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Rev. 0

Environmental Restoration  
Disposal Facility

*Waste Disposal Operations*

# Environmental Monitoring Plan

*June 4, 1996*



*Work performed for  
Bechtel Hanford Inc.  
under Subcontract  
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**RUST** Federal Services Inc.

## Approval and Change Control Page

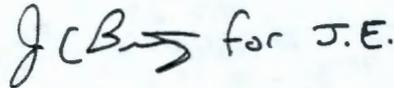
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## 1.0 Introduction

The Department of Energy (DOE) has issued requirements for complying with DOE and other Federal agency environmental regulations. DOE Order 5400.1 requires environmental monitoring plans for each DOE operation that uses, generates, releases, or manages pollutants of radioactive and/or hazardous nature. This Environmental Monitoring Plan (EMP) is intended to document the program for the Hanford Environmental Restoration Disposal Facility (ERDF) waste disposal operations and incorporate the recommended format and content of DOE/EH-0173T, "Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance".

**1.1 Policy** - It is the policy of the DOE and its contractors to conduct environmental monitoring (sampling and monitoring) to determine whether the public, workers, and the environment are adequately protected during DOE operations and whether operations are in compliance with DOE and other applicable federal, state, and local emission standards. It is also DOE contractor policy that environmental monitoring programs and practices meet high standards of quality and credibility.

**1.2 Purpose** - The purpose of this EMP is to establish a sound policy for environmental monitoring associated with waste disposal operations at the ERDF. The plan includes documentation of environmental monitoring surveillance and systems within the scope of the waste disposal operations subcontractor, along with their implementation. The plan also discusses the presence of other monitoring programs which round out the ERDF environmental monitoring program, including overall Hanford Site Monitoring, groundwater monitoring, etc. The results from the various programs are reported in the various Hanford Site wide environmental monitoring annual reports described in Section 7 as well as being used by the Environmental Restoration Contractor (ERC) team (including Bechtel Hanford, Inc. (BHI) and Rust Federal Services Inc. (Rust)) to control operation of the facility.

The objectives of the monitoring programs are to provide sufficient information to the overall Hanford Site environmental monitoring program to: (1) demonstrate compliance with legal and regulatory requirements imposed by applicable federal, state, and local agencies, (2) confirm adherence to DOE environmental protection policies, and (3) support environmental management decisions. The following specific objectives have been identified for environmental monitoring programs on the Hanford Site in support of these three overall objectives:

- Monitor all inactive, existing, and new low-level waste (LLW) disposal sites to assess both radiological and nonradiological hazards (DOE 5820.2A),
- Determine the effectiveness of effluent treatment and controls in reducing effluents and emissions (DOE/EH-0173T),
- Detect and quantify unplanned releases (DOE/EH-0173T) (40CFR302) (WAC 173-303-145) (DOE 5003.B),
- Monitor fugitive emissions and diffuse sources from contaminated areas for compliance with NESHAP (40CFR61) (DOE/EH-0173T),
- Monitor new and existing sites, processes, and facilities for potential impacts and releases (DOE/EH-0173T) (WAC 246-247-075), and

- Monitor and assess radioactive contamination and potential exposure to employees and the public (DOE 5400.1)

**1.3 Scope** - The scope of this environmental monitoring plan encompasses the monitoring and surveillance associated with the waste disposal operations at ERDF. The responsibility for performance of this scope lies with the ERDF waste disposal operations subcontractor, Rust Federal Services Inc. (Rust). The pre-operational monitoring, groundwater monitoring, and post-closure monitoring are outside the scope of this EMP as they will be carried out in accordance with Hanford Site wide policies and are beyond the scope of the waste disposal operations subcontract. The site characterization program will be used for baseline information for the facility and information can be found in the following two documents:

- WHC-SD-EN-AP-128, Rev. 1, Site Characterization Plan for the Environmental Restoration Disposal Facility,
- BHI-00270, Rev. 0, Preoperational Baseline and Site Characterization Report for the Environmental Restoration Disposal Facility

The groundwater monitoring program is operated by BHI and is controlled by:

- BHI-00079, Rev. 0, Groundwater Protection Plan for the Environmental Restoration Disposal Facility

The overall facility operational and environmental compliance will be monitored by the ERC team to ensure that overall ERDF impacts on the environment and personnel performing operations are monitored in accordance with applicable requirements.

## 2.0 Liquid Effluent Monitoring

**2.1 Identification of Liquid Effluents** - There are no ERDF potentially contaminated liquids that are discharged directly to surface waters or to the soil column: no permanent surface water bodies are located near the ERDF site. It is unlikely that ERDF waste disposal operations will adversely affect water quality, but there are several engineered systems in place to ensure this is the case. The ERDF waste disposal operations will produce three significant liquid streams that must be properly managed to ensure environmental compliance:

- Landfill leachate,
- Wash/Decontamination waters, and
- Stormwater.

Each of these liquid streams requires specific controls as discussed in the following sub-sections.

**2.1.1 Leachate** - Leachate from the ERDF primary and secondary liner are collected in sumps, pumped to the leachate storage tank, and stored on an interim basis until appropriate disposal can occur. The specific requirements for managing the leachate waste stream are described in the ERDF Leachate & Washwater Management Plan, but are briefly described in this plan to allow an understanding of the management practices. These liquids are not planned to be discharged to surface waters or to the soil column, and, as such, are not liquid effluents under normal operating conditions. The following describes the basic management scheme:

- *Collection* - Leachate drains to the individual cell sump and is then pumped up to the ERDF cell berm where it gravity drains to the leachate storage tanks. The piping and storage system are designed to comply with the RCRA/WAC 173-303 requirements for systems handling hazardous/dangerous wastes, including secondary containment and leak detection. Periodic inspections of both the tank contents and the tank integrity are performed to ensure that the potential for spills of leachate are minimized and that the system continues to be fit for its intended use.
- *Sampling/Analysis* - Periodic sampling and analysis as outlined in the ERDF Leachate & Washwater Management Plan (Section 5.0) is planned for leachate waters to understand leachate composition and ensure the use of appropriate handling and disposal practices.
- *Disposition* - Waters in the leachate storage tanks will be pumped into a water truck and used in the ERDF landfill operations as compaction and dust suppression water under normal conditions. Concentrated leachate and/or unusual conditions may require pumping of the materials into truck(s) for other disposition methods (i.e. treatment at ETF, etc.).

The policy and procedures for leachate management are not specifically addressed in this EMP, but are fully addressed in the ERDF Leachate Management Plan (LMP) which is also part of this overall ERDF Operations Manual.

**2.1.2 Wash/Decontamination Waters** - Wash waters from the ERDF decontamination pad are collected in the wash water storage tank and stored on an interim basis until appropriate disposal can occur. The specific requirements for managing the washwater

waste stream are described in the ERDF Leachate & Washwater Management Plan, but are briefly described in this plan to allow an understanding of the management practices. These liquids are not planned to be discharged to surface waters or to the soil column, and, as such, are not liquid effluents under normal operating conditions. The following describes the basic management scheme:

- *Collection* - Wash/decontamination waters are collected in the washwater storage tank by gravity drain from the decontamination pad area. The piping and storage system are designed to comply with the RCRA/WAC 173-303 requirements for systems handling hazardous/dangerous wastes, including secondary containment and leak detection. Periodic inspections of both the tank contents and the tank integrity are performed to ensure that the potential for spills of leachate is minimized and that the system continues to be fit for its intended use.
- *Sampling/Analysis* - Periodic sampling and analysis as outlined in the ERDF Leachate & Washwater Management Plan (Section 5.0) is planned for wash waters to understand composition and ensure the use of appropriate handling and disposal practices.
- *Disposition* - Waters in the washwater storage tank will be pumped into a water truck and used in the ERDF landfill operations as compaction water.

**2.1.3 Stormwater** - The ERDF is designed to prevent stormwater from entering the landfill using culverts and berms around the perimeter. This minimizes the possibility of stormwater intrusion into the landfill, causing increased water content and potential contaminated leachate. Periodic radiological control surveys of the landfill perimeter will also be used to ensure that contamination is maintained in the landfill and that the runoff from the perimeter is not potentially contaminated. The following describes the basic management scheme:

- *Run-on stormwater inside of the landfill* will be handled as leachate in active cells of the ERDF and as runoff stormwater in cells that have not yet received waste. The appropriate leachate drainage line for an inactive cell will be opened to stop flow to the leachate storage tanks and redirect as part of the runoff stormwater. Periodic radiological surveys in accordance with the ERDF HASP will be conducted in any inactive cell as part of the overall contamination control program and to ensure that the operations layer has not been contaminated such that stormwater entering the cell could have been contaminated.
- *Run-on stormwater in potentially contaminated areas* of the facility (i.e. decontamination area) are collected, drained to the wash water storage tank, and dispositioned as described in Section 2.1.2. These liquids are not planned to be discharged to surface waters or to the soil column, and, as such, are not liquid effluents under normal operating conditions.
- *Runoff stormwater outside of the landfill* is collected and controlled in varying basins around the landfill perimeter and allowed to percolate. The ERDF Design Analysis, BHI-00355, Rev. 0 demonstrates that the selected

stormwater layout, flowpath, and accumulation areas are sufficient to support control of a 24-hour, 25 year rainfall.

**2.2 Sampling Systems** - There are no on-line monitoring or sampling systems at the ERDF for the three liquid streams present. Off-line periodic samples are intended for use in determining the composition of the liquids contained in the leachate and washwater storage tanks to allow appropriate disposal. Sampling procedures for leachate and washwater are described in the ERDF Leachate & Washwater Management Plan to ensure proper management of these liquid streams.

### 3.0 Airborne Effluent Monitoring

The ERDF site contains no point sources of airborne effluents, with the landfill operations acting as a diffuse source of potential contamination. An analysis was done of the types of wastes to be received, waste placement activities (i.e. exposed surface area), and dispersion modeling. This analysis is presented in Appendix A and includes modeling using the CAP-88 computer program. This impact was estimated at <0.1 mrem/year and led to the determination that an environmental sampling program would be preferred for ERDF. The sampling times associated with the environmental sampling equipment allow lower detection levels and greater sensitivity to detect both chronic and acute emissions of low levels of radioactive constituents in the air.

Transportation equipment for materials being brought to the site is also required to have appropriate strong-tight type containment to minimize the spread of airborne contaminants. Environmental surveillance of airborne contamination (discussed in Section 5) will be used to develop a baseline for initial operations and to monitor ongoing operations. Quarterly review of the surveillance data will be performed and compared with action criteria described in Section 5 to understand potential impacts of ERDF waste disposal operations on personnel and the environment.

#### **4.0 Meteorological Monitoring**

Meteorological monitoring of the Hanford Site is performed on a site-wide basis and is not specifically addressed in this EMP. Information from the Hanford meteorological will be used by the overall Hanford Site environmental monitoring program as necessary to understand the impacts of ERDF operations on the surrounding environment. The 200 Area meteorological station is less than one mile from the ERDF site and provides a significant amount of current and past meteorological conditions for the ERDF site. No specific ERDF meteorological monitoring will be performed.

## 5.0 Environmental Surveillance

**5.1 Evaluation of Need** - Consideration of anticipated release to the environment is the first step in determining the extent and type of environmental surveillance required for a site. For the ERDF site, the anticipated releases from liquids, airborne, and external exposure were all considered in determining the appropriate surveillance methods.

**5.1.1 Liquid Effluents** - The three liquid waste streams at the ERDF site are not contaminated liquid effluents which require monitoring. Leachate is a potential waste stream and must be appropriately managed through collection, testing, and disposal normally through reuse as compaction/dust suppression water within the ERDF. Washwater is also a potentially contaminated waste stream which will be managed through similar practices as leachate. Both leachate and washwater collection, testing, and disposal practices are described in the ERDF Leachate & Washwater Management Plan.

Stormwater runoff will be maintained non-contaminated through facility design and contamination control and will be managed through controlled percolation and/or transpiration. None of these three liquid effluent streams is a potentially contaminated stream that should be included in an environmental surveillance program.

**5.1.2 Airborne Emission** - Existing site conditions and operational methods/controls were considered in determining an airborne emission surveillance program for the ERDF site. The potential types of airborne radionuclide emissions from ERDF are controlled by the wastes that will potentially be accepted for disposal and the waste placement operations/methods. The hauling, dumping, spreading, and compacting operation is an operation that has susceptibility to spread of particulate matter, but the limited physical/chemical processing involved leads to relatively low possibility of radionuclide gases, halogens, or tritium dispersion. Compaction water, dust suppression water and a dust suppressing agent will be used to minimize the potential for spread of airborne contaminants. For compliance purposes, airborne surveillance is required to baseline operations and understand any trends contradictory to that predicted. The surveillance program is described in Section 5.2 and includes data from both permanently installed particulate samplers and trench workplace monitoring particulate samplers.

