U.S. Department of Energy
Office of River Protection
P.O. Box 450, MSIN H6-60
Richland, Washington 99352

0066155

AUG 0 8 2005

05-ED-061

Mr. Jeff KenKnight, Unit Manager
Office of Air Quality
U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, OAQ-107
Seattle, Washington 98081

Mr. A.W. Conklin, Head
Air Emissions and Defense
Waste Section
State of Washington
Department of Health
P.O. Box 47827
Olympia, Washington 98504

Addressees:

RADIOACTIVE AIR EMISSIONS NOTICE OF CONSTRUCTION (NOC) APPLICATION FOR OPERATION OF THE INTEGRATED DISPOSAL FACILITY (IDF), REVISION 0A

Reference: CH2M HILL letter from E. S. Aromi to R. J. Schepens, ORP, "Radioactive Air Emissions Notice of Construction Application for Operation of the Integrated Disposal Facility," CH2M-0500734, dated March 15, 2005.

Attached for your review and approval is Revision 0A of the radioactive air emissions NOC application for operation of the IDF. The State of Washington Department of Health did not approve the exemption listed in Appendix C of the original NOC application (Reference). Revision 0A incorporates the change to the annual possession quantity and emission release rates attributed to the addition of the immobilized low-activity waste containers. This revision replaces the previously submitted application for operation of the IDF.

This NOC is being submitted in accordance with Washington Administrative Code 246-247, "Radiation Protection Air Emissions," and Title 40, Code of Federal Regulations, Part 61, "National Emission Standards for Hazardous Air Pollutants."

If you have any questions, please contact me, or your staff may contact Dennis W. Bowser, Environmental Division, (509) 373-2566.

Sincerely,

Roy J. Schepens
Manager

ED:DWB

Attachment

cc w/attach:
O. S. Wang, Ecology
D. Zhen, EPA
K. A. Peterson, FHI
J. J. Martell, WDOH Richland Office (2 copies)
Administrative Record
CH2M Correspondence Control

cc w/o attach:
B. Erlandson, BNI
L. E. Borneman, CH2M HILL
D. J. Carrell, CH2M HILL
C. J. Kemp, CH2M HILL
K. S. Tollefson, CH2M HILL
J. Cox, CTUIR
S. Harris, CTUIR
J. L. Hensley, Ecology
D. Bartus, EPA c/o Ecology
G. Bohnee, NPT
K. Niles, Oregon Energy
L. A. Huffman, RL
M. F. Jarvis, RL
R. Jim, YN
R. Lee, YN

Attachment
05-ED-061

Radioactive Air Emissions Notice of Construction Application for the Operation of the Integrated Disposal Facility, Revision 0A

RADIOACTIVE AIR EMISSIONS NOTICE OF CONSTRUCTION APPLICATION FOR THE OPERATION OF THE INTEGRATED DISPOSAL FACILITY, REVISION 0A

Author Name:
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EnergX, LLC for CH2M HILL Hanford Group, Inc.

CH2MHILL
Hanford Group, Inc.
Post Office Box 1500
Richland, Washington 99352

Contract No.: DE-AC27-99RL14047

INTRODUCTION

This document serves as a notice of construction application, in accordance with *Washington Administrative Code* 246-247, "Radiation Protection – Air Emissions" (WAC 246-247-060), and as a request for approval to modify pursuant to Title 40, *Code of Federal Regulations*, Part 61, "National Emissions Standards for Hazardous Air Pollutants," (40 CFR 61.07) for the Integrated Disposal Facility.

The Integrated Disposal Facility is a new mixed low-level waste and low-level waste landfill that supports the Hanford Site environmental remediation activities. The Integrated Disposal Facility consists of an expandable, lined landfill in a series of near-surface disposal cells that will be developed in phases located in the 200 East Area on the Hanford Site. The Integrated Disposal Facility will consist of two disposal cells, Cell 1 and Cell 2, for the disposal of mixed low-level waste and low-level waste. Cell 1 will be utilized for mixed low-level waste consisting of immobilized low-activity waste packages from the Waste Treatment and Immobilization Plant, immobilized low-activity waste containers from the Demonstration Bulk Vitrification System, and mixed low-level waste generated by the operation of the Integrated Disposal Facility. Cell 2 will be utilized for the disposal of low-level waste. The Integrated Disposal Facility will function as follows:

It will provide an approved disposal facility for the permanent, environmentally safe disposition of the following waste forms:

- Vitrified immobilized low-activity waste packages from the Waste Treatment and Immobilization Plant

- Low-level waste

- Vitrified immobilized low-activity waste containers from the Demonstration Bulk Vitrification System

- Newly generated Integrated Disposal Facility operations waste.

