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Waste Management Plan for Real Time Demonstration Project

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WASTE MANAGEMENT PLAN

FOR THE

E/E1 SCRAP YARDS REAL-TIME DEMONSTRATION PROJECT
AT THE PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY

APPROVALS

By their signature, following, the undersigned indicated that this Waste Management Plan (WMP) shall be utilized to ensure quality waste information is obtained for waste generated from the field activities at the Paducah Gaseous Diffusion Plant (PGDP).

LINDELL ORMSBEE, MANAGER KRCEE, UNIVERSITY OF KENTUCKY	Date
STEVE HAMPSON, PROJECT MANAGER KRCEE, UNIVERSITY OF KENTUCKY	Date

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1. INTRODUCTION

This Waste Management Plan (WMP) addresses waste management requirements for waste generated during the site investigation activities to be performed for the demonstration project at the E/E1 Scrap Yards at the Paducah Gaseous Diffusion Plant (PGDP). The WMP is the primary document for management of investigation-derived wastes (IDW) that will be generated during implementation of the Field Sampling Plan (FSP). Specifically, this plan addresses the management of IDW from the point of generation through transportation off the work site to a secured storage area at PGDP.

Waste management requirements specific to PGDP and contained in this WMP describe proper containerization of the IDW, transportation of the IDW to the waste storage area and characterization of the IDW.

This WMP identifies the types of various wastes that may be generated during the field activities. The approach to managing waste outlined in this WMP emphasizes:

- management of the waste generated in a manner that is protective of human health and the environment;
- minimization of waste generation, thereby reducing unnecessary costs and usage of limited permitted storage and disposal capacities; and
- compliance with federal, state, and site requirements.

Since the demonstration project is a dynamic real-time sampling and analysis project modifications may be made to the planned investigation process and the types and quantities of waste generated during field activities. These changes may necessitate revisions to the WMP that will ensure the inclusion of any additional requirements into the daily activities performed by each of the waste management personnel.

1.1 SITE LOCATION

Real-time characterization, assessment, soil-removal, and final status surveys will occur in the E-Scrap Yards (Figure 1) within the PGDP security fence. These scrap yards were used for storage of scrap metal from the cascade upgrade projects. Scrap metal was removed during the scrap metal removal project and as depicted in the photos taken after removal of the scrap metal there appears to be only fragments on the surface soil (Figure 2). Residual metal do not fall within the scope of the real-time demonstration project. The area of interest as seen in Figure 3 is approximately 5.75 acres.

1.2 SITE DESCRIPTION

Generation of IDW will be primarily confined to two areas within the E/E1 scrap yards. One area will be a one-half acre area where no activities such as soil removal will occur. In this half-acre area only PPE related to *in situ* measurements and the collection of approximately 400 plus soil samples will be generated during the field activities. Actual removal of soil (waste) through excavation activities will be limited to a 50 square meter (m^2) area of the E/E1 Scrap Yards situation in the Northwest corner within the security area. Excavation will be limited to a depth of 2 feet. The maximum volume of soil that can be generated during the demonstration project is approximately 1075 cubic feet. The soil removed from the 50 m^2 area will not be sent for disposal but will be placed back into the area from where it was removed during the demonstration project. These scrap yards were used for storage of scrap metal from the cascade upgrade projects. Scrap metal was removed during the scrap metal removal project and currently there are only small pieces of scrap metal mixed with soils within the areas of interest. The area of interest as seen in Figures 1 and 2 is approximately 5.75 acres.