Results of the site characterization program, including an ERDF preoperational baseline, were also considered as found in the following two documents:

- Site Characterization Plan for the Environmental Restoration Disposal Facility, WHC-SD-EN-AP-128, Rev. 1.
- Preoperational Baseline and Site Characterization Report for the Environmental Restoration Disposal Facility, BHI-00270, Rev. 0.

An analysis of the types of waste, potential dispersion/exposure from those wastes, and a monitoring system design are found in Appendix A and are the basis for the overall ERDF airborne surveillance program described in Section 5.2.

**5.1.3 External Exposure Monitoring** - The ERDF waste disposal operations involve the placement of radioactive/hazardous wastes into a landfill for disposal of the wastes. The external exposure at varying distances from the ERDF will be dependent upon the types and quantities of wastes placed in the ERDF, within the waste acceptance criteria for the facility. Occupational radiation levels will be controlled by periodic surveys (daily, weekly, and monthly depending on circumstances) of radiation and contamination areas to assist management in maintaining personnel exposure less than administrative control levels described in the ERDF Health & Safety Plan. These surveys will ensure that radiation areas (i.e. > 1 mrem/hr) are adequately posted to control access for personnel without appropriate dosimetry, training, and medical surveillance programs.

Controlling exposure to the public from ERDF operations will be assured by two methods: Posting of radiation areas to ensure exposure to non-occupational visitors is controlled within regulatory limits and posting of Thermo-Luminescent Dosimeters (TLDs) to measure exposure at certain locations outside of the landfill. The first of these methods will center on the appropriate posting of radiation areas at the ERDF to require dosimetry, training, and medical surveillance of onsite visitors prior to entry. Implementation of these requirements is controlled through the ERDF Health & Safety Plan and implementing guidance. The second of these methods will be performed through the placement of three TLDs to measure exposure from the ERDF. The first TLD used to monitor exposure from the ERDF will be co-located with an existing upwind monitoring location (PNL monitor- 200 West, South East). Two additional ERDF specific TLDs will be placed in downwind monitoring locations (at ERDF air monitoring stations 1 and 3). The Washington Department of Health may co-locate additional TLDs as they deem appropriate to monitor ERDF performance. The TLDs will be collected quarterly and analyzed in a manner consistent with the remainder of the Hanford Site (i.e. Westinghouse Hanford Company Operational Environmental Monitoring Program). Data from the TLD monitoring will be forwarded to WHC and PNNL for inclusion in the annual reports.

**5.1.4 Other Surveillance** -Periodic downwind soil sampling will be performed at the ERDF to assess the potential for spread of contamination and build-up of radionuclides over time. Annual soil samples will be taken at ERDF air monitors 1 and 3 and analyzed for gross beta, Sr-90, and Gamma Energy Analysis (GEA). Sampling methods, chain-of-custody, and handling requirements will be in accordance with the ERDF QAPjP. Results will be compared with baseline information found in the ERDF site baseline characterization report.

Groundwater monitoring and biota sampling are also performed either specific to ERDF or for environmental monitoring of the overall Hanford Site. Groundwater impacts specific to ERDF is monitored by BHI and overall site vegetation is monitored by Westinghouse Hanford Company and Pacific Northwest National Laboratory. This level of monitoring as part of the Hanford Site environmental surveillance program will adequately monitor the potential minor impact ERDF has on the overall site impacts to the environment and public.

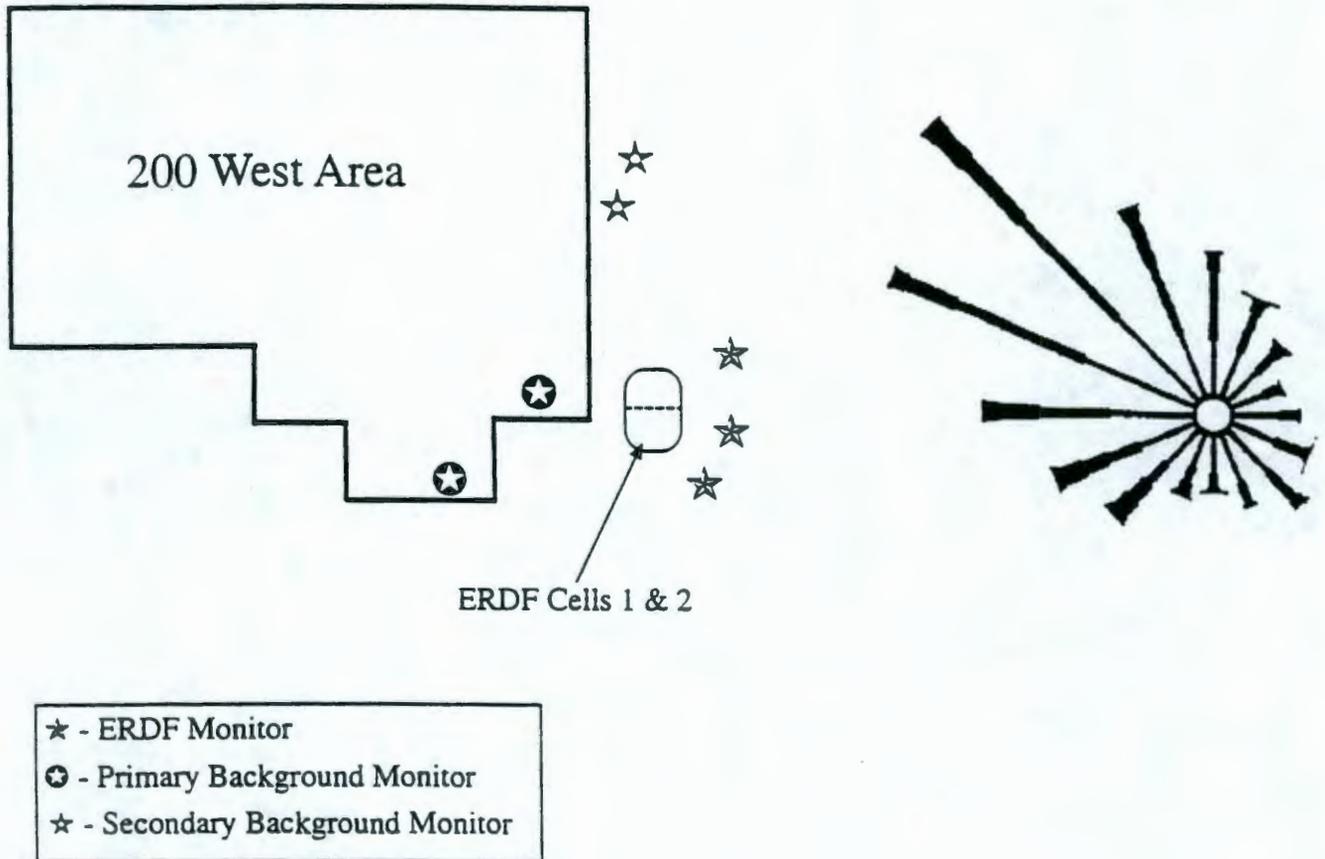
**5.1.5 Emergency Monitoring Provisions** - Battery operated high volume air samplers are available at the ERDF site for use under operational settings that can be utilized in an emergency to supplement the existing airborne emission surveillance equipment.

## **5.2 Airborne Surveillance**

**5.2.1 Basis of Sampling** - The types of materials to be received for waste disposal at the ERDF were considered in determining the type of environmental surveillance to be used to understand the impacts of site operations. The ERDF waste acceptance criteria, types of operations to be performed at ERDF, and environmental dispersion pathways all were used in determining that standard record air sampling equipment could be used to effectively understand the impact of site operations. Air dispersion modeling using the CAP-88 computer program was performed under ERDF conditions to determine the potential offsite exposure from operations, as described in Appendix A. The overall exposure is less than 0.06 mrem/year from the operations and supports a limited surveillance program for particulate radionuclides. A surveillance program, with equipment described in the following sections, was designed based upon the results of this modeling, the site physical characteristics, and support information/surveillance data available from the overall Hanford Site surveillance program.

**5.2.2 Equipment Type and Location** - Three ERDF specific air monitors were identified as necessary to provide surveillance for the ERDF site as part of the analysis from Appendix A. The selected locations and a windrose are shown in Figure 5-1, ERDF Facility Layout. The locations of the three monitors are all downwind of the cell operations as shown by the windrose. In addition, four additional air monitors currently in use in the Hanford Site Environmental Monitoring Program will be used to provide upwind and background information on airborne concentrations. The combined ERDF specific and Hanford Site monitoring will provide an overall clear monitoring program that will allow an understanding of the environmental impacts of ERDF waste disposal operations.

Figure 5-1 - Air Monitor Locations and Wind Patterns



**Equipment** - The standard Hanford Site air monitoring station is graphically displayed in Figure 5-2. The basic method for air sampling is to perform particulate sampling with glass fiber filters with a sampling efficiency of at least 99% for 0.3-micron dioctyl phthalate particles. An environmental housing is used to enclose the major components of the unit. Air is drawn from the 2 meter level through the air sample filter and a 30" long copper tube (1/2" diameter). The air passes through a gooseneck and enters the environmental housing. The air then flows through a gas totalizing meter, an automatic control valve and a rotary vane vacuum pump before discharge from the unit.

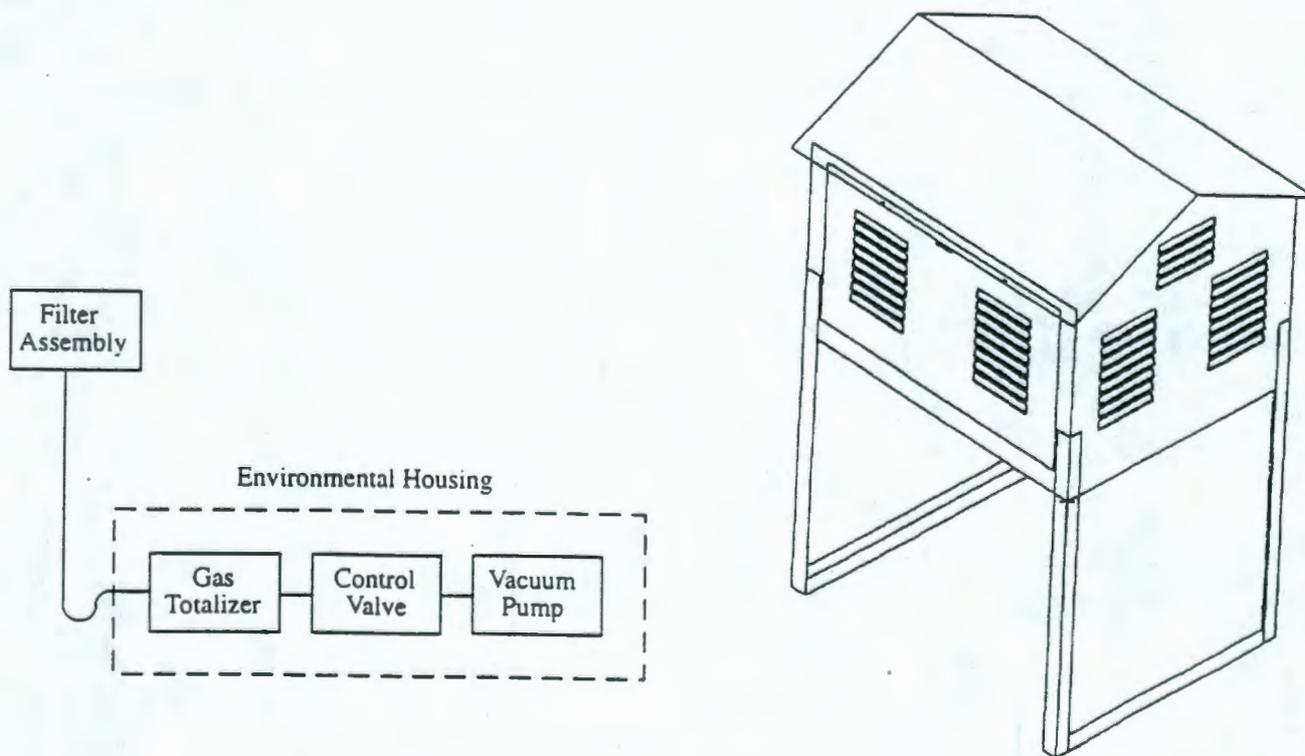
The particular types of equipment used in the air monitoring station are as follows:

- Filter Assembly - Hi-Q Model ILPH-47
- Gas totalizer - Hi-Q Model MR-7
- Automatic Control Valve - Hi-Q Model MCV-260
- Pump - Hi-Q Model 323
- Weather Housing - Hi-Q Model WH-36

*Sample Height* - ERDF air samples are collected at a height of 2 m above ground to be representative of the air breathing space of personnel.