The facility will meet environmental requirements and be approved by the U.S. Department of Energy and the State of Washington, Department of Ecology.

The total effective dose equivalent from all of calendar year 2003 Hanford Site air emissions (point sources as well as diffuse and fugitive sources) was 0.022 mrem, as reported in DOE/RL-2004-09, *Radionuclide Air Emissions Report for the Hanford Site, Calendar Year 2003*. The emissions resulting from the activities covered by this notice of construction should not exceed the national emission standard of 10 mrem/yr found in 40 CFR 61, Subpart H. The total effective dose equivalent for each calendar year from these and other tank farm activities is reported in DOE/RL-2004-09 and evaluated for compliance annually, per the *Hanford Site Air Operating Permit*, Department of Ecology Publication Number 00-05-006 (Ecology 2001), along with other site contractors' activities to ensure compliance with the National Emission Standard of 10 mrem/yr (40 CFR 61, Subpart H) for the Hanford Site.

The Integrated Disposal Facility operations potential-to-emit is estimated to result in a total effective dose equivalent to the hypothetical maximally exposed individual of 4.85×10^{-1} mrem/yr. There is no abated potential-to-emit total effective dose equivalent to the maximally exposed individual. The Integrated Disposal Facility used a release fraction that took into account the use of vents with high efficiency particulate air filters for low-level waste containers and calculated the emissions for the Integrated Disposal Facility as a 200 Area Diffuse and Fugitive Emission unit.

This notice of construction also provides notification of anticipated initial start-up, in accordance with 40 CFR 61.09(a)(1). It is requested that approval of this notice of construction will also constitute U.S. Environmental Protection Agency acceptance of the initial start-up notification. Written notification of the actual date of initial start-up, in accordance with 40 CFR 61.09(a)(2), will be provided at a later date.

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ABBREVIATIONS AND ACRONYMS

ALARA	as low as reasonably achievable
ALARACT	As Low As Reasonably Achievable Control Technology
ANSI	American National Standards Institute
APQ	annual possession quantity
ASME	American Society of Mechanical Engineers
BARCT	best available radionuclide control technology
CFR	*Code of Federal Regulations*
DBVS	Demonstration Bulk Vitrification System
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
Ecology	State of Washington, Department of Ecology
HEPA	high efficiency particulate air
IDF	Integrated Disposal Facility
ILAW	immobilized low-activity waste
LLW	low-level waste
MEI	maximally exposed individual
MLLW	mixed low-level waste
MPR	maximum public receptor
NOC	notice of construction
PTE	potential-to-emit
QA	quality assurance
RCW	*Revised Code of Washington*
SEPA	*State Environmental Policy Act*
TEDE	total estimated dose equivalent
TRU	transuranic
WAC	*Washington Administrative Code*
WDOH	Washington State Department of Health
WTP	Waste Treatment and Immobilization Plant

UNITS

ac	acres
Ci	curies
Ci/m^3	curies per cubic meter
Ci/yr	curies per year
ft	feet
ft^3	cubic feet
m	meters
m^3/sec	cubic meters per second

mrem	millirem
mrem/hr	millirem per hour
mrem/yr	millirem per year
nCi/g	nanocuries per gram
pCi/L	picocuries per liter

