0048923

Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

056862

MAR 20 1998

Mr. John L. Erickson, Director
Radiation Protection Program
State of Washington
Department of Health
P.O. Box 47827
Olympia, Washington 98504-7827

Mr. Douglas R. Sherwood
Hanford Project Manager
U.S. Environmental Protection Agency
712 Swift Boulevard, Suite 5
Richland, Washington 99352-0539

Mr. Mike A. Wilson, Program Manager
Nuclear Waste Program
State of Washington
Department of Ecology
P.O. Box 47600
Olympia, Washington 98504-7600

APR 1998
RECEIVED
EDMC

Addressees:

NOTICE OF VIOLATION (NOV) OF REQUIREMENTS DEFINED IN THE ENVIRONMENTAL RESTORATION DISPOSAL FACILITY (ERDF) RECORD OF DECISION (ROD) AND THE 200-UP-1 ROD

This letter is in response to U.S. Environmental Protection Agency (EPA) letter to Ms. Linda K. Bauer from Messrs. Michael Wilson, State of Washington Department of Ecology; John L. Erickson, State of Washington Department of Health; and Douglas R. Sherwood, EPA, same subject as above, dated February 25, 1998. The primary purpose of this letter is to document the U.S. Department of Energy, Richland Operations Office's (RL) undertaking of the Required Actions outlined in the NOV. In addition, in order to make the record more complete, RL is providing additional background information as to several of the factual observations underlying the NOV. In the enclosure, for the sake of clarity, RL is providing the information in the same order as it appeared in the NOV. Thus, the essential portions of this response, concerning the Required Actions, will appear after the discussion of each violation.

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If you want to discuss this matter further or require additional information, please contact Mr. Owen C. Robertson at (509) 373-6295.

Sincerely,

Owen Robertson

Owen C. Robertson, Senior Project Manager
Remedial Actions Project

James E. Rasmussen

James E. Rasmussen, Director
Environmental Assurance, Permits,
and Policy Division

RAP:OCR

Enclosure

cc w/encl:
S. M. Alexander, Ecology
J. W. Donnelly, Ecology
D. B. Ingemansen, EPA
M. N. Jarayssi, Ecology
S. D. Liedle, BHI
J. Schmidt, DOH
E. R. Skinnarland, Ecology

ENCLOSURE

056862

U.S. Department of Energy (DOE), Richland Operations Office (RL),
Responses to Notice of Violation (NOV)

Violation: Failure to Remove Leachate Tank from Service at ERDF

Response: The leachate recovery system at the Environmental Restoration Disposal Facility (ERDF) stores liquids that are considered to have leached through the ERDF in two vessels that each consist of a synthetic liner supported by a circular metal wall. While not meeting the typical definition of a "tank," that is the designation that has been used for these vessels and the basis for applying as Applicable or Relevant and Appropriate Requirements (ARAR) the substantive standards that govern "tanks" in 40 CFR § 264.196 and WAC 173-303-640(7). Each of the "tanks" has secondary containment that mitigates direct release of any leaks into the environment. The leachate has such low concentrations of contaminants that all such contaminants are near or below the Maximum Contaminant Levels permitted for public drinking water systems under the Safe Drinking Water Act. The U.S. Environmental Protection Agency (EPA) has had discussions with RL and Bechtel Hanford, Inc. (BHI) on a proposal to delist the leachate from classification as a hazardous waste.

The NOV is based on the following events, which were briefly summarized in the NOV:

(1) On September 5, 1997, the ERDF subcontractor for Tank No. 1 discovered about one gallon of fluid in the space between the tank and the secondary containment. Over time, about one to three gallons of fluid was recovered daily from the secondary containment and placed in Tank No. 2. While considering the possibility that the fluid might be due solely to condensation, all new leachate nevertheless was diverted into Tank No. 2, in fulfillment of the requirement to " . . . immediately stop the flow of dangerous waste into the tank system . . . " (WAC 173-303-640(7)(a)). BHI also notified EPA of a possible leak.

(2) RL understands the essence of the NOV as to Tank No. 1 is that it was not immediately drawn down below the level of the leak upon discovery of that leak. On October 8, 1997, the ERDF subcontractor began emptying Tank No. 1 and shipping the fluid by truck to the Liquid Waste Treatment Facility for disposal. By October 9, 1997, as the fluid level began to drop within the vessel, the leak stopped. Tank No. 1 was fully emptied by October 22, 1997.

(3) On November 6, 1997, after Tank No. 1 was fully emptied, BHI requested the subcontractor who constructed Tank No. 1 to conduct repairs in fulfillment of its warranty covering Tank No. 1. EPA conducted an assessment of the ERDF operations on November 10, 1997. The contractor resealed an existing patch on November 26, 1997, completing the repairs.

Required Actions: Tank No. 1

Comment: "DOE shall provide documentation demonstrating that the problems with the leaks ERDF tanks have been rectified. If cessation of tank leaks cannot be demonstrated, then DOE must immediately discontinue use of those tanks and remove them from service as required by 40 CFR § 264.196 and WAC 173-303-640(7)."

Response: In accordance with the specific requirements of the cited regulations, DOE is providing a certification (Attachment 1) that it has performed appropriate repairs on Tank No. 1 and that it is fit for use.

Comment: "In addition, DOE and EPA shall meet to discuss further actions concerning leachate containment."

Response: DOE hereby proposes a first meeting with EPA during the month of April 1998, to discuss long-term solutions to the question of leachate containment at ERDF. DOE specifically wishes to consider alternatives, such as delisting of the leachate from classification as hazardous/dangerous waste, and/or reclassifying the vessels so that appropriate site-specific requirements can be applied, in lieu of generic requirements that were designed for steel tanks.

Comment: "Additionally, the Leachate Management Plan must be modified by the addition of procedures that adequately address the discovery of leaks within the leachate containment system (tanks and associated piping)."

Response: Attachment 2 is our proposed addition to the ERDF Leachate Management Plan, which is herewith submitted for EPA's consideration. Upon receipt of EPA comments, the proposed addition will be incorporated into the Leachate Management Plan.

Violation: Failure to Notify of a Modification to Operations which Increase the Potential Emissions from ERDF

Response: WAC 246-247 requires: (a) the application of Best Radionuclide Control Technology; (b) quantification of potential emissions; and (c) monitoring of emissions, as approved by the State of Washington Department of Health (DOH). The Potential-to-Emit airborne radionuclides was calculated based on a set of assumptions that included 6,600 square feet for the open working face of

radioactive waste that would be disposed to ERDF at any one time. The resulting potential unabated emissions then became the basis for the number and placement of environmental airborne radiation monitors.

Subsequent development of the ERDF has led to an increase in the open working face, with a maximum average future area of as much as 50,000 square feet. However, the Potential-to-Emit calculation had not been updated, as would be required by WAC 246-247, prior to changing operational conditions.

At the same time, while this does not affect the Potential-to-Emit calculations, it is worth noting that the "actual" emissions have been limited by: (a) the fact that much of the material disposed into the ERDF is not an elevated source of potentially airborne radioactive particulates; (b) the practice of wetting soils to decrease fugitive dust emissions; (c) the fact that 30,000 square feet is more representative of the maximum open face exposed during any one day's disposal; and (d) the fact that once per day the entire exposed area is sprayed with fixatives and/or covered with clean soil.

The positive effect of these mitigating facts is demonstrated by the following monitoring data, including: (a) gross alpha/beta results for all radionuclides detected on air monitoring filters (note that the figures for May 2, 1997, through June 27, 1997, are from onsite detectors rather than a laboratory detector); (b) isotopic analysis of soil samples at ERDF taken November 21, 1997; (c) quarterly Thermo-Luminescent Device (TLD) readings near the ERDF; and (d) an isotopic analysis of radionuclides found by each air monitor during calendar year 1997. These data are presented in Attachment 4, discussed below.

Required Actions: ERDF Potential-to-Emit

Comment: "DOE shall work with both the lead regulatory agency and DOH to define all applicable air monitoring requirements. DOE should inform the regulatory agencies of any changes to operating procedures that have potential effects to WAC 246-247 compliance."

Response: On March 10, 1998, DOE and BHI personnel met with EPA and DOH representatives to ensure a common understanding as to the expectations of DOH in response to this NOV. The updated calculation of the Potential-to-Emit (below) will be the starting point for establishing a recurring process of timely notification to, and coordination with, DOH as to changes in operations that may cause changes in emissions.

Comment: "Within 30 days of DOE's receipt of this NOV, the following actions shall occur:

i. Determine the date of the modification of operations that exceeded the 6,600 square feet and the days of operation at that level."

Response: The 6,600 square foot open face area was exceeded during the first quarter of operation of the ERDF, i.e., July 1996 through September 1996.

Comment: "ii. Provide the volume and estimated radionuclide inventory disposed to the ERDF during calendar year 1997."

Response: See Attachment 3, which includes a summary of the volumes of each form of waste disposed of in ERDF during calendar year 1997 (CY 97), in tons, and an inventory of radionuclides present in that waste. The total estimated volume of waste disposed in ERDF during 1997 is 594,054 tons. The total radionuclide inventory is estimated to be 1.8E+3 Ci as derived from the ERDF database, and represents a summation of all inventories as described in the shipping documents. All waste is included in this inventory estimate regardless of whether it is stabilized, encapsulated, or otherwise contained.

Comment: "iii. Provide a summary of ERDF radiation surveys and soil, vegetation, TLD, and ambient air data, for calendar year 1997."

Response: See Attachment 4, which summarizes sampling data at ERDF for CY 97, including: (i) gross alpha and beta measurements for each radiological air monitor (again, the confirming laboratory analysis for May 2, 1997, through June 27, 1997, was not available); (ii) environmental soil samples for various isotopes; (iii) quarterly and annual TLD data for each air monitor; and (iv) a matrix of air monitoring composite sampling results for the two halves of CY 97, and for each air monitor. No vegetation samples were taken in CY 97 since there was no evidence of offsite migration of contaminants and therefore no mechanism for plant uptake.

Comment: "iv. Rerun the Potential-to-Emit calculations using the estimated total radionuclide inventory for the facility for the current working area."

Response: See Attachment 5, Potential-to-Emit calculations based on the current estimate of square feet of exposed waste surface area during operations. The Potential-to-Emit calculation was run to demonstrate that ERDF did not exceed its operating basis through 1997 using 30,000 square feet as the maximum estimated area open to date.

Comment: "v. Reevaluate the current environmental monitoring program for the expansion to 50,000 square feet."

Response: See Attachment 6, Potential-to-Emit based on a potential expansion to a maximum average 50,000 square feet of exposed face. Attachment 6 was rerun using a safety factor of 10 times the current dispersible radionuclide inventory. The air monitoring stations are located in the prevailing downwind directions based on meteorological data for the 200 Area. The stations are positioned

around the perimeter of the ERDF site, and are capable of capturing emissions from any size of operational work face in the existing ERDF disposal cells. In addition, there are several other monitors on the 200 Area plateau that generate air emissions data that could be used to supplement the ERDF air monitoring data. Therefore, DOE believes that the current environmental monitoring program for ERDF is adequate to determine actual emissions from ERDF operations.

Comment: "vi. Seek approval from the regulators to expand operations to 50,000 square feet. If approval cannot be reached within in 45-days, operations shall be returned to 6,600 square feet of working area."

Response: DOE wishes to meet with EPA and DOH as soon as possible to complete the consultation process and document regulator concurrence.

Violation: Failure to Label Containers

Response: An inspection conducted by the State of Washington Department of Ecology (Ecology) on September 9, and September 11, 1997, discovered several 55-gallon drums at the 200-UP-1 Operable Unit waste storage area which lacked elements of labeling prescribed as an ARAR arising from WAC 173-303-630(3), such as lack of marking as "hazardous waste," lack of waste codes, and lack of identifiers for the major risks from the contents. A similar Notice of Correction had been issued on April 29, 1996, for the same location, which had resulted in corrections at that time, but the problem recurred.

For the record, DOE wishes to note the following: The inspection report states that a BHI employee at the scene was asked why certain drums were not labeled as hazardous waste. The report claims he said that he was advised, in a meeting with the BHI environmental management staff, that, because the waste was about to be shipped to ERDF for disposal, "a cost savings could be gained by not labeling every drum." However, the employee strongly affirms that he did "not" make any such statement, and DOE is unaware of any meeting in which such a course of action was proposed. DOE can only surmise that there must have been a misunderstanding by the inspector on this point.

Required Actions: Investigation Derived Waste (IDW)

Comment: " . . . provide documentation of changes implemented on site concerning hazardous and solid waste management to ensure contractor compliance with the RCRA ARARs identified in RODs and consistent with the Strategy for Management of Investigation Derived Waste."

Response: A single IDW Coordinator has been assigned to oversee IDW container management (Attachment 7). Waste management specialists more experienced in WAC 173-303 requirements have been assigned to inspect the IDW

(Attachment 8). These waste management specialists have been trained in the IDW Strategy implementing procedure, BHI-FS-01, 4.14, Waste Control Plans and Site Specific Waste Management Instructions (SSWMIs) for IDW and remediation wastes. The SSWMIs provide more detailed instructions to implement appropriate waste handling, storage and packaging of the wastes, and supplement the Waste Control Plan and Waste Management Plan. An improved IDW inspection checklist was developed and implemented (Attachment 9). Since some of the labeling problems were due to labels being destroyed or lost through exposure to weather, a more durable label was obtained and applied to containers (Attachment 10).

Comment: " . . . DOE shall submit a report documenting the inventory of all remaining CERCLA-related investigation waste stored on the Hanford site and a schedule for disposition of such wastes."

Response: The IDW is listed in the Site Waste Information and Tracking System (SWITS) database. Table 1 below provides a summary from SWITS of: (a) IDW containers at each operable unit, (b) whether the organic/carbonaceous issue impacts the waste for disposal to ERDF, and (c) the status of funding for disposal or long-term storage. The organic/carbonaceous dangerous wastes are prohibited from land disposal without treatment (usually incineration to reduce volume) in the State of Washington (WAC 173-303-140(4)(d)). While much of the non-organic/carbonaceous IDW has been disposed of, a majority of the remaining IDW in storage is subject to this requirement. All the identified IDW wastes, whether affected by Washington Land Disposal Restrictions (LDR) or not, could be managed at the Central Waste Complex (CWC) without treatment, but at a greater cost than the current storage at each operable unit. BHI has not been funded at this time to ship these wastes to the CWC. To avoid the greater cost of storage at the CWC and minimize the cost of disposal, RL intends to work with Ecology to resolve the organic/carbonaceous waste issue so the IDW can be disposed into ERDF. Please contact Donna Wanek at (509) 376-5778 to coordinate the date and participants.

The current approved Detailed Work Plan (DWP) and the previous Multi-Year Work Plan have postponed disposal or long-term storage of the majority of the existing IDW based on the agreement between the regulatory agencies and RL to give funding priority to response activities other than the disposal of IDW. Giving priority to disposal of IDW will require a new agreement on response action funding priorities. Until a new agreement is reached, RL will continue to use such funds as are available for the limited disposal of existing IDW and continued management of these wastes. RL will also look for efficiencies that might be gained by reallocating these currently available funds for management and disposal of this waste.

Comment: "It is the Agencies' expectation that all waste destined for disposal at ERDF is sampled in accordance with an approved sampling and analysis plan (SAP) for that operable unit."

Response: As described in the IDW Strategy, the sampling requirements described in the approved Waste Control Plans (WCPs) and Remedial Design/Remedial Action (RD/RA) Plan provide the characterization information for the existing IDW. The approved sampling was performed in accordance with the IDW Strategy, focusing on certain contaminants of concern. Both the RD/RA and WCPs were approved and signed by the lead regulatory agency. These documents are considered the SAP for the IDW generated from the operable unit. BHI will continue to follow the IDW Strategy sampling requirements until they are revised. RL, BHI, EPA and Ecology should meet to discuss updating the current IDW Strategy to reflect the current site operations (e.g., storage, disposal, well drilling, well maintenance, and abandonment activities). Please contact Donna Wanek at (509) 376-5778 to coordinate the date and participants. Once revisions are determined and agreed to, the implementing procedures and other documents can be revised to reflect the change. Additionally, it should be noted that the ERDF Waste Acceptance Criteria (WAC) has already been revised and forwarded to EPA for review. Once the ERDF revision is approved, additional changes to implementing procedures may be required.

Table 1

CWCSA	Containers	Organic/Carbonaceous	Disposition Funding
100-BC-5	6	0	Not in DWP
100-NR-1	31	0	Not in DWP
100-NR-2	19	0	19 *
200-BP-5	6	0	Not in DWP
200-BP-11	60	0	60 *
200-UP-1	225	225	Not in DWP
200-UP-1 †	79	78	78*†
200-ZP-1	8	8	Not in DWP

* Disposition is expected to be complete by the end of Fiscal Year 1998

† These 78 containers of waste cannot be disposed to ERDF due to high Toxicity Characteristic Leaching Procedure levels

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Violation: Issues of Concern Requiring Correction

Response: DOE understands these following issues are matters of concern to the regulatory agencies but do not rise to the level of being a basis for asserting the existence of a violation of an applicable requirement. DOE hopes to work with the regulatory agencies to resolve their concerns.

Violation: 200-UP-1 Operable Unit

"Item 1: Ecology's review of BHI documentation revealed an incomplete analytical data set was used by BHI in preparing UP-1 Investigation Derived Waste (IDW) soils for shipment to the ERDF at the time of Ecology's September inspection. BHI failed to use readily available data from samples of UP-1 IDW in preparing UP-1 IDW for shipment to the ERDF . . . BHI's ERDF Waste Profile Data Sheet did not present 'worst case' data as it was presented . . . Furthermore, substantiating data for UP-1 IDW was not gathered, documented, or presented as required . . . "

Response: Waste Profile WP-200UP1001, Rev.00, did not incorporate all available data. However, the waste was correctly designated, all the correct waste codes were identified, and the ERDF waste acceptance criteria were met. Subsequent revisions of the Waste Profile incorporated all available 200-UP-1 IDW sample data. To ensure that future profiles include all pertinent data, the waste certification procedure (BHI-FS-03, W002) will be revised to require a documented check of various data sources (e.g., Remedial Investigation work plans, Waste Control Plans) to make sure that all sample data is known.

Violation: 200-UP-1 Operable Unit

"Item 2: . . . BHI procedures implementing requirements of the IDW Strategy and substantive requirements of WAC 173-303 were poorly coordinated, not current to management activities actually being performed, and deviated substantially from ERDF acceptance criteria . . . the ERDF Waste Profile Data sheet in use at the time of Ecology's September inspection for shipping waste to the ERDF had been modified from the format referenced in BHI-EE-10."

Response: To ensure that procedures and practice are consistent with current waste management practices and the ERDF WAC, procedure BHI-FS-03, "Field Support Waste Management Instructions," is being revised. BHI-FS-01, 4.14, "Control of CERCLA and Other Past Practice Investigation Derived Waste," will be rewritten and incorporated into BHI-FS-03. The ERDF WAC is being revised to address actual work practices and is currently before EPA for review and approval. The 200-UP-1 wastes shipped to ERDF did, however, meet the ERDF WAC for chemical and radiological constituents of concern.

The ERDF Waste Profile (WP) Data Sheet is different from the BHI-EE-10 format. BHI-EE-10 stipulates the required information to be included in the profile. The Waste Profile and data supporting the WP include this information. A subsequent revision to BHI-EE-10 clarifies that the ERDF WP Data Sheet or similar form can be used. All the data used in the development of the waste profile (e.g., laboratory sample results, Hanford Environmental Information System sample numbers, and sampling locations) are attached to the WP Data Sheet.

Violation: 200-UP-1 Operable Unit

"Item 3: BHI's Waste Profile Data Sheet in use for preparing UP-1 IDW soils for shipment to the ERDF at the time of Ecology's September inspection did not contain a complete listing of constituents present in the IDW."

Response: See response to Item 1, above.

Violation: 200-UP-1 Operable Unit

"Item 4: On September 9, 1997, Ecology noted approximately twenty open 55-gallon steel drums in the UP-1 container storage area. At the time of the observation . . . Per WAC 173-303-630(5)(a) and 40 CFR § 264.173, a container holding dangerous waste must always be closed, except when it is necessary to add or remove waste. At the time of Ecology's observations on September 9, 1997, no personnel were adding or removing waste from these containers nor were any personnel present at the UP-1 container management area.

Response: The approximately twenty 55-gallon drums were left open to allow water to evaporate from the soils in each drum, in order to meet the ERDF WAC for "no free liquids." This treatment method was approved in CERCLA documentation (Attachments 11 and 12). Indeed, the Ecology inspector's report, at page 6, states that the contractor employee on site " . . . said BHI, USDOE, EPA and Ecology had agreed that this liquid could be placed in open drums or evaporation basins for passive evaporation to reduce waste volume. He said after high evaporation rates for the year had ceased (when ambient temperatures dropped in the fall) the liquid would be sampled and characterized for disposal in the 200 Area Effluent Treatment Facility (ETF). He said the liquid was designated with the waste code F001 due to contact with soils contaminated with carbon tetrachloride but still needed to be characterized to meet ETF acceptance criteria. He said BHI expected to ship the liquids to ETF in late October of 1997.

NOTE: I [the Ecology inspector] checked on the agreement for this passive evaporation with Mr. Jack Donnelly, Ecology's 200 Area CERCLA clean-up manager. Mr. Donnelly confirmed that this was an agreed-upon management strategy for this IDW."

Environmental Restoration Contractor personnel were following the agreed-upon approach for the drums without lids. The lids are removed from each drum in the morning and replaced each evening before the end of shift. During each day shift, the field crew would also pay attention to changes in local weather so the lids could be replaced if unfavorable conditions (e.g., rain, snow, high winds, etc.) suddenly occurred. The field crews normally spent a majority of their time at the containers. There were no known instances of unauthorized materials being placed in the drums.

Violation: 100-BC Remediation

"Item 1: As part of the air monitoring requirements, DOE agreed to collect a number of background soil samples in the 100-BC-1 Operable Unit . . . DOE and BHI unilaterally decided that background samples were not required and subsequently disposed of the samples prior to analysis. This action is inconsistent with the agreements made in the meeting . . . "

Response: The statement is correct. RL acknowledges that three samples collected at the request of DOH were discarded without analysis and without prior notification to DOH. DOH had requested, in a May 20, 1996, meeting, that soils downwind of 100-BC liquid waste remediation sites be sampled to provide pre-excavation background data. In the letter transmitting the minutes of that meeting, it was agreed to take soil samples at each downwind monitor location, and place them in storage pending agreement on the type of analysis to be performed. However, after the decision on analysis was postponed, and due to RL's misunderstanding of the intent of DOH, RL disposed of the soil samples in December 1996 without first consulting DOH. Subsequently, background soil samples taken prior to initiation of excavation activities were analyzed in accordance with the site Environmental Monitoring Plan (DOE/RL-91-50). Similar agreements have been made with DOH for the other reactor areas.