*Proximity to Obstructions* - Samples are located to obtain concentration measurements representative of the open areas around ERDF and have not been placed in proximity to any obstructions (i.e. buildings, etc.) which could cause localized effects. Suitable locations for each of the monitors were found within 500 meters of the emission source (the cell) to ensure representative samples.

**Figure 5-2 - Air Monitoring Station**



**5.2.3 Sampling and Analysis Frequency** - Air samples will be taken every two weeks from the three ERDF air monitoring stations in accordance with BHI-SH-04, Procedure 7.29, Environmental Air Particulate Monitoring. Hanford Site experience indicates that particulate filters must be collected at this frequency to avoid excessive particulate buildup on the filters. Air samples are collected in a manner that avoids loss of sample mass, cross-contamination, or mis-identification. Appropriate chain of custody and field control methods described in the BHI procedure to ensure that the samples are appropriately collected and controlled throughout the process.

Particulate sample media are analyzed for gross alpha and gross beta every 2 weeks to provide early indication of any loss of control that may require expedited analysis of samples and/or additional or special sampling. Particulate samples from each location are composited together every six months and analyzed for gamma energy analysis (Cs-137, Co-60, and Eu-154), Sr-90, Pu-238, Pu-239/240, U-234, U-235, U-238, and Am-241.

Workplace monitoring results will also be used to supplement the overall environmental air monitoring program as described in Section 7.

**5.3 Other Surveillance** - No other surveillance has been identified for the ERDF site.

**5.4 Environmental Surveillance Review** - An annual review of the environmental surveillance program adequacy will be conducted. The purpose of this review will be to ensure that the correct type of sampling is implemented at the proper frequency. Operational data will be used to determine adequacy. BHI, DOE, DOH, and EPA will be involved in the review process.

## 6.0 Laboratory Procedures

Analytical procedures performed by Quanterra will be performed in accordance with procedures based on reference methods identified in 40 CFR 61. The specific laboratory procedures, and their detection levels are described in the following table. Copies of procedures are available at the Quanterra office located at 2800 George Washington Way, Richland, Washington.

Analyte	Quanterra Procedure	Method Detection Limit	Sample Volume	Detection Limit
Air Samples				
Gross Alpha	RD3242	10 pCi/sample	40320 ft <sup>3</sup> *	25x10 <sup>-3</sup> pCi/ft <sup>3</sup>
Gross Beta	RD3242	100 pCi/sample	40320 ft <sup>3</sup> *	250x10 <sup>-3</sup> pCi/ft <sup>3</sup>
Gamma Energy Analysis	RICHRC5071	200 pCi/sample	524160 ft <sup>3</sup> **	40x10 <sup>-3</sup> pCi/ft <sup>3</sup>
Pu-238, 239/240	RICHRC5010	1 pCi/sample	524160 ft <sup>3</sup> **	2x10 <sup>-6</sup> pCi/ft <sup>3</sup>
Am-241	RD3206	1 pCi/sample	524160 ft <sup>3</sup> **	2x10 <sup>-6</sup> pCi/ft <sup>3</sup>
Sr-90	RICHRC5006	10 pCi/sample	524160 ft <sup>3</sup> **	20x10 <sup>-6</sup> pCi/ft <sup>3</sup>
U-234, 235,238	RICHRC5030	1 pCi/sample	524160 ft <sup>3</sup> **	2x10 <sup>-6</sup> pCi/ft <sup>3</sup>

\* 2 ft<sup>3</sup>/min x 2 weeks = 40320 ft<sup>3</sup>

\*\*2 ft<sup>3</sup>/min x 26 weeks - 524160 ft<sup>3</sup>

Analyte	Quanterra Procedure	Method Detection Limit
Soil Samples		
Gross Beta	RD3242	10 pCi/g*
Gamma Energy Analysis	RICHRC5071	0.2 pCi/g**
Sr-90	RICHRC5006	1 pCi/g*

\* dry weight

\* Cs-137 and dry weight

## 7.0 Data Analysis and Statistical Treatment

Data from the ERDF record samples will be used for several purposes in understanding and reporting information on environmental releases. Appropriate methods for handling data and interfaces between organizations will be established to ensure that the various needs can be met.

**7.1 Operational Monitoring** - The environmental record samples will be reviewed by ERDF ES&H management in understanding potential personnel exposure. These samples will not act as the main data source in this area, as localized work space air samples will be taken to support operations and the selection of PPE for in-cell personnel. The results of these samples will be used in overall policy formulation to ensure that both localized air samples and near field air samples are showing consistent results and trends.

**7.1.1 Workplace Monitoring Requirements** - The workplace air sampling program is governed by BHI-SH-02, Vol. 2, 2.2.1, "Monitoring and Evaluating Airborne Radioactive Material". The general goal of the program is to ensure the worker is not exposed to greater than 2% of the Allowed Limit of Intake (ALI) without monitoring being in place. In a continuously occupied area such as ERDF, the air samples will be counted so that 1% of a Derived Air Concentration (DAC) for Sr-90 and 1% of a DAC for Pu-239 could be detected. Air samplers are evaluated in the field per BHI-SH-04, 2.1 "Field Air Sampling". Results are documented on air sample counting forms which are controlled in accordance with BHI-SH-02, Vol. 2, 2.1.4, "Managing Radiological Records".

A sampler will generally run continuously throughout the operation or over the course of a day. The results from this sample are compared to grab samples to evaluate potential worker exposures. To adapt the ERDF work place air sampling activities for the environmental monitoring program, one sampler will be operated and evaluated as an environmental sampler. The filter will be changed weekly, instead of biweekly, basis to minimize dust loading; otherwise, the filters will be handled and analyzed in the same manner as the other environmental samples. The sample rate will be higher than those of the stationary environmental samplers, providing adequate volume for lower detection limits.

**7.1.2 Workplace Monitoring Equipment/Detection Levels** - Gross alpha and beta screening will be performed on workplace samples with a Ludlum 2929 scaler, with either a 43-1-1 or 4310 detector. This configuration is typically 30% efficient for Pu-239 and 20% efficient for Sr-90. For gross beta counting, the efficient of 10% derived for Tc-99 is used for conservatism. Using these efficiencies and assuming a one hour count time, MDA for alpha is typically 0.4 pCi; MDA for beta is typically 40 pCi. These MDAs are achieved in the typical backgrounds expected of less than 0.2 DPM alpha and 1000 DPM beta. A one hundred cubic meter air sample is typically drawn each week using a battery powered air sampler that draws four cubic feet per minute. This will allow MDAs to equate to minimum detectable quantities of  $4 \times 10^{-3}$  pCi/m<sup>3</sup> alpha and  $4 \times 10^{-2}$  pCi/m<sup>3</sup> beta.

Trending of workplace monitor results will be performed in accordance with BHI-SH-04, Procedure 2.1, Field Air Sampling. The information will be recorded on the field screening air sample evaluation data sheet and the airborne concentration trending forms. Management will be notified if  $0.2 \text{ pCi/m}^3$  for alpha or  $200 \text{ pCi/m}^3$  for beta are detected.

**7.1.3 Action Levels for Workplace Monitoring** - Worker protection guidelines dictate the need to investigate work place air samples that exceed  $0.2 \text{ pCi/m}^3$  alpha and  $200 \text{ pCi/m}^3$  beta. These results will be compared to overall environmental surveillance results through an ERDF specific monitoring plan. This program is part of an experimental program for using monitoring data for multiple purposes and will be monitored with the Washington Department of Health. Results of the sampling will be compared to the other environmental samples through taking into account:

- The workplace monitoring is closer to the potential source of airborne contamination, reducing the effect of emission dilution in the air.
- The workplace sampler is closer to the source and therefore less sensitive to wind direction and speed. Dispersion (based on the distance to the sampler) will be considered by taking into account both the difference in distance and the difference in the amount of time that the wind is actually blowing towards the remotely mounted environmental surveillance sampler, and
- The sampler will be operated during working hours only, when the highest potential to generate airborne contamination exists. No air will be drawn during off hours when soil fixatives will minimize the potential for airborne emissions. The result will be that no sample dilution will result from 16 hour air sampling during lower risk of contamination times.

**7.2 Hanford Site Environmental Report** - The overall Hanford Site Operational Environmental Monitoring Annual Report is prepared by Westinghouse Hanford Company and The Hanford Site Environmental Monitoring Report is prepared by Pacific Northwest National Laboratory, and these reports will require data from the ERDF environmental monitoring program. The emissions data, along with supplementary explanatory text, will be transmitted to WHC and PNNL to allow incorporation into the overall site report. The PNNL health physics organization will then combine this emissions data with information from the remainder of the site in calculating the offsite dose to the maximally exposed individual. Information from ERDF environmental monitoring will be collected by Rust and reported on a quarterly basis to WHC/PNNL for inclusion in the overall site-wide reporting.

**7.3 Air Emissions Report** - For the annual air emissions report required by 40 CFR 61, Subpart H, ERDF monitoring data will be provided to be incorporated into this report.

**7.4 Data Reduction** - Data from the laboratory will be in terms of radionuclide content on the record sample. This information will be combined with the amount of material drawn through the filter paper to understand a concentration of radionuclides in the effluent. Laboratory data will be received in both electronic and written media with sample results usually in picocuries per sample (i.e. pCi). These will then be converted to picocuries per milliliter ( $\text{pCi/ml}$ ) by dividing by the volume of air passed through the sample.

**7.5 Data Verification** - The ES&H Manager will compile and review the data from the environmental surveillance program. Any gross alpha or beta values that exceed baseline background levels by more than two standard deviations above the mean background concentration will be investigated to determine the cause of the aberration. The mean background concentration will be determined by use of historical data from PNL air station #4 which is upwind of the ERDF site. This investigation will include a review of materials placed during the time in question, any changes in operational practices, workplace air monitoring taken during the same period, sampling logs/interview of sampler, laboratory data package/interview with analyst, etc. as necessary to understand any potential causes of the data being outside of anticipated ranges. Data outside of two standard deviation shall also be reviewed with available data from the overall Hanford Site environmental monitoring system to see if the elevated levels are localized or prevalent across a general area of the site.

For above normal emissions, Rust will notify BHI/DOE; BHI/DOE will informally notify the Washington Department of Health, EPA, and the Washington Department of Ecology. Any investigations will be documented and provided to BHI/DOE on a quarterly basis. Investigation levels will be set at 2 sigma. For any unplanned release, the Occurrence Notification Center will be contacted and appropriate notifications made in accordance with BHI-EE-02, Environmental Requirements.

## 8.0 Dose Calculations

No specific ERDF modeling for dose impacts is anticipated, but will reside with the overall Hanford Site environmental monitoring program. Air emission monitoring information will be reviewed quarterly in conjunction with operational monitoring programs to understand trends and overall effects of the program and potential required changes to operational/PPE programs.

## 9.0 Records and Reports

Monitoring data will be reviewed as results are received and will be formally compiled on a monthly basis. Necessary information will be forwarded to site wide organizations as needed to support periodic reporting described in Section 7, including WHC for the RCRA Monitoring Program and WHC/PNNL for inclusion in the overall Hanford Site environmental monitoring programs. ERDF specific monitoring records will be maintained for 5 years in accordance with the records keeping requirements of the ERDF administration manual. These records shall include sampling logs, chain-of-custody data sheets, data packages from the laboratory, and data compilation reports/calculations. The ES&H manager is responsible for ensuring quality of these records, compliance with applicable QAPjP requirements, and submission for inclusion in the overall ERDF record files.

## 10.0 Quality Assurance

The requirements of the ERDF QAPjP that apply to environmental monitoring are described in the following sections.

**10.1 Organization** - The overall organization requirements for ERDF are described in Criterion 1 of the QAPjP, with supplemental information provided in QAI-1.1. The specific ERDF organizational structure for the environmental monitoring activities at ERDF are as follows:

**10.1.1 Quality Achieving Organization** - The ES&H Manager is responsible for the implementation of the environmental monitoring program, including:

- Performance of required monitoring/sampling,
- Shipping samples to appropriate laboratory,
- Data reduction and reporting of results,
- Maintenance of the EMP to ensure compliance with regulatory requirements based upon baseline and ongoing data from operational impacts on the environment. through analysis and finally to data reduction and reporting.

The ES&H Manager will be supported in the implementation of the program by the BHI radiological controls organization and ERDF line management organizations as necessary to perform the appropriate monitoring/sampling.

**10.1.2 Quality Assuring Organization** - The QA coordinator for ES&H activities is responsible for quality assurance associated with the environmental monitoring function. This includes the responsibilities described in Section 2.3.6 of the QAPjP, including periodic surveillance of the environmental monitoring activities.

**10.1.3 Procedural Control** - Procedures for performance of environmental monitoring are described (as necessary) in Sections 3, 4, and 5 of this EMP. Field sampling activities are controlled by BHI procedures and are consistent with the remainder of the Hanford Site Environmental Restoration Program monitoring activities.