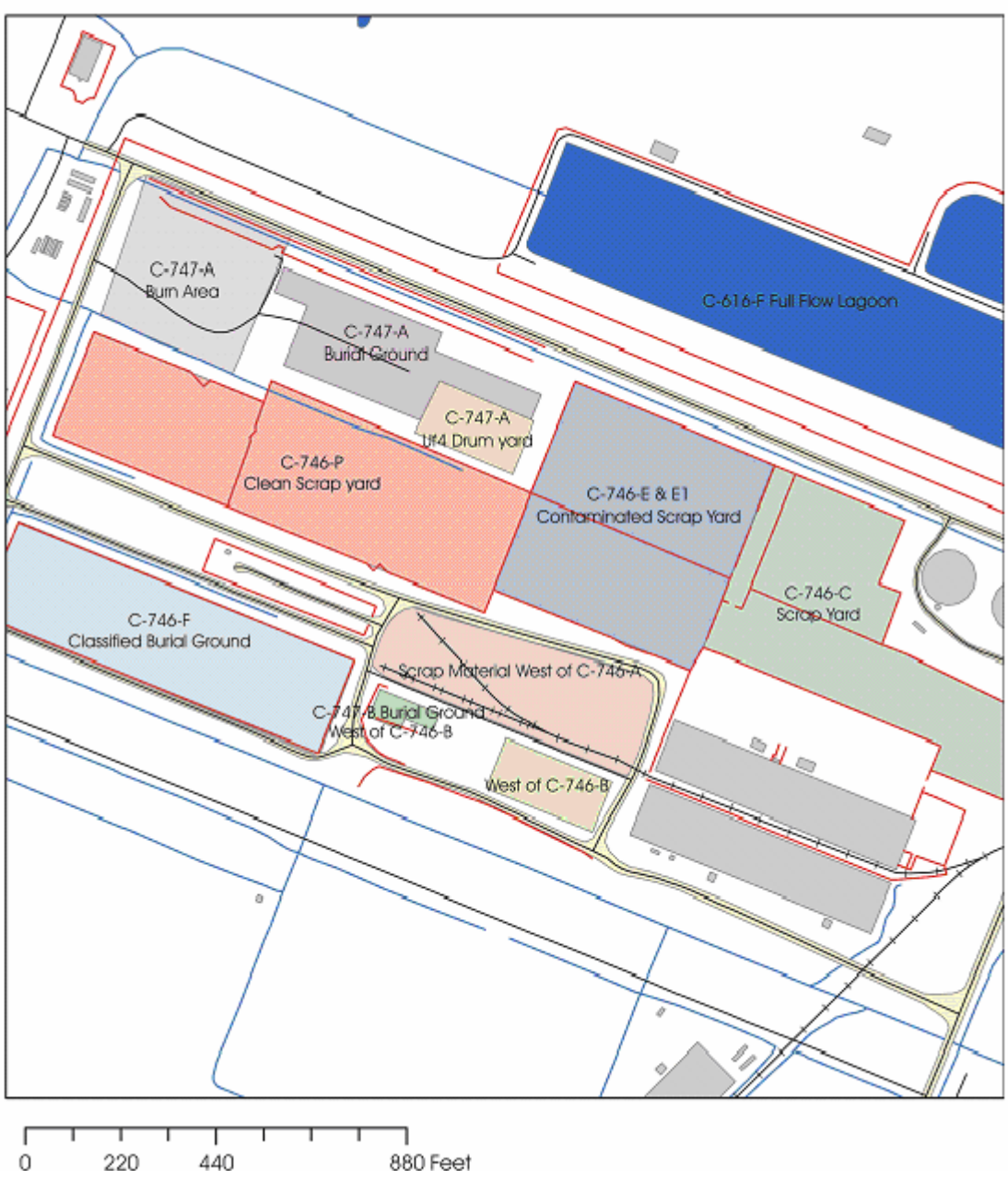

Figure 1. C-746-E/C-746-E1 Scrap Yards

Figure 2. Photograph of Small Metal Pieces Remaining After Scrap Removal (October 9, 2006)