ATTACHMENTS

1. Certification of Tank Repairs
2. Leachate Management Plan—Proposed Modification
3. ERDF Waste Volume and Radionuclide Inventories for CY 1997
4. ERDF Sampling Data for CY 1997
5. ERDF Potential-to-Emit CAP-88 Calculation Summary (Current Use)
6. ERDF Potential-to-Emit CAP-88 Calculation Summary (50,000 Square feet)
7. IDW Coordinator Position Description
8. Waste Transporters Position Description
9. Inspection Criteria for Hazardous/Dangerous Waste Storage Areas
10. Sample Label
11. ERDF Explanation of Significant Differences (excerpt)
12. 200-ZP-1 Remedial Design Report (excerpt)

Attachment One

Certification of Tank Repairs

053439

Environmental Restoration Contractor **ERC Team**

Interoffice Memorandum

Job No. 22192
Written Response Required? NO
Closes CCN: N/A
OU: N/A
TSD: N/A
ERA: N/A
Subject Code: 6620; 8560

TO: A. R. Michael H0-17

DATE: December 4, 1997

COPIES: J. G. April H9-03, w/a
J. W. Carson H0-15, w/a
M. A. Casbon T2-05, w/a
D. R. Myers H0-17, w/a
Document and Info Services H0-09, w/a

FROM: J. D. Ludowise J. D. Ludowise
Environmental Engineering
H9-03/372-9324

SUBJECT: **CERTIFICATION OF REPAIR TO ERDF LEACHATE COLLECTION TANK NO. 1 ON NOVEMBER 26, 1997**

An inspection of the inside wall of the primary liner in Leachate Collection Tank No. 1 revealed a patch that had partially peeled away from the liner. The patch was found while air lancing all patches and seams, including the wall to floor seem for the tank. The patch, located 39 inches above the floor was approximately 3 inches in diameter and has been present since the initial commissioning of the tank (reported in *Repair and Certification of the ERDF Leachate Storage* Tanks, BHI-01088).

The previously patched area on the east wall of the primary liner was repaired as follows:

1. Loose pieces of the old patch were pulled off and discarded.

2. The area around the leak (about 14 inches diameter centered on the hole) was wiped clean using window glass cleaner and a rag.

3. The patch material (approximately 12 inches in diameter) was cleaned with window glass cleaner and rag.

4. The patch and area around hole was dried with heat gun.

5. The patch was fusion welded to the liner using heat gun to heat the materials followed immediately by a hand roller to press the materials together.

6. Visual inspection, air lancing, and physical stressing with a screwdriver blade were used to identify loose edges around the patch. One loose spot was identified.

7. Loose spot was fusion welded with heat gun and hand roller as described in No. 5.

8. Polyvinyl chloride cement was applied to edges of patch.

9. Patch was marked with grease pencil with date of repair, 11/26/97.

The Professional Engineer's certification of the repair work described above is attached.

JDL:pek

Attachment: Professional Engineer's Certification

Attachment

Professional Engineer's Certification

The ERDF Leachate Storage Tank No. 1 was repaired on November 26, 1997 in general conformance with the Technical Specification for W-296 Lined Bolted Steel Liquid Storage Tanks, 0600X-SP-M0006. The ERDF Leachate Storage Tank was repaired in general conformance with the tank manufacturer's instructions for repair and with established engineering plans and specifications and is certified for service.

John D. Ludowise, P.E.
Certifying Engineer

JOHN D. LUDOWISE
STATE OF WASHINGTON
23766
REGISTERED
PROFESSIONAL ENGINEER

11-4-97

EXPIRES: 2/8/98

Attachment Two

Leachate Management Plan - Proposed Modification

Proposed Addition to the ERDF Leachate Management Plan

In partial fulfillment of the required actions specified by the Notice of Violation issued to DOE-RL by the US Environmental Protection Agency on February 25, 1998, we propose the insertion of the following text into the existing Leachate Management Plan for the Environmental Restoration Disposal Facility (ERDF):

7.0 Response to Leaks from Leachate Storage Tanks

In accordance with the substantive standards of 40 Code of Federal Regulations Section 264.196 and Washington Administrative Code 173-303-640(7), as applied to the ERDF via the ARARs process, the following steps will be implemented immediately upon discovery of an apparent leak in either the primary or secondary containment systems of the leachate or washwater storage tanks. If any circumstance prevents immediate action in response, immediate written notification will be made to BHI.

a. Immediately stop the flow of leachate into the tank.
b. Notify BHI of all evidence of the leak. BHI will ensure appropriate notifications are made.
c. As early as practicable, draw down the contents of the tank in question to the other tank, until the leak stops. If such transfer is not possible (due to the other tank being full, leaking, or otherwise impaired), begin transfer as quickly as possible to an appropriate treatment or disposal facility until the leak stops.
d. The following shall be completed in an expeditious manner by the appropriate parties: inspection and repair of the tank; appropriate tests of the repairs; certification of the repairs prior to returning the tank to service, with appropriate documentation.
e. If there has been a release into the secondary containment system, all released materials must be removed, to the other tank or other appropriate location, within 24 hours or as timely as possible to prevent harm to the environment.

Attachment Three

ERDF Waste Volume and Radionuclide Inventories for CY 1997

ERDF Waste Volume for CY 1997

Description	Tons	% of Total	Containers	% of Total
Burial Boxes	24.6	0.0	3	0.0
Concrete	33,249.3	5.6	1737	5.6
Containers	18.2	0.0	2	0.0
Debris	114.4	0.0	9	0.0
Debris1	6.0	0.0	1	0.0
Metal	13.7	0.0	1	0.0
Monolith #04	16.0	0.0	1	0.0
Monolith #10	16.0	0.0	1	0.0
Monolith #11	16.0	0.0	1	0.0
Monolith #03	16.0	0.0	1	0.0
Monolith #06	16.0	0.0	1	0.0
Monolith #07	16.0	0.0	1	0.0
Monolith #08	16.0	0.0	1	0.0
Monolith #09	16.0	0.0	1	0.0
Other	378.0	0.1	76	0.2
Soil	556,227.1	93.6	28996	92.9
Steel	3,828.5	0.6	363	1.2
Total	**594,053.9**		**31197**	

$$\frac{594{,}053.9 \text{ tons}}{1.9 \text{ tons/yd}^3} = 312{,}660 \text{ yds}^3$$

ERDF Total Radionuclide Inventory

For Calender Year 1997

Radionuclide	Curies	pCi/g
Americium-241	4.0E-03	7.4E-03
Americium-243	2.0E-03	3.7E-03
Carbon-14	3.4E+01	6.3E+01
Carbon-14A	3.1E+00	5.7E+00
Cesium-134	2.0E-03	3.7E-03
Cesium-137+Barium-137	2.1E+02	3.8E+02
Cobalt-58	7.8E-02	1.4E-01
Cobalt-60	2.7E+02	5.0E+02
Europium-152	5.0E+02	9.3E+02
Europium-154	2.9E+02	5.3E+02
Europium-155	1.7E+01	3.2E+01
Hydrogen-3	1.6E+02	3.0E+02
Neptunium-237	2.3E-04	4.2E-04
Nickel-63	1.1E+02	2.0E+02
Nickel-63A	7.1E-01	1.3E+00
Pu-238	1.1E+00	2.1E+00
Pu-239	2.1E+01	3.9E+01
Pu-240	6.1E+00	1.1E+01
Pu-241	1.5E+02	2.8E+02
Pu-242	1.0E-07	1.9E-07
Radium-226	1.1E-02	2.0E-02
Radium-228	3.9E-05	7.2E-05
Sodium-22	1.2E-05	2.2E-05
Stontium-90 + Yttrium-90	4.7E+01	8.8E+01
Technetium-99	1.2E+01	2.2E+01
Thorium-228	5.1E-02	9.5E-02
Thorium-232	1.8E-05	3.4E-05
Uranium-233/234	4.4E-02	8.2E-02
Uranium-235	4.9E+00	9.1E+00
Uranium-238	1.2E+01	2.2E+01
TOTAL CURIES	1.8E+03	3.4E+03

Total Tons for 1997:	594054
Kilograms per short ton:	9.1E+02
grams per kilogram:	1.0E+03
Total grams for 1997:	5.4E+11
Pico Curies (pCi)/Curie:	1.0E+12

Attachment Four

ERDF Sampling Data for CY 1997

ERDF Air Monitoring - Gross Alpha/Gross Beta
CY 1997

On/Off Dates	Total Alpha (pCi/m^3)	Total ßeta (pCi/m^3)	Sample Time (hours)	Flow Rate (cfm)	Volume (m^3)
East Monitor (N482)					
12/27/96-01/10/97	6.1E-03 ± 19%	1.4E-02 ± 15%	336.0	2.0	1141
01/10/97-01/24/97	1.3E-02 ± 16%	3.2E-02 ± 14%	344.3	2.0	1169
01/24/97-02/07/97	4.8E-03 ± 20%	1.4E-02 ± 15%	344.3	2.0	1169
02/07/97-02/21/97	5.3E-03 ± 19%	1.4E-02 ± 15%	344.3	2.0	1170
02/21/97-03/07/97	9.9E-04 ± 36%	2.5E-03 ± 23%	344.3	2.0	1170
03/07/97-03/21/97	9.7E-04 ± 36%	2.0E-03 ± 25%	344.3	2.0	1169
03/21/97-04/04/97	4.2E-04 ± 52%	1.3E-03 ± 31%	345.6	2.0	1174
04/04/97-04/18/97	1.1E-03 ± 36%	2.9E-03 ± 21%	345.8	2.0	1175
04/18/97-05/02/97	3.8E-04 ± 58%	1.5E-03 ± 30%	345.7	2.0	1174
05/02/97-05/16/97	2.6E-04 ± 20%	4.2E-04 ± 20%	338.2	2.0	1149
05/16/97-05/30/97	4.2E-04 ± 20%	2.8E-03 ± 20%	334.0	2.0	1135
05/30/97-06/13/97	7.0E-04 ± 20%	1.5E-03 ± 20%	309.0	2.0	1050
06/13/97-06/27/97	1.5E-04 ± 20%	5.5E-03 ± 20%	333.9	2.0	1135
06/27/97-07/01/97	1.7E-03 ± 130%	2.9E-03 ± 86%	78.2	1.5	192
07/01/97-07/15/97	3.1E-04 ± 130%	1.6E-03 ± 34%	335.6	1.9	1083
08/15/97-08/29/97	1.3E-03 ± 70%	1.2E-02 ± 16%	195.7	2.0	664
08/29/97-09/12/97	2.5E-03 ± 31%	1.8E-02 ± 9.2%	335.5	2.0	1140
09/12/97-09/26/97	7.9E-04 ± 75%	1.8E-02 ± 9.3%	333.0	2.0	1132
09/26/97-10/10/97	5.3E-04 ± 96%	9.9E-03 ± 13%	336.9	2.0	1144
10/10/97-10/24/97	1.2E-03 ± 43%	1.8E-02 ± 9.5%	335.6	2.0	1140
10/24/97-11/07/97	8.6E-04 ± 66%	5.9E-03 ± 17%	335.0	2.0	1110
11/07/97-11/21/97	1.5E-04 ± 220%	1.3E-02 ± 11%	336.2	2.0	1142
11/21/97-12/05/97	1.0E-03 ± 60%	5.2E-03 ± 19%	336.5	1.9	1057
12/05/97-12/19/97	1.3E-03 ± 41%	2.1E-02 ± 8.6%	335.0	2.0	1139
12/19/97-01/02/98	-2.4E-05 ± 800%	4.7E-03 ± 18%	338.3	2.1	1207
South Monitor (N483)					
12/27/96-01/10/97	7.3E-03 ± 18%	1.4E-02 ± 15%	344.0	2.0	1170
01/10/97-01/24/97	1.3E-02 ± 16%	3.0E-02 ± 14%	345.1	2.0	1172
01/24/97-02/07/97	4.2E-03 ± 21%	1.4E-02 ± 15%	345.1	2.0	1172
02/07/97-02/21/97	3.5E-03 ± 22%	8.5E-03 ± 16%	344.4	2.0	1171
02/21/97-03/07/97	8.5E-04 ± 39%	3.0E-03 ± 21%	344.4	2.0	1171
03/07/97-03/21/97	1.2E-03 ± 32%	2.7E-03 ± 22%	345.0	2.0	1172
03/21/97-04/04/97	7.1E-04 ± 44%	1.8E-03 ± 26%	345.8	2.0	1174
04/04/97-04/18/97	1.2E-03 ± 32%	2.6E-03 ± 23%	345.9	2.0	1175
04/18/97-05/02/97	1.4E-03 ± 31%	4.8E-03 ± 18%	345.5	2.0	1173
05/02/97-05/16/97	1.3E-04 ± 20%	4.4E-03 ± 20%	338.4	2.0	1150
05/16/97-05/30/97	1.3E-04 ± 20%	1.4E-03 ± 20%	333.7	2.0	1134

ERDF Air Monitoring - Gross Alpha/Gross Beta
CY 1997

On/Off Dates	Total Alpha (pCi/m^3)	Total ßeta (pCi/m^3)	Sample Time (hours)	Flow Rate (cfm)	Volume (m^3)
05/30/97-06/13/97	3.8E-05 ± 20%	6.5E-03 ± 20%	281.0	2.0	955
06/13/97-06/27/97	4.9E-05 ± 20%	4.1E-03 ± 20%	337.5	2.0	1147
06/27/97-07/01/97	1.4E-03 ± 130%	6.8E-03 ± 36%	78.1	1.8	232
07/01/97-07/15/97	5.1E-04 ± 91%	2.3E-02 ± 8.2%	335.6	2.0	1140
07/15/97-07/30/97	5.7E-04 ± 78%	1.7E-02 ± 9.0%	362.0	2.0	1230
South Monitor (N483) (continued)					
07/30/97-08/15/97	1.3E-03 ± 38%	1.3E-02 ± 10%	379.6	2.0	1289
08/15/97-08/29/97	6.3E-04 ± 77%	1.1E-02 ± 12%	337.3	2.0	1146
08/29/97-09/12/97	1.4E-03 ± 43%	1.7E-02 ± 9.5%	335.6	2.0	1141
09/12/97-09/26/97	1.5E-03 ± 41%	1.7E-02 ± 9.6%	333.1	2.0	1131
09/26/97-10/10/97	4.4E-05 ± 720%	8.3E-03 ± 14%	336.9	2.0	1144
10/10/97-10/24/97	2.0E-03 ± 32%	1.7E-02 ± 9.4%	335.6	2.1	1168
10/24/97-11/07/97	2.1E-03 ± 32%	1.8E-02 ± 9.3%	335.0	2.1	1168
11/07/97-11/21/97	7.9E-04 ± 68%	5.2E-02 ± 5.5%	336.0	2.0	1142
11/21/97-12/05/97	1.1E-03 ± 45%	1.3E-02 ± 11%	336.6	2.0	1143
12/05/97-12/19/97	1.3E-03 ± 41%	3.1E-02 ± 7.2%	335.0	2.0	1139
12/19/97-01/02/98	3.0E-04 ± 130%	1.7E-02 ± 9.7%	338.0	2.0	1149
North Monitor (N484)					
12/27/96-01/10/97	1.2E-03 ± 33%	4.0E-03 ± 19%	343.5	2.0	1167
01/10/97-01/24/97	1.4E-03 ± 32%	4.9E-03 ± 18%	344.1	2.0	1169
01/24/97-02/07/97	1.8E-03 ± 28%	3.7E-03 ± 20%	344.1	2.0	1169
02/07/97-02/21/97	3.8E-03 ± 21%	9.1E-03 ± 16%	344.1	2.0	1170
02/21/97-03/07/97	1.9E-04 ± 87%	1.1E-03 ± 35%	344.1	2.0	1170
03/07/97-03/21/97	7.0E-04 ± 43%	1.5E-03 ± 29%	344.1	2.0	1169
03/21/97-04/04/97	8.0E-04 ± 39%	1.9E-03 ± 27%	345.5	2.0	1173
04/04/97-04/18/97	1.3E-03 ± 32%	2.8E-03 ± 22%	345.7	2.0	1174
04/18/97-05/02/97	4.6E-04 ± 52%	1.7E-03 ± 27%	344.2	2.0	1169
05/02/97-05/16/97	3.9E-04 ± 20%	6.5E-03 ± 20%	338.4	2.0	1150
05/16/97-05/30/97	-6.2E-04 ± 20%	2.8E-03 ± 20%	338.5	2.0	1150
05/30/97-06/13/97	5.5E-04 ± 20%	9.0E-03 ± 20%	314.0	2.0	1067
06/13/97-06/27/97	1.9E-04 ± 20%	4.2E-03 ± 20%	333.3	2.0	1133
06/27/97-07/01/97	8.7E-04 ± 190%	7.9E-03 ± 33%	78.6	1.8	233
07/01/97-07/15/97	3.1E-04 ± 130%	1.1E-02 ± 13%	335.5	1.9	1054
07/15/97-07/30/97	1.3E-03 ± 39%	1.2E-02 ± 11%	361.9	2.0	1230
07/30/97-08/15/97	1.1E-03 ± 41%	1.7E-02 ± 9.2%	379.7	2.0	1290
08/15/97-08/29/97	1.2E-03 ± 43%	1.0E-02 ± 13%	337.7	2.0	1147
08/29/97-09/12/97	1.3E-03 ± 45%	2.0E-02 ± 8.8%	335.5	2.0	1140
09/12/97-09/26/97	6.6E-04 ± 84%	1.8E-02 ± 9.4%	333.1	2.0	1131

ERDF Air Monitoring - Gross Alpha/Gross Beta
CY 1997

On/Off Dates	Total Alpha (pCi/m^3)	Total ßeta (pCi/m^3)	Sample Time (hours)	Flow Rate (cfm)	Volume (m^3)
09/26/97-10/10/97	5.3E-04 ± 96%	8.2E-03 ± 14%	337.0	2.0	1145
10/10/97-10/24/97	1.7E-03 ± 35%	1.9E-02 ± 9.0%	335.6	2.1	1168
10/24/97-11/07/97	2.3E-03 ± 30%	1.7E-02 ± 9.6%	335.0	2.1	1168
11/07/97-11/21/97	1.7E-03 ± 36%	3.2E-02 ± 7.0%	336.4	2.0	1143
11/21/97-12/05/97	1.0E-03 ± 45%	1.5E-02 ± 10%	336.3	2.1	1171
12/05/97-12/19/97	1.6E-03 ± 37%	2.9E-02 ± 7.3%	335.0	2.0	1139
12/19/97-01/02/98	5.1E-04 ± 88%	2.2E-02 ± 8.4%	338.0	2.0	1149

shaded areas indicate samples counted at the ERDF, all others at Quanterra

ERDF ENVIRONMENTAL SOIL SAMPLE
CY 1997

ERDF ENVIRONMENTAL SOIL SAMPLE RESULTS - D146
Sample date - November 21, 1997

Isotope	Result (pCi/gm)	Notes
Co-60	3.1E-03 ± 160%	Questionable result - No peak detected.
Zn-65	2.7E-04 ±1000%	Questionable result - No peak detected.
Sr-90	7.6E-02 ± 150%	Questionable result - No peak detected.
Ru-103	1.5E-03 ± 330%	Questionable result - No peak detected.
Ru-106	2.6E-02 ± 180%	Questionable result - No peak detected.
Sn-113	-3.3E-03 ± 220%	
Sb-125	1.5E-03 ±1000%	Questionable result - No peak detected.
Cs-134	3.1E-02 ± 33%	
Cs-137	2.9E-01 ± 14%	
Ce-144	-1.5E-02 ± 350%	
Eu-152	-4.7E-03 ± 360%	
Eu-154	-1.0E-02 ± 170%	
Eu-155	3.0E-02 ± 86%	Questionable result - No peak detected.
U-234	2.2E-01 ± 14%	
U-235	2.2E-02 ± 44%	
U-238	2.0E-01 ± 15%	
Pu-238	-4.0E-03 ± 310%	
Pu239/40	1.7E-02 ± 63%	

ERDF Environmental TLD Data
CY 1997

1st quarter 1997

TLD ID	mrem/hr	mrem/day	mrem/qtr	mrem/yr
ERDF-1	0.015	0.351	29.45	128
ERDF-2	0.010	0.243	20.42	89
ERDF-3	0.010	0.234	19.67	85
			Average	100
			Maximum	130
			Minimum	85

2nd quarter 1997

TLD ID	mrem/hr	mrem/day	mrem/qtr	mrem/yr
ERDF-1	0.010	0.228	23.66	83
ERDF-2	0.009	0.222	23.08	81
ERDF-3	0.010	0.231	24.07	84
			Average	83
			Maximum	84
			Minimum	81

3rd quarter 1997

TLD ID	mrem/hr	mrem/day	mrem/qtr	mrem/yr
ERDF-1	0.010	0.237	21.56	87
ERDF-2	0.010	0.230	20.93	84
ERDF-3	0.010	0.236	21.51	86
			Average	86
			Maximum	87
			Minimum	84

4th quarter 1997

TLD ID	mrem/hr	mrem/day	mrem/qtr	mrem/yr
ERDF-1	0.013	0.317	23.47	120
ERDF-2	0.012	0.296	21.87	110
ERDF-3	0.013	0.303	22.44	110
			Average	110
			Maximum	120
			Minimum	110

CY 1997 Average

TLD ID	mrem/hr	mrem/day	mrem/qtr	mrem/yr
ERDF-1	0.012	0.283	24.54	100
ERDF-2	0.010	0.248	21.58	90
ERDF-3	0.010	0.251	21.92	92