**10.1.4 Personnel Training and Qualification** - Personnel who take environmental samples or perform environmental monitoring shall be appropriately trained in the types of instrumentation and procedures being used. This shall be accomplished as part of ERDF site specific training and through supervised on-the-job training.

**10.2 Quality Assurance Program** - The overall ERDF Quality Assurance program and requirements for ERDF are described in Criterion 2 of the QAPjP, with supplemental information provided in QAI-2.1, QAI-2.2, QAI-2.3 and QAI-2.4. Requirements specific to the environmental monitoring program are as follows:

**10.2.1 QA Coordinator** - The QA Coordinator for environmental monitoring activities at ERDF is the ERDF ES&H QA Coordinator. He is responsible for implementing the

QAPjP requirements that apply to environmental monitoring activities, including specific QA requirements outlined in this Section of the EMP.

**10.2.2 Management Assessment** - The ES&H Manager shall regularly assess the adequacy of implementation of the QA Program for environmental monitoring activities and make appropriate changes to the program to improve the quality of the data. This should include performance of self-assessments in accordance with the requirements of QAI-2.1 and with the intent of quality improvement as described in QAI-2.4.

**10.3 Design Control** - The design control requirements for ERDF are described in Criterion 3 of the QAPjP, with supplemental information provided in QAI-3.1. The requirements of design control are not applicable for the environmental monitoring program at ERDF unless data from future operations indicates that the types of monitoring/samples are inadequate or the current equipment is insufficient to support the program. Appropriate design control would then be required to support any future design changes to the ERDF installed equipment.

**10.4 Procurement Document Control** - The procurement document control requirements for ERDF are described in Criterion 4 of the QAPjP, with supplemental information provided in QAI-4.1. Standard procurement requirements apply to the procurement of supplies to support the environmental monitoring (i.e. filter papers, etc.). The types of materials are readily available commercially, but do require appropriate specification of technical requirements (i.e. filter paper material type, thickness, etc.). No rights of access needs are anticipated for procurement of these items. Any equipment changes required for future needs (as discussed in Section 10.3) would require appropriate quality considerations be placed in the appropriate procurement documents.

**10.5 Instruction, Procedures, and Drawings** - The instructions, procedures, and drawings requirements for ERDF are described in Criterion 5 of the QAPjP. Procedures for air monitoring are released/controlled by BHI and are consistent with the remainder of the Hanford Site Environmental Restoration Program monitoring activities.

**10.6 Document Control** - The document control requirements for ERDF are described in Criterion 6 of the QAPjP. This EMP has been properly prepared and approved in accordance with the requirements of the criterion and changes will be controlled in accordance with ERDF administrative policy.

**10.7 Control of Purchased Material, Equipment, and Services** - The control of purchased material, equipment and services requirements for ERDF are described in Criterion 7 of the QAPjP, with supplemental information provided in QAI-7.1, QAI-7.2, and QAI-7.3. Receipt of environmental monitoring related equipment and supplies will be performed by the ES&H QA Coordinator to ensure that equipment and comply with identified technical requirements. Once properly received, quality environmental monitoring equipment will be controlled in locked areas with other radiological/industrial hygiene instrumentation and equipment.

**10.8 Identification and Control of Material, Parts, and Components** - The identification and control of material, parts and components requirements for ERDF are described in Criterion 8

of the QAPjP. The requirements that apply specific to the environmental monitoring program are identification of samples, traceability of samples from the field through to data, and chain-of-custody. The procedures described in other Sections of this EMP describe the sample recovery, packaging, labeling, and chain-of-custody requirements to ensure that samples are adequately controlled throughout the environmental monitoring field efforts.

**10.9 Control of Processes** - The control of processes requirements for ERDF are described in Criterion 9 of the QAPjP. These requirements are applicable to the environmental monitoring program because environmental sampling has been identified as a special process.

**10.10 Inspection** - The inspection requirements for ERDF are described in Criterion 10 of the QAPjP, with supplemental information on surveillance in QAI-10.1. The ERDF ES&H QA Coordinator will perform surveillance on the environmental monitoring program as required in QAI-10.1 to ensure that appropriate quality requirements of the QAPjP and this EMP are being implemented.

**10.11 Test Control** - The test control requirements for ERDF are described in Criterion 11 of the QAPjP, with supplemental information in QAI-11.1. No specific testing requiring described controls has been identified as part of the environmental monitoring program.

**10.12 Control of Measuring and Test Equipment** - The control of measuring and test equipment requirements for ERDF are described in Criterion 12 of the QAPjP, with supplemental information in QAI-12.1. No specific measuring and test equipment has been identified for the environmental monitoring program that would require implementation of these controls.

**10.13 Handling, Storage, and Shipment** - The handling, storage, and shipment requirements for ERDF are described in Criterion 13 of the QAPjP, with supplemental information in QAI-13.1. The procedures for environmental sample taking, handling and shipment in this EMP delineate the methods to ensure compliance with the QA requirements

**10.14 Inspection, Test, and Operating Status** - The inspection, test, and operating status requirements for ERDF are described in Criterion 14 of the QAPjP, with supplemental information in QAI-14.1. No specific inspection, test, or operating status requirements have been identified for the environmental monitoring program that would require implementation of these controls.

**10.15 Nonconforming Material, Parts, or Components** - The nonconforming material, parts, or components requirements for ERDF are described in Criterion 15 of the QAPjP, with supplemental information in QAI-15.1 and QAI-15.2. Quality parts procured for the environmental monitoring program will be appropriately receipt inspected (See Section 10.7) with any discrepancies appropriately resolved using the procurement related nonconformances instructions identified in QAI-15.2.

**10.16 Corrective Actions** - The corrective actions requirements for ERDF are described in Criterion 16 of the QAPjP, with supplemental information in QAI-16.1. The standard level

requirements will be applied in the environmental monitoring program to ensure that conditions which impact quality are properly identified and addressed.

**10.17 Quality Assurance Records** - The quality assurance records requirements for ERDF are described in Criterion 17 of the QAPjP. The standard level requirements will be applied in the environmental monitoring program to ensure that records are properly maintained.

**10.18 Audits, Surveillance, and Managerial Controls** - The audits, surveillance, and managerial controls requirements for ERDF are described in Criterion 18 of the QAPjP, with supplemental information provided in QAI-18.1. The performance of audits and surveillance for the environmental monitoring program will be in compliance with the standard level of requirements for this criterion.

## Appendix A

Environmental  
Restoration  
Contractor **ERC Team**  
**Meeting Minutes**

031775

Job No. 22192  
Written Response Required  
Closes CCN N/A  
OU ERDF  
TSD N/A  
ERA N/A  
Subject Code 4170 8560

**SUBJECT** ERDF Operational Air Monitoring

**TO** Distribution

**FROM** D. E. Gilkeson *NEA*

**DATE** April 24, 1996

**ATTENDEES**

**DISTRIBUTION**

J. C. Biagini, H0-04  
S. Carrick, DOH  
E. T. Coenenberg, H9-11  
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D. E. Gilkeson, H0-04  
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D. R. Myers, H0-04  
O. C. Robertson, H0-12  
H. M. Rodriguez, A5-15  
D. C. Ward, A5-15  
R. L. Wardlow, H0-04  
M. A. Wesselman, H0-17

Attendees  
P. J. Berthelot, X0-17  
V. R. Dronen, H0-04  
F. V. Roeck, H0-04  
A. R. Michael, H0-04  
E. D. Marvin, H4-79  
BHI Document Control H0-09

A meeting on the above subject was held on April 15, 1996, at 3350 George Washington Way, Room 1A14.

The meeting was called to discuss and resolve Washington State Department of Health (DOH) and the U.S. Environmental Protection Agency (EPA) comments on the Environmental Restoration Disposal Facility (ERDF) operational air monitoring requirements as specified in the ERDF Environmental Monitoring Plan (EMP) prepared by Rust Federal Services (Rust), the ERDF waste disposal subcontractor. Appropriate representatives from the U.S. Department of Energy (DOE), Richland Operations Office (RL), project management and Environmental Assurance Program (EAP), DOH and EPA were present to discuss and resolve remaining concerns. The meeting followed the attached agenda (attachment 1). Monitoring at the ERDF was discussed as summarized below.

**Monitoring Locations**

The ERDF site environmental air monitors are consistent with those used at Hanford, site wide. The monitors have a volume flow rate of two cubic feet per minute, use a 47 mm filter, and are run by a six amp, quarter

horsepower pump. The filters are positioned so that samples are collected approximately two meters above grade.

The ERDF monitors were located to establish preoperational ambient air baseline and accomplish facility operational monitoring of four ERDF cells. These locations were chosen using Hanford Site meteorological data, DOE guidance documents, and the professional judgement of Hanford Site Near Field Monitoring personnel. Near Field Monitoring personnel involvement in monitor locations began in November of 1993. Meteorological data shows the prevailing wind direction of east south east as seen on the windrose (attachment 2). The ERDF monitoring stations were located to adequately monitor downwind conditions. Hanford Site-Wide Monitoring Plan guidance recommends that near facility monitoring locations be set within 500 meters of the facility boundary.

As a result of public comment regarding sensitive habitat, the ERDF footprint was reduced from 6 square miles to 1.6 square miles, and moved northward to minimize environmental impact. Air monitoring locations were moved northward, maintaining the appropriate distance to the facility boundary (attachments 3 and 4). The monitors were placed to avoid the ERDF operations clean stockpile wind shadow; the top of the operations stockpile is approximately 40 feet above grade.

In June of 1995, RL approved a change in ERDF preoperational ambient air conditions characterization (Attachment 5). Rather than installing new monitors to complete the environmental baseline, the ERDF project used seven existing samplers to verify that 200 Area Plateau data was representative of the ERDF site. The ERDF background levels were determined using statistical techniques; environmental data is documented in *The Preoperational Baseline and Site Characterization Report for the Environmental Restoration Disposal Facility* (BHI-00270). This characterization method allowed postponing monitor installation until facility construction. The monitors will be in place for operations.

Of those 200 Area Plateau monitors used for the environmental baseline, the monitors in 200 West (WHC N-963 and PNL 200 West South East) will be used to collect upwind data for operational monitoring. Downwind monitoring will be accomplished using the three new monitoring locations provided during ERDF construction. Background data is available from three monitors north of the site (WHC N-966 and N-304, and the GTE Building Monitor), which were also used to establish baseline characteristics.

The regulators agreed that five monitors, two upwind and three downwind, could adequately monitor the ERDF site by relocating one downwind monitor if work place air monitoring was conducted. The regulators agreed that relocating monitor Number 1 from control point 703 to control point 801 (Attachment 7) would provide an adequate monitoring configuration. DOH also requested co-location of a DOH environmental air monitor at control point 801. ERDF personnel agreed to provide power to support two environmental monitors at this location. Additional environmental monitoring data will be obtained through work-place monitoring. Data from work place air sampling will be used in a manner similar to methods used for stack emission monitoring. The regulators also agreed to re-evaluating environmental monitoring requirements on an annual basis to determine if changes in monitoring may be implemented.

### Source Term

The DOH questioned the justification for not conducting Tritium and Carbon-14 monitoring. The ERDF Waste Acceptance Criteria does not limit Tritium and allows relatively large quantities of Carbon-14 to be placed in ERDF. The DOH was informed that all waste placed in the ERDF would be subject to the Record of Decision (ROD) process in which contaminants of concern would be identified. None of the waste identified to date included tritium or Carbon-14 as contaminants of concern.

Should these isotopes be identified as contaminants of concern, monitoring at the ERDF could be modified accordingly per direction of the regulators. The regulators have the ability to continually assess the adequacy of environmental monitoring at the ERDF in a proactive manner during the process.

### Projected Emissions

Emissions estimates for the ERDF have been completed using the CAP88 analysis method. Copies of the write up and calculations were provided to the agencies (Attachment 6). These calculations were completed using data from the *Source Inventory Development Engineering Study for the Environmental Restoration Disposal Facility* (DOE/RL/12074-29, Rev. 0) and the *Safety Analysis for the Environmental Restoration Disposal Facility* (BHI-00370, Rev. 0). Modelling results indicated a total unabated offsite dose of  $8.29E-03$  mrem/yr to the maximum exposed individual. This value does not exceed the National Emission Standards for Hazardous Air Pollutants (NESHAPs) limit of  $1.0E-01$  mrem/yr.

### Comment Resolution

During the meeting, the agencies asked questions drawn directly from comments submitted on the draft EMP. The comments and corresponding resolutions are organized below by subject matter.

### Monitors

6. More air samplers are needed. The exact number can be negotiated with the department.

Presentation of background information identified planned use of two existing site monitors not included in the Environmental Monitoring Plan. The regulators agreed that five monitors, two upwind and three downwind, could adequately monitor the ERDF site by relocating one downwind monitor and completing work place air monitoring. The regulators agreed that relocating monitor Number 1 from including control point 703 to control point 801 (Attachment 7) would provide an adequate monitoring configuration. Data from work place air sampling will be used in a manner similar to method used for stack emission monitoring.