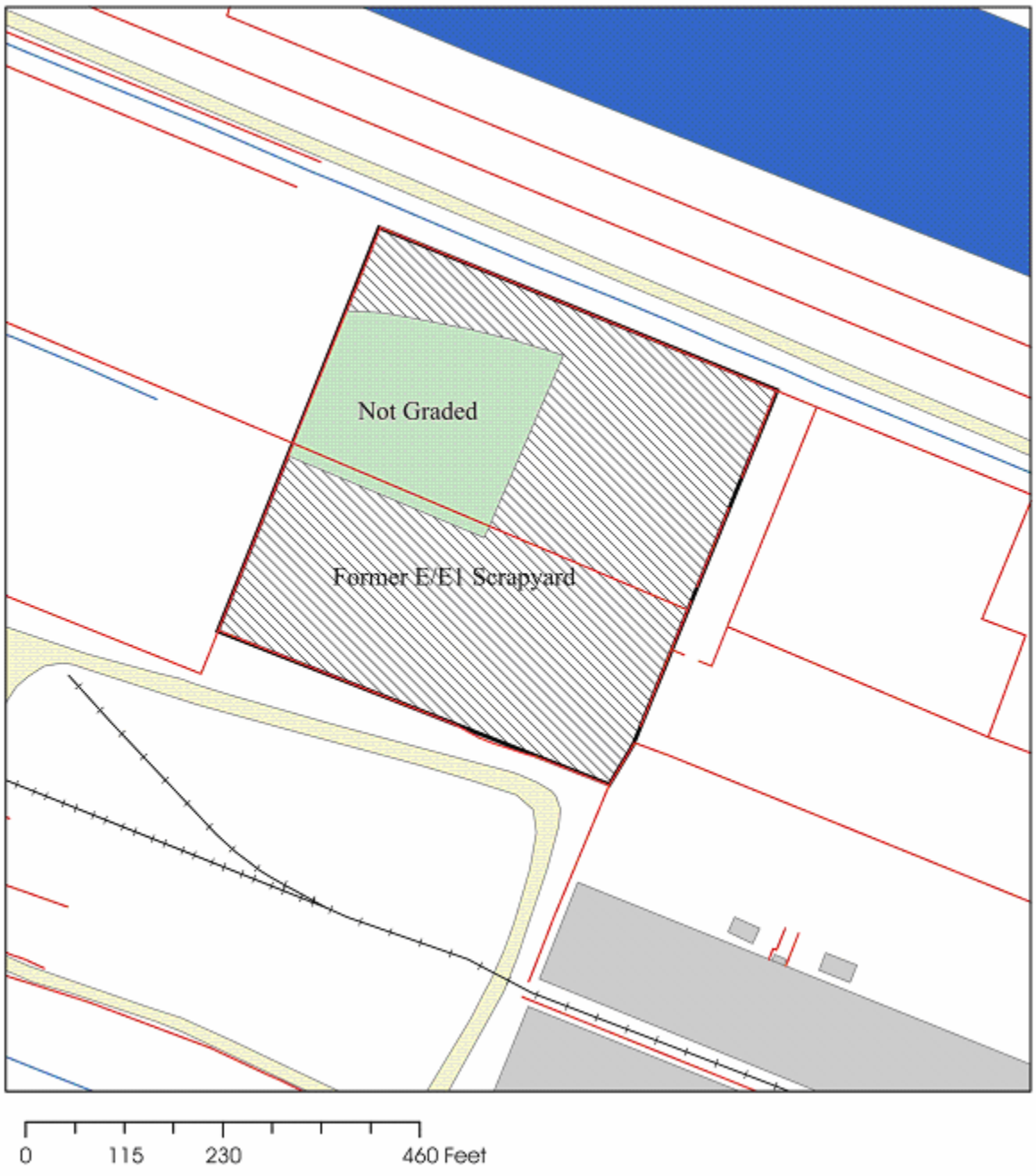

Figure 3. Demonstration Area - Location of Area Not Graded

2. OBJECTIVES

The Paducah site has contaminated soils and sediments. The purpose of the proposed work is to demonstrate “real-time” (field-deployable) measurement technologies and associated processes – data management approaches, decision-making techniques, etc. for surface and near surface soils that can optimize characterization and remediation performance (shortened schedules, reduced overall costs, improved decisions, reduced waste generation, etc.) at the site.

3. CHARACTERIZATION ACTIVITIES

The E/E1 characterization activities for this investigation will include a gamma walkover survey (GWS) of the approximately 5.7 acres of the scrap yard. Minimal IDW waste will be generated during the GWS. The next phase of the characterization utilizes both XRF and *in situ* gamma spectroscopy that do not involve the generation of soil. *In situ* measurements will generate minimal IDW PPE. This work will also include the collection of 20 soil samples for off-site laboratory analysis that will involve some IDW. Based on the initial phases of the real-time characterization, two areas in the E/E1 scrap yard will be selected to demonstrated real-time technologies. The first area will be approximately 0.5 acres. In this area extensive *in situ* measurements will be taken and approximately 400 soil samples will be collected for detailed characterization of contaminants of concern (COCs). Soil samples will either be analyzed on-site or sent to a fixed based laboratory. Since the maximum soil sample depth is 1 foot and all soil removed will be utilized to generate the samples, it is not anticipated soil waste will be generated that require disposal.

