearrangement of the process configuration. The skid configuration will occupy a space of approximately 80 ft. by 30 ft. All utilities necessary for the study are available in Plant 8C. The floor in the process area will be sealed with an acid resistant coating, and the entire process area will be surrounded by a dike for secondary containment of the piping and tertiary containment of the tanks.

During the initial treatment technology investigation, 55-gallon drums of soil will be processed one drum at a time. Additional soil may be processed during subsequent testing of the soil washing process.

The soil washing process will incorporate physical and chemical separation techniques. Contaminated soil will be transferred from a 55-gallon drum to a

conveyor where it will be carried to a trommel screen for initial grain size separation of greater than and less than 4.75 mm. Material greater than 4.75 mm will be radiologically screened and put into an empty drum as the first process stream. Material less than 4.75 mm will be fed to a two deck vibrating screen.

The vibrating screen will separate the soils into three sizes: greater than 2 mm, 150 µm to 2mm, and less than 150 µm. The soil fraction less than 150 µm and wash water will be transferred to a holding tank where it will be stored until the end of the screening process. The two larger fractions will be combined and pumped to an attrition scrubber where they will be scrubbed with a low concentration (0.5 molar) of dispersant. The scrubber effluent will be pumped to a holding tank where it will be agitated until the next screening stage is ready.

The next screening stage requires the removal of the 150 µm mesh lower screen. The contents of the holding tank will be pumped to the screen where it will be separated at greater than and less than 2 mm. The material greater than 2 mm will be radiologically monitored and collected as the second process stream. The material less than 2 mm will be collected separately in a holding tank and later combined with the less than 150 µm soil fraction and wash water from the initial screen step to form a slurry.

This slurry will be pumped to a multigravity separator (horizontal centrifuge) where the materials will be separated based on the specific gravities of the particles. The heavier uranium will be removed and drummed for disposal. The lighter soil fraction will be transferred to a holding tank before being pumped to the hydrocyclone (water jet). The hydrocyclone will separate the grains into 2 mm to 25 µm and less than 25 µm. The larger sized soil fraction will be pumped to a holding tank and then to a filter press to remove residual water from the slurry. The residual water will be pumped back to the trommel screen for reuse or will be collected for analysis and treatment in the wastewater system. The filter cake will be radiologically screened and collected in drums as the third process stream.

The less than 25 µm material from the hydrocyclones will be transferred to a holding tank and then processed through one of two reactor vessels. One vessel is a fiberglass reinforced plastic-lined tank that uses a dilute caustic for ambient temperature extractions. The other vessel is a glass-lined metal-jacketed vessel for high temperature inorganic acid processing. In either vessel, the soil and extractant mixture will be agitated for up to four hours. After the mixture is allowed to cool, it will be pumped to a filter press. The filter cake will be water washed, reslurried, refiltered, and collected as the fourth process stream. The spent extraction solution will be collected and treated by precipitation or ion exchange. The precipitate and liquid will be separated using the filter press. The final liquids and solids will be drummed separately for analysis.

The output of this process will include drums of material greater than 4.75 mm (first process stream), 2-4.75mm material (second process stream), heavy particulate uranium, filter cake of 2 mm to 75 µm soil (third process stream), filter cake of clean fine soil 25 µm and less (fourth process stream), and the remaining solids and spent wash solutions. All of the residuals from the process streams will be initially stored on the Plant 1 Pad. Reagents may be recycled back into the system. Each run (each 55-gallon drum of soil washed) will produce

approximately ten 55-gallon drums of spent wash solution. The wastewater stream from the ID soils will be analyzed and if all residual uranium has been precipitated out, as expected, it will be processed in the Plant 8 Sump System.

The wastewater stream from the OU5 soils will be collected and analyzed to determine whether the water contains concentration of substances requiring classification as a RCRA material. In the event a water sample indicates concentrations of substances requiring its classification as RCRA waste material, the entire batch will be held for further treatment or disposal as a RCRA waste. This material (if still RCRA) will not be discharged into the general sump. If operation continues past the initial drums, more dispersant, reagents, and extracting agents (acids) may be required.

Processes which may emit dust, fumes or hazardous gases will be designed to comply with Best Achievable Control Technology (BACT). Conveyors, screens, drum dumping and mixers will be covered with ventilation through a particulate collection device. The device will end with a HEPA unit, as there are concerns that radionuclides might be part of the dust.

According to the Treatability Study Work Plan for OU5 Soil Washing, the remedy selection soil washing tests are expected to last 12 months and will cost approximately $1,000,000. Equipment used will be decontaminated for possible use in the remedy design phase.

Categorical Exclusion to be Applied

The authority for finding this project to be subject to NEPA Categorical Exclusion is contained in Subpart D of the revision to 10 CFR part 1021, entitled "National Environmental Policy Act; Implementing Procedures and Guidelines." The Final Rule and Notice, effective May 26, 1992, includes a revised and expanded list of categorical exclusions that are classes of actions that normally do not require the preparation of either an Environmental Impact Statement or an Environmental Assessments.

The Final Rule and Notice specifically lists in Part 1021, Appendix B to Subpart D, Sec. 1021.410, B6.2, the following types of actions that are Categorical Exclusions applicable to Specific Agency Actions:

> The siting, construction, and operation of temporary (generally less than 2 years) pilot-scale waste collection and treatment facilities, and pilot-scale (generally less than one acre) waste stabilization and containment facilities (including siting, construction, and operation of a small-scale laboratory building or renovation of a room in an existing building for sample analysis) if the action: (1) Supports remedial investigations/feasibility studies under CERCLA, or similar studies under RCRA, such as RCRA facility investigations/corrective measure studies, or other authorities, and (2) would not unduly limit the choice of reasonable remedial alternatives (by permanently altering substantial site area or by committing large amounts of funds relative to the scope of the remedial alternatives).

The OU5 RI/FS Soil Treatability Study meets the requirements for the Categorical Exclusion listed above. Furthermore, the proposed action will not violate applicable statutory, regulatory, or permit requirements; it will not require siting and construction or major expansion of waste disposal, recovery or treatment facilities; and it will not impact any environmentally sensitive areas (e.g., wetlands, floodplains, or the sole-source aquifer).

Compliance Action

I have determined that the proposed action meets the requirements for the CX referenced. Therefore, the proposed action is categorically excluded from further NEPA review and documentation.

Approval: Tom Rowland
Thomas J. Rowland, Acting Manager
U.S. Department of Energy, Fernald Field Office

Date: 4/2/93