The work place air sampling program is governed by BHI-SH-02, VOL.2, 2.2.1, "Monitoring and Evaluating Airborne Radioactive Material." The general goal of the program is to ensure the worker is

not exposed to greater than 2% of an Allowed Limit of Intake (ALI) without monitoring being in place. In a continuously occupied area such as ERDF, the air samples would be counted so that 1% of a Derived Air Concentration (DAC) for Sr-90 ( $2E-10$  uCi/ml or  $200$  pCi/m<sup>3</sup>) and 1% of a DAC for Pu-239 ( $2E-12$  uCi/ml or  $2$  pCi/m<sup>3</sup>) could be detected.

Gross alpha and beta screening will be performed with a Ludlum 2929 scaler, with either a 43-1-1 or 4310 detector. This configuration is typically 30% efficient for Pu-239 and 20% efficient for Sr-90. For gross beta counting, the efficiency of 10% derived for Tc-99 is used for conservatism. Using these efficiencies and assuming a one-hour count time, MDA for alpha is typically 0.4 pCi; MDA for beta is typically 40 pCi. These MDAs are achieved in the typical backgrounds of 0.2 DPM alpha and 1000 DPM beta.

Assuming that a one hundred cubic meter air sample can be drawn in a week using the battery powered air samplers that draw four cubic feet per minute, the above MDAs equate to a minimum detectable concentration of  $4e-3$  pCi/cu meter alpha, and  $4e-2$  pCi/cu meter beta.

Air samplers are evaluated in the field per BHI-SH-04, 2.1 "Field Air Sampling." Results are documented on air sample counting forms which are controlled in accordance with BHI-SH-02, Vol. 2, Procedure 2.1.4, "Managing Radiological Records."

Environmental samples would be collected and controlled in accordance with BHI-SH-04, Procedure 7.9, and data would be processed in accordance with procedure found in Section 2 of BHI-EE-01.

11. What type of sampling equipment will be used?

The ERDF site environmental air monitors are consistent with those used site wide. The monitors have a volume flow rate of two cubic feet per minute, use a 47 mm filter, and are run by a six amp, quarter horsepower pump. The filters are positioned so that samples are collected approximately two meters above grade. Work-place monitoring will be performed with battery powered equipment using 47 mm filters and a flow rate of up to four cubic feet per minute.

### Pathway

2. The placement of monitoring stations should follow a pathway analysis, which is not evident in the ERDF monitoring plan.

The CAP88 modelling will be referenced in the EMP. This modelling identifies a receptor east south east of the ERDF site as the most exposed individual. Monitors are placed accordingly.

3. NRC guidance is more generic, requiring that air pathway to be assessed to clearly demonstrate that there is a reasonable assurance that the exposure to humans will not exceed standards.

A CAP88 analysis has been completed, demonstrating that exposure to humans does not exceed

standards. Meteorological data was compiled from nine years of 200 West Weather Station monitoring. Modelling results indicated a total unabated offsite dose of  $8.29E-03$  mrem/yr to the maximum exposed individual. This value does not exceed the National Emission standards for Hazardous Air Pollutants (NESHAPs) limit of  $1.0E-01$  mrem/yr.

7. Pathway analysis should be included in the monitoring plan.

The CAP88 modelling will be referenced in the EMP. This modelling identifies a receptor east south east of the ERDF site as the most exposed individual. Monitors are placed accordingly.

9. The plan cites the use of historical information to determine sampling locations. More details on what historical information was used would be appreciated.

Meteorological data was compiled from nine years of 200 West Weather Station monitoring. Meteorological data from the ERDF site, specifically a windrose, will be included in the EMP.

#### **Additional Requirements**

8. In addition to air samplers, other media affected by the air pathway need to be included (soil, vegetation and TLDs).

Soil and vegetation samples will be collected in accordance with the Hanford Site Environmental Monitoring Plan (DOE/RL 91-50). This work shall be performed by Rust Federal Services, consistent with the guidance in DOE/EH-0173T as required by the subcontract Section 3.5.6, paragraph 3.

Environmental air samples will be collected and controlled in accordance with BHI-SH-04, Procedure 7.9. Soil and vegetative sampling will be done in accordance with the Hanford Site Environmental Monitoring Plan. Frequencies and sampling methods will be consistent with those used to monitor operations in 200 West. Soil, vegetative and air sampling data will be processed in accordance with procedure found in Section 2 of BHI-EE-01.

#### **Sampling Information**

10. What frequency of sampling and what analyses will be done? Will this include particulates only, or will H-3 and C-14 be analyzed in some of the samples? Tritium may be a factor, depending on waste acceptance criteria and the possible use of onsite (tritium contaminated) groundwater as irrigation water. The DOH questioned the justification for conducting Tritium and Carbon-14 monitoring when the ERDF Waste Acceptance Criteria does not limit quantities of these isotopes placed in ERDF. The DOH was informed that all waste placed in the ERDF would be subject to the ROD process in which contaminants of concern would be identified. None of the waste identified to date included tritium or Carbon-14 as contaminants of concerns.

Should these isotopes be identified as contaminants of concerns, monitoring at the ERDF could be modified accordingly per direction of the regulators involved in the ROD process. The regulators have the ability to continually assess the adequacy of environmental monitoring at the ERDF in a proactive manner during the process.

12. What are the expected detection limits?

Composite samples will be analyzed using the same laboratories and procedure used by other site contractors. Detection limits are expected to be the same.

13. Are designated action or reporting levels planned?

Values found to be greater than two sigma above mean values at air monitoring station WHC N-963 in previous years will be considered levels that warrant notification.

### Source Term

4. There are additional factors that must be considered, especially in order to meet the requirements in WAC 246-247 for adequately monitoring fugitive emissions. First, the ERDF will be disposing of bulk loose contaminated soils, while US Ecology only disposed of packaged waste.

During operation, water and surfactants will be used to suppress dust and fugitive emissions. Work place air monitoring will determine the effectiveness of this method. When the facility is inactive, all contaminated surfaces will be treated with fixatives, or covered with clean soils.

### Regulations

1. DOH thought that the ERDF would not only meet the substantive requirements for WAC 246-247, but also requirements for commercial low-level waste facilities, as committed by the parties in the Tri-Party Agreement in earlier public meetings.

The ERDF ROD commits to meeting substantive requirements of the regulations as determined applicable or relevant and appropriate. These requirements are defined by the *Environmental Restoration Disposal Facility Applicable or Relevant and Appropriate Requirements Study Report* (BHI-00317, Rev. 0).

5. Monitoring must be adequate enough to meet the NUREG 1388 guidance to protect their current license.

Monitoring is adequate to meet NUREG 1388. See answer to question number three.

Concurrence:

*A. W. Conklin* Date 5/21/96  
A. W. Conklin, DOH

*O. C. Robertson* Date 5/21/96  
O. C. Robertson, RL, ER

*H. M. Rodriguez* Date 5/23/96  
H. M. Rodriguez, RL, EAP

Attachment 1

Meeting Agenda

AGENDA  
Resolution of DOH and EPA Comments on the ERDF Environmental Monitoring Plan  
April 15, 1996

- I. Original Site Plan and Monitoring Locations
- II. Revised Site Plan and Monitoring Locations
- III. Monitor Specifications
- IV. Source Term
- V. Projected Emissions
- VI. Comment Resolution
  - A. Monitors - # 6, 11
  - B. Pathway - #2, 3, 7, 9
  - C. Additional Requirements - # 8
  - D. Sampling Information - #10, 12, 13
  - E. Source Term - #4
  - F. Regulations - #1, 5

031775

Attachment 2

Windrose

**Attachment 3**

**Original Monitoring Locations**

**Attachment 4**

**Modified Monitoring Locations**

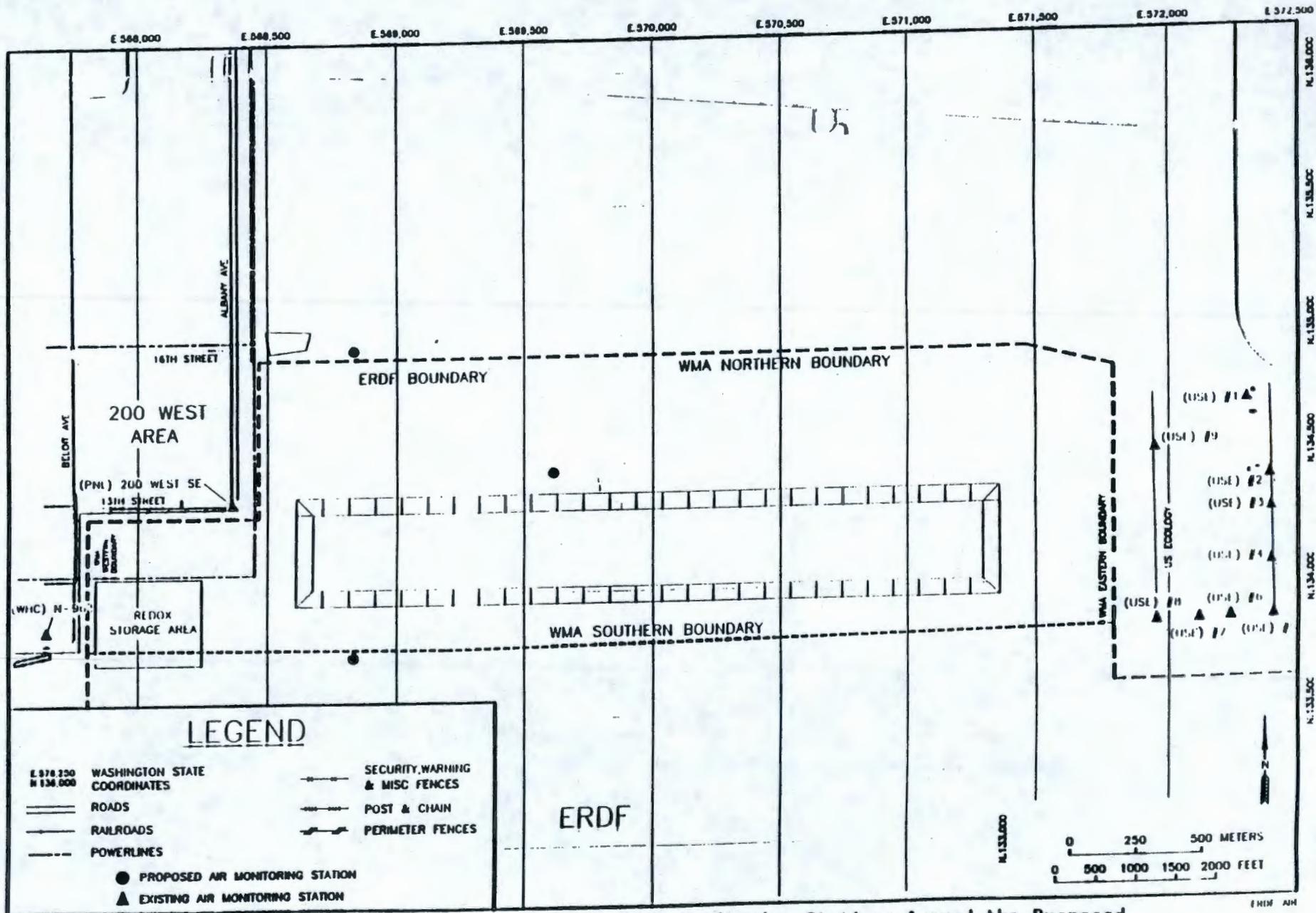


Figure 23. Existing and Proposed Air Monitoring Stations Around the Proposed Environmental Restoration Disposal Facility.