The second area will be a contaminated area up to 50 square meters (m^2) in size with contamination above action levels (i.e., hot spot criteria) that will be targeted for selective cleanup to a maximum depth of two feet. In the event that no area this size is identified with contamination above action levels, work will focus on an area with the highest measurable level of contamination. The real-time technologies implemented will be used to demonstrate the ability of GWS results to support precise excavation and characterization of waste streams for disposal. There may be as many as 20 soil samples collected for of-site analysis as part of this work that would generate some IDW.

The implementation of real-time technologies will provide a mechanism to determine, as work is being conducted, the disposal fate of the material removed from the contaminated area. The soil removed from the 50 m^2 area will not be sent for disposal but will be placed back into the area from where it was removed during the demonstration project.

4. INVESTIGATION DERIVED WASTE MANAGEMENT

All waste generated within the work zone during this investigation will be considered investigation derived waste. All waste management activities will be performed in compliance with the applicable PRS documents and procedures. These procedures, including all definitions of technical and regulatory terms, are incorporated into this plan by reference. All waste management activities will be conducted under PRS procedures and program controls.

4.1 WASTE STREAM GENERATION AND IDENTIFICATION

4.1.1 Waste Generating Activities

Activities associated with this investigation will result in the generation of limited volumes of IDW at the site. These activities are listed in Sect. 3.0 of the WMP checklist, and are briefly discussed below.

Excavation: An area limited to 50 m^2 may be excavated. The 50 m^2 area will be segregated into two 25 m^2 areas for potential soil removal. The 25 m^2 area with highest contamination levels will be excavated to a depth of one foot. The exposed bottom of the dig will be evaluated for contamination status using real-time protocols described in the Field Sampling and Analysis Plan. If any contaminant is above action level in the exposed soils at a depth of 1 foot, an additional one foot will be removed from the expose surface soil area. If contaminant does not exceed the action level in the bottom of the excavated unit and the second unit also has contamination above action levels, the top one foot of the second unit will be removed. The exposed bottom of the second dig will be evaluated for contamination status using real-time protocols described in the Field Sampling and Analysis Plan. The maximum quantity of soil that will be excavated during the demonstration project is approximately 1075 ft^3.

The soil removed from the 50 m^2 area will not be sent for disposal but will be placed back into the area from where it was removed during the demonstration project.

Decontamination: Decontamination of the sampling and excavation equipment will produce limited volumes of decontamination water fluids.

Sampling: Sampling will generate miscellaneous waste materials, such as PPE, disposable sampling equipment, and paper. This waste will also be segregated from all other IDW.

4.1.2 Potential Waste Streams

The IDW streams that are expected to be generated during this project include:

C**ontaminated solid material**: Solid material is defined as soil for this project demonstration. An area limited to 50 m^2 may be excavated. A 50 m^2 area will be identified from the E/E1 scrap yard area and segregated into two 25 m^2 areas for soil removal. Approximately 1075 ft^3 of potentially contaminated soil will be removed during excavation. However, the soil

removed will not be sent for disposal but will be placed back into the area from where it was removed during the demonstration project.

Decontamination water: Water from the decontamination of excavation and sampling equipment may become contaminated through exposure to residual contaminated material on the equipment. It is estimated that approximately 10 gallons of decontamination water may be generated from equipment decontamination after the completion of soil sampling for the demonstration project.

PPE and soil/erosion control waste: PPE, hypalon, or HPDE sheeting, and other disposable materials used during sampling and waste management activities may become contaminated by contact to contaminated soil or water. Before exiting the sampling the sampling zones, personnel will doff and containerize all disposable PPE as potentially contaminated. This PPE will be surveyed and containerized for disposal. Approximately 30 ft^3 is expected to be generated.