Table 1. Metric Conversion Chart

Into metric units			Out of metric units		
If you know	Multiply by	To get	If you know	Multiply by	To get
Length			Length		
inches	25.40	millimeters	millimeters	0.0393	inches
inches	2.54	centimeters	centimeters	0.393	inches
feet	0.3048	meters	meters	3.2808	feet
yards	0.914	meters	meters	1.09	yards
miles	1.609	kilometers	kilometers	0.62	miles
Area			**Area**		
square inches	6.4516	square centimeters	square centimeters	0.155	square inches
square feet	0.092	square meters	square meters	10.7639	square feet
square yards	0.836	square meters	square meters	1.20	square yards
square miles	2.59	square kilometers	square kilometers	0.39	square miles
square feet	2.2957E-05	acres	acres	4.356E+04	square feet
acres	0.404	hectares	hectares	2.471	acres
Mass (weight)			**Mass (weight)**		
ounces	28.35	grams	grams	0.0352	ounces
pounds	0.453	kilograms	kilograms	2.2046	pounds
short ton	0.907	metric ton	metric ton	1.10	short ton
Volume			**Volume**		
fluid ounces	29.57	milliliters	milliliters	0.03	fluid ounces
quarts	0.95	liters	liters	1.057	quarts
gallons	3.79	liters	liters	0.26	gallons
cubic feet	0.03	cubic meters	cubic meters	35.3147	cubic feet
cubic yards	0.76456	cubic meters	cubic meters	1.308	cubic yards
Temperature			**Temperature**		
Fahrenheit	subtract 32 then multiply by 5/9ths	Celsius	Celsius	multiply by 9/5ths, then add 32	Fahrenheit

Source: *Engineering Unit Conversions*, (Lindeburg 1990)

1.0 FACILITY NAME AND LOCATION

Name and address of the facility and location (latitude and longitude) of the emission unit(s).

The Integrated Disposal Facility (IDF) is located at:

U.S. Department of Energy, Office of River Protection
Hanford Site
200 East Area Tank Farms
Richland, Washington 99352

The IDF is located in the Hanford 200 East Area on a 170 acre parcel located north of 1st Avenue and south of 4th Street, between the Plutonium-Uranium Extraction Plant and the 200 East Area Power Plant. The easternmost boundary of the IDF is approximately halfway between Canton Avenue and Baltimore Avenue, with the southern boundary at 1st Street.

Figure 1 is a map of the Hanford Site and Figure 2 is a map of the IDF (DOE/RL-2003-12, *Hanford Facility Dangerous Waste Permit Application, Integrated Disposal Facility*).

The coordinates of the IDF are as follows:

Table 2. Facility Location

Latitude	Longitude
46°33'20"N	119°31'24"W

Figure 1. The Hanford Site

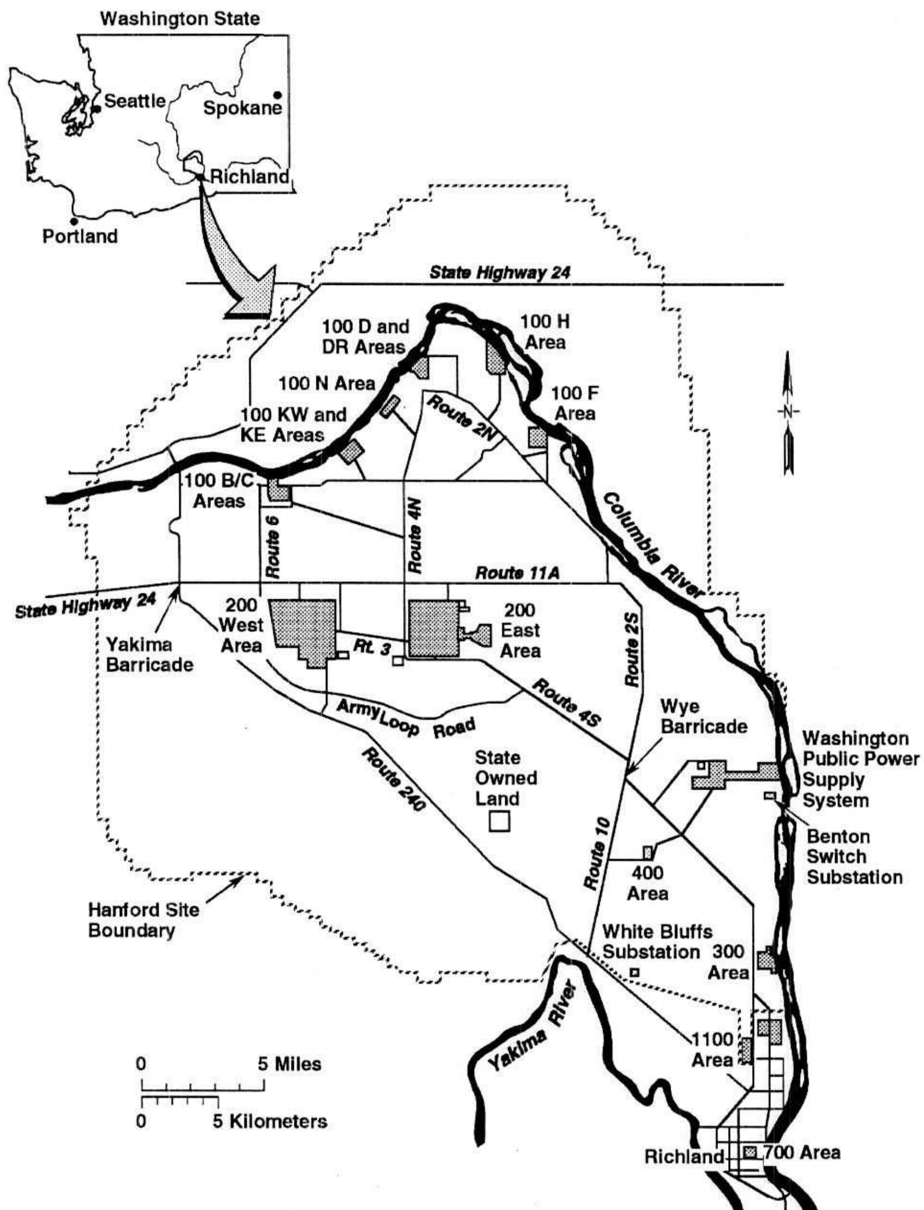
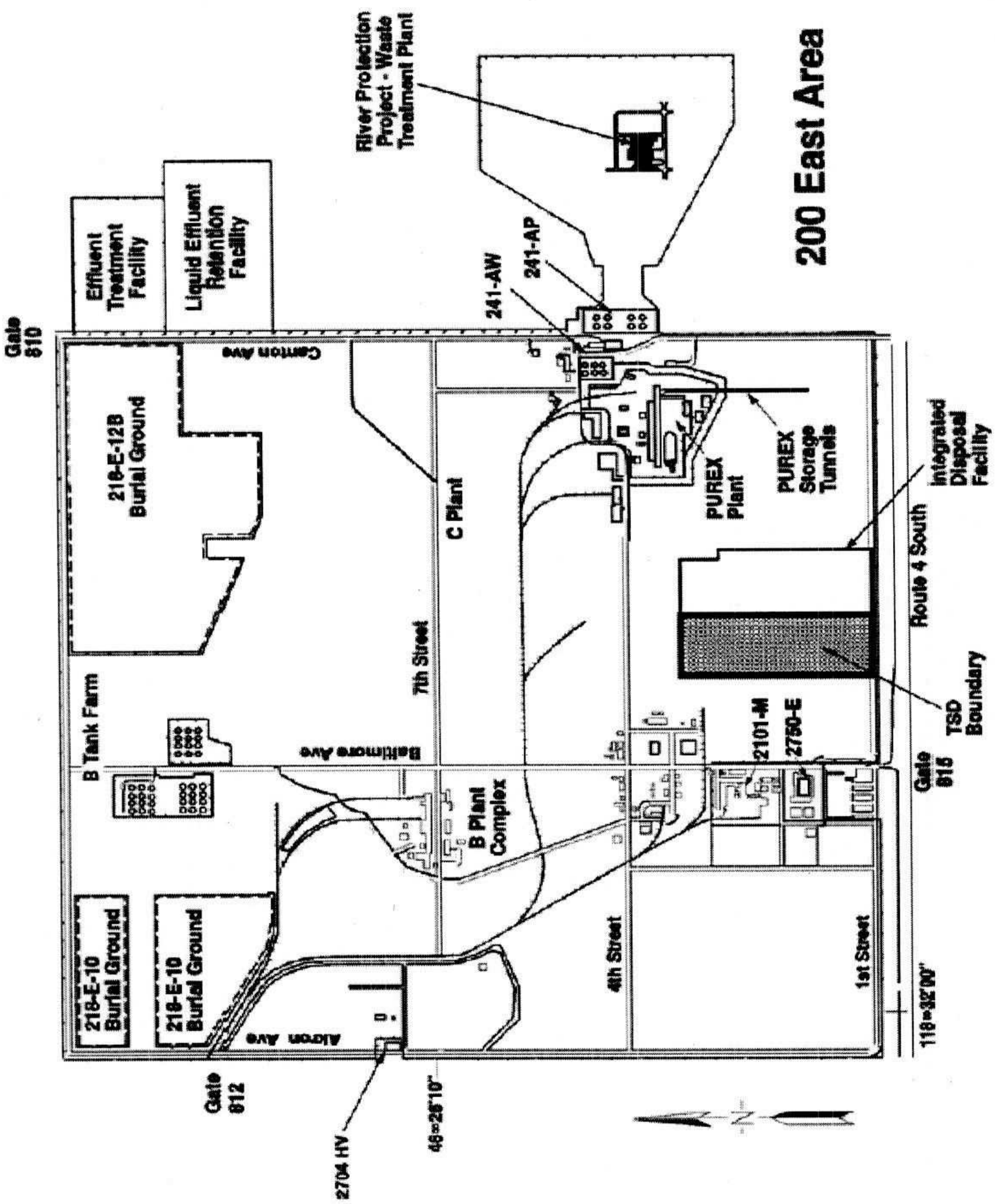