WMC-SD-EN-AP-128, Rev. 11/80  
 U.S. GEOLOGICAL SURVEY

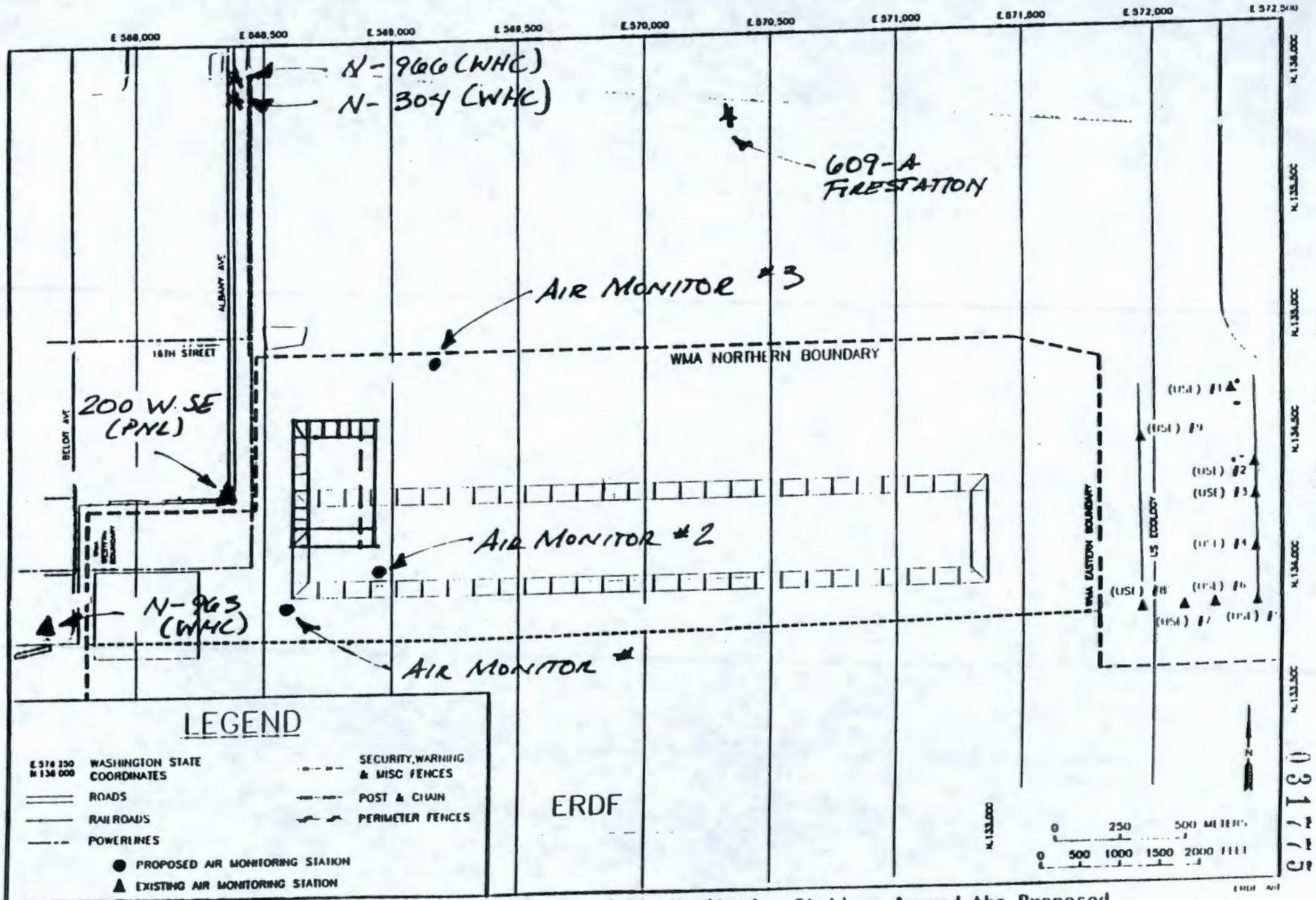


Figure 23. Existing and Proposed Air Monitoring Stations Around the Proposed Environmental Restoration Disposal Facility.

Attachment 5

Chron Number 016174

JUN 13 1995

Mr. J. F. Nemec, President  
Bechtel Hanford, Inc.  
P.O. Box 969  
Richland, Washington 99352-0539

Subject Code: 8500, 8560  
Written Response Required? NO  
Class: CCN: 015882  
OU: N/A  
TSD: N/A  
ERA: N/A  
Non-Project: N

Dear Mr. Nemec:

CONTRACT DE-AC06-93RL12367 - APPROVAL OF PROPOSED CHANGE IN CHARACTERIZATION OF THE ENVIRONMENTAL RESTORATION DISPOSAL FACILITY (ERDF) PRE-OPERATIONAL AMBIENT AIR CONDITIONS

As discussed with members of your staff, we approve your proposal to use existing samplers and Environmental Restoration Contractor personnel to complete the pre-operational air monitoring for the ERDF. This approval is contingent on the requirements of DOE Order 5400.1, General Protection Program, being met. Further, we understand that cost savings of approximately \$240,000 will result from this change.

If you have any question please contact Mr. Owen Robertson of my staff on 376-6295.

Sincerely,

ORIGINAL SIGNED BY  
R.A. HOLTEN

Richard A. Holten, Director  
Plateau Remediation Division

PRD:OCR

cc: M. T. Janaskie, EM-442  
T. E. Logan, BHI

bcc: Off File  
PRD Rdg File  
R. K. Stewart, EOD

O. C. Robertson, PRD  
R. D. Freeberg, EOD

Record Note: None

RECEIVED

JUN 14 1995

DUE AL: DCC

OCR\ERDF3.LET

OFFICE >	PRD <i>C.C.</i>	EOD <i>RKS</i>	EOD <i>[Signature]</i>	PRD <i>[Signature]</i>	
SURNAME >	ROBERTSON	STEWART	FREEBERG	HOLTEN	
DATE >	<i>6/9/95</i>	<i>6/7/95</i>	<i>6/9/95</i>	<i>6-13-95</i>	

# Bechtel Hanford, Inc.

450 Hills Street, Richland, WA 99352  
Mailing address: P.O. Box 969, Richland, WA 99352  
Telephone: (509) 375-4640 Fax: (509) 375-4644

015882

Job No. 22192  
Written Response Required? YES  
Actioner: Owen C. Robertson, Jr.  
Due Date: June 2, 1995  
Closed CCN: N/A  
OU: N/A  
TSD: ERDF  
ERA: N/A  
Subject Code: 8560

MAY 23 1995

U.S. Department of Energy  
Richland Operations Office  
O. C. Robertson, Project Manager, ERDF  
Plateau Remediation Division  
P.O. Box 550, MSIN H4-83  
Richland, Washington 99352

RECEIVED  
MAY 23 1995  
DOE-RL DCC

Dear Mr. Robertson:

Subject: Contract No. DE-AC06-93RL12367  
**CHARACTERIZATION OF ERDF PREOPERATIONAL AMBIENT AIR  
CONDITIONS**

The Environmental Restoration Disposal Facility (ERDF) is required to complete preoperational monitoring as defined by DOE Order 5400.1, General Protection Program, Chapter IV, paragraph 3. The order states that:

An environmental study shall be conducted prior to startup of a site, facility, or process which has the potential for significant adverse environmental impact. The preoperational study should begin not less than one year, and preferably two years before startup to evaluate seasonal changes. The study shall serve to characterize existing physical, chemical, and biological conditions that could be affected; establish background levels of radioactive and chemical components; characterize pertinent environmental and ecologic parameters; and identify potential pathways for human exposure and environmental impact as a basis for determining the nature and extent of the subsequent routine operational and emergency effluent monitoring and environmental surveillance programs. Where time and circumstance do not allow for completion of preoperational monitoring prior to start-up, it shall be conducted concurrent with work on the new site, facility, or process. The preoperational study shall be consistent with NEPA compliance activities. Where appropriate, activities and documentation conducted for NEPA compliance may be substituted for compliance for this requirement.

The ERDF project has completed activities to characterize the site, with the exception of preoperational air monitoring. The ERDF schedule includes activities to fulfill preoperational air monitoring requirements; these activities were assigned to Westinghouse Hanford Company (WHC) during



O. C. Robertson

Page 2

MAY 23 1995

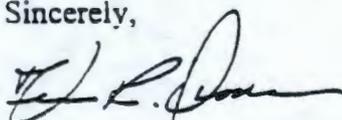
transition to the ERC ("Environmental Restoration Contract Transition." CCN: 001078). Recently, the ERDF project team has examined the activities prescribed by WHC monitoring program, and believes that the intent of the DOE orders can be met in a more efficient, cost effective manner.

The WHC monitoring plan for the ERDF currently requires air sampling at five different monitoring locations: two existing monitoring locations in the 200 West area (200-West SE, and N-963) and three new monitoring locations on the ERDF site. Monitors at these locations would take continuous air samples that would be analyzed for gross alpha, gross beta, <sup>90</sup>Sr, gamma energy analysis, plutonium, and uranium isotopes. Thermo Luminescent Dosimeters at these locations would monitor exposure rates for external radiation sources.

The ERDF project is proposing that the ERC can characterize preoperational ambient air conditions for the ERDF site in a more cost effective manner than the WHC air sampling plan. The ERDF project would use existing samplers (see attached map) and ERC personnel to complete the preoperational air monitoring. Samples from these locations would be analyzed for gross alpha, gross beta, <sup>90</sup>Sr, gamma energy, plutonium and uranium isotopes. The ERDF project would examine data from seven existing samplers to verify that the 200 Area Plateau data is representative of the ERDF site. Average ambient levels less than 0.05% of Derived Concentration Guide for the public values for all isotopes combined would be considered acceptable and a background for the ERDF would be determined using statistical techniques. An initial analysis of the background data can be available by June 15, 1995, and additional sampling recommendations would be made at this time. Using existing data would save approximately \$240,000 in sample analysis, labor, equipment, and power installation costs; monitor installation cost would be deferred to operations for operational monitoring.

The ERDF project team is requesting that the U.S. Department of Energy, Richland Operations Office, review and approve this proposal. If any questions should arise, please contact Danielle Gilkeson on 372-9085.

Sincerely,



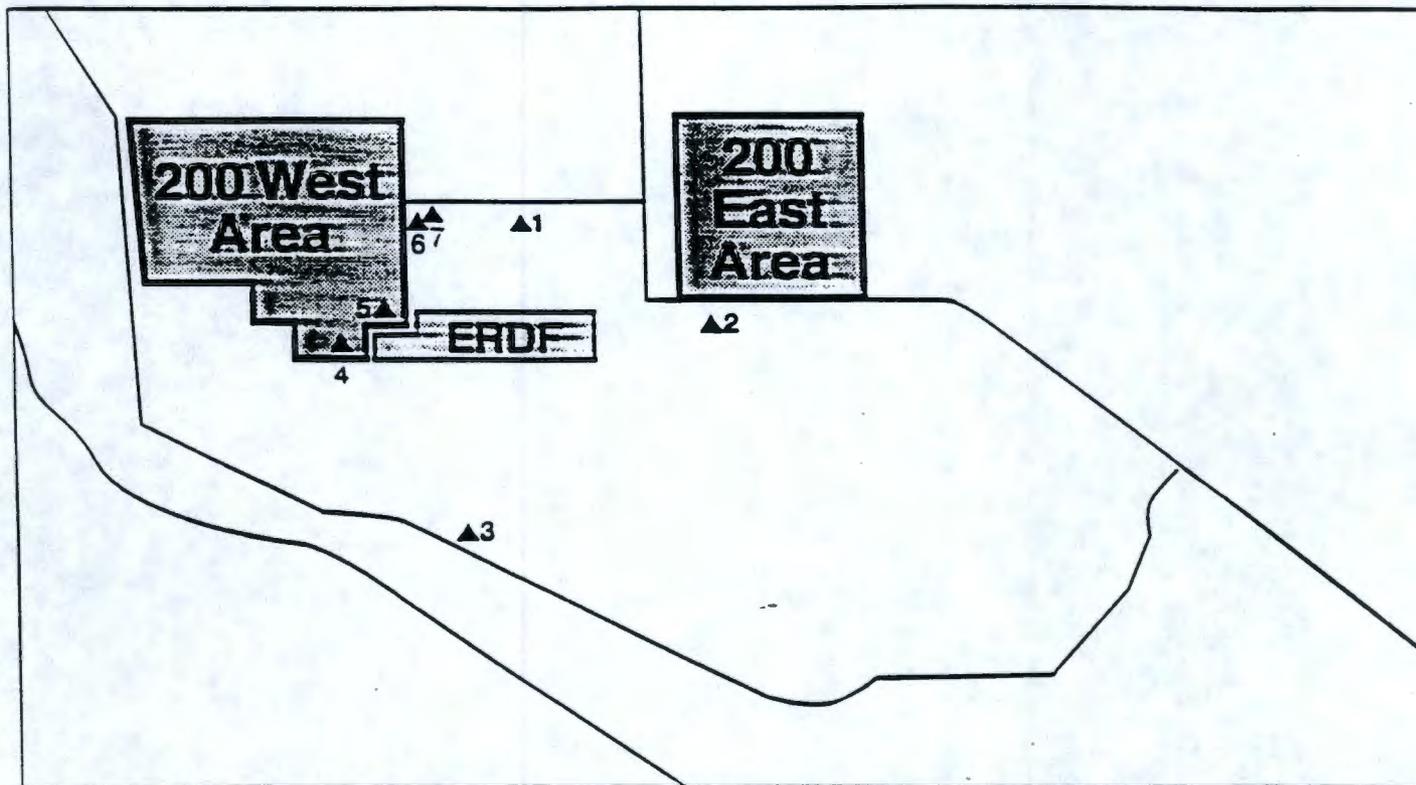
V. R. Dronen, Project Manager  
Environmental Restoration Disposal Facility

DEG:deg

Attachment: Existing Sampling Locations Proposed for ERDF Preoperational Monitoring Data

cc: R. A. Holten (RL) H4-83, w/a

## Existing Sampling Locations Proposed for ERDF Preoperational Monitoring Data



E9:

- 1 - GTE Building
- 2 - South of 200 East
- 3 - Army Loop Camp
- 4 - N-963
- 5 - 200 West South East
- 6 - N-966
- 7 - N-304

# Hanford Environmental Restoration

## Do It *FASTER, EASIER, BETTER* SUGGESTION FORM

95-172

ORIGINATOR

Date: May 23, 1995

Name: Danielle Gilkeson

Phone: 372-9085

MSIN: H4-82

TITLE OF SUGGESTION: Elimination of ERDF Degradational Air Monitoring

DESCRIPTION: (Be specific: Who, what, where, when, and how. Include estimate of cost savings if possible. If you have any questions, contact Steve Sandlin on 376-6835.)