The PGDP Waste Generation Plan Form is included as Attachment A. .

4.1.3 Waste Stream Identification and Tracking

The Waste Manager and the Environmental Safety and Health Representative will coordinate field activities to adequately catalog and track all waste generated during the field activities. The following sections outline the approach to waste management tracking, with particular emphasis on PGDP requirements.

The Waste Manager will ensure that all waste activities are conducted in accordance with PGDP facility requirements and this WMP. The Waste Manager will coordinate activities with the field personnel and PRS to oversee daily waste management operations and maintain a waste management logbook that contains a history of generated waste and status of waste containers.

Before supplying waste storage containers to the field crews, the Waste Manager will ensure that each waste container is properly inspected to verify that it meets required specifications and has been properly labeled before transportation to the work site. PGDP will supply the Waste Manager with Request for Disposal (RFD) sheets and waste container labels.

Additional responsibilities of the Waste Manager will include:

- labeling containers, if appropriate;
- maintaining container inventories at the site;
- interfacing with the PGDP Waste Disposal Coordinator;
- preparing RFDs;
- tracking IDW;
- coordinating IDW transfers;
- transferring IDW characterization data to the PGDP Waste Disposal Coordinator; and
- preparing the containers for disposal per labeling requirements of the Waste Acceptance Criteria (WAC).

The Waste Manager will also update a computer-generated status sheet that can be quickly retrieved and will contain a complete list of all waste that has been generated during investigation activities. The Waste Status Sheet will supply information pertaining to the following:

- sample number
- current location of waste
- generation date
- RFD/container number
- waste origination point
- quantity of waste
- sampling status
- sample results status
- solid or liquid
- resampling needed
- date released to PGDP

Documentation in the Waste Management Logbook will contain work site location, waste container RFD numbers and other container information, type of waste, generation date, and names of personnel performing the waste containerization.

Real-time technologies will be utilized to characterize waste streams prior to containerization of the material. After the real-time data have been reviewed, the Waste Manager will coordinate with PGDP Waste Disposal Coordinator to arrange for the transfer of the waste into the proper waste holding area. The PGDP Waste Management Coordinator will verify that all waste meets the requirements of the WAC prior to acceptance of the waste.

The Waste Manager will complete all chain-of-custody forms relating to the transfer and shipment of waste characterization samples. Photocopies of the chain-of-custody forms will be made and copies will be placed in the project file and attached to the appropriate RFD form. The chain-of-custody form, and the associated sample, will be transferred to personnel responsible for packaging and shipping the samples off site.

Because the volume of aqueous wastes are expected to be small and the concentration and activity of contaminants are expected to be low, water will be analyzed and a determination will be made as whether they can be release to the PGDP sanitary sewer system or released to PGDP outfalls.

4.2 IDW REQUEST FOR DISPOSAL, LABELING, AND STORAGE

4.2.1 IDW Request for Disposal Forms

A RFD form and container log sheet will be completed by the KRCEE Project Subcontractor as the waste is generated from the site work. PGDP will supply RFD forms on an as-needed basis. Completed forms will be delivered from the Waste Management Manger to the PGDP Waste Disposal Coordinator. Waste log forms will be completed for each applicable waste container to be removed from the work site. The PGDP Container Log Sheet documents each waste addition to a particular container. Completion of a container log sheet that has been

attached to a corresponding RFD will be required once a container has been filled to capacity or its intended use has been fulfilled. The Wastewater Tank Log Sheet documents each addition of wastewater to the tank.

4.2.2 IDW Labeling

All containers containing IDW will be carefully labeled and permanently marked to ensure proper management of the wastes as established by PGDP.

4.2.3 IDW Storage

IDW containers will be stored in a secured Generator Storage Area (GSA) provided by PGDP. Wastes will be segregated and assembled according to waste type and location of origin. Following completion of the RFD and waste characterization forms, the PGDP Program will manage the waste in accordance with applicable regulations and PGDP procedures for ultimate disposition.

The demonstration project will use current storage facilities for environmental restoration waste at PGDP.

4.3 CONTAINERIZATION AND TRANSPORTATION OF IDW

The areas that will be under investigation are within the security area of PGDP.