Figure 2. Integrated Disposal Facility on the Hanford Site



2.0 RESPONSIBLE MANAGER

Name, title, address, and phone number of the responsible manager.

R. J. Schepens, Manager
U.S. Department of Energy, Office of River Protection
Post Office Box 450
Richland, Washington 99352-0450
(509) 376-6677

3.0 PROPOSED ACTION

Identify the type of proposed action for which this application is submitted: (a) Construction of new emission unit(s); (b) Modification of existing emission unit(s); identify whether this is a significant modification – significant means the potential-to-emit airborne radioactivity at a rate that could increase the TEDE to the MEI by at least 1 mrem/yr as a result of the proposed modification; (c) Modification of existing unit(s), unregistered.

This document is submitted in accordance with *Washington Administrative Code* (WAC) 246-247, "Radiation Protection-Air Emissions," [WAC 246-247-110(3)(b)] as a notice of construction (NOC) application for a new emission unit(s) at the Hanford Site. This new activity will be a diffuse and fugitive insignificant emission unit, because the potential-to-emit (PTE) airborne radioactivity is estimated to be at a rate that would not increase the total estimated dose equivalent (TEDE) to the maximally exposed individual (MEI) by at least 1 mrem/yr.

The U.S. Department of Energy (DOE), through the Office of River Protection (ORP), is constructing the Waste Treatment and Immobilization Plant (WTP) to treat Hanford Site tank waste. Immobilized low-activity waste (ILAW) produced by the WTP is to be permanently disposed of via near-surface disposal on the Hanford Site. To address ILAW disposal, the Immobilized Tank Waste Storage and Disposal Program created the IDF. In its original conception, known as Project W-520, the facility was to handle ILAW packages only and consist of a network of individual trenches, developed in phases over the course of the ILAW package generation and disposal. This concept was updated to allow other waste forms to be disposed at the IDF, thus integrating disposal of several waste types and sources into a single facility.

Included in the IDF scope are ILAW package transportation, receipt, unloading, placement in a disposal cell, and periodic backfill of the disposal cell. Also included are receipt, unloading, placement, and periodic backfill of ILAW containers from the Demonstration Bulk Vitrification System (DBVS), newly generated IDF operations waste, and low-level waste (LLW) from Hanford Site sources.

The proposed action is to operate the IDF as a mixed low-level waste (MLLW) and LLW landfill in support of the Hanford Site environmental remediation activities. The IDF consists of structures, systems, and components necessary for onsite transportation of ILAW to the designated disposal cell and subsequent long-term ILAW isolation in a safe, environmentally compliant manner. The IDF includes disposal cells, leachate handling and storage facilities, and infrastructure improvements. The IDF will consist of two disposal cells, Cell 1 and Cell 2, for the disposal of MLLW and LLW. Cell 1 will be utilized for MLLW waste consisting of ILAW packages from the Waste Treatment Plant, ILAW containers from the DBVS, and MLLW generated by the operation of the IDF. Cell 2 will be utilized for the disposal of LLW.