ERDF Air Monitoring Composite Results
CY 1997

	Sample On Date		10-Jan-97		10-Jan-97		10-Jan-97	
	Sample Off Date		2-May-97		2-May-97		2-May-97	
	Sample Time		2689.3	hours	2689.2	hours	2688.7	hours
	Flow Rate		2	cfm	2	cfm	2	cfm
	Sample Volume		9137	m^3	9137	m^3	9135	m^3
Isotope	**Warning Levels**		**Air Monitor- N482**		**Air Monitor- N483**		**Air Monitor- N484**	
K-40	9.00E+02	pCi/m^3	? 1.7E-02 ± 46%	pCi/m^3	? 1.4E-02 ± 70%	pCi/m^3	? 1.3E-03 ± 662%	pCi/m^3
Co-60	8.00E+01	pCi/m^3	-7.7E-04 ± 90%	pCi/m^3	? 5.2E-04 ± 129%	pCi/m^3	? 3.6E-04 ± 101%	pCi/m^3
Zn-65	6.00E+02	pCi/m^3	not reported	pCi/m^3	not reported	pCi/m^3	not reported	pCi/m^3
Sr-90	9.00E+00	pCi/m^3	1.1E-04 ± 126%	pCi/m^3	1.6E-04 ± 103%	pCi/m^3	5.1E-06 ±2998%	pCi/m^3
Ru-103	2.00E+03	pCi/m^3	not reported	pCi/m^3	not reported	pCi/m^3	not reported	pCi/m^3
Ru-106	3.00E+01	pCi/m^3	-1.5E-03 ± 358%	pCi/m^3	? 2.6E-03 ± 178%	pCi/m^3	-1.6E-03 ± 379%	pCi/m^3
Sn-113	1.00E+03	pCi/m^3	not reported	pCi/m^3	not reported	pCi/m^3	not reported	pCi/m^3
Sb-125	1.00E+03	pCi/m^3	? 8.3E-04 ± 118%	pCi/m^3	-6.0E-04 ± 161%	pCi/m^3	-1.0E-03 ± 112%	pCi/m^3
Cs-134	2.00E+02	pCi/m^3	-5.3E-04 ± 104%	pCi/m^3	? 3.5E-04 ± 138%	pCi/m^3	-2.4E-05 ±1724%	pCi/m^3
Cs-137	4.00E+02	pCi/m^3	? 2.5E-05 ±1767%	pCi/m^3	-4.3E-04 ± 95%	pCi/m^3	-3.3E-04 ± 109%	pCi/m^3
Ce-144	3.00E+01	pCi/m^3	not reported	pCi/m^3	not reported	pCi/m^3	not reported	pCi/m^3
Eu-152	5.00E+01	pCi/m^3	not reported	pCi/m^3	not reported	pCi/m^3	not reported	pCi/m^3
Eu-154	5.00E+01	pCi/m^3	-1.6E-04 ±1144%	pCi/m^3	? 1.1E-03 ± 150%	pCi/m^3	-2.0E-03 ± 90%	pCi/m^3
Eu-155	3.00E+02	pCi/m^3	? 1.5E-04 ± 599%	pCi/m^3	? 4.7E-04 ± 198%	pCi/m^3	? 3.1E-04 ± 262%	pCi/m^3
U-234	9.00E-02	pCi/m^3	-5.6E-07 ± 200%	pCi/m^3	2.7E-05 ± 117%	pCi/m^3	9.2E-06 ± 188%	pCi/m^3
U-235	1.00E-01	pCi/m^3	not reported	pCi/m^3	9.0E-06 ± 201%	pCi/m^3	-3.9E-06 ± 73%	pCi/m^3
U-238	1.00E-01	pCi/m^3	-1.1E-06 ± 143%	pCi/m^3	-1.4E-06 ± 142%	pCi/m^3	4.1E-06 ± 299%	pCi/m^3
Pu-238	3.00E-02	pCi/m^3	-9.2E-07 ± 142%	pCi/m^3	-4.4E-07 ± 201%	pCi/m^3	-4.2E-07 ± 201%	pCi/m^3
Pu239/40	2.00E-02	pCi/m^3	-2.8E-06 ± 83%	pCi/m^3	5.4E-06 ± 201%	pCi/m^3	not reported	pCi/m^3
Am-241	2.00E-02	pCi/m^3	5.0E-06 ± 241%	pCi/m^3	1.7E-05 ± 110%	pCi/m^3	4.0E-06 ± 266%	pCi/m^3

SYMBOL KEY: ? Questionable Result - No peak detected

ERDF Air Monitoring Composite Results
CY 1997

	Sample On Date		27-Jun-97			27-Jun-97			27-Jun-97	
	Sample Off Date		19-Dec-97			19-Dec-97			19-Dec-97	
	Sample Time		3294.3	hours		4177.7	hours		4178.1	hours
	Flow Rate		2	cfm		2	cfm		2	cfm
	Sample Volume		10949	m^3		14219	m^3		14163	m^3
Isotope	**Warning Levels**		**Air Monitor- N482**			**Air Monitor- N483**			**Air Monitor- N484**	
K-40	9.00E+02	pCi/m^3	not reported	pCi/m^3		not reported	pCi/m^3		not reported	pCi/m^3
Co-60	8.00E+01	pCi/m^3	-3.2E-05 ± 160%	pCi/m^3		-8.0E-06 ± 620%	pCi/m^3		-1.5E-05 ± 330%	pCi/m^3
Zn-65	6.00E+02	pCi/m^3	? 1.3E-05 ± 860%	pCi/m^3		-1.4E-04 ± 100%	pCi/m^3		? 4.2E-05 ± 280%	pCi/m^3
Sr-90	9.00E+00	pCi/m^3	? 1.5E-04 ± 100%	pCi/m^3		2.9E-04 ± 40%	pCi/m^3		? 8.5E-05 ± 110%	pCi/m^3
Ru-103	2.00E+03	pCi/m^3	? 2.9E-06 ±1000%	pCi/m^3		-2.2E-05 ± 170%	pCi/m^3		? 8.9E-06 ± 420%	pCi/m^3
Ru-106	3.00E+01	pCi/m^3	-2.2E-05 ±1000%	pCi/m^3		-3.8E-04 ± 110%	pCi/m^3		-3.5E-04 ± 110%	pCi/m^3
Sn-113	1.00E+03	pCi/m^3	-3.4E-06 ±1000%	pCi/m^3		-1.4E-06 ±1000%	pCi/m^3		-2.2E-05 ± 270%	pCi/m^3
Sb-125	1.00E+03	pCi/m^3	? 4.1E-06 ±1000%	pCi/m^3		-2.7E-05 ± 390%	pCi/m^3		? 2.5E-06 ±1000%	pCi/m^3
Cs-134	2.00E+02	pCi/m^3	-2.3E-06 ±1000%	pCi/m^3		? 3.3E-05 ± 140%	pCi/m^3		? 1.7E-05 ± 280%	pCi/m^3
Cs-137	4.00E+02	pCi/m^3	? 6.2E-05 ± 120%	pCi/m^3		1.0E-04 ± 49%	pCi/m^3		? 2.1E-05 ± 210%	pCi/m^3
Ce-144	3.00E+01	pCi/m^3	? 5.9E-04 ± 80%	pCi/m^3		-1.9E-04 ± 120%	pCi/m^3		? 7.8E-05 ± 490%	pCi/m^3
Eu-152	5.00E+01	pCi/m^3	-2.0E-05 ± 600%	pCi/m^3		-5.5E-05 ± 200%	pCi/m^3		-2.4E-05 ± 410%	pCi/m^3
Eu-154	5.00E+01	pCi/m3	-6.8E-05 ± 200%	pCi/m^3		? 6.2E-05 ± 240%	pCi/m^3		-7.6E-05 ± 210%	pCi/m^3
Eu-155	3.00E+02	pCi/m^3	-5.4E-06 ±1000%	pCi/m^3		-7.0E-05 ± 170%	pCi/m^3		? 5.2E-05 ± 210%	pCi/m^3
U-234	9.00E-02	pCi/m^3	1.7E-05 ± 57%	pCi/m^3		1.5E-05 ± 46%	pCi/m^3		1.5E-05 ± 61%	pCi/m^3
U-235	1.00E-01	pCi/m^3	4.1E-06 ± 100%	pCi/m^3		? 4.8E-06 ± 95%	pCi/m^3		? 5.8E-06 ± 140%	pCi/m^3
U-238	1.00E-01	pCi/m^3	3.7E-06 ± 100%	pCi/m^3		1.5E-05 ± 47%	pCi/m^3		1.6E-05 ± 55%	pCi/m^3
Pu-238	3.00E-02	pCi/m^3	? 4.3E-06 ± 240%	pCi/m^3		? 7.0E-06 ± 110%	pCi/m^3		-3.1E-06 ± 320%	pCi/m^3
Pu239/40	2.00E-02	pCi/m^3	2.6E-06 ± 120%	pCi/m^3		? 2.2E-06 ± 150%	pCi/m^3		1.5E-05 ± 51%	pCi/m^3
Am-241	2.00E-02	pCi/m^3	not reported	pCi/m^3		not reported	pCi/m^3		not reported	pCi/m^3

SYMBOL KEY: ? Questionable Result - No peak detected

Attachment Five

ERDF Potential-to-Emit CAP 8 Calculation Summary (Current Use)

CALCULATION COVER SHEET

Project Title ERDF **Job No.** 22192

Area 600

Discipline Environmental Engineering ***Calc. No.** 0600X-CA-V0002

Subject Calculation of Estimated Air Emissions from 1997 ERDF Activities

Computer Program Microsoft Excel **Program No.** 97

CAP88-PC Ver. 1.0

Committed Calculation ☒ **Preliminary** ☐ **Superseded** ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Sheet Calc = 2 Sheet Att. A = 1 Sheets Att. B = 3 Sheets Att. C = 2 Sheets Att. D = 29 Sheets Total = 38 Sheets	J.D. Ludowise M.A. Landrie 3-18-98	K E Cook KEC 3/18/98	Michael Wassenmann 3/18/98 F Roeck FWR 3/18/98	Arthur R Michael ARMichael	3/19/98

SUMMARY OF REVISION

Scanned:	Rev.	Date	Bar Code No.	Rev.	Date	Bar Code No.

*Obtain Calc. No. from DIS.

Calc No.: 0600X-CA-V0002		Rev. No.:	0
Originator:	J. D. Ludowise	Date:	3/18/98
Checked:	K. E. Cook	Date:	3/18/98
Project: ERDF		Job No.:	22192
Subject: Calculation of Estimated		Sheet No. :	1 of 2
Air Emissions from 1997 ERDF Activities			

1. Purpose

Calculate the unabated offsite dose rate (in mrem/year) to the maximally exposed individual (MEI) resulting from calender year 1997 ERDF air emissions.

2. Given/Assumed Information

a. General

- Soil Density = 1600 kg/m3.
- Average yearly operation is 252 days (24 hour day is used for conservitism).
- On a daily basis, a conservative average of 30,000 ft2 of new soil is exposed to potential wind blown erosion.
- Depth of potential daily wind erosion is 1 cm (0.01 meters).

b. Average Radionuclide Concentrations (Curies/kilogram)

- Summarized in Table 1
- Attachment B documents the basis for these numbers.

c. Release Factors (unitless)

- Reference is WAC 246-247-030, factor of 1E-03 is used.

d. Distance to Site Boundary and Windfile

- See Attachment C.

e. CAP-88 Output

- CAP-88 output genreated, distance to MEI is 27.804 meters to the east southeast (ESE).
  CAP-88 summary and synopsis outputs in Attachment D.

3. Results

Unabated Offsite Dose Rate = Sum of two CAP88PC runs = 4.87e-03 mrem/yr
- An example of how the Unabated Offsite Dose Rate was calculated is
  shown in Attachment A.

Table 1. ERDF Emission Estimate Calculation

Radionuclide	Average Radionuclide Inventory pCi/g	Average Radionuclide Inventory Ci/kg	Total Soil Mass kg/yr.	Total Inventory Per Year Ci/yr.	Release Factor	Potential Inventory Released Ci/yr.
Am-241	1.50E+01	1.50E-08	1.12E+07	1.68E-01	1.00E-03	1.68E-04
Am-243	3.70E-03	3.70E-12	1.12E+07	4.14E-05	1.00E-03	4.14E-08
C-14	6.30E+01	6.30E-08	1.12E+07	7.06E-01	1.00E-03	7.06E-04
Co-60	4.10E+01	4.10E-08	1.12E+07	4.59E-01	1.00E-03	4.59E-04
Cs-137	2.10E+02	2.10E-07	1.12E+07	2.35E+00	1.00E-03	2.35E-03
Eu-152	4.20E+02	4.20E-07	1.12E+07	4.70E+00	1.00E-03	4.70E-03
Eu-154	9.50E+01	9.50E-08	1.12E+07	1.06E+00	1.00E-03	1.06E-03
Eu-155	3.10E+01	3.10E-08	1.12E+07	3.47E-01	1.00E-03	3.47E-04
H-3	3.00E+02	3.00E-07	1.12E+07	3.36E+00	1.00E-03	3.36E-03
Ni-63	2.00E+02	2.00E-07	1.12E+07	2.24E+00	1.00E-03	2.24E-03
Pu-238	4.90E+00	4.90E-09	1.12E+07	5.49E-02	1.00E-03	5.49E-05
Pu-239	1.90E+01	1.90E-08	1.12E+07	2.13E-01	1.00E-03	2.13E-04
Pu-240	1.10E+01	1.10E-08	1.12E+07	1.23E-01	1.00E-03	1.23E-04
Pu-241	2.80E+02	2.80E-07	1.12E+07	1.23E-01	1.00E-03	1.23E-04
Pu-242	1.90E-07	1.90E-16	1.12E+07	2.13E-09	1.00E-03	2.13E-12
Ra-226	2.00E-02	2.00E-11	1.12E+07	2.24E-04	1.00E-03	2.24E-07
Ra-228	7.00E-05	7.00E-14	1.12E+07	7.84E-07	1.00E-03	7.84E-10
Sr-90	2.70E+02	2.70E-07	1.12E+07	3.02E+00	1.00E-03	3.02E-03
Tc-99	2.20E+01	2.20E-08	1.12E+07	2.46E-01	1.00E-03	2.46E-04
Th-228	9.50E-02	9.50E-11	1.12E+07	1.06E-03	1.00E-03	1.06E-06
Th-232	3.40E-05	3.40E-14	1.12E+07	3.81E-07	1.00E-03	3.81E-10
U-233/234	3.63E+01	3.63E-08	1.12E+07	4.07E-01	1.00E-03	4.07E-04
U-235	3.34E+00	3.34E-09	1.12E+07	3.74E-02	1.00E-03	3.74E-05
U-238	3.63E+01	3.63E-08	1.12E+07	4.07E-01	1.00E-03	4.07E-04

Attachment:	A		
Originator:	J. D. Ludowise	Date:	3/18/98
Checked:	K. E. Cook	Date:	3/18/98
Calc No.:	0600X-CA-V0002		
Rev. No.:	0	Sheet No. :	1 of 1

Attachment A. Example of Unabated Offsite Dose Rate Calcluation

1. Determine the Total Radionuclide Inventory per Year

Total Radionuclide Inventory per Year = (Average Radionuclide Inventory) x (Total Soil Mass)

- The average radionuclide inventory values are given in Attachment B. The total soil mass needs to be calculated.

Total Soil Mass = (Area of soil potentially exposed to wind blown erosion on a daily basis) x (Depth of erosion) x (Soil Density) x (Days of operation per year)
= (30,000 ft2/day x .0929 m2/ft2) x (0.01 m) x (1600 kg/m3) x (252 days/year)
= 1.12E+07 kg/yr.

Therefore (using Am-241 as an example):

Total Radionuclide Inventory per Year = (1.50E+01 pCi/g x 1 Ci / 1E+12 pCi x 1000g / 1kg) x (1.12E+07 kg/yr)
= 1.68E-01 Ci/yr.

2. Calculate the Potential Radionuclide Inventory Released per Year

Potential Radionuclide Inventory Released per Year = (Total Radionuclide Inventory per Year) x (Release Factor)

- The total radionuclide inventory per year was calculated in Step 1.

Therefore (using Am-241 as an example):

Potential Radionculide Inventory Released per Year = (1.68E-01 Ci/yr) x (1.00E-03) = 1.68E-04 Ci/yr.

3. Calculate the Unabated Offsite Dose Rate

Edit DEFAULT.DAT file so value reported in output files is at the site boundary, ESE from ERDF.

ILOC = 12
JLOC = 12

Run CAP88PC with Ci/yr values from Step 2.

Unabated Offsite Dose Rate = Sum of two CAP88PC runs
= 4.35e-03 + 5.17e-04 mrem/yr
= 4.87e-03 mrem/yr

Attachment: B		
Originator: J. D. Ludowise	Date: 03-17-98	
Checked: K. E. Cook	Date: 03-18-98	
Calc. No.: 0600X-CA-V0002		
Rev. No.: 0	Sheet No. : 1 of 3	

ERDF Air Monitoring
Potential to Emit for Calendar Year 1997

PURPOSE

The purpose of this summary is to describe the basis for the calculated potential releasable inventory of radionuclides at the Environmental Restoration Disposal Facility (ERDF) through 1997. The numbers presented were developed using empirical data and, in the absence of analytical data, on the ERDF waste inventories as reported on shipping documents. The numbers were entered in the CAP88pc model as used and approved by the Environmental Protection Agency (EPA).

BACKGROUND

The ERDF has received waste from five primary sources: the 100 B/C, the 100-DR, and the 300 FF-1 remedial action sites, "N" reactor basin and facility decommissioning, and also receives waste from the decontamination and decommissioning (D&D) efforts. To determine the long-term effect of these various waste streams on off-site emissions, some assumptions are necessary and are listed below.

ASSUMPTIONS

1. The principal waste is in the form of contaminated soil and constitutes the major source for potential off-site emissions. Currently over 800,000 tons of soil have been disposed at ERDF. The total volume disposed waste in ERDF for calendar year 1997 is approximately 600,000 tons.

2. The maximum exposed area at any time during operations to date is estimated to be 30,000 square feet.

3. Waste, other than soil, is not considered as having the potential to emit for the following reasons:

   - Waste received at ERDF that is highly radioactive is packaged or encapsulated and therefore does not have an exposed dispersible radioactive inventory (e.g. monoliths from N-Area).
   - Non-soil waste that is not encapsulated or sealed contains similarly low radionuclide inventories as the soils and therefore does present a special potential to emit. Such non-soil waste is usually in a non-dispersible form (e.g., concrete, rubble).

4. Results of the potential to emit radionuclides off-site is based on the EPA's air emission model CAP88PC and on the concentration of radionuclides in the top 1-centimeter layer of soil.

5. The radionuclide inventory has been estimated based on available laboratory data from samples taken at the remedial action sites. Where there is little or no recent laboratory data for a particular radionuclide, the inventory is based on data as reported in the ERDF database. The ERDF database concentrations represent the total for that isotope based on waste shipment documentation.

ERDF Air Monitoring
Potential to Emit for Calendar Year 1997

6. Two sources of laboratory data were used: 1) the radiological counting facility (RCF) located at 100 N and, 2) the data contained in the Hanford Environmental Information Service (HEIS). An average was determined for each nuclide where possible using available data as described above. For the 300 area process trench soils, the concentrations were determined based on field screening data.

7. Short lived radionuclides with half lives of less than 3 years are not considered in the calculation since at least ten half-lives have occurred since the reactors were last operated.

8. Naturally occurring radionuclides are not considered as part of the potential to emit inventory as there is no mechanism by which these isotopes could have been concentrated either at ERDF or at the remedial action sites.

9. The values for soils from the 300 area were proportioned with the values from the 100 area for Uranium. The 300-area waste constituted approximatly10% of the total ERDF inventory. The 100 Area was <u>not</u> reduced by 10% for the calculation.

10. The CAP88pc model uses a maximally exposed individual (MEI) positioned 27.8-kilometers in the east-south-east direction.

CONCLUSION

The ERDF inventory can be determined based on analytical data and the physical relationships of the isotopes. Historical information used in combination with field screening data to document shipment of waste to ERDF constitutes an effective data source for isotopes that have minimal recent laboratory analyses. The totals for the listed isotopes are shown in the attached summary.

ERDF Air Monitoring
Potential to Emit for Calendar Year 1997

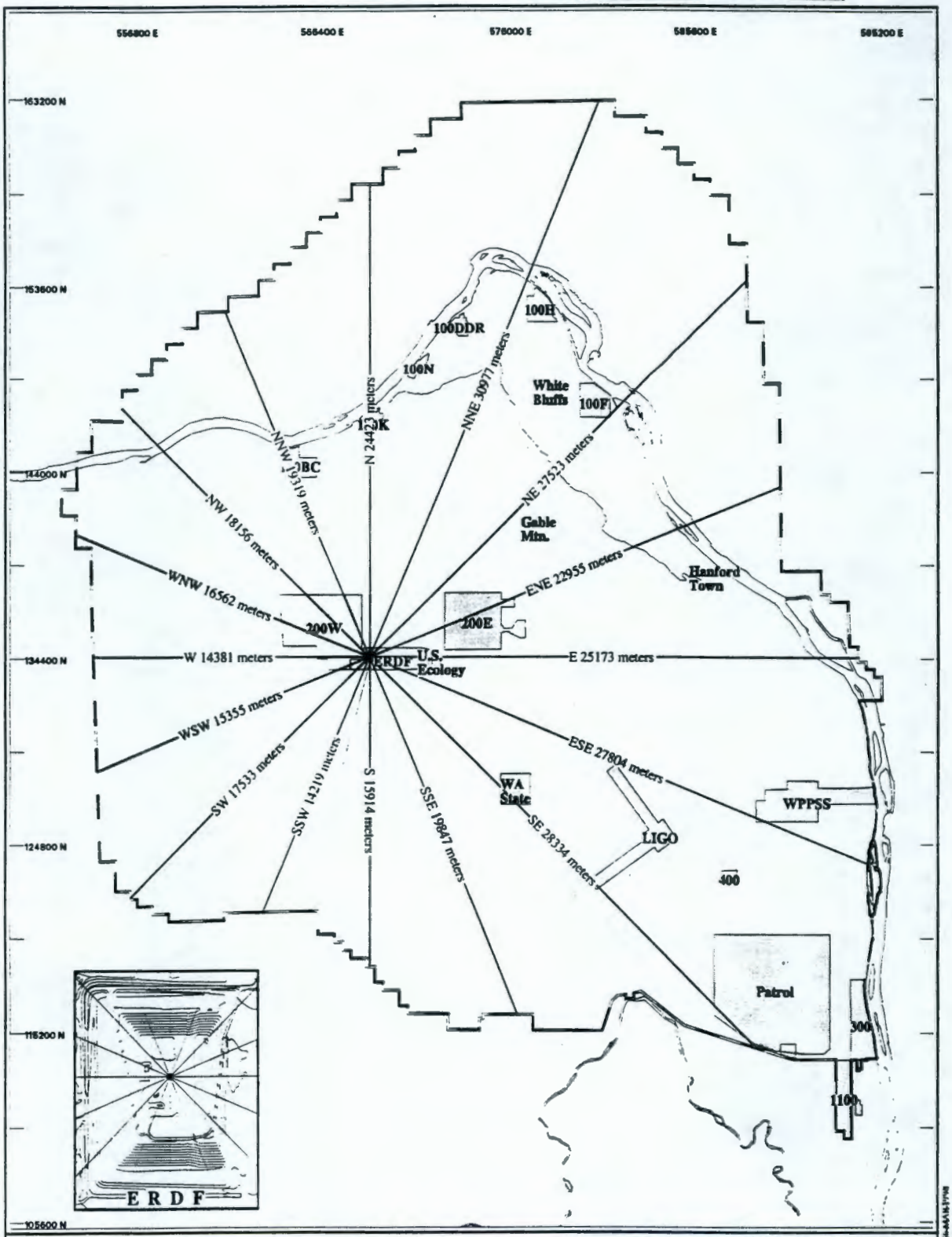
SUMMATIONS OF CALCULATIONS

From the 100 Area Waste Streams:

ISO	Data Source	pCi/gm
Am^{241}	RCF	1.5 E+1
Am^{243}	ERDF database	3.7 E-3
C^{14}	ERDF database	6.3 E+1
Co^{60}	the RCF	4.1 E+1
Cs^{137}	HEIS	2.1 E+2
Eu^{152}	HEIS	4.2 E+2
Eu^{154}	HEIS	9.5 E+1
Eu^{155}	the RCF	3.1 E+1
H^{3}	ERDF database	3.0 E+2
Ni^{63}	ERDF database	2.0 E+2
Pu^{238}	HEIS	4.9 E+0
Pu^{239}	HEIS	1.9 E+1
Pu^{240}	ERDF database	1.1 E+1
Pu^{241}	ERDF database	2.8 E+2
Pu^{242}	ERDF database	1.9 E-7
Ra^{226}	ERDF database	2.0 E-2
Ra^{228}	ERDF database	7.0 E-5
Sr^{90}	HEIS	2.7 E+2
Tc^{99}	ERDF database	2.2 E+1
Th^{228}	ERDF database	9.5 E-2
Th^{232}	ERDF database	3.4 E-5

300 Area waste stream (process trench concentrations)		100% values
ISO	Data Source	pCi/gm
U^{234}	300 area calcs	363
U^{235}	300 area calcs	033.4
U^{238}	300 area calcs	363

Attachment C
Orig. J.D. Ludowise Date 3-18-98
Chk'd by KEC Date 3/18/98
Calc. No. 0600X-CA-V0002
Rev. No. 0 Sheet No. 1 of 2



Hanford Site: Distances From ERDF

Area Bounds

Hanford Bounds

U.S. DEPARTMENT OF ENERGY
RICHLAND OPERATIONS OFFICE
HANFORD ENVIRONMENTAL RESTORATION PROGRAM

BECHTEL HANFORD, INC.
RICHLAND, WASHINGTON

Bechtel Job No.: 22192 DOE Contract Number: DE-AC06-93RL12367

AML: map_b Service Request No.: JRC0251 Date: 16-MAR-1998

Projection ..... Lambert Conformal Conic
Coordinate System ..... Washington State Plane, South Zone
Horizontal Datum ..... North American Datum83 (NAD83)
Vertical Datum .. North American Vertical Datum, 1988(NVD88)

Spatial and attribute data are maintained by the Environmental Data Management Group of the Environmental Restoration Contractor

Attachment:	C		
Originator: J. D. Ludowise		Date:	03-18-98
Checked: K. E. Cook		Date:	03-18-98
Calc. No.: 0600X-CA-V0002			
Rev. No.:	0	Sheet No. :	2 of 2

FILE JF20010.WND

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    0.1170    0.0413    0.0413    0.2248    0.2523    0.2225    0.1009
    0.1201    0.0393    0.0415    0.2598    0.2445    0.1921    0.1026
    0.1547    0.0508    0.0614    0.3093    0.1992    0.1525    0.0720
    0.2136    0.0628    0.0628    0.2990    0.1859    0.1156    0.0603
    0.2250    0.0729    0.0604    0.3229    0.1729    0.1000    0.0458
    0.2279    0.0772    0.0809    0.3566    0.1434    0.0735    0.0404
    0.2321    0.0683    0.0648    0.3823    0.1570    0.0614    0.0341
    0.2230    0.0883    0.0773    0.3355    0.1876    0.0728    0.0155
    0.2270    0.0778    0.0730    0.3524    0.1698    0.0762    0.0238
    0.1925    0.0690    0.0607    0.3326    0.1946    0.1130    0.0377
    0.1450    0.0471    0.0489    0.3047    0.2641    0.1376    0.0526
    0.0601    0.0202    0.0202    0.2500    0.3617    0.1984    0.0894
    0.0762    0.0214    0.0206    0.1907    0.3395    0.2377    0.1139
    0.1734    0.0470    0.0438    0.2561    0.2642    0.1540    0.0616
    0.1410    0.0410    0.0359    0.3103    0.2692    0.1462    0.0564
    0.1205    0.0361    0.0281    0.2811    0.2731    0.1888    0.0723