4.3.1 Required Equipment

The movement of characterized waste containers will be the responsibility of KRCEE Subcontractor. Containers stored in a Generator Staging Area will be moved to the designated waste holding facility at the direction of PRS. It will be the responsibility of KRCEE Subcontractor to transfer, track, and maintain these containers into the designated waste holding areas.

Equipment that will be used to move IDW must undergo an inspection by KRCEE Subcontractor and PRS personnel. Any equipment that does not meet the requirements will not be approved for use during any investigation activities until approved corrections or modifications have been made.

4.3.2 Containerization and Transportation of Solid IDW

Solid IDW consisting of solid material, and compactable waste (i.e., PPE), will be transported from work sites as described below. IDW will be containerized following the appropriate PGDP facility Waste Acceptance Criteria. Waste to be taken to the C-746-U landfill must be characterized in accordance with the WAC, and a landfill waste package must be completed.

Containers will be transported by truck or flat-bed trailer. When loading containers for transport, forklift trucks will be used to place the containers onto the truck or flat-bed trailer.

After the containers are loaded, they will be strapped together or otherwise secured to the frame of the vehicle. Care will be taken when moving the containers onto the transportation vehicle as well as off the vehicle onto wooden pallets at the waste storage pad. Before any containers are moved from the excavation area, the outside of the containers will be cleaned of mud and debris.

5. Sample Analysis

During the course of the investigation field activities, real-time measurements will be used to characterize contaminants. Soil samples will be prepared and analyzed on-site and will not be sent to an off-site fixed analytical laboratory unless the analysis cannot be conducted in the field. The use of real-time technologies precludes the necessity for field screening techniques. For the health and safety of on-site workers, real-time measurement will be utilized to determine PPE levels and the handling and disposition of IDW. Since real-time procedures are being implemented for the demonstration, it will not be necessary for samples to undergo radiation screening prior to shipment.

Specific protocols for real-time technologies utilized for site characterization are provided in the Field Sampling and Analysis Plan.

6. IDW CHARACTERIZATION, SAMPLING, AND ANALYSES

Real-time technologies will be used to characterize wastes prior to containerization. Soil analysis will be conducted using real-time procedures. Table 6.1 provides information related to real-time methods, action levels, detection limits and comparison of real-time detection limits to laboratory detection limits. Table 6.2 provides detection limits for metals using XRF. For those contaminants that do lend themselves to real-time measurements such as for PCBs and PAHs, analytical measurements will be performed on site. It is the intent of the demonstration project to conduct all analysis on site and not send samples to an off-site analytical laboratory. Quality Assurance/Quality Control (QA/QC) requirements and chain-of-custody procedures will be followed for all sampling and analysis activities as outlined in the Quality Assurance Project Plan. QA and chain-of-custody documentation will be maintained for future reference.

Table 6.1 Contaminants of Concern for the E/E1 Scrap Yard Area, Action Levels, and Soil Detection Limits

	Action Level	Detection Limits[6]					
		GWS	in situ HPGe	XRF[7]	Test Kit[4]	On-Site GC[5]	Standard Laboratory[3]
PCB (total HR)	42.5 ppm	NA[2]	NA	NA	0.5 ppm	0.1 ppm	0.1 ppm
PAH (total)	20.8 ppm	NA	NA	NA	1 ppm	0.5 ppm	0.5 ppm
Pu-239/240	1,150 pCi/g			NA	NA	NA	1 pCi/g
Tc-99	36,200 pCi/g	NA	NA	NA	NA	NA	8 pCi/g
Th-230	1,490 pCi/g			NA	NA	NA	3 pCi/g
U-238	171 pCi/g	30 pCi/g	3 pCi/g	6 pCi/g	NA	NA	2 pCi/g
TCE	10[1] ppm	NA	NA	NA	NA	0.01 ppm	0.01 ppm

[1]Waste disposal criteria
[2]Not applicable
[3]As reported in Sampling and Analysis Plan for SWOU, December, 2004
[4]There are a variety of test kits available, ranging from qualitative to quantitative, with actual detection limits and dynamic ranges varying depending on the type of kit used. The numbers quoted are for "screening" kits.
[5]A gas chromatograph is typically coupled with a detector that is contaminant-specific (e.g., an ECD for for PCBs). With the proper detector and analytical protocols, detection limits comparable to a standard laboratory's can be achieved. For the needs of this project, less rigorous implementations would likely be used that would likely raise detection limits and/or

limit selectivity but that would significantly reduce costs and increase throughput. For example, in the case of TCE, a simple PID (without the GC back-end) can be used as a head space screening device with the proper sample handling protocols (e.g., immediately jar and cap sample, heat jar, and perform head space analysis through cap) with detection limits around 1 ppm.