The Environmental Restoration Disposal Facility (ERDF) is required to complete preoperational monitoring as defined by DOE Order 5400.1, General Protection Program, Chapter IV, paragraph 3. The order states that:

An environmental study shall be conducted prior to startup of a site, facility, or process which has the potential for significant adverse environmental impact. The preoperational study should begin not less than one year, and preferably two years before startup to evaluate seasonal changes. The study shall serve to characterize existing physical, chemical, and biological conditions that could be affected; establish background levels of radioactive and chemical components; characterize pertinent environmental and ecologic parameters; and identify potential pathways for human exposure and environmental impact as a basis for determining the nature and extent of the subsequent routine operational and emergency effluent monitoring and environmental surveillance programs. Where time and circumstance do not allow for completion of preoperational monitoring prior to start-up, it shall be conducted concurrent with work on the new site, facility, or process. The preoperational study shall be consistent with NEPA compliance activities. Where appropriate, activities and documentation conducted for NEPA compliance may be substituted for compliance for this requirement.

Currently on the Hanford Site, preoperational monitoring involves collecting soil, biotic (plant and animal), ground water and air sampling data to establish an environmental baseline. These samples are analyzed for chemical and radiological constituents. The ERDF project team has completed site characterization activities, with the exception of preoperational air monitoring.

Thank you for your ideas.

(cont'd)

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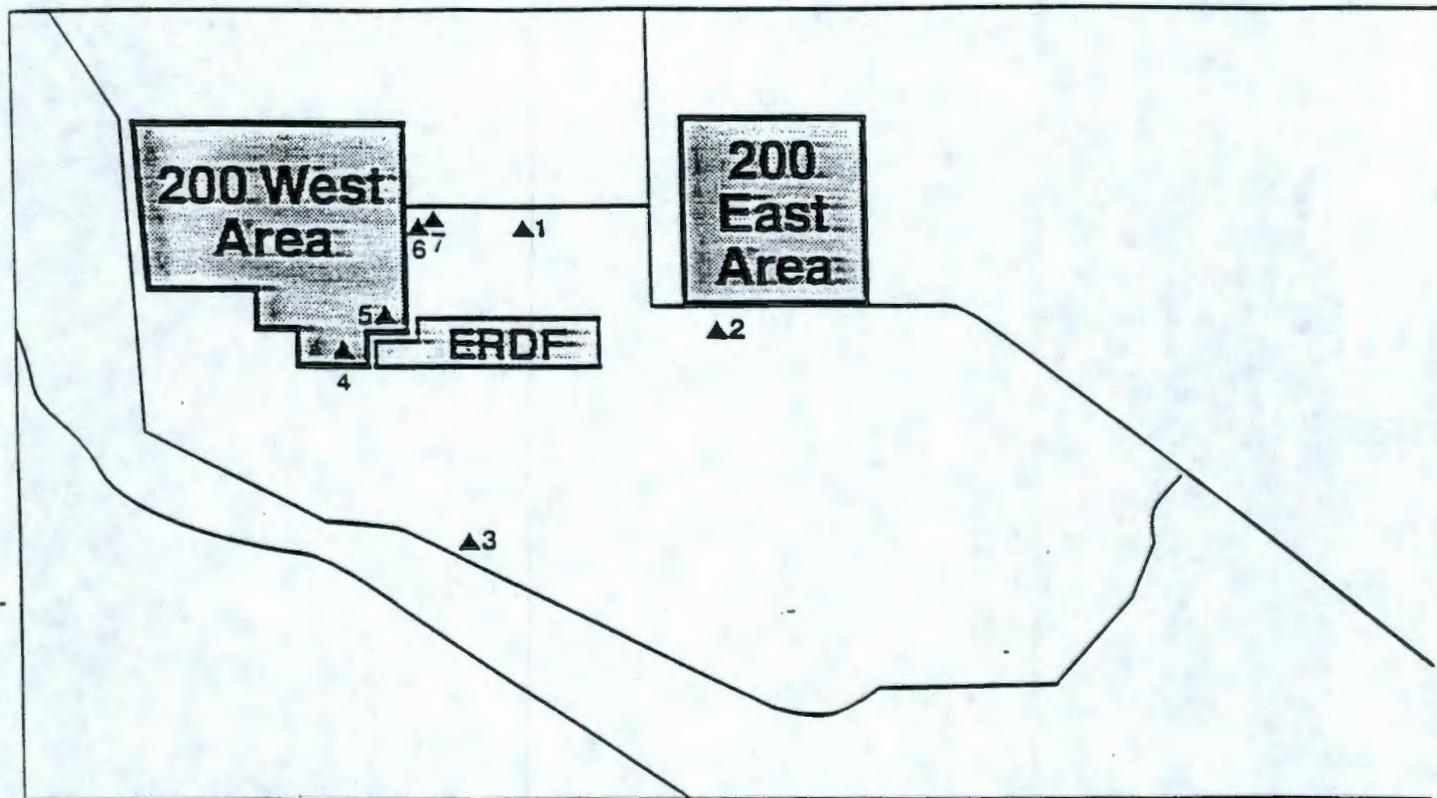
BEV BROWN  
H4 - 83

In "Environmental Restoration Contract Transition Status" (BHI-001078), responsibility for ERC air monitoring activities was assigned to the Westinghouse Hanford Company (WHC) as part of site wide air monitoring; preoperational monitoring is included in this agreement. With respect to ERDF preoperational air monitoring, WHC has encouraged the maximum amount of monitoring, two years, and has requested installation of additional air monitors to supplement air sampling data.

This Quality Improvement Team (QIT) Idea proposes that preoperational air monitoring for the ERDF project be eliminated. The ERDF Project Team is of the opinion that sufficient site air monitoring data exists to characterize preoperational ambient air conditions at the ERDF site. In recent years, several monitors (attached map) have surrounded the ERDF site, sampling for both chemical and radiological constituents. Current and past data from these monitors can be used to establish ambient air conditions at the site. It is unnecessary to install additional monitors to supplement collection of site data.

In proposing this QIT Idea, a cost avoidance of approximately \$240,000 can be claimed from the original WHC plan to install and operate air monitors two years prior to facility operations. This cost avoidance comes from eliminating aerial power lines required to run the monitors prior to installation of site power. Had this plan been implemented, approximately 8000 feet of power lines would have been installed at a cost of \$25 per foot, totalling \$200,000; two transformers, at a total cost of \$7500 would have been required to step down the power to run the monitors. Additionally, two years of sample analysis would have been completed, an estimated cost of \$31,200. This estimate does not include labor costs for sample collection; rates for these services were not available.

### Existing Sampling Locations Proposed for ERDF Preoperational Monitoring Data



E95C

- 1 - GTE Building
- 2 - South of 200 East
- 3 - Army Loop Camp
- 4 - N-963
- 5 - 200 West South East
- 6 - N-966
- 7 - N-304

**Attachment 6**

**Environmental Restoration Disposal Facility  
Emissions Information**

## Environmental Restoration Disposal Facility Emissions Information

### Introduction

The USDOE Hanford Site Environmental Restoration Disposal Facility (ERDF) is being constructed in accordance with the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA), as amended by the *Superfund Amendments and Reauthorization Act of 1986* (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record for the site.

### Location

The selected ERDF site covers a maximum of 4.1 km<sup>2</sup> (1.6mi<sup>2</sup>) approximately in the center of the Hanford Site, southeast of the 200 West Area and southwest of the 200 East Area.

### Process Description

The ERDF is anticipated to serve as the receiving and disposal facility for waste generated from response actions where disposal is the selected remedy for the Hanford Site operable units. It is possible that some waste generated during remediation may not be acceptable for ERDF disposal and will be handled elsewhere. Only remediation waste that originates on the Hanford Site will be placed in the ERDF.

### Emission Calculations

The following text describes the calculations used in determining the Annual Unabated Offsite Dose in mrem/yr for the ERDF.

The worst case source inventory was taken from the *Source Inventory Development Engineering Study for the Environmental Restoration Disposal Facility* (DOE/RL/12074-29, Rev. 0). The emissions from the ERDF operations were based on a daily open working face of 6600 ft<sup>2</sup> (conversation with Jeff Biagini, RUST). Soil density and yearly operation information was taken from the *Safety Analysis for the Environmental Restoration Disposal Facility* (Project W-296) (BHI-00370, Rev. 0). The resuspension factor of 1.0E-03 was used based on the source material being in particulate form. The potential quantity of resuspended soil per day was determined by multiplying the maximum surface area exposed per day by the volume of soil which may be suspended per day by the resuspension factor by the density of resuspended soil (see Attachment).

The unabated offsite dose for each radionuclide per day was determined by multiplying the total curie per day for each radionuclide by the quantity of resuspended soil per day by the CAP 88 conversion factor. The unabated offsite dose for all radionuclides for one year was determined by summing all the radionuclides offsite dose, then multiplying the total by 240 days of

operation per year (see Attachment 1).

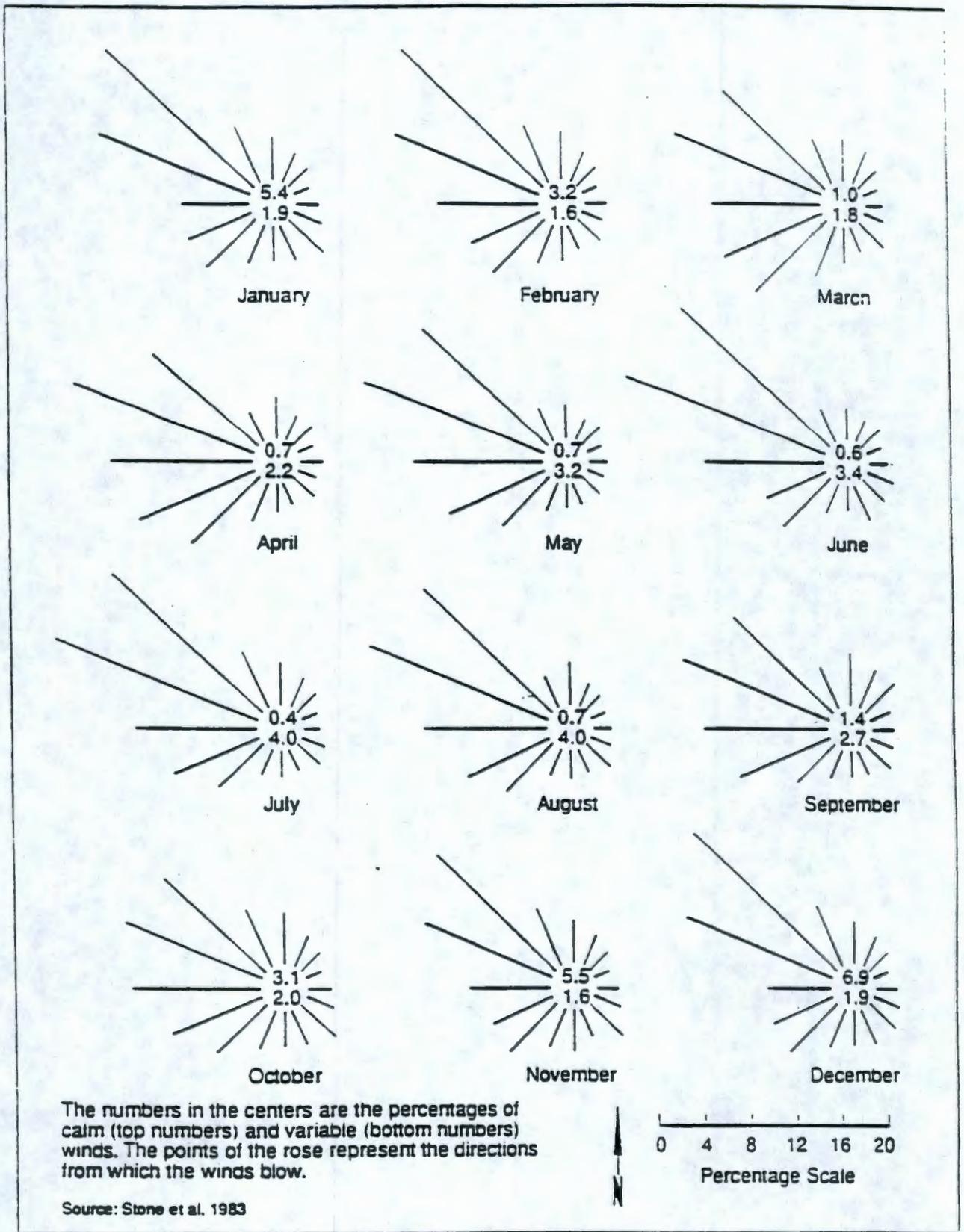
The total unabated offsite dose is  $8.29E-03$  mrem/yr to the maximum exposed individual. This value does not exceed the National Emissions Standards for Hazardous Air Pollutants (NESHAPs) limit which is  $1.0E-01$  mrem/yr. Therefore, continuous emission monitoring is not required, however, near field monitoring will be conducted.