200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR, AIRDOS Format  21-May-93, PDR
Wind, m/sec:   0.890  2.650  4.700  7.150  9.800 12.700 15.600 19.000
```

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

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

Non-Radon Individual Assessment
Mar 18, 1998 11:25 am

Facility: Environmental Restoration Disposal Facility
Address: Hanford Site
City: Richland
State: WA Zip: 99352

Effective Dose Equivalent
(mrem/year)

4.35E-03

At This Location: 27804 Meters East Southeast
Source Category: DOE Facility
Source Type: Area
Emission Year: 1997

Comments: Data for ERDF Offsite Unabated Dose Calculations.

Dataset Name: ERDF97a
Dataset Date: Mar 18, 1998 11:23 am
Wind File: WNDFILES\JF20010.WND

C A U T I O N: Defaults Have Been Changed

(Changes Detailed on Next Page)

C A U T I O N !

The Following DEFAULT VALUES Have Been Changed By The User.

These changes CANNOT BE USED to demonstrate compliance per 40 CFR 61.93(a) unless specifically approved by EPA.

Direction Single Location - Individual Calculation

Changed From: 0
To: 12

Distance Single Location - Individual Calculation

Changed From: 0
To: 12

Note:
ILOC and JLOC values were changed so that the output would ~~report~~ 3-18-98
correspond to dose rate at site boundary in the ESE direction 3-18-98

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 27804 Meters East Southeast
Lifetime Fatal Cancer Risk: 4.78E-08

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	1.05E-03
BREAST	6.29E-04
R MAR	3.93E-03
LUNGS	1.48E-02
THYROID	6.49E-04
ENDOST	3.65E-02
RMNDR	2.13E-03
EFFEC	4.35E-03

RADIONUCLIDE EMISSIONS DURING THE YEAR 1997

Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
AM-241	W	1.00	1.7E-04	1.7E-04
AM-243	W	1.00	4.1E-08	4.1E-08
C-14	*	0.00	7.1E-04	7.1E-04
CO-60	Y	1.00	4.6E-04	4.6E-04
CS-137	D	1.00	2.3E-03	2.3E-03
BA-137M	D	1.00	0.0E+00	0.0E+00
EU-152	W	1.00	4.7E-03	4.7E-03
EU-154	W	1.00	1.1E-03	1.1E-03
EU-155	W	1.00	3.5E-04	3.5E-04
H-3	*	0.00	3.4E-03	3.4E-03
NI-63	W	1.00	2.2E-03	2.2E-03
PU-238	Y	1.00	5.5E-05	5.5E-05
PU-239	Y	1.00	2.1E-04	2.1E-04
PU-240	Y	1.00	1.2E-04	1.2E-04
PU-241	Y	1.00	1.2E-04	1.2E-04
PU-242	Y	1.00	2.1E-12	2.1E-12
RA-226	W	1.00	2.2E-07	2.2E-07
RA-228	W	1.00	7.8E-10	7.8E-10
SR-90	D	1.00	3.0E-03	3.0E-03
TC-99	W	1.00	2.5E-04	2.5E-04
TH-228	Y	1.00	1.1E-06	1.1E-06
TH-232	Y	1.00	3.8E-10	3.8E-10
RA-228	W	1.00	0.0E+00	0.0E+00
AC-228	Y	1.00	0.0E+00	0.0E+00
TH-228	Y	1.00	0.0E+00	0.0E+00
RA-224	W	1.00	0.0E+00	0.0E+00
RN-220	*	0.00	0.0E+00	0.0E+00
PO-216	W	1.00	0.0E+00	0.0E+00
PB-212	D	1.00	0.0E+00	0.0E+00
BI-212	W	1.00	0.0E+00	0.0E+00
TL-208	D	1.00	0.0E+00	0.0E+00
U-233	Y	1.00	4.1E-04	4.1E-04
U-234	Y	1.00	4.1E-04	4.1E-04
U-235	Y	1.00	3.7E-05	3.7E-05

SITE INFORMATION

Temperature: 12 degrees C
Precipitation: 16 cm/y
Mixing Height: 1000 m

SOURCE INFORMATION

Source Number: 1

Source Height (m): 1.00
Area (sq m): 2.79E+03

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

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	1.000	1.000	1.000
Fraction From Assessment Area:	0.000	0.000	0.000
Fraction Imported:	0.000	0.000	0.000

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

DISTANCES USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

24423	19319	18156	16562	14381	15355	17533	14219	15914	19847
28334	27804	25173	22955	27523	30977				

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

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

Non-Radon Individual Assessment
Mar 18, 1998 11:44 am

Facility: Environmental Restoration Disposal Facility
Address: Hanford Site
City: Richland
State: WA Zip: 99352

Effective Dose Equivalent
(mrem/year)

5.17E-04

At This Location: 27804 Meters East Southeast
Source Category: DOE Facility
Source Type: Area
Emission Year: 1997

Comments: Data for ERDF Offsite Unabated Dose Calculations.

Dataset Name: ERDF97b
Dataset Date: Mar 18, 1998 11:44 am
Wind File: WNDFILES\JF20010.WND

C A U T I O N: Defaults Have Been Changed

(Changes Detailed on Next Page)

C A U T I O N !

The Following DEFAULT VALUES Have Been Changed By The User.

These changes CANNOT BE USED to demonstrate compliance per 40 CFR 61.93(a) unless specifically approved by EPA.

Direction Single Location - Individual Calculation

Changed From: 0
To: 12

Distance Single Location - Individual Calculation

Changed From: 0
To: 12

See Note on sheet 2 of this Att.

MAXIMALLY EXPOSED INDIVIDUAL
(RN-222 Working Level Calculations Excluded)

Location Of The Individual: 27804 Meters East Southeast
Lifetime Fatal Cancer Risk: 6.66E-09

ORGAN DOSE EQUIVALENT SUMMARY
(RN-222 Working Level Calculations Excluded)

Organ	Dose Equivalent (mrem/y)
GONADS	1.40E-06
BREAST	1.57E-06
R MAR	4.27E-05
LUNGS	4.00E-03
THYROID	1.38E-06
ENDOST	5.53E-04
RMNDR	4.93E-05
EFFEC	5.17E-04

Mar 18, 1998 11:44 am

SYNOPSIS
Page 2

RADIONUCLIDE EMISSIONS DURING THE YEAR 1997

Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
U-238	Y	1.00	4.1E-04	4.1E-04
TH-234	Y	1.00	0.0E+00	0.0E+00
PA-234	Y	1.00	0.0E+00	0.0E+00
U-234	Y	1.00	0.0E+00	0.0E+00
TH-230	Y	1.00	0.0E+00	0.0E+00
RA-226	W	1.00	0.0E+00	0.0E+00
RN-222	*	0.00	0.0E+00	0.0E+00
PO-218	W	1.00	0.0E+00	0.0E+00
PB-214	D	1.00	0.0E+00	0.0E+00
BI-214	W	1.00	0.0E+00	0.0E+00
PO-214	W	1.00	0.0E+00	0.0E+00
PB-210	D	1.00	0.0E+00	0.0E+00
BI-210	W	1.00	0.0E+00	0.0E+00
PO-210	W	1.00	0.0E+00	0.0E+00

SITE INFORMATION

Temperature: 12 degrees C
Precipitation: 16 cm/y
Mixing Height: 1000 m

SOURCE INFORMATION

Source Number: 1

Source Height (m): 1.00
Area (sq m): 2.79E+03

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

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	1.000	1.000	1.000
Fraction From Assessment Area:	0.000	0.000	0.000
Fraction Imported:	0.000	0.000	0.000

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

DISTANCES USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

24423	19319	18156	16562	14381	15355	17533	14219	15914	19847
28334	27804	25173	22955	27523	30977				

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Non-Radon Individual Assessment
Mar 18, 1998 11:25 am

Facility: Environmental Restoration Disposal Facility
Address: Hanford Site
City: Richland
State: WA Zip: 99352

Source Category: DOE Facility
Source Type: Area
Emission Year: 1997

Comments: Data for ERDF Offsite Unabated Dose Calculations.

Dataset Name: ERDF97a
Dataset Date: Mar 18, 1998 11:23 am
Wind File: WNDFILES\JF20010.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
GONADS	1.05E-03
BREAST	6.29E-04
R MAR	3.93E-03
LUNGS	1.48E-02
THYROID	6.49E-04
ENDOST	3.65E-02
RMNDR	2.13E-03
EFFEC	4.35E-03

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	4.57E-04
INHALATION	3.41E-03
AIR IMMERSION	5.06E-08
GROUND SURFACE	4.87E-04
INTERNAL	3.87E-03
EXTERNAL	4.87E-04
TOTAL	4.35E-03

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
AM-241	9.78E-04
AM-243	2.41E-07
C-14	6.25E-07
CO-60	3.04E-05
CS-137	3.72E-05
BA-137M	1.24E-04
EU-152	2.98E-04
EU-154	5.43E-05
EU-155	7.88E-07
H-3	5.37E-08
NI-63	3.04E-07
PU-238	1.93E-04
PU-239	8.06E-04
PU-240	4.65E-04
PU-241	7.30E-06
PU-242	7.66E-12
RA-226	4.67E-08
RA-228	6.69E-11
SR-90	1.35E-04
TC-99	2.31E-06
TH-228	2.73E-06
TH-232	1.40E-09
RA-228	4.87E-13
AC-228	4.83E-11
TH-228	1.42E-13
RA-224	5.55E-13
RN-220	2.67E-14
PO-216	7.10E-16
PB-212	8.05E-12
BI-212	8.85E-12
TL-208	5.37E-11
U-233	5.88E-04
U-234	5.81E-04
U-235	5.06E-05
TOTAL	4.35E-03

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
LEUKEMIA	5.73E-09
BONE	1.80E-09
THYROID	2.80E-10
BREAST	2.32E-09
LUNG	2.56E-08
STOMACH	1.51E-09
BOWEL	8.11E-10
LIVER	6.68E-09
PANCREAS	9.93E-10
URINARY	8.63E-10
OTHER	1.21E-09
TOTAL	4.78E-08

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	4.73E-09
INHALATION	3.14E-08
AIR IMMERSION	1.22E-12
GROUND SURFACE	1.16E-08
INTERNAL	3.61E-08
EXTERNAL	1.17E-08
TOTAL	4.78E-08

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
AM-241	4.99E-09
AM-243	1.22E-12
C-14	1.53E-11
CO-60	7.62E-10
CS-137	9.72E-10
BA-137M	2.97E-09
EU-152	7.18E-09
EU-154	1.31E-09
EU-155	1.77E-11
H-3	1.45E-12
NI-63	6.84E-12
PU-238	1.63E-09
PU-239	6.29E-09
PU-240	3.63E-09
PU-241	2.78E-11
PU-242	5.97E-17
RA-226	5.86E-13
RA-228	6.62E-16
SR-90	2.27E-09
TC-99	8.44E-11
TH-228	5.47E-11
TH-232	7.91E-15
RA-228	3.46E-18
AC-228	1.16E-15
TH-228	3.08E-18
RA-224	1.27E-17
RN-220	6.38E-19
PO-216	1.70E-20
PB-212	1.87E-16
BI-212	2.13E-16
TL-208	1.31E-15
U-233	7.50E-09
U-234	7.41E-09
U-235	6.58E-10
TOTAL	4.78E-08

Note: Underlined values indicate dose rate at site boundary
JAL 3-18-98

Attachment: D		
Originator: J. D. Ludowise	Date:	03-18-98
Checked: K. E. Cook	Date:	03-18-98
Calc. No.: 0600X-CA-V0002		
Rev. No.: 0	Sheet No.:	16 of 29

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

Direction	Distance (m) 24423	19319	18156	16562	14381	15355	17533
N	1.6E-03	2.4E-03	2.6E-03	3.0E-03	3.6E-03	3.3E-03	2.7E-03
NNW	1.6E-03	2.4E-03	2.6E-03	2.9E-03	3.5E-03	3.2E-03	2.7E-03
NW	1.4E-03	2.2E-03	2.4E-03	2.7E-03	3.3E-03	3.0E-03	2.5E-03
WNW	1.1E-03	1.7E-03	1.9E-03	2.2E-03	2.6E-03	2.4E-03	2.0E-03
W	1.3E-03	2.0E-03	2.2E-03	2.5E-03	3.1E-03	2.8E-03	2.3E-03
WSW	7.1E-04	1.1E-03	1.2E-03	1.4E-03	1.7E-03	1.5E-03	1.3E-03
SW	7.3E-04	1.1E-03	1.2E-03	1.4E-03	1.7E-03	1.5E-03	1.3E-03
SSW	9.5E-04	1.4E-03	1.5E-03	1.7E-03	2.1E-03	1.9E-03	1.6E-03
S	1.4E-03	2.1E-03	2.3E-03	2.6E-03	3.2E-03	2.9E-03	2.4E-03
SSE	1.3E-03	1.9E-03	2.1E-03	2.4E-03	2.9E-03	2.6E-03	2.2E-03
SE	2.8E-03	4.1E-03	4.4E-03	5.0E-03	6.0E-03	5.5E-03	4.6E-03
ESE	5.5E-03	7.8E-03	8.4E-03	9.5E-03	1.1E-02	1.0E-02	8.8E-03
E	4.8E-03	7.0E-03	7.6E-03	8.6E-03	1.0E-02	9.4E-03	8.0E-03
ENE	1.6E-03	2.4E-03	2.6E-03	2.9E-03	3.5E-03	3.2E-03	2.7E-03
NE	1.1E-03	1.6E-03	1.7E-03	2.0E-03	2.4E-03	2.2E-03	1.8E-03
NNE	8.2E-04	1.3E-03	1.4E-03	1.6E-03	1.9E-03	1.7E-03	1.4E-03

Direction	Distance (m) 14219	15914	19847	28334	27804	25173	22955
N	3.6E-03	3.1E-03	2.3E-03	1.2E-03	1.2E-03	1.4E-03	1.8E-03
NNW	3.6E-03	3.1E-03	2.3E-03	1.2E-03	1.2E-03	1.4E-03	1.8E-03
NW	3.3E-03	2.8E-03	2.1E-03	1.1E-03	1.1E-03	1.3E-03	1.6E-03
WNW	2.7E-03	2.3E-03	1.7E-03	8.7E-04	8.9E-04	1.0E-03	1.3E-03
W	3.1E-03	2.7E-03	1.9E-03	1.0E-03	1.0E-03	1.2E-03	1.5E-03
WSW	1.7E-03	1.4E-03	1.0E-03	5.5E-04	5.6E-04	6.4E-04	8.1E-04
SW	1.7E-03	1.5E-03	1.1E-03	5.7E-04	5.8E-04	6.6E-04	8.3E-04
SSW	2.1E-03	1.8E-03	1.3E-03	7.6E-04	7.8E-04	8.9E-04	1.1E-03
S	3.2E-03	2.8E-03	2.0E-03	1.1E-03	1.1E-03	1.3E-03	1.6E-03
SSE	2.9E-03	2.5E-03	1.8E-03	1.0E-03	1.0E-03	1.2E-03	1.5E-03
SE	6.1E-03	5.3E-03	3.9E-03	2.2E-03	2.2E-03	2.5E-03	3.1E-03
ESE	1.1E-02	9.9E-03	7.5E-03	4.3E-03	4.4E-03	4.9E-03	6.1E-03
E	1.0E-02	9.0E-03	6.8E-03	3.7E-03	3.8E-03	4.3E-03	5.5E-03
ENE	3.5E-03	3.0E-03	2.3E-03	1.2E-03	1.3E-03	1.4E-03	1.8E-03
NE	2.4E-03	2.1E-03	1.5E-03	8.1E-04	8.3E-04	9.4E-04	1.2E-03
NNE	1.9E-03	1.6E-03	1.2E-03	6.2E-04	6.4E-04	7.2E-04	9.5E-04

Maximum Dose Rate
ESE JAL 3-18-98

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)	
Direction	27523	30977
N	1.2E-03	1.1E-03
NNW	1.2E-03	1.1E-03
NW	1.1E-03	9.7E-04
WNW	9.0E-04	7.7E-04
W	1.1E-03	9.1E-04
WSW	5.7E-04	4.8E-04
SW	5.9E-04	5.0E-04
SSW	7.9E-04	6.8E-04
S	1.2E-03	1.0E-03
SSE	1.0E-03	8.9E-04
SE	2.2E-03	1.9E-03
ESE	4.4E-03	3.8E-03
E	3.8E-03	3.3E-03
ENE	1.3E-03	1.1E-03
NE	8.4E-04	7.2E-04
NNE	6.4E-04	5.5E-04

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Direction	Distance (m) 24423	19319	18156	16562	14381	15355	17533
N	1.7E-08	2.6E-08	2.9E-08	3.2E-08	3.9E-08	3.6E-08	3.0E-08
NNW	1.7E-08	2.6E-08	2.8E-08	3.2E-08	3.9E-08	3.6E-08	3.0E-08
NW	1.6E-08	2.4E-08	2.6E-08	3.0E-08	3.6E-08	3.3E-08	2.7E-08
WNW	1.3E-08	1.9E-08	2.1E-08	2.4E-08	2.9E-08	2.6E-08	2.2E-08
W	1.5E-08	2.2E-08	2.5E-08	2.8E-08	3.4E-08	3.1E-08	2.6E-08
WSW	7.9E-09	1.2E-08	1.3E-08	1.5E-08	1.8E-08	1.7E-08	1.4E-08
SW	8.1E-09	1.2E-08	1.3E-08	1.5E-08	1.9E-08	1.7E-08	1.4E-08
SSW	1.1E-08	1.5E-08	1.7E-08	1.9E-08	2.3E-08	2.1E-08	1.8E-08
S	1.6E-08	2.3E-08	2.6E-08	2.9E-08	3.5E-08	3.2E-08	2.7E-08
SSE	1.4E-08	2.1E-08	2.3E-08	2.6E-08	3.2E-08	2.9E-08	2.4E-08
SE	3.1E-08	4.5E-08	4.9E-08	5.5E-08	6.6E-08	6.0E-08	5.1E-08
ESE	6.0E-08	8.5E-08	9.2E-08	1.0E-07	1.2E-07	1.1E-07	9.6E-08
E	5.3E-08	7.7E-08	8.3E-08	9.4E-08	1.1E-07	1.0E-07	8.7E-08
ENE	1.8E-08	2.6E-08	2.8E-08	3.2E-08	3.8E-08	3.5E-08	2.9E-08
NE	1.2E-08	1.7E-08	1.9E-08	2.1E-08	2.6E-08	2.4E-08	2.0E-08
NNE	9.0E-09	1.4E-08	1.5E-08	1.7E-08	2.1E-08	1.9E-08	1.6E-08

Direction	Distance (m) 14219	15914	19847	28334	27804	25173	22955
N	4.0E-08	3.4E-08	2.5E-08	1.3E-08	1.3E-08	1.5E-08	2.0E-08
NNW	3.9E-08	3.4E-08	2.5E-08	1.3E-08	1.3E-08	1.5E-08	2.0E-08
NW	3.6E-08	3.1E-08	2.3E-08	1.2E-08	1.2E-08	1.4E-08	1.8E-08
WNW	2.9E-08	2.5E-08	1.8E-08	9.6E-09	9.8E-09	1.1E-08	1.4E-08
W	3.5E-08	3.0E-08	2.2E-08	1.1E-08	1.2E-08	1.3E-08	1.7E-08
WSW	1.9E-08	1.6E-08	1.2E-08	6.1E-09	6.3E-09	7.2E-09	9.0E-09
SW	1.9E-08	1.6E-08	1.2E-08	6.3E-09	6.5E-09	7.4E-09	9.2E-09
SSW	2.3E-08	2.0E-08	1.5E-08	8.5E-09	8.7E-09	9.9E-09	1.2E-08
S	3.6E-08	3.1E-08	2.2E-08	1.2E-08	1.3E-08	1.5E-08	1.8E-08
SSE	3.2E-08	2.8E-08	2.0E-08	1.1E-08	1.1E-08	1.3E-08	1.6E-08
SE	6.7E-08	5.8E-08	4.3E-08	2.4E-08	2.4E-08	2.8E-08	3.5E-08
ESE	1.3E-07	1.1E-07	8.2E-08	4.7E-08	4.8E-08	5.4E-08	6.7E-08
E	1.1E-07	9.9E-08	7.4E-08	4.1E-08	4.2E-08	4.7E-08	6.0E-08
ENE	3.9E-08	3.3E-08	2.5E-08	1.4E-08	1.4E-08	1.6E-08	2.0E-08
NE	2.6E-08	2.3E-08	1.7E-08	8.9E-09	9.1E-09	1.0E-08	1.3E-08
NNE	2.1E-08	1.8E-08	1.3E-08	6.8E-09	7.0E-09	8.0E-09	1.0E-08

Mar 18, 1998 11:25 am

SUMMARY
Page 8

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)	
Direction	27523	30977
N	1.3E-08	1.2E-08
NNW	1.4E-08	1.2E-08
NW	1.3E-08	1.1E-08
WNW	1.0E-08	8.5E-09
W	1.2E-08	1.0E-08
WSW	6.3E-09	5.4E-09
SW	6.6E-09	5.6E-09
SSW	8.8E-09	7.5E-09
S	1.3E-08	1.1E-08
SSE	1.1E-08	9.8E-09
SE	2.5E-08	2.1E-08
ESE	4.8E-08	4.2E-08
E	4.2E-08	3.7E-08
ENE	1.4E-08	1.2E-08
NE	9.3E-09	8.0E-09
NNE	7.1E-09	6.1E-09

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Non-Radon Individual Assessment
Mar 18, 1998 11:44 am

Facility: Environmental Restoration Disposal Facility
Address: Hanford Site
City: Richland
State: WA Zip: 99352

Source Category: DOE Facility
Source Type: Area
Emission Year: 1997

Comments: Data for ERDF Offsite Unabated Dose Calculations.

Dataset Name: ERDF97b
Dataset Date: Mar 18, 1998 11:44 am
Wind File: WNDFILES\JF20010.WND

ORGAN DOSE EQUIVALENT SUMMARY
(RN-222 Working Level Calculations Excluded)

Organ	Selected Individual (mrem/y)
GONADS	1.40E-06
BREAST	1.57E-06
R MAR	4.27E-05
LUNGS	4.00E-03
THYROID	1.38E-06
ENDOST	5.53E-04
RMNDR	4.93E-05
EFFEC	5.17E-04

Radon Decay Product Concentration (working level)

0.00E+00

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY
(RN-222 Working Level Calculations Excluded)

Pathway	Selected Individual (mrem/y)
INGESTION	3.62E-05
INHALATION	4.81E-04
AIR IMMERSION	2.58E-13
GROUND SURFACE	4.37E-08
INTERNAL	5.17E-04
EXTERNAL	4.37E-08
TOTAL	5.17E-04

Radon Decay Product Concentration (working level)

0.00E+00

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY
(RN-222 Working Level Calculations Excluded)

Nuclide	Selected Individual (mrem/y)
U-238	5.17E-04
TH-234	0.00E+00
PA-234	0.00E+00
U-234	0.00E+00
TH-230	0.00E+00
RA-226	0.00E+00
RN-222	0.00E+00
PO-218	0.00E+00
PB-214	0.00E+00
BI-214	0.00E+00
PO-214	0.00E+00
PB-210	0.00E+00
BI-210	0.00E+00
PO-210	0.00E+00
TOTAL	5.17E-04

Radon Decay Product Concentration (working level)

0.00E+00

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
LEUKEMIA	5.36E-11
BONE	2.98E-11
THYROID	2.45E-13
BREAST	2.82E-12
LUNG	6.45E-09
STOMACH	1.92E-12
BOWEL	3.60E-12
LIVER	1.57E-12
PANCREAS	1.28E-12
URINARY	1.08E-10
OTHER	1.57E-12
TOTAL	6.66E-09

	Selected Individual Cancer Risk
Radon Decay Product Lung Exposure	0.00E+00
Total Fatal Risk All Exposures	6.66E-09

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	2.00E-10
INHALATION	6.46E-09
AIR IMMERSION	5.48E-18
GROUND SURFACE	9.22E-13
INTERNAL	6.66E-09
EXTERNAL	9.22E-13
TOTAL	6.66E-09

	Selected Individual Cancer Risk
Radon Decay Product Lung Exposure	0.00E+00
Total Fatal Risk All Exposures	6.66E-09

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
U-238	6.66E-09
TH-234	0.00E+00
PA-234	0.00E+00
U-234	0.00E+00
TH-230	0.00E+00
RA-226	0.00E+00
RN-222	0.00E+00
PO-218	0.00E+00
PB-214	0.00E+00
BI-214	0.00E+00
PO-214	0.00E+00
PB-210	0.00E+00
BI-210	0.00E+00
PO-210	0.00E+00
TOTAL	6.66E-09

	Selected Individual Cancer Risk
Radon Decay Product Lung Exposure	0.00E+00
Total Fatal Risk All Exposures	6.66E-09

See Note on sheet 16 of this Att. JJL 3-18-98

Attachment: D	
Originator: J. D. Ludowise	Date: 03-18-98
Checked: K. E. Cook	Date: 03-18-98
Calc. No.: 0600X-CA-V0002	
Rev. No.: 0	Sheet No. : 26 of 29

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	24423	19319	18156	16562	14381	15355	17533
N	1.9E-04	2.8E-04	3.1E-04	3.5E-04	4.2E-04	3.9E-04	3.3E-04
NNW	1.9E-04	2.8E-04	3.1E-04	3.5E-04	4.2E-04	3.8E-04	3.2E-04
NW	1.7E-04	2.6E-04	2.8E-04	3.2E-04	3.9E-04	3.5E-04	3.0E-04
WNW	1.3E-04	2.0E-04	2.2E-04	2.6E-04	3.1E-04	2.8E-04	2.4E-04
W	1.6E-04	2.4E-04	2.6E-04	3.0E-04	3.6E-04	3.3E-04	2.8E-04
WSW	8.3E-05	1.3E-04	1.4E-04	1.6E-04	2.0E-04	1.8E-04	1.5E-04
SW	8.5E-05	1.3E-04	1.4E-04	1.6E-04	2.0E-04	1.8E-04	1.5E-04
SSW	1.1E-04	1.6E-04	1.8E-04	2.0E-04	2.4E-04	2.2E-04	1.9E-04
S	1.7E-04	2.5E-04	2.7E-04	3.1E-04	3.7E-04	3.4E-04	2.8E-04
SSE	1.5E-04	2.3E-04	2.5E-04	2.8E-04	3.4E-04	3.1E-04	2.6E-04
SE	3.3E-04	4.8E-04	5.2E-04	5.9E-04	7.1E-04	6.5E-04	5.5E-04
ESE	6.5E-04	9.2E-04	1.0E-03	1.1E-03	1.3E-03	1.2E-03	1.0E-03
E	5.8E-04	8.4E-04	9.1E-04	1.0E-03	1.2E-03	1.1E-03	9.5E-04
ENE	1.9E-04	2.8E-04	3.0E-04	3.4E-04	4.1E-04	3.8E-04	3.2E-04
NE	1.3E-04	1.9E-04	2.0E-04	2.3E-04	2.8E-04	2.6E-04	2.1E-04
NNE	9.7E-05	1.5E-04	1.6E-04	1.8E-04	2.2E-04	2.0E-04	1.7E-04

	Distance (m)						
Direction	14219	15914	19847	28334	27804	25173	22955
N	4.3E-04	3.7E-04	2.7E-04	1.4E-04	1.4E-04	1.6E-04	2.2E-04
NNW	4.2E-04	3.7E-04	2.7E-04	1.4E-04	1.4E-04	1.6E-04	2.2E-04
NW	3.9E-04	3.4E-04	2.5E-04	1.3E-04	1.3E-04	1.5E-04	1.9E-04
WNW	3.1E-04	2.7E-04	2.0E-04	1.0E-04	1.0E-04	1.2E-04	1.5E-04
W	3.7E-04	3.2E-04	2.3E-04	1.2E-04	1.2E-04	1.4E-04	1.8E-04
WSW	2.0E-04	1.7E-04	1.2E-04	6.4E-05	6.5E-05	7.5E-05	9.5E-05
SW	2.0E-04	1.7E-04	1.2E-04	6.6E-05	6.8E-05	7.8E-05	9.7E-05
SSW	2.5E-04	2.1E-04	1.6E-04	8.9E-05	9.1E-05	1.0E-04	1.2E-04
S	3.8E-04	3.3E-04	2.4E-04	1.3E-04	1.3E-04	1.5E-04	1.9E-04
SSE	3.5E-04	3.0E-04	2.2E-04	1.2E-04	1.2E-04	1.4E-04	1.7E-04
SE	7.2E-04	6.2E-04	4.6E-04	2.6E-04	2.6E-04	3.0E-04	3.7E-04
ESE	1.4E-03	1.2E-03	8.9E-04	5.1E-04	5.2E-04	5.8E-04	7.2E-04
E	1.2E-03	1.1E-03	8.1E-04	4.4E-04	4.5E-04	5.1E-04	6.5E-04
ENE	4.2E-04	3.6E-04	2.7E-04	1.5E-04	1.5E-04	1.7E-04	2.2E-04
NE	2.8E-04	2.4E-04	1.8E-04	9.6E-05	9.8E-05	1.1E-04	1.4E-04
NNE	2.3E-04	1.9E-04	1.4E-04	7.3E-05	7.5E-05	8.5E-05	1.1E-04

Maximum Dose rate ESE JJL 3-18-98

Mar 18, 1998 11:44 am

SUMMARY
Page 7

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)	
Direction	27523	30977
N	1.5E-04	1.2E-04
NNW	1.5E-04	1.3E-04
NW	1.3E-04	1.1E-04
WNW	1.1E-04	9.0E-05
W	1.2E-04	1.1E-04
WSW	6.6E-05	5.6E-05
SW	6.9E-05	5.8E-05
SSW	9.2E-05	7.9E-05
S	1.4E-04	1.2E-04
SSE	1.2E-04	1.0E-04
SE	2.7E-04	2.3E-04
ESE	5.2E-04	4.5E-04
E	4.6E-04	4.0E-04
ENE	1.5E-04	1.3E-04
NE	9.9E-05	8.5E-05
NNE	7.6E-05	6.5E-05

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	24423	19319	18156	16562	14381	15355	17533
N	2.4E-09	3.7E-09	4.0E-09	4.5E-09	5.4E-09	5.0E-09	4.2E-09
NNW	2.4E-09	3.6E-09	4.0E-09	4.5E-09	5.4E-09	5.0E-09	4.2E-09
NW	2.2E-09	3.3E-09	3.6E-09	4.1E-09	5.0E-09	4.6E-09	3.8E-09
WNW	1.7E-09	2.6E-09	2.9E-09	3.3E-09	4.0E-09	3.6E-09	3.0E-09
W	2.0E-09	3.1E-09	3.4E-09	3.8E-09	4.7E-09	4.3E-09	3.5E-09
WSW	1.1E-09	1.6E-09	1.8E-09	2.1E-09	2.5E-09	2.3E-09	1.9E-09
SW	1.1E-09	1.7E-09	1.8E-09	2.1E-09	2.6E-09	2.3E-09	1.9E-09
SSW	1.4E-09	2.1E-09	2.3E-09	2.6E-09	3.1E-09	2.9E-09	2.4E-09
S	2.1E-09	3.2E-09	3.5E-09	4.0E-09	4.8E-09	4.4E-09	3.6E-09
SSE	1.9E-09	2.9E-09	3.2E-09	3.6E-09	4.4E-09	4.0E-09	3.3E-09