The IDF disposal mission components are as follows:

Receive compliant WTP ILAW packages, DBVS ILAW containers, newly generated IDF operations waste, and LLW.

Transport the ILAW packages in a designed or procured transportation system to the IDF.

Provide an approved, permanent disposal facility for the long-term, safe disposition of WTP ILAW packages, Demonstration Bulk Vitrification System ILAW containers, and newly generated IDF operations waste that meets environmental protection requirements, as dictated by the DOE and the State of Washington, Department of Ecology (Ecology).

Provide an approved, permanent disposal facility for the long-term, safe disposition of LLW that meets environmental protection requirements as dictated by the DOE.

Operate the IDF during receipt of WTP ILAW packages, DBVS ILAW containers, newly generated IDF operations waste, and LLW, and secure the packages in preparation for long-term disposal.

Provide for package retrieval, as necessary, during landfill operations.

Provide for a disposal facility closure technique that stabilizes the IDF and protects the environment and the public from inadvertent exposure.

4.0 STATE ENVIRONMENTAL POLICY ACT

If this project is subject to the requirements of the State Environmental Policy Act (SEPA) contained in chapter 197-11 WAC, provide the name of the lead agency, lead agency contact person, and their phone number.

The proposed action is categorically exempt from the requirements of the *State Environmental Policy Act* (SEPA) under WAC 197-11, "SEPA Rules" (WAC 197-11-845, "Department of Social and Health Services").

5.0 CHEMICAL AND PHYSICAL PROCESSES

Describe the chemical and physical processes upstream of the emission unit(s).

The IDF will provide for disposal of two types of waste: LLW and MLLW. MLLW includes ILAW (WTP ILAW and DBVS ILAW) and newly generated IDF operations waste.

MLLW and LLW cells in the IDF have equally sized ultimate capacities of 450,000 m^3 ($1.50x10^{+7}$ ft^3) each, for the full IDF build out capacity of 9000,000 m^3 ($3.18x10^{+7}$ ft^3) (RPP-21633, "Preliminary Closure Plan for the Integrated Disposal Facility"). The IDF is expandable up to the full build out capacity. Expansion is dependant upon waste generation and waste generation forecasts. Leachate generation and associated management of the leachate are minimized by the expansion approach.

The forecasted volumes of MLLW from WTP ILAW and DBVS vitrified ILAW waste processes were derived from ORP-11242, *River Protection Project System Plan* as follows:

- 352,000 m^3 ($1.24x10^{+6}$ ft^3) of ILAW packages

The remaining capacity will be used for the newly generated IDF operations waste and will act as a buffer for the two cells' overall capacity, should it be required. The estimate for the MLLW generated from operation of the IDF is unknown; however, based on engineering judgment, the yearly amount would not be significant. The 450,000 m^3 ($1.59x10^{+7}$ ft^3) capacity of Cell 1 and associated ILAW volumes are listed as information only regarding the exemption request presented in Appendix C. This value is used as a bounding volume for calculating the ILAW radiological air emissions.

5.1 CHEMICAL

5.1.1 Low-Level Waste

Low-level radioactive waste is not spent nuclear fuel, transuranic (TRU) waste, high-level radioactive waste, byproduct material (as defined in Section 11e (2) of the *Atomic Energy Act of 1954*), or naturally occurring radioactive material (DOE Order , *Radioactive Waste Management)*. Both contact-handle and remote-handle LLW will be disposed at the IDF.

Low-Level Waste Category I: This waste contains radioactivity not classified as spent nuclear fuel, TRU waste, or high-level waste. LLW Category I waste also meets the radionuclide limits for Category I waste defined in HNF-EP-0063 *Hanford Site Solid Waste Acceptance Criteria*. This waste may be comprised of either contact-handle or remote-handle waste considered low-activity waste with very low concentrations of long-lived radionuclides.

Low-Level Waste Category III: This waste also contains radioactivity not classified as spent nuclear fuel, TRU waste, or high-level waste. In addition, it exceeds the radionuclide limits for Category I waste and meets the Category III limits defined in HNF-EP-0063. This waste may be comprised of either contact-handle or remote-handle waste considered moderate-activity to high-activity waste with low to moderate concentrations of long-lived radionuclides, in stabilized form that minimizes subsistence for a period of 1,000 years.