### **Control Systems**

Soil fixatives and water will be applied daily to accomplish dust control. At the 35 and 70 foot levels, waste will be covered with clean fill on a daily basis as required to maintain a clean haulage surface (horizontal and ramp surfaces). The combination of this cover and use of dust suppression techniques will prevent wind erosion and resulting resuspension of contaminated soils.

**Attachment**

**ERDF Emissions Calculations**



923 1764/48578/8-24-94

Figure 2-16. Monthly Wind Roses for HMS Based on 50 foot Wind Data, 1955 through 1980.

## Conversion factors

$$9.29\text{E-}2 \text{ meter}^2 = 1 \text{ ft}^2$$

Yearly operation is 240 days/yr

## Calculations

Maximum surface area

$$\begin{aligned} \text{which may be} &= 6600 \text{ ft}^2/\text{day} * 9.29\text{E-}02 \text{ m}^2/\text{ft}^2 = 6.13\text{E+}02 \text{ m}^2/\text{day} \\ \text{exposed per day} & \\ \text{in m}^2/\text{day} & \end{aligned}$$

Volume of soil

$$\begin{aligned} \text{which may be} &= 6.13\text{E+}02 \text{ m}^2/\text{day} * 1 \text{ cm depth} * 1 \text{ m}/100 \text{ cm} = 6.13\text{E+}00 \text{ m}^3/\text{day} \\ \text{suspended in m}^3/\text{day} & \end{aligned}$$

Volume of soil

$$\begin{aligned} \text{multiplied by} &= 6.13\text{E+}00 \text{ m}^3/\text{day} * 1.00\text{E-}03 \text{ Resuspension factor} = 6.13\text{E-}03 \text{ m}^3/\text{day} \\ \text{Resuspension} & \\ \text{factor in m}^3/\text{day} & \end{aligned}$$

Mass of

$$\begin{aligned} \text{resuspended soil} &= 6.13\text{E-}03 \text{ m}^3/\text{day} * 1600 \text{ kg}/\text{m}^3 = 9.81\text{E+}00 \text{ kg soil}/\text{day} \\ \text{in kg soil}/\text{day} & \end{aligned}$$

Determine total inventory in Ci/day

$$\text{Total Ci}/\text{day of radionuclide} = \text{Inventory in Ci}/\text{kg} * 9.81\text{E+}00 \text{ kg soil}/\text{day}$$

$$2.84\text{E-}08 \text{ Ci}/\text{day} = 2.90\text{E-}09 \text{ Ci}/\text{kg} * 9.81\text{E+}00 \text{ kg soil}/\text{day}$$

<sup>1</sup>Source Inventory Development Engineering Study for the Environmental Restoration Disposal Facility (DOE/RL/12074--29 Rev. 0)

Determine offsite dose for each radionuclide

Total offsite dose in mrem/day yr = Total inventory Ci/day \* <sup>2</sup>CAPP 88 Factor  
mrem/Ci yr

$4.35E-07$  mrem/day yr =  $2.84E-08$  Ci/day \*  $1.53E+01$  mrem/Ci yr

<sup>2</sup> Capp 88 modeling run see attached summary report.

Determine total offsite dose for all radionuclides

Sum of all individual radionuclide offsite dose to obtain total offsite dose.

Total offsite dose/year in mrem/yr = Total offsite dose in mrem/day yr \* 240 days

$8.28E-03$  mrem/yr =  $3.45E-05$  mrem/day yr for all radionuclides \* 240 days

ERDF Emission Estimate

Radionuclide	Radionuclide Inventory Ci/kg	Potential soil emission kg/day	Total Inventory per day Ci/day	CAPP 88 Conversion Factor mrem/ci yr	Offsite dose per radionuclide mrem/day yr	Number of days of operation days	Offsite dose per radionuclide mrem/yr
238 Pu	2.90E-09	9.81E+00	2.84E-08	1.53E+01	4.35E-07	2.40E+02	1.04E-04
239/240 Pu	6.22E-08	9.81E+00	6.10E-07	1.71E+01	1.04E-05	2.40E+02	2.50E-03
60 Co	1.58E-07	9.81E+00	1.55E-06	1.88E-01	2.91E-07	2.40E+02	6.99E-05
90 Sr	2.67E-07	9.81E+00	2.62E-06	1.04E-01	2.72E-07	2.40E+02	6.54E-05
137 Cs	4.49E-07	9.81E+00	4.40E-06	3.30E-02	1.45E-07	2.40E+02	3.49E-05
152 Eu	9.25E-07	9.81E+00	9.07E-06	1.91E-01	1.73E-06	2.40E+02	4.16E-04
154 Eu	2.08E-07	9.81E+00	2.04E-06	1.54E-01	3.14E-07	2.40E+02	7.54E-05
14 C	1.99E-07	9.81E+00	1.95E-06	1.57E-03	3.06E-09	2.40E+02	7.36E-07
40 K	1.60E-08	9.81E+00	1.57E-07	1.32E-01	2.07E-08	2.40E+02	4.97E-06
99 Tc	5.00E-10	9.81E+00	4.91E-09	1.91E-02	9.37E-11	2.40E+02	2.25E-08
155 Eu	1.80E-08	9.81E+00	1.77E-07	6.74E-03	1.19E-09	2.40E+02	2.86E-07
226 Ra	9.40E-09	9.81E+00	9.22E-08	5.60E-01	5.16E-08	2.40E+02	1.24E-05
234 U	3.60E-07	9.81E+00	3.53E-06	3.22E-01	1.14E-06	2.40E+02	2.73E-04
235 U	5.00E-09	9.81E+00	4.91E-08	3.92E-01	1.92E-08	2.40E+02	4.61E-06
238 U	4.51E-07	9.81E+00	4.42E-06	3.84E+00	1.70E-05	2.40E+02	4.08E-03
241 Am	1.56E-08	9.81E+00	1.53E-07	1.76E+01	2.69E-06	2.40E+02	6.46E-04
				Total	3.45E-05		8.29E-03

Assuming:

6600 ft<sup>2</sup> of new area exposed daily to potential wind blown erosion.

Soil density is 1600 kg/m<sup>3</sup> from safty analysis.

Inventory was taken from Souce Inventory Development Engineering Study for the Environmental Restoration Disposal Facility.

Yearly operation is 240 days. All other days waste is covered.

All waste is disposed of as uncontainerized bulk inventory.

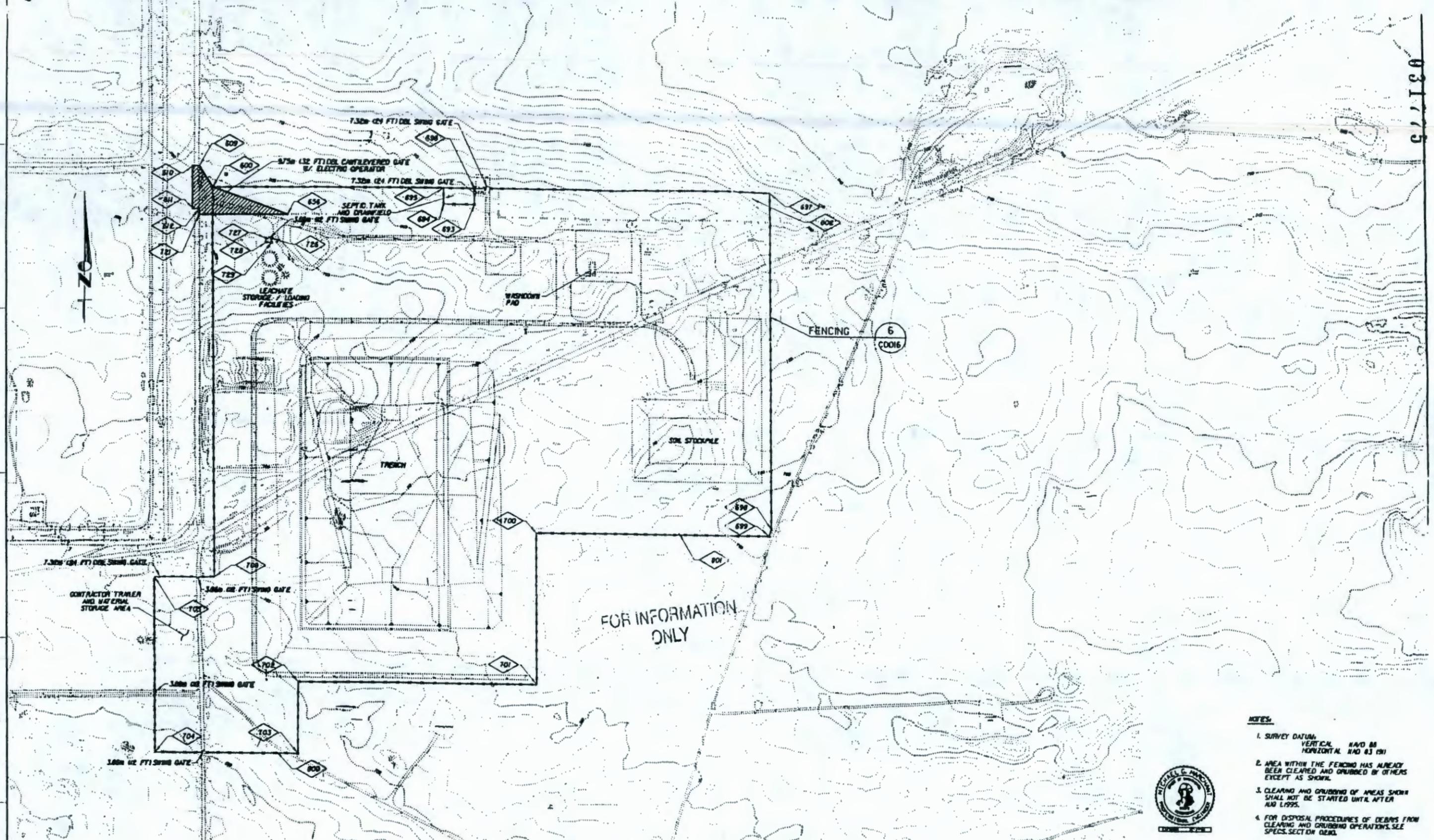
Resuspension factor is 1 E-3. (WAC 246-247-030)

Capp 88 offsite MEI dose is at 12500 m to ESE. Capp 88 conversion factor generated in attached computer modeling run.

031775

Attachment # 7

Drawing 0600X-DD-C0002



FOR INFORMATION ONLY

- NOTES:**
1. SURVEY DATUM:  
VERTICAL: NAVD 88  
HORIZONTAL: NAD 83 (N)
  2. AREA WITHIN THE FENCING HAS ALREADY BEEN CLEARED AND GRUBBED BY OTHERS EXCEPT AS SHOWN.
  3. CLEARING AND GRUBBING OF AREAS SHOWN SHALL NOT BE STARTED UNTIL AFTER AUG 1995.
  4. FOR DISPOSAL PROCEDURES OF DEBRIS FROM CLEARING AND GRUBBING OPERATIONS, SEE SPECS. SECTION 0280.



AREA TO BE CLEARED AND GRUBBED



Prepared by P. HINTER	Checked by M. MARCHANT	Approved by S. NEWTON	U.S. DEPARTMENT OF ENERGY Remediation Operations Office Prepared for U.S. Army Corps of Engineers, Fort Belvoir BY CONTRACTOR 81100
<b>FENCE LOCATION AND CLEARING AND GRUBBING PLAN</b>			Project: W-296 ENVIRONMENTAL RESTORATION DISPOSAL FACILITY (ERTDF)
Scale: 1"=200'			Drawing No: 0600X-00-C0002
Date: 1202.0120			Sheet: 0

AUTHORIZED FOR IMPLEMENTATION	ORIGINALS STORED	DATE
_____	_____	_____