SE	4.2E-09	6.2E-09	6.7E-09	7.6E-09	9.1E-09	8.4E-09	7.1E-09
ESE	8.3E-09	1.2E-08	1.3E-08	1.5E-08	1.7E-08	1.6E-08	1.3E-08
E	7.4E-09	1.1E-08	1.2E-08	1.3E-08	1.6E-08	1.4E-08	1.2E-08
ENE	2.4E-09	3.6E-09	3.9E-09	4.4E-09	5.3E-09	4.9E-09	4.1E-09
NE	1.6E-09	2.4E-09	2.6E-09	3.0E-09	3.6E-09	3.3E-09	2.8E-09
NNE	1.3E-09	1.9E-09	2.1E-09	2.4E-09	2.9E-09	2.6E-09	2.2E-09

	Distance (m)						
Direction	14219	15914	19847	28334	27804	25173	22955
N	5.5E-09	4.8E-09	3.5E-09	1.8E-09	1.8E-09	2.1E-09	2.8E-09
NNW	5.5E-09	4.7E-09	3.5E-09	1.8E-09	1.9E-09	2.1E-09	2.8E-09
NW	5.0E-09	4.3E-09	3.2E-09	1.7E-09	1.7E-09	1.9E-09	2.5E-09
WNW	4.0E-09	3.5E-09	2.5E-09	1.3E-09	1.3E-09	1.5E-09	2.0E-09
W	4.8E-09	4.1E-09	2.9E-09	1.5E-09	1.6E-09	1.8E-09	2.3E-09
WSW	2.6E-09	2.2E-09	1.6E-09	8.2E-10	8.4E-10	9.6E-10	1.2E-09
SW	2.6E-09	2.2E-09	1.6E-09	8.4E-10	8.7E-10	9.9E-10	1.2E-09
SSW	3.2E-09	2.7E-09	2.0E-09	1.1E-09	1.2E-09	1.3E-09	1.6E-09
S	4.9E-09	4.2E-09	3.0E-09	1.7E-09	1.7E-09	2.0E-09	2.4E-09
SSE	4.5E-09	3.8E-09	2.8E-09	1.5E-09	1.5E-09	1.8E-09	2.2E-09
SE	9.3E-09	8.0E-09	5.9E-09	3.3E-09	3.4E-09	3.8E-09	4.8E-09
ESE	1.8E-08	1.5E-08	1.1E-08	6.5E-09	6.7E-09	7.5E-09	9.3E-09
E	1.6E-08	1.4E-08	1.0E-08	5.7E-09	5.8E-09	6.6E-09	8.4E-09
ENE	5.4E-09	4.7E-09	3.5E-09	1.9E-09	1.9E-09	2.2E-09	2.8E-09
NE	3.6E-09	3.1E-09	2.3E-09	1.2E-09	1.3E-09	1.4E-09	1.8E-09
NNE	2.9E-09	2.5E-09	1.8E-09	9.5E-10	9.7E-10	1.1E-09	1.4E-09

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)	
Direction	27523	30977
N	1.9E-09	1.6E-09
NNW	1.9E-09	1.6E-09
NW	1.7E-09	1.5E-09
WNW	1.4E-09	1.2E-09
W	1.6E-09	1.4E-09
WSW	8.5E-10	7.2E-10
SW	8.8E-10	7.5E-10
SSW	1.2E-09	1.0E-09
S	1.7E-09	1.5E-09
SSE	1.6E-09	1.3E-09
SE	3.4E-09	2.9E-09
ESE	6.7E-09	5.8E-09
E	5.9E-09	5.1E-09
ENE	2.0E-09	1.7E-09
NE	1.3E-09	1.1E-09
NNE	9.8E-10	8.4E-10

Attachment Six

ERDF Potential-to-Emit CAP 8 Calculation Summary (50,000 Square Feet)

CALCULATION COVER SHEET

Project Title ERDF **Job No.** 22192

Area 600

Discipline Environmental Engineering ***Calc. No.** 0600X-CA-V0003

Subject Calculation of Estimated Air Emissions from 1998 ERDF Activities

Computer Program Microsoft Excel **Program No.** 97

CAP88-PC Ver. 1.0

Committed Calculation ☒ **Preliminary** ☐ **Superseded** ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Sheet Calc = 2 Sheet Att. A = 1 Sheets Att. B = 3 Sheets Att. C = 2 Sheets Att. D = 29 Sheets Total = 38 Sheets	J. D. Ludowise J.A. Ludowise 3-18-98	K E Cook KEC 3/18/98	Michael Vandenburgh Michael Vandenburgh 3-18-98 F. Rocek FVR 3/18/98	Arthur R Michael ARMichael	3/19/98

SUMMARY OF REVISION

Scanned:	Rev.	Date	Bar Code No.	Rev.	Date	Bar Code No.

*Obtain Calc. No. from DIS.

Calc No.: 0600X-CA-V0003		Rev. No.:	0
Originator:	J. D. Ludowise	Date:	3/18/98
Checked:	K. E. Cook	Date:	3/18/98
Project: ERDF		Job No.:	22192
Subject: Calculation of Estimated		Sheet No. :	1 of 2
Air Emissions from 1998 ERDF Activities			

1. Purpose

Calculate the unabated offsite dose rate (in mrem/year) to the maximally exposed individual (MEI) resulting from calender year 1998 ERDF air emissions.

2. Given/Assumed Information

a. General

- Soil Density = 1600 kg/m3.
- Average yearly operation is 252 days (24 hour day is used for conservitism).
- On a daily basis, a conservative average of 50.000 ft2 of new soil is exposed to potential wind blown erosion.
- Depth of potential daily wind erosion is 1 cm (0.01 meters).

b. Average Radionuclide Concentrations (Curies/kilogram)

- Summarized in Table 1
- Attachment B documents the basis for these numbers.

c. Release Factors (unitless)

- Reference is WAC 246-247-030. factor of 1E-03 is used.

d. Distance to Site Boundary and Windfile

- See Attachment C.

e. CAP-88 Output

- CAP-88 output genreated, distance to MEI is 27,804 meters to the east southeast (ESE).
  CAP-88 summary and synopsis outputs in Attachment D.

3. Results

Unabated Offsite Dose Rate = Sum of two CAP88PC runs = 1.39e-02 mrem/yr
- An example of how the Unabated Offsite Dose Rate was calculated is
  shown in Attachment A.

Calc No.: 0600X-CA-V0003		Rev. No.:	0
Originator:	J. D. Ludowise	Date:	3/18/98
Checked:	K. E. Cook	Date:	3/18/98
Project: ERDF		Job No.:	22192
Subject: Calculation of Estimated		Sheet No. :	2 of 2
Air Emissions from 1998 ERDF Activities			

Table 1. ERDF Emission Estimate Calculation

Radionuclide	Average Radionuclide Inventory pCi/g	Average Radionuclide Inventory Ci/kg	Total Soil Mass kg/yr.	Total Inventory Per Year Ci/yr.	Release Factor	Potential Inventory Released Ci/yr.
Am-241	1.50E+01	1.50E-08	1.87E+07	2.80E-01	1.00E-03	2.80E-04
Am-243	3.70E-03	3.70E-12	1.87E+07	6.91E-05	1.00E-03	6.91E-08
C-14	6.30E+01	6.30E-08	1.87E+07	1.18E+00	1.00E-03	1.18E-03
Co-60	4.10E+01	4.10E-08	1.87E+07	7.65E-01	1.00E-03	7.65E-04
Cs-137	2.10E+02	2.10E-07	1.87E+07	3.92E+00	1.00E-03	3.92E-03
Eu-152	4.20E+02	4.20E-07	1.87E+07	7.84E+00	1.00E-03	7.84E-03
Eu-154	9.50E+01	9.50E-08	1.87E+07	1.77E+00	1.00E-03	1.77E-03
Eu-155	3.10E+01	3.10E-08	1.87E+07	5.79E-01	1.00E-03	5.79E-04
H-3	3.00E+02	3.00E-07	1.87E+07	5.60E+00	1.00E-03	5.60E-03
Ni-63	2.00E+02	2.00E-07	1.87E+07	3.73E+00	1.00E-03	3.73E-03
Pu-238	4.90E+00	4.90E-09	1.87E+07	9.15E-02	1.00E-03	9.15E-05
Pu-239	1.90E+01	1.90E-08	1.87E+07	3.55E-01	1.00E-03	3.55E-04
Pu-240	1.10E+01	1.10E-08	1.87E+07	2.05E-01	1.00E-03	2.05E-04
Pu-241	2.80E+02	2.80E-07	1.87E+07	2.05E-01	1.00E-03	2.05E-04
Pu-242	1.90E-07	1.90E-16	1.87E+07	3.55E-09	1.00E-03	3.55E-12
Ra-226	2.00E-02	2.00E-11	1.87E+07	3.73E-04	1.00E-03	3.73E-07
Ra-228	7.00E-05	7.00E-14	1.87E+07	1.31E-06	1.00E-03	1.31E-09
Sr-90	2.70E+02	2.70E-07	1.87E+07	5.04E+00	1.00E-03	5.04E-03
Tc-99	2.20E+01	2.20E-08	1.87E+07	4.11E-01	1.00E-03	4.11E-04
Th-228	9.50E-02	9.50E-11	1.87E+07	1.77E-03	1.00E-03	1.77E-06
Th-232	3.40E-05	3.40E-14	1.87E+07	6.35E-07	1.00E-03	6.35E-10
U-233/234	1.09E+02	1.09E-07	1.87E+07	2.03E+00	1.00E-03	2.03E-03
U-235	1.00E+01	1.00E-08	1.87E+07	1.87E-01	1.00E-03	1.87E-04
U-238	1.09E+02	1.09E-07	1.87E+07	2.03E+00	1.00E-03	2.03E-03

Attachment:	A		
Originator:	J. D. Ludowise	Date:	3/18/98
Checked:	K. E. Cook	Date:	3/18/98
Calc No.:	0600X-CA-V0003		
Rev. No.:	0	Sheet No. :	1 of 1

Attachment A. Example of Unabated Offsite Dose Rate Calcluation

1. Determine the Total Radionuclide Inventory per Year

Total Radionuclide Inventory per Year = (Average Radionuclide Inventory) x (Total Soil Mass)

- The average radionuclide inventory values are given in Attachment B. The total soil mass needs to be calculated.

Total Soil Mass = (Area of soil potentially exposed to wind blown erosion on a daily basis) x (Depth of erosion) x (Soil Density) x (Days of operation per year)
= (50,000 ft2/day x .0929 m2/ft2) x (0.01 m) x (1600 kg/m3) x (252 days/year)
= 1.87E+07 kg/yr.

Therefore (using Am-241 as an example):

Total Radionuclide Inventory per Year = (1.50E+01 pCi/g x 1 Ci / 1E+12 pCi x 1000g / 1kg) x (1.87E+07 kg/yr)
= 2.80E-01 Ci/yr.

2. Calculate the Potential Radionuclide Inventory Released per Year

Potential Radionuclide Inventory Released per Year = (Total Radionuclide inventory per Year) x (Release Factor)

- The total radionuclide inventory per year was calculated in Step 1.

Therefore (using Am-241 as an example):

Potential Radionculide Inventory Released per Year = (2.80E-01 Ci/yr) x (1.00E-03) = 2.80E-04 Ci/yr.

3. Calculate the Unabated Offsite Dose Rate

Edit DEFAULT.DAT file so value reported in output files is at the site boundary. ESE from ERDF.

ILOC = 12

JLOC = 12

Run CAP88PC with Ci/yr values from Step 2.

Unabated Offsite Dose Rate = Sum of two CAP88PC runs
= 1.13e-02 + 2.58e-03 mrem/yr
= 1.39e-02 mrem/yr

Attachment:	B	
Originator: J. D. Ludowise		Date: 03-17-98
Checked: K. E. Cook		Date: 03-18-98
Calc. No.: 0600X-CA-V0003		
Rev. No.:	0	Sheet No. : 1 of 3

ERDF Air Monitoring
Potential to Emit Summary

PURPOSE

The purpose of this summary is to describe the basis for the calculated potential releasable inventory of radionuclides at the Environmental Restoration Disposal Facility (ERDF). The numbers presented were developed using empirical data and, in the absence of analytical data, on the ERDF waste inventories as reported on shipping documents. The numbers were entered in the CAP88pc model as used and approved by the Environmental Protection Agency (EPA).

BACKGROUND

The ERDF has received waste from five primary sources: the 100 B/C, the 100-DR, and the 300 FF-1 remedial action sites, "N" reactor basin and facility decommissioning, and also receives waste from the decontamination and decommissioning (D&D) efforts. To determine the long-term effect of these various waste streams on off-site emissions, some assumptions are necessary and are listed below.

ASSUMPTIONS

1. The principal waste is in the form of contaminated soil and constitutes the major source for potential off-site emissions. The total volume disposed waste in ERDF for calendar year 1997 was approximately 600,000 tons and will be considered as representative of out-year waste receipts.

2. The maximum exposed area at any time in the future is estimated to be approximately 50,000 square feet for the purposes of the calculation.

3. Waste, other than soil, is not considered as having the potential to emit for the following reasons:

   - Waste received at ERDF that is highly radioactive is packaged or encapsulated and therefore does not have an exposed dispersible radioactive inventory.
   - Non-soil waste that is not encapsulated or sealed contains similarly low radionuclide inventories as the soils and therefore does present a special potential to emit. Such non-soil waste is usually in a non-dispersible form (e.g., concrete, rubble).

4. Results of the potential to emit radionuclides off-site is based on the EPA's air emission model CAP88PC and on the concentration of radionuclides in the top 1-centimeter layer of soil.

5. The radionuclide inventory is estimated based on laboratory data and the ERDF database through 1997. The waste received through 1997 is considered to be representative of the overall waste inventory expected over the life of the facility.

ERDF Air Monitoring
Potential to Emit Summary

6. Two sources of laboratory data were used for the waste data through 1997: 1) the radiological counting facility (RCF) located at 100 N and, 2) the data contained in the Hanford Environmental Information Service (HEIS). An average was determined for each nuclide where possible using available data as described above. For the 300 area process trench soils, the concentrations were determined based on field screening data.

7. Short lived radionuclides with half lives of less than 3 years are not considered in the calculation since at least ten half-lives have occurred since the reactors were last operated.

8. Naturally occurring radionuclides are not considered as part of the potential to emit inventory as there is no mechanism by which these isotopes could have been concentrated either at ERDF or at the remedial action sites.

9. The values for soils from the 300 area were proportioned with the values from the 100 area for Uranium. The 300-area waste will constitute approximatly30% of the total ERDF inventory for the foreseeable future. The 100 Area waste inventory <u>not</u> reduced by 30% for the calculation. The totals for the listed isotopes are shown in the attached summary.

10. The CAP88pc model uses a maximally exposed individual (MEI) positioned 27.8-kilometers in the east-south-east direction.

11. To account for potential short-term increases in radionuclide inventory received at ERDF, the calculated potential to emit, based on a 50,000 sq. ft. operating face and the overall potentially dispersible inventory disposed through 1997, will be set at ten times (10x) the modeling results.

CONCLUSION

The ERDF inventory can be determined based on analytical data and the physical relationships of the isotopes. Historical information used in combination with field screening data to document shipment of waste to ERDF constitutes an effective data source for isotopes that have minimal recent laboratory analyses. Waste receipts through 1997 represent a typical waste stream to be disposed at ERDF into the foreseeable future.

ERDF Air Monitoring
Potential to Emit Summary

SUMMATIONS OF CALCULATIONS

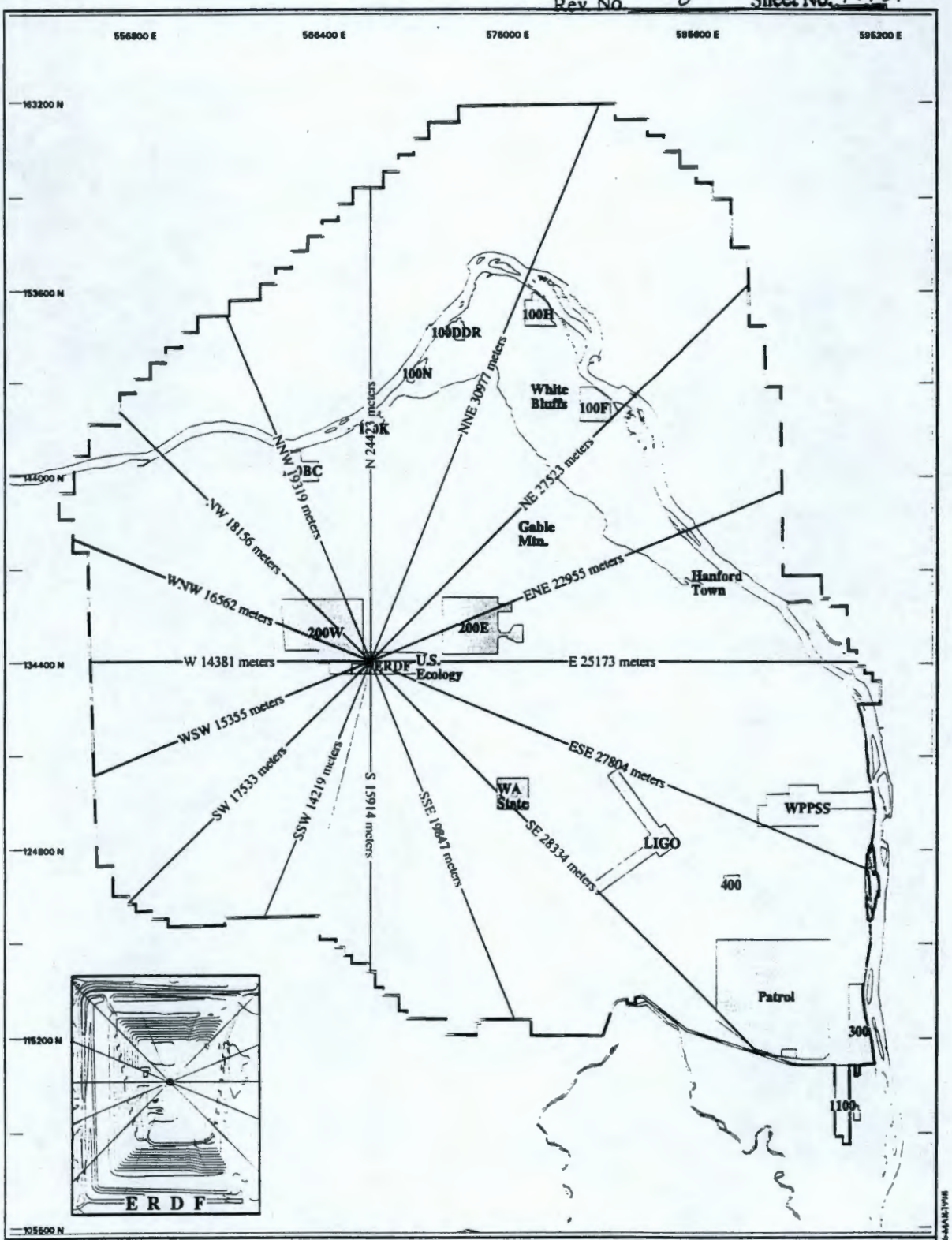
From the 100 Area Waste Streams:

ISO	Data Source	pCi/gm
Am^{241}	RCF	1.5 E+1
Am^{243}	ERDF database	3.7 E-3
C^{14}	ERDF database	6.3 E+1
Co^{60}	the RCF	4.1 E+1
Cs^{137}	HEIS	2.1 E+2
Eu^{152}	HEIS	4.2 E+2
Eu^{154}	HEIS	9.5 E+1
Eu^{155}	the RCF	3.1 E+1
H^{3}	ERDF database	3.0 E+2
Ni^{63}	ERDF database	2.0 E+2
Pu^{238}	HEIS	4.9 E+0
Pu^{239}	HEIS	1.9 E+1
Pu^{240}	ERDF database	1.1 E+1
Pu^{241}	ERDF database	2.8 E+2
Pu^{242}	ERDF database	1.9 E-7
Ra^{226}	ERDF database	2.0 E-2
Ra^{228}	ERDF database	7.0 E-5
Sr^{90}	HEIS	2.7 E+2
Tc^{99}	ERDF database	2.2 E+1
Th^{228}	ERDF database	9.5 E-2
Th^{232}	ERDF database	3.4 E-5

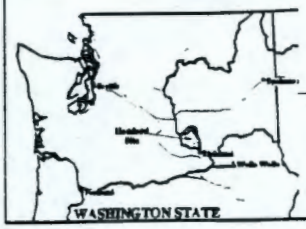
300 Area waste stream (process trench concentrations) 100% values

ISO	Data Source	pCi/gm
U^{234}	300 area calcs	363
U^{235}	300 area calcs	033.4
U^{238}	300 area calcs	363

Attachment C
Orig. J. D. Ludowise Date 3-18-98
Chk'd by KEC Date 3/18/98
Calc. No. 0600X-CA-V0007
Rev. No. 0 Sheet No. 1 of 2



Hanford Site: Distances From ERDF



Area Bounds

Hanford Bounds

U.S. DEPARTMENT OF ENERGY
RICHLAND OPERATIONS OFFICE
HANFORD ENVIRONMENTAL RESTORATION PROGRAM

BECHTEL HANFORD, INC.
RICHLAND, WASHINGTON

Bechtel Job No.: 22192 DOE Contract Number: DE-AC06-93RL12367

GIS: map_b Service Request No.: JRC0251 Date: 16-MAR-1998

Projection ..... Lambert Conformal Conic
Coordinate System ..... Washington State Plane, South Zone
Horizontal Datum ..... North American Datum 1983 (NAD83)
Vertical Datum .. North American Vertical Datum, 1988 (NVD88)

Spatial and attribute data are maintained in the Environmental Data Management Group of the Environmental Restoration Contractor.

ERC: jrc map_1.mxl n w H JRC0251 J.Ludowise 16-MAR-1998

Attachment: C		
Originator: J. D. Ludowise	Date:	03-18-98
Checked: K. E. Cook	Date:	03-18-98
Calc. No.: 0600X-CA-V0003		
Rev. No.: 0	Sheet No. :	2 of 2

FILE JF20010.WND

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200 AREA (HMS) - 10 M - Pasquill A - G (1983 - 1991 Average)
Created 8/26/92 KR, AIRDOS Format  21-May-93, PDR
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C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

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

Non-Radon Individual Assessment
Mar 18, 1998 11:28 am

Facility: Environmental Restoration Disposal Facility
Address: Hanford Site
City: Richland
State: WA Zip: 99352

Effective Dose Equivalent
(mrem/year)

1.13E-02

At This Location: 27804 Meters East Southeast
Source Category: DOE Facility
Source Type: Area
Emission Year: 1998

Comments: Data for ERDF Offsite Unabated Dose Calculations.

Dataset Name: ERDF98a
Dataset Date: Mar 18, 1998 11:24 am
Wind File: WNDFILES\JF20010.WND

C A U T I O N: Defaults Have Been Changed

(Changes Detailed on Next Page)

C A U T I O N !

The Following DEFAULT VALUES Have Been Changed By The User.

These changes CANNOT BE USED to demonstrate compliance per 40 CFR 61.93(a) unless specifically approved by EPA.

Direction Single Location - Individual Calculation

Changed From: 0
To: 12

Distance Single Location - Individual Calculation

Changed From: 0
To: 12

Note:
ILOC and JLOC values were changed so that the output would correspond to dose rate at site boundary in the ESE direction

JDL 3-18-98

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 27804 Meters East Southeast
Lifetime Fatal Cancer Risk: 1.31E-07

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	1.77E-03
BREAST	1.07E-03
R MAR	6.84E-03
LUNGS	5.60E-02
THYROID	1.10E-03
ENDOST	6.53E-02
RMNDR	3.93E-03
EFFEC	1.13E-02

RADIONUCLIDE EMISSIONS DURING THE YEAR 1998

Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
AM-241	W	1.00	2.8E-04	2.8E-04
AM-243	W	1.00	6.9E-08	6.9E-08
C-14	*	0.00	1.2E-03	1.2E-03
CO-60	Y	1.00	7.7E-04	7.7E-04
CS-137	D	1.00	3.9E-03	3.9E-03
BA-137M	D	1.00	0.0E+00	0.0E+00
EU-152	W	1.00	7.8E-03	7.8E-03
EU-154	W	1.00	1.8E-03	1.8E-03
EU-155	W	1.00	5.8E-04	5.8E-04
H-3	*	0.00	5.6E-03	5.6E-03
NI-63	W	1.00	3.7E-03	3.7E-03
PU-238	Y	1.00	9.1E-05	9.1E-05
PU-239	Y	1.00	3.5E-04	3.5E-04
PU-240	Y	1.00	2.1E-04	2.1E-04
PU-241	Y	1.00	2.1E-04	2.1E-04
PU-242	Y	1.00	3.5E-12	3.5E-12
RA-226	W	1.00	3.7E-07	3.7E-07
RA-228	W	1.00	1.3E-09	1.3E-09
SR-90	D	1.00	5.0E-03	5.0E-03
TC-99	W	1.00	4.1E-04	4.1E-04
TH-228	Y	1.00	1.8E-06	1.8E-06
TH-232	Y	1.00	6.3E-10	6.3E-10
RA-228	W	1.00	0.0E+00	0.0E+00
AC-228	Y	1.00	0.0E+00	0.0E+00
TH-228	Y	1.00	0.0E+00	0.0E+00
RA-224	W	1.00	0.0E+00	0.0E+00
RN-220	*	0.00	0.0E+00	0.0E+00
PO-216	W	1.00	0.0E+00	0.0E+00
PB-212	D	1.00	0.0E+00	0.0E+00
BI-212	W	1.00	0.0E+00	0.0E+00
TL-208	D	1.00	0.0E+00	0.0E+00
U-233	Y	1.00	2.0E-03	2.0E-03
U-234	Y	1.00	2.0E-03	2.0E-03
U-235	Y	1.00	1.9E-04	1.9E-04

SITE INFORMATION

Temperature: 12 degrees C
Precipitation: 16 cm/y
Mixing Height: 1000 m

SOURCE INFORMATION

Source Number: 1

Source Height (m): 1.00
Area (sq m): 4.64E+03

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

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	1.000	1.000	1.000
Fraction From Assessment Area:	0.000	0.000	0.000
Fraction Imported:	0.000	0.000	0.000

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

DISTANCES USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

24423	19319	18156	16562	14381	15355	17533	14219	15914	19847
28334	27804	25173	22955	27523	30977				

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

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

Non-Radon Individual Assessment
Mar 18, 1998 11:30 am

Facility: Environmental Restoration Disposal Facility
Address: Hanford Site
City: Richland
State: WA Zip: 99352

Effective Dose Equivalent
(mrem/year)

2.58E-03

At This Location: 27804 Meters East Southeast
Source Category: DOE Facility
Source Type: Area
Emission Year: 1998

Comments: Data for ERDF Offsite Unabated Dose Calculations.

Dataset Name: ERDF98b
Dataset Date: Mar 18, 1998 11:25 am
Wind File: WNDFILES\JF20010.WND

C A U T I O N: Defaults Have Been Changed

(Changes Detailed on Next Page)

C A U T I O N !

The Following DEFAULT VALUES Have Been Changed By The User.

These changes CANNOT BE USED to demonstrate compliance per 40 CFR 61.93(a) unless specifically approved by EPA.

Direction Single Location - Individual Calculation

Changed From: 0
To: 12

Distance Single Location - Individual Calculation

Changed From: 0
To: 12

See Note on sheet 2 of this Att.
JDL 3-18-98

MAXIMALLY EXPOSED INDIVIDUAL
(RN-222 Working Level Calculations Excluded)

Location Of The Individual: 27804 Meters East Southeast
Lifetime Fatal Cancer Risk: 3.32E-08

ORGAN DOSE EQUIVALENT SUMMARY
(RN-222 Working Level Calculations Excluded)

Organ	Dose Equivalent (mrem/y)
GONADS	6.99E-06
BREAST	7.85E-06
R MAR	2.13E-04
LUNGS	1.99E-02
THYROID	6.86E-06
ENDOST	2.76E-03
RMNDR	2.46E-04
EFFEC	2.58E-03

RADIONUCLIDE EMISSIONS DURING THE YEAR 1998

Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
U-238	Y	1.00	2.0E-03	2.0E-03
TH-234	Y	1.00	0.0E+00	0.0E+00
PA-234	Y	1.00	0.0E+00	0.0E+00
U-234	Y	1.00	0.0E+00	0.0E+00
TH-230	Y	1.00	0.0E+00	0.0E+00
RA-226	W	1.00	0.0E+00	0.0E+00
RN-222	*	0.00	0.0E+00	0.0E+00
PO-218	W	1.00	0.0E+00	0.0E+00
PB-214	D	1.00	0.0E+00	0.0E+00
BI-214	W	1.00	0.0E+00	0.0E+00
PO-214	W	1.00	0.0E+00	0.0E+00
PB-210	D	1.00	0.0E+00	0.0E+00
BI-210	W	1.00	0.0E+00	0.0E+00
PO-210	W	1.00	0.0E+00	0.0E+00

SITE INFORMATION

Temperature: 12 degrees C
Precipitation: 16 cm/y
Mixing Height: 1000 m

SOURCE INFORMATION