[6]For many systems, detection limits are a direct function of sampling and measurement protocols, including counting times in the case of spectroscopy (e.g., HPGe and XRF). The numbers quoted are for standard protocols, which may differ significantly from technique to technique (e.g., standard count times for an in situ HPGe measurement are 15 minutes, while for an XRF they are 2 minutes).

[7]Individual XRF measurements provide concentration information for a variety of metals. Table 2 summarizes detection limits as reported by EPA Method 6200. This information is dated; actual detection limits can be expected to be significantly better than these for some elements.

Table 6.2 Method 6200 XRF Detection Limits

Analyte	Chemical Abstract Series Number	Detection Limit in Quartz Sand (milligrams per kilogram)
Antimony (Sb)	7440-36-0	40
Arsenic (As)	7440-38-0	40
Barium (Ba)	7440-39-3	20
Cadmium (Cd)	7440-43-9	100
Calcium (Ca)	7440-70-2	70
Chromium (Cr)	7440-47-3	150
Cobalt (Co)	7440-48-4	60
Copper (Cu)	7440-50-8	50
Iron (Fe)	7439-89-6	60
Lead (Pb)	7439-92-1	20
Manganese (Mn)	7439-96-5	70
Mercury (Hg)	7439-97-6	30
Analyte	Chemical Abstract Series Number	Detection Limit in Quartz Sand (milligrams per kilogram)
Molybdenum (Mo)	7439-93-7	10
Nickel (Ni)	7440-02-0	50
Potassium (K)	7440-09-7	200
Rubidium (Rb)	7440-17-7	10
Selenium (Se)	7782-49-2	40
Silver (Ag)	7440-22-4	70
Strontium (Sr)	7440-24-6	10
Thallium (Tl)	7440-28-0	20
Thorium (Th)	7440-29-1	10
Tin (Sn)	7440-31-5	60

Titanium (Ti)	7440-32-6	50
Vanadium (V)	7440-62-2	50
Zinc (Zn)	7440-66-6	50
Zirconium (Zr)	7440-67-7	10

Aqueous IDW

Because the volume of aqueous wastes (limited to decontamination fluid) are expected to be small and the concentration and activity of contaminants are expected to be low, water will be analyzed and a determination will be made as whether the water can be release to the PGDP sanitary sewer system or released to outfalls. It is anticipated that field sampling equipment will not be decontaminated in the field and if possible sample equipment will be utilized once and discarded as IDW.

If waste water is collected, it will be analyzed to determine its disposition. Once waste results are obtained an assessment will made to determine whether the wastewater can be discharged within the appropriate Kentucky Pollutant Discharge Elimination System (KPDES) discharge limits. Table 6.3 provides the parameters for characterization of decontamination water.

An IDW characterization report will be submitted with RFD forms and other applicable information to PGDP Waste Operations following receipt and evaluation of the data.

Table 6-3. Waste Characterization Requirements for Decontamination Water

IDW Type	Parameter	Methods
Decontamination water	VOCs (including TCE)	SW-846 8240
	Gross alpha and beta (total and dissolved)	Laboratory*
	pH	SW-846 9040
	Isopropanol (and hexane if used in decontamination)	SW-846 8240
	Hardness	MCAWW-130.1
	Total suspended solids	MCAWW-160.2
	Oil and grease	SW-846 9070
	Total phosphorus	MCAWW-365.2
	Chlorine	MCAWW-330.1
	Hexavalent chromium	SW-846 7196
	Total uranium	EPA 900/HASL-300; IN 7105
	PCBs	MCAWW-608
	Total metals	MCAWW-200.7 R3.3

* If gross alpha and beta activity is greater than WAC for the most restrictive isotope, specific analysis for isotopes will be conducted for the sample.