Source Number: 1

Source Height (m): 1.00
Area (sq m): 4.64E+03

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

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	1.000	1.000	1.000
Fraction From Assessment Area:	0.000	0.000	0.000
Fraction Imported:	0.000	0.000	0.000

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

DISTANCES USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

24423	19319	18156	16562	14381	15355	17533	14219	15914	19847
28334	27804	25173	22955	27523	30977				

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Non-Radon Individual Assessment
Mar 18, 1998 11:28 am

Facility: Environmental Restoration Disposal Facility
Address: Hanford Site
City: Richland
State: WA Zip: 99352

Source Category: DOE Facility
Source Type: Area
Emission Year: 1998

Comments: Data for ERDF Offsite Unabated Dose Calculations.

Dataset Name: ERDF98a
Dataset Date: Mar 18, 1998 11:24 am
Wind File: WNDFILES\JF20010.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
GONADS	1.77E-03
BREAST	1.07E-03
R MAR	6.84E-03
LUNGS	5.60E-02
THYROID	1.10E-03
ENDOST	6.53E-02
RMNDR	3.93E-03
EFFEC	1.13E-02

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	1.04E-03
INHALATION	9.45E-03
AIR IMMERSION	8.45E-08
GROUND SURFACE	8.16E-04
INTERNAL	1.05E-02
EXTERNAL	8.17E-04
TOTAL	1.13E-02

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
AM-241	1.63E-03
AM-243	4.02E-07
C-14	1.04E-06
CO-60	5.06E-05
CS-137	6.21E-05
BA-137M	2.07E-04
EU-152	4.98E-04
EU-154	9.06E-05
EU-155	1.31E-06
H-3	8.95E-08
NI-63	5.06E-07
PU-238	3.21E-04
PU-239	1.34E-03
PU-240	7.75E-04
PU-241	1.22E-05
PU-242	1.28E-11
RA-226	7.77E-08
RA-228	1.12E-10
SR-90	2.25E-04
TC-99	3.86E-06
TH-228	4.56E-06
TH-232	2.34E-09
RA-228	8.11E-13
AC-228	8.04E-11
TH-228	2.36E-13
RA-224	9.24E-13
RN-220	4.45E-14
PO-216	1.18E-15
PB-212	1.34E-11
BI-212	1.48E-11
TL-208	8.95E-11
U-233	2.93E-03
U-234	2.90E-03
U-235	2.53E-04
TOTAL	1.13E-02

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
LEUKEMIA	9.84E-09
BONE	3.24E-09
THYROID	4.70E-10
BREAST	3.90E-09
LUNG	9.29E-08
STOMACH	2.54E-09
BOWEL	1.38E-09
LIVER	1.12E-08
PANCREAS	1.67E-09
URINARY	2.27E-09
OTHER	2.04E-09
TOTAL	1.31E-07

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	9.30E-09
INHALATION	1.03E-07
AIR IMMERSION	2.03E-12
GROUND SURFACE	1.95E-08
INTERNAL	1.12E-07
EXTERNAL	1.95E-08
TOTAL	1.31E-07

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
AM-241	8.32E-09
AM-243	2.04E-12
C-14	2.55E-11
CO-60	1.27E-09
CS-137	1.62E-09
BA-137M	4.95E-09
EU-152	1.20E-08
EU-154	2.20E-09
EU-155	2.95E-11
H-3	2.42E-12
NI-63	1.14E-11
PU-238	2.72E-09
PU-239	1.05E-08
PU-240	6.05E-09
PU-241	4.64E-11
PU-242	9.94E-17
RA-226	9.77E-13
RA-228	1.11E-15
SR-90	3.79E-09
TC-99	1.41E-10
TH-228	9.13E-11
TH-232	1.32E-14
RA-228	5.77E-18
AC-228	1.93E-15
TH-228	5.13E-18
RA-224	2.12E-17
RN-220	1.06E-18
PO-216	2.84E-20
PB-212	3.12E-16
BI-212	3.55E-16
TL-208	2.19E-15
U-233	3.74E-08
U-234	3.70E-08
U-235	3.29E-09
TOTAL	1.31E-07

Note: Underlined Values indicate dose rate at site boundary JDL 3-18-98

Attachment: D	
Originator: J. D. Ludowise	Date: 03-18-98
Checked: K. E. Cook	Date: 03-18-98
Calc. No.: 0600X-CA-V0003	
Rev. No.: 0	Sheet No.: 16 of 29

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	24423	19319	18156	16562	14381	15355	17533
N	4.1E-03	6.2E-03	6.8E-03	7.7E-03	9.2E-03	8.5E-03	7.1E-03
NNW	4.1E-03	6.2E-03	6.7E-03	7.6E-03	9.2E-03	8.4E-03	7.1E-03
NW	3.7E-03	5.6E-03	6.2E-03	7.0E-03	8.5E-03	7.8E-03	6.5E-03
WNW	3.0E-03	4.5E-03	4.9E-03	5.6E-03	6.8E-03	6.2E-03	5.2E-03
W	3.4E-03	5.2E-03	5.8E-03	6.6E-03	8.0E-03	7.3E-03	6.1E-03
WSW	1.8E-03	2.8E-03	3.1E-03	3.5E-03	4.3E-03	3.9E-03	3.2E-03
SW	1.9E-03	2.8E-03	3.1E-03	3.6E-03	4.4E-03	4.0E-03	3.3E-03
SSW	2.5E-03	3.6E-03	3.9E-03	4.4E-03	5.4E-03	4.9E-03	4.1E-03
S	3.7E-03	5.4E-03	6.0E-03	6.8E-03	8.2E-03	7.5E-03	6.3E-03
SSE	3.3E-03	5.0E-03	5.4E-03	6.2E-03	7.5E-03	6.9E-03	5.7E-03
SE	7.2E-03	1.1E-02	1.1E-02	1.3E-02	1.6E-02	1.4E-02	1.2E-02
ESE	1.4E-02	2.0E-02	2.2E-02	2.5E-02	2.9E-02	2.7E-02	2.3E-02
E	1.3E-02	1.8E-02	2.0E-02	2.2E-02	2.7E-02	2.5E-02	2.1E-02
ENE	4.2E-03	6.1E-03	6.6E-03	7.5E-03	9.0E-03	8.3E-03	7.0E-03
NE	2.7E-03	4.1E-03	4.5E-03	5.1E-03	6.1E-03	5.6E-03	4.7E-03
NNE	2.1E-03	3.2E-03	3.6E-03	4.0E-03	4.9E-03	4.5E-03	3.7E-03

	Distance (m)						
Direction	14219	15914	19847	28334	27804	25173	22955
N	9.4E-03	8.1E-03	6.0E-03	3.1E-03	3.1E-03	3.6E-03	4.7E-03
NNW	9.3E-03	8.0E-03	5.9E-03	3.1E-03	3.2E-03	3.6E-03	4.7E-03
NW	8.6E-03	7.4E-03	5.4E-03	2.8E-03	2.9E-03	3.3E-03	4.3E-03
WNW	6.9E-03	5.9E-03	4.3E-03	2.2E-03	2.3E-03	2.6E-03	3.4E-03
W	8.1E-03	7.0E-03	5.0E-03	2.6E-03	2.7E-03	3.1E-03	3.9E-03
WSW	4.4E-03	3.7E-03	2.7E-03	1.4E-03	1.4E-03	1.7E-03	2.1E-03
SW	4.4E-03	3.8E-03	2.7E-03	1.5E-03	1.5E-03	1.7E-03	2.1E-03
SSW	5.4E-03	4.7E-03	3.4E-03	2.0E-03	2.0E-03	2.3E-03	2.8E-03
S	8.4E-03	7.2E-03	5.2E-03	2.9E-03	3.0E-03	3.4E-03	4.2E-03
SSE	7.6E-03	6.5E-03	4.8E-03	2.6E-03	2.6E-03	3.0E-03	3.8E-03
SE	1.6E-02	1.4E-02	1.0E-02	5.6E-03	5.7E-03	6.5E-03	8.1E-03
ESE	3.0E-02	2.6E-02	1.9E-02	1.1E-02	1.1E-02	1.3E-02	1.6E-02
E	2.7E-02	2.3E-02	1.8E-02	9.6E-03	9.9E-03	1.1E-02	1.4E-02
ENE	9.1E-03	7.9E-03	5.9E-03	3.2E-03	3.3E-03	3.7E-03	4.7E-03
NE	6.2E-03	5.3E-03	3.9E-03	2.1E-03	2.1E-03	2.4E-03	3.1E-03
NNE	4.9E-03	4.3E-03	3.1E-03	1.6E-03	1.7E-03	1.9E-03	2.5E-03

Maximum dose rate ESE JDL 3-18-98

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)	
Direction	27523	30977
N	3.2E-03	2.7E-03
NNW	3.2E-03	2.8E-03
NW	2.9E-03	2.5E-03
WNW	2.3E-03	2.0E-03
W	2.7E-03	2.3E-03
WSW	1.5E-03	1.2E-03
SW	1.5E-03	1.3E-03
SSW	2.0E-03	1.7E-03
S	3.0E-03	2.6E-03
SSE	2.7E-03	2.3E-03
SE	5.8E-03	5.0E-03
ESE	1.1E-02	9.9E-03
E	1.0E-02	8.6E-03
ENE	3.3E-03	2.9E-03
NE	2.2E-03	1.9E-03
NNE	1.7E-03	1.4E-03

Mar 18, 1998 11:28 am

SUMMARY
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INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	24423	19319	18156	16562	14381	15355	17533
N	4.8E-08	7.2E-08	7.9E-08	8.9E-08	1.1E-07	9.9E-08	8.3E-08
NNW	4.8E-08	7.2E-08	7.8E-08	8.8E-08	1.1E-07	9.8E-08	8.2E-08
NW	4.3E-08	6.6E-08	7.2E-08	8.1E-08	9.8E-08	9.0E-08	7.5E-08
WNW	3.4E-08	5.2E-08	5.7E-08	6.5E-08	7.9E-08	7.2E-08	6.0E-08
W	4.0E-08	6.1E-08	6.7E-08	7.7E-08	9.3E-08	8.5E-08	7.1E-08
WSW	2.1E-08	3.3E-08	3.6E-08	4.1E-08	5.0E-08	4.6E-08	3.8E-08
SW	2.2E-08	3.3E-08	3.7E-08	4.2E-08	5.1E-08	4.7E-08	3.8E-08
SSW	2.9E-08	4.2E-08	4.5E-08	5.2E-08	6.2E-08	5.7E-08	4.8E-08
S	4.3E-08	6.3E-08	7.0E-08	7.9E-08	9.6E-08	8.8E-08	7.3E-08
SSE	3.9E-08	5.8E-08	6.3E-08	7.2E-08	8.7E-08	8.0E-08	6.7E-08
SE	8.4E-08	1.2E-07	1.3E-07	1.5E-07	1.8E-07	1.7E-07	1.4E-07
ESE	1.6E-07	2.3E-07	2.5E-07	2.9E-07	3.4E-07	3.1E-07	2.7E-07
E	1.5E-07	2.1E-07	2.3E-07	2.6E-07	3.1E-07	2.8E-07	2.4E-07
ENE	4.8E-08	7.1E-08	7.7E-08	8.7E-08	1.0E-07	9.6E-08	8.1E-08
NE	3.2E-08	4.8E-08	5.2E-08	5.9E-08	7.1E-08	6.5E-08	5.5E-08
NNE	2.5E-08	3.8E-08	4.1E-08	4.7E-08	5.7E-08	5.2E-08	4.3E-08

	Distance (m)						
Direction	14219	15914	19847	28334	27804	25173	22955
N	1.1E-07	9.4E-08	6.9E-08	3.6E-08	3.7E-08	4.1E-08	5.5E-08
NNW	1.1E-07	9.3E-08	6.9E-08	3.6E-08	3.7E-08	4.2E-08	5.5E-08
NW	1.0E-07	8.6E-08	6.3E-08	3.3E-08	3.4E-08	3.8E-08	5.0E-08
WNW	8.0E-08	6.9E-08	5.0E-08	2.6E-08	2.7E-08	3.0E-08	3.9E-08
W	9.5E-08	8.1E-08	5.9E-08	3.1E-08	3.2E-08	3.6E-08	4.6E-08
WSW	5.1E-08	4.4E-08	3.1E-08	1.7E-08	1.7E-08	1.9E-08	2.5E-08
SW	5.2E-08	4.4E-08	3.2E-08	1.7E-08	1.8E-08	2.0E-08	2.5E-08
SSW	6.3E-08	5.4E-08	4.0E-08	2.3E-08	2.4E-08	2.7E-08	3.2E-08
S	9.8E-08	8.4E-08	6.1E-08	3.4E-08	3.5E-08	4.0E-08	4.9E-08
SSE	8.9E-08	7.6E-08	5.6E-08	3.0E-08	3.1E-08	3.5E-08	4.4E-08
SE	1.8E-07	1.6E-07	1.2E-07	6.5E-08	6.7E-08	7.6E-08	9.5E-08
ESE	3.4E-07	3.0E-07	2.3E-07	1.3E-07	1.3E-07	1.5E-07	1.8E-07
E	3.1E-07	2.7E-07	2.0E-07	1.1E-07	1.1E-07	1.3E-07	1.6E-07
ENE	1.1E-07	9.2E-08	6.8E-08	3.7E-08	3.8E-08	4.3E-08	5.5E-08
NE	7.2E-08	6.2E-08	4.6E-08	2.4E-08	2.5E-08	2.8E-08	3.6E-08
NNE	5.7E-08	4.9E-08	3.6E-08	1.9E-08	1.9E-08	2.2E-08	2.9E-08

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)	
Direction	27523	30977
N	3.7E-08	3.2E-08
NNW	3.7E-08	3.2E-08
NW	3.4E-08	2.9E-08
WNW	2.7E-08	2.3E-08
W	3.2E-08	2.7E-08
WSW	1.7E-08	1.5E-08
SW	1.8E-08	1.5E-08
SSW	2.4E-08	2.0E-08
S	3.5E-08	3.0E-08
SSE	3.1E-08	2.7E-08
SE	6.8E-08	5.8E-08
ESE	1.3E-07	1.2E-07
E	1.2E-07	1.0E-07
ENE	3.9E-08	3.3E-08
NE	2.5E-08	2.2E-08
NNE	1.9E-08	1.7E-08

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

D O S E A N D R I S K E Q U I V A L E N T S U M M A R I E S

Non-Radon Individual Assessment
Mar 18, 1998 11:30 am

Facility: Environmental Restoration Disposal Facility
Address: Hanford Site
City: Richland
State: WA Zip: 99352

Source Category: DOE Facility
Source Type: Area
Emission Year: 1998

Comments: Data for ERDF Offsite Unabated Dose Calculations.

Dataset Name: ERDF98b
Dataset Date: Mar 18, 1998 11:25 am
Wind File: WNDFILES\JF20010.WND

ORGAN DOSE EQUIVALENT SUMMARY
(RN-222 Working Level Calculations Excluded)

Organ	Selected Individual (mrem/y)
GONADS	6.99E-06
BREAST	7.85E-06
R MAR	2.13E-04
LUNGS	1.99E-02
THYROID	6.86E-06
ENDOST	2.76E-03
RMNDR	2.46E-04
EFFEC	2.58E-03

Radon Decay Product Concentration (working level)

0.00E+00

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY
(RN-222 Working Level Calculations Excluded)

Pathway	Selected Individual (mrem/y)
INGESTION	1.80E-04
INHALATION	2.40E-03
AIR IMMERSION	1.29E-12
GROUND SURFACE	2.18E-07
INTERNAL	2.58E-03
EXTERNAL	2.18E-07
TOTAL	2.58E-03

Radon Decay Product Concentration (working level)

0.00E+00

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY
(RN-222 Working Level Calculations Excluded)

Nuclide	Selected Individual (mrem/y)
U-238	2.58E-03
TH-234	0.00E+00
PA-234	0.00E+00
U-234	0.00E+00
TH-230	0.00E+00
RA-226	0.00E+00
RN-222	0.00E+00
PO-218	0.00E+00
PB-214	0.00E+00
BI-214	0.00E+00
PO-214	0.00E+00
PB-210	0.00E+00
BI-210	0.00E+00
PO-210	0.00E+00
TOTAL	2.58E-03

Radon Decay Product Concentration (working level)

0.00E+00

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
LEUKEMIA	2.67E-10
BONE	1.49E-10
THYROID	1.22E-12
BREAST	1.41E-11
LUNG	3.22E-08
STOMACH	9.59E-12
BOWEL	1.80E-11
LIVER	7.81E-12
PANCREAS	6.39E-12
URINARY	5.39E-10
OTHER	7.81E-12
TOTAL	3.32E-08

	Selected Individual Cancer Risk
Radon Decay Product Lung Exposure	0.00E+00
Total Fatal Risk All Exposures	3.32E-08

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	9.98E-10
INHALATION	3.22E-08
AIR IMMERSION	2.73E-17
GROUND SURFACE	4.60E-12
INTERNAL	3.32E-08
EXTERNAL	4.60E-12
TOTAL	3.32E-08

	Selected Individual Cancer Risk
Radon Decay Product Lung Exposure	0.00E+00
Total Fatal Risk All Exposures	3.32E-08

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
U-238	3.32E-08
TH-234	0.00E+00
PA-234	0.00E+00
U-234	0.00E+00
TH-230	0.00E+00
RA-226	0.00E+00
RN-222	0.00E+00
PO-218	0.00E+00
PB-214	0.00E+00
BI-214	0.00E+00
PO-214	0.00E+00
PB-210	0.00E+00
BI-210	0.00E+00
PO-210	0.00E+00
TOTAL	3.32E-08

	Selected Individual Cancer Risk
Radon Decay Product Lung Exposure	0.00E+00
Total Fatal Risk All Exposures	3.32E-08

See Note on sheet 16 of this Att. 3-18-98
3-18-98

Attachment: D	
Originator: J. D. Ludowise	Date: 03-18-98
Checked: K. E. Cook	Date: 03-18-98
Calc. No.: 0600X-CA-V0003	
Rev. No.: 0	Sheet No.: 26 of 29

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	24423	19319	18156	16562	14381	15355	17533
N	9.3E-04	1.4E-03	1.5E-03	1.8E-03	2.1E-03	1.9E-03	1.6E-03
NNW	9.4E-04	1.4E-03	1.5E-03	1.7E-03	2.1E-03	1.9E-03	1.6E-03
NW	8.5E-04	1.3E-03	1.4E-03	1.6E-03	1.9E-03	1.8E-03	1.5E-03
WNW	6.7E-04	1.0E-03	1.1E-03	1.3E-03	1.5E-03	1.4E-03	1.2E-03
W	7.8E-04	1.2E-03	1.3E-03	1.5E-03	1.8E-03	1.7E-03	1.4E-03
WSW	4.1E-04	6.3E-04	7.0E-04	8.0E-04	9.8E-04	8.9E-04	7.3E-04
SW	4.3E-04	6.4E-04	7.1E-04	8.1E-04	9.9E-04	9.0E-04	7.5E-04
SSW	5.6E-04	8.1E-04	8.8E-04	1.0E-03	1.2E-03	1.1E-03	9.3E-04
S	8.3E-04	1.2E-03	1.3E-03	1.5E-03	1.9E-03	1.7E-03	1.4E-03
SSE	7.5E-04	1.1E-03	1.2E-03	1.4E-03	1.7E-03	1.6E-03	1.3E-03
SE	1.6E-03	2.4E-03	2.6E-03	2.9E-03	3.5E-03	3.3E-03	2.7E-03
ESE	3.2E-03	4.6E-03	5.0E-03	5.6E-03	6.7E-03	6.2E-03	5.2E-03
E	2.9E-03	4.2E-03	4.5E-03	5.1E-03	6.1E-03	5.6E-03	4.7E-03
ENE	9.5E-04	1.4E-03	1.5E-03	1.7E-03	2.1E-03	1.9E-03	1.6E-03
NE	6.2E-04	9.3E-04	1.0E-03	1.2E-03	1.4E-03	1.3E-03	1.1E-03
NNE	4.9E-04	7.4E-04	8.1E-04	9.2E-04	1.1E-03	1.0E-03	8.5E-04

	Distance (m)						
Direction	14219	15914	19847	28334	27804	25173	22955
N	2.1E-03	1.8E-03	1.4E-03	7.0E-04	7.2E-04	8.1E-04	1.1E-03
NNW	2.1E-03	1.8E-03	1.4E-03	7.0E-04	7.2E-04	8.2E-04	1.1E-03
NW	2.0E-03	1.7E-03	1.2E-03	6.4E-04	6.6E-04	7.5E-04	9.7E-04
WNW	1.6E-03	1.3E-03	9.8E-04	5.1E-04	5.2E-04	5.9E-04	7.7E-04
W	1.8E-03	1.6E-03	1.1E-03	6.0E-04	6.1E-04	7.0E-04	8.9E-04
WSW	9.9E-04	8.5E-04	6.1E-04	3.2E-04	3.3E-04	3.7E-04	4.7E-04
SW	1.0E-03	8.6E-04	6.2E-04	3.3E-04	3.4E-04	3.9E-04	4.8E-04
SSW	1.2E-03	1.1E-03	7.7E-04	4.4E-04	4.5E-04	5.2E-04	6.2E-04
S	1.9E-03	1.6E-03	1.2E-03	6.5E-04	6.7E-04	7.6E-04	9.4E-04
SSE	1.7E-03	1.5E-03	1.1E-03	5.8E-04	6.0E-04	6.8E-04	8.6E-04
SE	3.6E-03	3.1E-03	2.3E-03	1.3E-03	1.3E-03	1.5E-03	1.9E-03
ESE	6.8E-03	5.9E-03	4.4E-03	2.5E-03	2.6E-03	2.9E-03	3.6E-03
E	6.2E-03	5.4E-03	4.0E-03	2.2E-03	2.3E-03	2.5E-03	3.2E-03
ENE	2.1E-03	1.8E-03	1.3E-03	7.3E-04	7.5E-04	8.4E-04	1.1E-03
NE	1.4E-03	1.2E-03	9.0E-04	4.8E-04	4.9E-04	5.5E-04	7.1E-04
NNE	1.1E-03	9.7E-04	7.1E-04	3.7E-04	3.8E-04	4.3E-04	5.6E-04

Maximum Dose rate ESE 3-18-98

Mar 18, 1998 11:30 am

SUMMARY
Page 7

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)	
Direction	27523	30977
N	7.2E-04	6.2E-04
NNW	7.3E-04	6.3E-04
NW	6.7E-04	5.7E-04
WNW	5.3E-04	4.5E-04
W	6.2E-04	5.3E-04
WSW	3.3E-04	2.8E-04
SW	3.4E-04	2.9E-04
SSW	4.6E-04	3.9E-04
S	6.8E-04	5.8E-04
SSE	6.1E-04	5.2E-04
SE	1.3E-03	1.1E-03
ESE	2.6E-03	2.3E-03
E	2.3E-03	2.0E-03
ENE	7.6E-04	6.5E-04
NE	5.0E-04	4.3E-04
NNE	3.8E-04	3.3E-04

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Direction	Distance (m) 24423	19319	18156	16562	14381	15355	17533
N	1.2E-08	1.8E-08	2.0E-08	2.3E-08	2.7E-08	2.5E-08	2.1E-08
NNW	1.2E-08	1.8E-08	2.0E-08	2.2E-08	2.7E-08	2.5E-08	2.1E-08
NW	1.1E-08	1.6E-08	1.8E-08	2.1E-08	2.5E-08	2.3E-08	1.9E-08
WNW	8.6E-09	1.3E-08	1.4E-08	1.6E-08	2.0E-08	1.8E-08	1.5E-08
W	1.0E-08	1.5E-08	1.7E-08	1.9E-08	2.3E-08	2.1E-08	1.8E-08
WSW	5.3E-09	8.1E-09	8.9E-09	1.0E-08	1.3E-08	1.1E-08	9.4E-09
SW	5.5E-09	8.3E-09	9.1E-09	1.0E-08	1.3E-08	1.2E-08	9.6E-09
SSW	7.1E-09	1.0E-08	1.1E-08	1.3E-08	1.6E-08	1.4E-08	1.2E-08
S	1.1E-08	1.6E-08	1.7E-08	2.0E-08	2.4E-08	2.2E-08	1.8E-08
SSE	9.7E-09	1.4E-08	1.6E-08	1.8E-08	2.2E-08	2.0E-08	1.7E-08
SE	2.1E-08	3.1E-08	3.4E-08	3.8E-08	4.6E-08	4.2E-08	3.5E-08
ESE	4.2E-08	5.9E-08	6.4E-08	7.2E-08	8.6E-08	7.9E-08	6.7E-08
E	3.7E-08	5.4E-08	5.8E-08	6.6E-08	7.8E-08	7.2E-08	6.1E-08
ENE	1.2E-08	1.8E-08	2.0E-08	2.2E-08	2.6E-08	2.4E-08	2.0E-08
NE	8.0E-09	1.2E-08	1.3E-08	1.5E-08	1.8E-08	1.6E-08	1.4E-08
NNE	6.2E-09	9.5E-09	1.0E-08	1.2E-08	1.4E-08	1.3E-08	1.1E-08

Direction	Distance (m) 14219	15914	19847	28334	27804	25173	22955
N	2.8E-08	2.4E-08	1.8E-08	9.0E-09	9.2E-09	1.0E-08	1.4E-08
NNW	2.7E-08	2.4E-08	1.7E-08	9.1E-09	9.3E-09	1.1E-08	1.4E-08
NW	2.5E-08	2.2E-08	1.6E-08	8.2E-09	8.4E-09	9.6E-09	1.3E-08
WNW	2.0E-08	1.7E-08	1.3E-08	6.5E-09	6.7E-09	7.6E-09	9.9E-09
W	2.4E-08	2.0E-08	1.5E-08	7.6E-09	7.8E-09	9.0E-09	1.1E-08
WSW	1.3E-08	1.1E-08	7.8E-09	4.1E-09	4.2E-09	4.8E-09	6.1E-09
SW	1.3E-08	1.1E-08	7.9E-09	4.2E-09	4.3E-09	5.0E-09	6.2E-09
SSW	1.6E-08	1.4E-08	9.9E-09	5.7E-09	5.8E-09	6.6E-09	8.0E-09
S	2.4E-08	2.1E-08	1.5E-08	8.4E-09	8.6E-09	9.8E-09	1.2E-08
SSE	2.2E-08	1.9E-08	1.4E-08	7.5E-09	7.7E-09	8.8E-09	1.1E-08
SE	4.6E-08	4.0E-08	3.0E-08	1.6E-08	1.7E-08	1.9E-08	2.4E-08
ESE	8.7E-08	7.6E-08	5.7E-08	3.2E-08	3.3E-08	3.7E-08	4.7E-08
E	7.9E-08	6.9E-08	5.2E-08	2.8E-08	2.9E-08	3.3E-08	4.2E-08
ENE	2.7E-08	2.3E-08	1.7E-08	9.4E-09	9.6E-09	1.1E-08	1.4E-08
NE	1.8E-08	1.6E-08	1.2E-08	6.1E-09	6.3E-09	7.1E-09	9.2E-09
NNE	1.5E-08	1.2E-08	9.2E-09	4.7E-09	4.8E-09	5.5E-09	7.2E-09

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)	
Direction	27523	30977
N	9.3E-09	8.0E-09
NNW	9.4E-09	8.1E-09
NW	8.6E-09	7.3E-09
WNW	6.8E-09	5.8E-09
W	7.9E-09	6.8E-09
WSW	4.2E-09	3.6E-09
SW	4.4E-09	3.7E-09
SSW	5.9E-09	5.0E-09
S	8.7E-09	7.4E-09
SSE	7.8E-09	6.7E-09
SE	1.7E-08	1.5E-08
ESE	3.4E-08	2.9E-08
E	2.9E-08	2.5E-08
ENE	9.7E-09	8.4E-09
NE	6.4E-09	5.5E-09
NNE	4.9E-09	4.2E-09

Attachment Seven

IDW Coordinator Postion Description

Training Position Description (TPD)
(Secondary)

PosID: NEW

Position Title: Investigative Derived Waste (IDW) Coordinator

Name of Employees in Position:

HID	Name
0055085	SCHILPEROORT, BRADLEY D.

Responsibilities of Position:

This position is secondary to the primary functions of the individuals listed above. The position functions as the oversight and controller of all investigative derived waste storage locations.. It is responsible for the receipt and management of waste for storage, inspections, maintenance scheduling, housekeeping, inventories, and daily operation of the IDW storage area.

Entry Level Education and Experience:

This position requires 3 years of experience in waste management or a position furnishing technical assistance to waste management and a thorough knowledge federal and state laws, and BHI procedures that govern the management of IDW waste. Must also be familiar with the management requirements for CERCLA and RCRA Past Practice wastes.

Mandated Training:

ClassID	Name
000002	HGET
020001	RAD WORKER II
020003	RAD WORKER II - Retraining
031220	40 HR HAZ WASTE WORKER
032020	8 HR HAZ WASTE REFRESHER TRAINING
031310	8 HR WASTE SUPERVISOR TRAINING

Directed Training

+

ClassID	Name
020159	ADV. 2 - HAZARDOUS WASTE SHIPPER CERT.
020089	ADV. 3 - RADIOACTIVE WASTE SHIPPER CERT.
035010	WASTE DESIGNATION SUPPORT
105010	100N FACILITY ORIENTATION
105006	STANDARD FIRST AID
105013	CPR
056002	BHI WASTE MANAGEMENT (FS-03 Procedure W-001)

Attachment Eight

Waste Transporters Position Description

Training Position Description

PosID: 171 **Revision Date:** 10/14/97

Position Title: WASTE TRANSPORTATION SPECIALIST

Name of Employees In Position:

HID	Name		
0092537	BIDSTRUP, ROBERT H	53	FIELD SUPPORT
0064466	EHLIS, JEFFREY J	53	FIELD SUPPORT
0055060	GANA, ROBERT G	53	FIELD SUPPORT
0088347	HARDING, EDWARD M	53	FIELD SUPPORT
0059707	HARROW, DAVID A	53	FIELD SUPPORT
0024678	HUFF, PATRICIA K	53	FIELD SUPPORT
0045578	MCCALL, BRIAN W	53	FIELD SUPPORT
0056247	NEWMAN, PATRICIA A	53	FIELD SUPPORT

Responsibilities of Position:

1. Responsible for the preparation, scheduling and coordination of waste, hazardous materials shipments.

2. Prepare required transportation and disposal documentation for the movement and disposal of allhazardous materials, including Radioactive Shipping Records, Onsite Waste Tracking Forms, and Uniform Hazardous Manifests.

3. Interface with projects, other functional organizations, customer representatives, and regulators on technical issues when requested.

4. Preparation of Site Specific Waste Management Instructions (SSWMIs) for projects and waste handling/generating activities as required. Provides site waste handling direction to projects as necessary.

5. Train waste handling personnel during pre-job briefings and/or at the Plan of the Day meeting to the requirements of SSWMIs and other waste handling criteria as necessary.

6. Ensure wastes are compliant and packaged in accordance with the waste accpetance criteria for the designated waste disposal facility.

7. Ensure wastes are transported in identified regulatory and procedurally compliant containers and vehicles in a manner consistent with Federal and State laws, DOE orders, and BHI procedures.

Entry Level Education and Experience Requirements:

Training Position Description

PosID: 171 **Revision Date:** 10/14/97

Position Title: WASTE TRANSPORTATION SPECIALIST

Shipper certification for hazardous and radioactive materials and hazardous waste. A recognized degree in a scientific

Mandated Training:

ClassID	Name
105012	FACILITY EMERGENCY INFO TRAINING CHECKLIST
000002	HGET
020064	MOD 1 BASIC HAZARDOUS MATERIAL TRAINING
020059	MOD 3 BASIC RADIOACTIVE MATERIAL TRAINING
020702	RAD WORKER I & II REFRESHER TRAINING
105650	RAD WRKR ERC REFRESHER TRAINING

Directed Training:

ClassID	Name
105010	100N FACILITY ORIENTATION
031110	24 HOUR HAZARDOUS WASTE TSD WORKER
032020	8 HR HAZARDOUS WASTE REFRESHER TRAINING
105130	CONFINED SPACE TRAINING
105013	CPR
105155	DEVELOPING AND CONDUCTING PRE-JOB/POD
105160	HAZARD ANALYSIS TRAINING FOR FIELD ENGINEERS (PKG)
105135	LOCK & TAG HAZARDOUS ENERGY CONTROL
170610	QTRC - AHERA CERTIFIED BUILDING INSPECTOR REFRESH
020003	RAD WORKER II RETRAINING
020001	RAD WORKER II TRAINING - INITIAL
105650	RAD WRKR ERC REFRESHER TRAINING
020032	SCOTT SKAPAK AIRLINE SYSTEM
105006	STANDARD FIRST AID
105162	TASK INSTRUCTION - OJT
105085	WORK CONTROL TRAINING

ERC Training Completion Roster

Environmental Excellence
HANFORD

Time: 01100
Date: 2/21/98

Course Name: SSWMI N-Springs Pump + Treat System (100 area) Location: ground water
Course Number: 0052270 Initial: ✓ Recert: Course Length: 1 hr.

Please Complete/Correct all Columns

	HID No. Found on Training Card	Last Name (print)	Initials	Signature	Company	Supervisor Name
1	0024678	HUFF	PKH	Patti Huff	BHI	B. Schilperoort
2						
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Authorized Authenticator J.W. Lawson (print) Phone 373-1915 MSIN X1-86

Authorized Authenticator John W. Lawson (signature) Date 3/11/98

*NOTE: Subcontractor will use Social Security Number. All ERC Team personnel will use HID number

When completed please send to:

ERC Training H0-08
375-9428

PLL UP 007 REV 3 (06/1/97)

ERC Training Completion Roster

HANFORD

Course Name: SSWMI 100-HR-3

Course Number: _____ Initial: _____ Recert: _____

Time: 0800

Date: 2/23/98

Location: ground water

Course Length: .5 hr.

Please Complete/Correct all Columns

	HID No. Found on Training Card	Last Name (print)	Initials	Signature	Company	Supervisor Name
1	0024678	HUFF	PKH	Patti Huff	BHI	B. Schilperoort
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Authorized Authenticator J.W. Lawson (print) Phone 373-1915 MSIN X1-86

Authorized Authenticator John W. Lawson (signature) Date 3/11/98

*NOTE: Subcontractor will use Social Security Number. All ERC Team personnel will use HID number

When completed please send to:

ERC Training H0-08
375-9428

RLI HR 007 REV 3 (06/1/97)

ERC Training Completion Roster

Environmental Excellence
HANFORD

Course Name: SSWMI - Installation of Sample tubes along the Columbia River shoreline Rev 0.
Course Number: _____ Initial: _____ Recert: _____

Time: 01000
Date: 2/21/98
Location: ground water
Course Length: 1 hr

Please Complete/Correct all Columns

	HID No. Found on Training Card	Last Name (print)	Initials	Signature	Company	Supervisor Name
1	0024678	HUFF	PKH	Patti Huff	BHI	B. Schilperoort
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Authorized Authenticator J.W. Lawson (print) Phone 373-1915 MSIN X1-86

Authorized Authenticator John W. Lawson (signature) Date 3/11/98

*NOTE: Subcontractor will use Social Security Number. All ERC Team personnel will use HID number

When completed please send to:

ERC Training H0-08
375-9428

PNL HP 007 REV 2 (06/1/97)

ERC Training Completion Roster

Environmental Excellence
HANFORD

Course Name: SSWMI 100-KR-4 operable unit rev 0
Course Number: _____ Initial: ✓ Recert: _____

Time: 0900
Date: 2/21/98
Location: ground water
Course Length: .5 hr

Please Complete/Correct all Columns

	HID No. Found on Training Card	Last Name (print)	Initials	Signature	Company	Supervisor Name
1	0024678	HUFF	PKH	Patti Huff	BHI	B. Schilperoort
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Authorized Authenticator J.W. Lawson (print) Phone 373-1915 MSIN X1-86

Authorized Authenticator John W. Lawson (signature) Date 3/11/98

*NOTE: Subcontractor will use Social Security Number. All ERC Team personnel will use HID number

When completed please send to:

ERC Training H0-08
375-9428

ERC Training Completion Roster

Environmental Excellence
HANFORD

Time: 12:00
Date: 2/20/98
Course Name: SSWMI Well decommisioning, Maintenace + Sampling Rev0
Location: ground water
Course Number: _____ Initial: ✓ Recert: _____ Course Length: 1 hr.

Please Complete/Correct all Columns

	HID No. Found on Training Card	Last Name (print)	Initials	Signature	Company	Supervisor Name
1	0024678	HUFF	PKH	Patti Huff	BHI	B. Schilperoort
2						
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Authorized Authenticator J.W. LAWSON (print) Phone 373-1915 MSIN X1-86

Authorized Authenticator John W. Lawson (signature) Date 3/11/98

*NOTE: Subcontractor will use Social Security Number. All ERC Team personnel will use HID number

When completed please send to:

ERC Training H0-08
375-9428

ERC Training Completion Roster

Environmental Excellence
HANFORD

Course Name: SSWMI-200up-1 Rev 1
Course Number: _____ Initial: ✓ Recert: _____

Time: 10:00
Date: 2/20/98
Location: ground water
Course Length: 1 hr.

Please Complete/Correct all Columns

	HID No. Found on Training Card	Last Name (print)	Initials	Signature	Company	Supervisor Name
1	0024678	HUFF	PKH	Pauli Huff	BHI	B. Schilperoort
2						
3						
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Authorized Authenticator J. W. Lawson (print) Phone 373-1915 MSIN X1-86

Authorized Authenticator John W. Lawson (signature) Date 3/11/98

*NOTE: Subcontractor will use Social Security Number. All ERC Team personnel will use HID number

When completed please send to:

ERC Training H0-08
375-9428

PUL HP 007 REV 2 (06/1/97)

ERC Training Completion Roster

HANFORD

Course Name: Waste Control Plan 200ZP-1 + 200ZP-2 operable units

Course Number: _____ Initial: ✓ Recert: _____

Time: 0930

Date: 2/20/98

Location: ground water

Course Length: .5 hr

Please Complete/Correct all Columns

	HID No. Found on Training Card	Last Name (print)	Initials	Signature	Company	Supervisor Name
1	0024678	HUFF	PKH	Patti Huff	BHI	B. Schilperoort
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Authorized Authenticator J. W. Lawson (print) Phone 373-1915 MSIN X1-86

Authorized Authenticator John W. Lawson (signature) Date 3/11/98

*NOTE: Subcontractor will use Social Security Number. All ERC Team personnel will use HID number

When completed please send to:

ERC Training H0-08
375-9428

ERC Training Completion Roster

Environmental Excellence
HANFORD

Course Name: SSWMI 200ZP-1 Site rev 0
Course Number: _____ Initial: ✓ Recert: _____

Time: 11:00
Date: 2/20/98
Location: ground water
Course Length: 1 hr.

Please Complete/Correct all Columns

	HID No. Found on Training Card	Last Name (print)	Initials	Signature	Company	Supervisor Name
1	0024678	HUFF	PKH	Patti Huff	BHI	B. Schilperoort
2						
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Authorized Authenticator J. W. Lawson (print) Phone 373-1915 MSIN X1-86

Authorized Authenticator John W. Lawson (signature) Date 3/11/98

*NOTE: Subcontractor will use Social Security Number. All ERC Team personnel will use HID number

When completed please send to:

ERC Training H0-08
375-9428

BHI HR 007 REV 3 (06/1/97)

Attachment Nine

Inspection Criteria for Hazardous/Dangerous Waste Storage Areas

INSPECTION CRITERIA FOR HAZARDOUS/DANGEROUS WASTE STORAGE AREAS

Note: This inspection should be used with the attachment, (Containerized Waste Inspection Criteria)

Date:	Status		
Time:	NO NOTED PROBLEMS	REQUIRED REMEDIAL ACTIONS/DATE	SEE COMMENTS
1. LOCATION			
A. Physically located within the waste site boundaries	☐	☐ _____	☐
B. Signs/Postings	☐	☐ _____	☐
2. CONTAINER CONDITION			
A. Structural Condition	☐	☐ _____	☐
B. Interim Control Labels	☐	☐ _____	☐
C. Hazardous Waste Labels	☐	☐ _____	☐
D. Major Risk Labels/Waste Codes	☐	☐ _____	☐
E. Compatibility/Segregation	☐	☐ _____	☐
F. Liquid Waste	☐	☐ _____	☐
G. Aisle Space	☐	☐ _____	☐
H. Container closed if not adding/removing waste	☐	☐ _____	☐
I. Inventory Information and PIN numbers	☐	☐ _____	☐
3. SAFETY/EMERGENCY EQUIPMENT			
A. Eye Wash/Safety Shower	☐	☐ _____	☐
B. Fire Extinguisher	☐	☐ _____	☐
C. Spill Response Equipment	☐	☐ _____	☐

4. COMMENTS

5. INSPECTOR

_____
Printed Name Date

_____
Signature Date

Attachment Ten

Sample Label

EFSG-94-0204

HAZARDOUS WASTE - F001

PIN _____

Attachment Eleven

ERDF Explanation of Significant Differences (excerpt)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10, HANFORD PROJECT OFFICE
712 Swift Boulevard, Suite 5
Richland, Washington 99352

UNITED STATES DEPARTMENT OF ENERGY
RICHLAND OPERATIONS OFFICE
P.O. Box 550
Richland, Washington 99352

WASHINGTON STATE DEPARTMENT OF ECOLOGY
1315 W. 4th Avenue
Kennewick, Washington 99336-6018

USDOE Environmental Restoration Disposal Facility, Hanford Site, Benton County, Washington Explanation of Significant Difference (ESD)

INTRODUCTION

Site Name and Location

USDOE Environmental Restoration Disposal Facility (ERDF), Hanford Site, Benton County, Washington

Lead and Support Agencies

The U.S. Environmental Protection Agency (EPA) is the lead regulatory agency on ERDF, the U.S. Department of Energy (DOE) is lead agency for operation and management of ERDF, and Washington State Department of Ecology (Ecology) is the support agency (the Tri-Parties).

Statutory Citation for an ESD

In Section 117(c) of the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA), provisions are made for addressing and documenting changes to the selected remedy that occur after the Record of Decision (ROD) is signed. This ESD documents the changes to the selected remedy in accordance with CERCLA Section 117(c). Additionally, since significant, non-fundamental changes are being made to the original remedy, documentation procedures specified by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Section 300.435(c)(2)(i), have been followed.

Need for ESD

The ROD for the ERDF provides for disposal of remediation waste from CERCLA past-practice units.

variety of treatability test wastes have been generated from the evaluation of potential cleanup alternatives. These investigation-derived wastes (IDW) include drilling muds, cuttings from test pit and well installation; purge water, soil and other materials from collection of samples; residues (e.g., ash, spent carbon) from testing of treatment technologies; miscellaneous treatability test and investigative equipment such as piping, tanks, etc.; contaminated personal protective equipment (PPE); and solutions (aqueous or otherwise) used to decontaminate non-disposable protective clothing and equipment. IDW is currently being stored in drums at a central area within the operable unit boundaries. Many of these drums have been stored in this manner since the beginning of the operable unit investigations. With the exception of liquid-bearing IDW, most of these wastes meet the ERDF waste acceptance criteria. Liquid-bearing IDW can generally be processed via stabilization, evaporation, or other methods to satisfy the ERDF waste acceptance criteria.

Disposal options have been evaluated as part of the 100 Area and 300 Area operable unit feasibility studies. The 100 Area and 300 Area RODs that have been issued specify that the ERDF is the selected disposal site for waste generated during cleanup activities. IDW generated during investigations of the operable units is similar in nature and contamination to the remedial action waste. This ESD clarifies that investigation-derived wastes that have been generated during RCRA Facility Investigation/Corrective Measures Studies or from CERCLA Remedial Investigation/Feasibility Studies in the 100 and 300 Areas may be placed in the ERDF provided the waste acceptance criteria are met. This would provide for safe and environmentally protective disposal of this material. No additional regulatory decision document is necessary.

Limited evaluations have been completed for operable units within the 200 Area. The 200-ZP-1 Record of Decision does not specifically address IDW disposal. IDW for 200-ZP-1 shall be addressed with the remedial design documentation for that action. The remainder of the IDW stored within the 200 Area totals approximately 500 cubic yards. This material consists primarily of PPE and drill cuttings from well installation. The Tri-Parties believe that this waste would be more safely managed by disposing of the material in ERDF. The IDW shall meet the established waste acceptance criteria for the ERDF prior to disposal. No additional regulatory decision document is necessary.

Investigation-derived waste generated during future activities will be addressed as part of the "Strategy for Management of Investigation-Derived Waste". This document is included in Appendix F of the Tri-Party Agreement. Decisions concerning the disposition of IDW generated as part of future investigations or treatability studies shall be addressed in future RI/FS and RFI/CMS work plans and CERCLA proposals and decision documents.

Decontamination and Decommissioning Wastes. On May 22, 1995, the Department of Energy (DOE) and the EPA issued a joint nationwide policy pertaining to the decommissioning of DOE facilities under CERCLA. This policy establishes a framework for conducting such actions, and generally commits to utilization of the CERCLA process in situations where the building or structure contains a hazardous substance posing a substantial threat of a release into the environment. The DOE is undertaking a variety of activities that will be subject to this policy, including the stabilization and transition of several buildings and structures on the Hanford site. It is anticipated that these decommissioning actions will generate wastes consisting of radioactively or chemically contaminated construction debris such as concrete, rebar, steel plate, timbers, etc. Additionally, decommissioning activities may generate waste streams consisting of materials such as contaminated piping and tanks associated with operations formerly conducted in the facilities.

Attachment Twelve

200-ZP-1 Remedial Design Report (excerpt)

DOE/RL-96-07
Rev. 0

200-ZP-1 IRM Phase II and III Remedial Design Report

Date Published
June 1996

United States
Department of Energy
P.O. Box 550
Richland, Washington 99352

U.S. Environmental Protection Agency's (EPA) Offsite Rule (40 CFR 300.440) concerning offsite disposal of wastes.

4.2.1 Filtered Solids

Treatment system filters collect two types of waste: heavy particles as a sludge and fine particulates within the filter elements. Because they are contaminated with groundwater that is designated as a listed waste, the filtered solids are designated under the dangerous waste regulations as a listed waste. The sludge will be transported into a sludge storage tank. Fine particles collect on filters located in the filter housings; the filter elements will be removed from the filter housings and replaced at prescribed intervals. Filtered solids will be field sampled to determine whether they meet the ERDF waste acceptance criteria, treated as necessary, and disposed of at the ERDF. It is anticipated that the filtered solids will meet the ERDF criterion for carbon tetrachloride without further treatment. Treatment, consisting of passive evaporation, might be required to ensure that the solids do not contain free liquids.

4.2.2 Granular Activated Carbon

Because saturated (spent) GAC is contaminated with groundwater that is designated as a listed waste, the spent GAC is designated under the dangerous waste regulations as a listed waste. Spent GAC will be sampled to determine whether it meets the ERDF waste acceptance criteria for carbon tetrachloride. If it does, and if it is determined that the ERDF prohibition on organic wastes does not include GAC, it will be disposed of onsite at the ERDF. If the spent GAC does not meet the ERDF criteria, it will either be sent offsite to a permitted *Resource Conservation and Recovery Act* (RCRA) treatment, storage, and disposal facility for regeneration or regenerated onsite. The determination of the disposal option will be made following a technical evaluation of regeneration methods and a cost-benefit analysis. Regeneration onsite would require removing (e.g., vacuuming) the spent GAC from the canisters in which it is contained and treating to remove carbon tetrachloride and other organics from the carbon matrix. Onsite regeneration would be required to meet all substantive requirements for onsite treatment of dangerous waste and air emissions control.

4.2.3 Drill Cuttings and Solid Wastes

Drill cuttings and other solid wastes (e.g., soil samples, pumps, contaminated tools) have been or will be generated to support 200-ZP-1 investigations, treatability tests, technology demonstrations, and remedial actions. The drill cuttings and any solid wastes that contacted contaminated groundwater or soil containing carbon tetrachloride vapor are designated as a listed waste. The drill cuttings and contaminated solid wastes will be disposed of at the ERDF. In addition, 200-ZP-2 drill cuttings and associated waste will be managed similar to the 200-ZP-1 waste.

Drill cuttings and other contaminated solid waste will be treated as necessary before disposal to ensure that they meet ERDF waste acceptance criterion prohibiting free liquids. It is expected that treatment of saturated cuttings will require decanting water from the soils, evaporation by removing the lids to drums, and/or the addition of sorbent material to the soils, to meet the ERDF criterion. Evaporation will not result in any discharge of VOCs at levels that could endanger workers or that would exceed any environmental release limits. After free liquids are removed, it is anticipated that drill cuttings and other solid waste will meet the ERDF criterion for carbon tetrachloride.

4.2.4 Liquid Wastes

Contaminated water might be generated if saturated soils are decanted. In addition, purgewater will be generated during well installation, development, testing, and monitoring. An environmentally protective method of disposing of any decanted water or purgewater would be to process it through the 200-ZP-1 treatment system. Contaminated water from decanting will be processed at the 200-ZP-1 treatment system. Purgewater will be processed at the 200-ZP-1 treatment system if technically feasible. If not technically feasible, purgewater will continue to be managed at the Hanford Site purgewater tanks.

4.2.5 Uncontaminated Wastes

Any investigation- and remediation-derived wastes that did not contact any process streams and that are not otherwise contaminated shall be disposed of as solid waste at an approved solid waste landfill. Examples of this waste include gloves, tape, sampling equipment, and paper.

4.3 ROUTINE INSPECTIONS

Routine inspections of the equipment, facilities, operations, and procedures will be conducted, per Phase II/III operating and calibration procedures, by ERC personnel. Inspection schedules will be developed based on the requirements of WAC 173-303 and an evaluation of the rate of possible equipment deterioration and the probability of an environmental or human health incident. Appropriate inspection records will be prepared and retained to document the findings and recommended and implemented corrective actions resulting from the routine inspections.

4.4 MONITORING PROGRAM

Operation of the Phase II and III treatment system will include periodic monitoring of systems and equipment, as well as performance and aquifer response monitoring as described in Chapter 7.0.