7. SAMPLE RESIDUALS AND MISCELLANEOUS WASTE MANAGEMENT

Sample residuals may be generated at the on-site laboratory. Sample residuals will be managed at PGDP by the Waste Manager.

7.1 ON-SITE REAL-TIME LABORATORY SAMPLE RESIDUALS

The residual generated by the on-site real-time laboratory will be placed back into the areas from where the material was removed once analytical results have been verified and validated.

7.2 OFF-SITE LABORATORY RESIDUALS

Sample residuals from off-site laboratory samples will be disposed of by the laboratory. Documentation regarding the disposition of the sample residuals will be provided to PGDP personnel by the off-site laboratory after completion of disposal.

7.3 ARCHIVED SAMPLE WASTE

Archived on-site samples will be held until the real-time demonstration project has been completed and all samples have been verified and validated. If necessary, based on data results, archived samples will be provided for analysis and the wastes will be managed as specified in Sect. 7.1. If the archived samples are not needed for analysis as determined KRCEE, the samples will be managed as outlined in Sect. 7.1 above

7.4 MISCELLANEOUS WASTES

Miscellaneous laboratory wastes such as empty bottles, and PPE are to be collected and contained at the on-site real-time laboratory. The PPE will be containerized with other PPE from the real-time demonstration project.

8. WASTE MINIMIZATION

The intent of the real-time demonstration project is to minimize the generation of waste. Waste minimization requirements established by the 1984 Hazardous and Solid Waste Amendments of RCRA; DOE Orders 5400.1, 5400.3, and 5820.2A; and PGDP will be implemented as appropriate. Waste generation, waste tracking, waste reduction techniques, and all other waste reduction program requirements specified in PGDP's Waste Minimization Plan will be implemented.

To support PGDP's commitment to waste reduction, an effort will be made during the field investigation to minimize waste generation as much as possible. The major effort will be to ensure that potentially contaminated solid materials are localized and do not come into contact with any clean media, which could create more potentially contaminated waste. Waste minimization will also be accomplished through waste segregation, selection of PPE, waste handling (spill control) and minimizing use of water in decontamination activities.

Solid wastes such as Tyvek™ coveralls and packaging materials will be segregated. An attempt will be made to separate visibly soiled Tyvek™ coveralls from unsoiled ones. In some instances, partially soiled coveralls can be cut up and segregated. Other solid waste will not be allowed to contact potentially contaminated trench materials. Efforts will be made to keep Tyvek™ coveralls clean, reuse clean coveralls, and only wear coveralls when necessary. Proper waste handling and spill control techniques will help minimize waste, particularly around the decontamination areas where decontamination water must be contained. In addition, hoses used in the decontamination area will not be permitted to leak, which would create more wastewater to be disposed.

ATTACHMENT A

WASTE GENERATION PLAN

Waste Stream	Volume (cubic feet)	Container (number)	Preliminary Category	Characterization Method	Analytes	Future Disposition	Schedule	Comments
Excavated solid material (soil)	1075 cubic feet	NA	LLW	Real-time methods	To be determined from results of characterization sample analysis	Will be returned to location it was removed from	Single event	None
Decontamination water	4 cubic feet (30 gallons)	Tank [1]	RCRA	Real-time/ Laboratory Methods	To be determined from results of characterization sample analysis	To be determined	Single event	None
PPE	30 cubic feet (1.5 cubic yards)	55-gal. drum [5]	LLW	Real-time methods	To be determined from results of characterization sample analysis	To be determined	Single event	None

Note: This table documents the packaging requirements, forecasted quantities, and characterization for the waste generated during the project. Requirements for labeling, transportation, GSA management, etc., must be followed to insure proper waste management.

I have reviewed and agree to implement this waste management plan as described.

Generator Date

Prepared by Date

I have reviewed this waste generation plan and agree that there is sufficient storage space landfill/disposal capacity available to accommodate the forecasted waste materials.

TSD Facility Manager Date

Waste Operations Manager Date