5.1.2 Mixed Low-Level Waste

MLLW is a dangerous, extremely hazardous, or acutely hazardous waste that contains LLW. Contact-handle MLLW has a dose rate equal to or less than 200 mrem/h and contains radioactivity not classified as spent nuclear fuel or TRU waste. Remote-handle MLLW has a dose rate greater than 200 mrem/h and contains radioactivity not classified as spent nuclear fuel, TRU waste, or high-level waste.

5.1.3 Newly Generated Integrated Disposal Facility Operations Waste

Newly generated IDF operations waste is potentially dangerous, mixed, or LLW generated from the operations of the IDF that could include: personal protective equipment, rags, waste material from the maintenance of equipment or vehicles, and waste generated at the leachate waste treatment facility that is returned to the IDF for disposal.

5.1.4 Low-Level Waste and Mixed Low-Level Waste Containers and Packaging

The packages for waste shall meet applicable federal transportation regulations under Title 49, *Code of Federal Regulations* (49 CFR) container requirements for the hazard class/division of the waste, except that packaging for onsite transfers under an approved package-specific safety document might be allowed where cost or technical constraints make the use of a U.S. Department of Transportation (DOT) compliant package unfeasible. Outer containers shall be in good condition, with no visible cracks, holes, dents, bulges, pit or scale corrosion, or other damage that could compromise container integrity, in compliance with WAC 173-303, "Dangerous Waste Regulations." Minor external surface rust that can be sanded or brushed off will be acceptable. Containers having some pit or scale corrosion could be acceptable for storage provided the integrity of the container is confirmed.

MLLW generated from IDF operations will consist of 208 liter drums, medium boxes, small boxes, long equipment containers, and other containers. MLLW is defined as dangerous or hazardous waste in WAC 173-303, and therefore should be disposed in Cell 1.

LLW will be shipped primarily in 208 liter drums, 322 liter drums, other drums, MB-V boxes, medium boxes, small boxes, and other containers. LLW is not a dangerous or hazardous waste as defined in WAC 173-303, and therefore should be disposed in Cell 2. However, because the volume of remote-handle LLW is expected to be small, remote-handle LLW may be disposed in Cell 1 along with remote-handle MLLW. This would avoid the need to set up remote handling operations in both Cell 1 and Cell 2, and will provide greater flexibility for LLW disposal operations in Cell 2.

5.1.5 Immobilized Low-Activity Waste

WTP – ILAW: MLLW includes the low-activity waste fraction of the Hanford Site tank waste that is immobilized in a glass matrix at the WTP.

Other ILAW Streams – DBVS: MLLW that contains the low-activity fraction of the Hanford Site tank waste immobilized in a glass matrix is produced by the DBVS.

ILAW Containers and Packaging: The ILAW package shall be compatible with crane lifting and movement. The package shall be equipped with lifting and other handling apparatus designed to allow safe lifting, movement, and stacking of the packages when fully loaded. The package shall maintain its integrity during handling, transportation, and lifting during disposal at the IDF.

The WTP ILAW packages are stainless steel cylinders that have been filled with vitrified low-activity waste, which is physically similar to molten glass, then sealed and cooled. These packages will be remote-handled. The DBVS containers, also known as vitrification boxes, are filled with material similar to the material in the ILAW packages. The ILAW and DBVS packages will be disposed in Cell 1.

5.2 PHYSICAL PROCESS

5.2.1 Facility

The IDF consists of an expandable, lined landfill in a series of near-surface disposal cells that will be developed in phases located in the 200 East Area on the Hanford Site. The landfill will be divided lengthwise into two distinct cells, Cell 1 for disposal of MLLW and Cell 2 for disposal of LLW. The IDF is designed to provide an approved disposal facility for the permanent, environmentally safe disposition of ILAW, newly generated IDF operations waste and LLW that meets the environmental requirements and is approved by the DOE and Ecology, as shown in Figure 3 (H-2-*830828, IDF Cells 1 and 2 – Site and Access Plan, Integrated Disposal Facility Design Drawing Set, February 2004*).

The IDF is designed for ILAW package transportation, receipt, unloading, emplacement in a disposal cell, and periodic backfill of the disposal cell. Also included are receipt, unloading, emplacement, and periodic backfill of DBVS containers, newly generated IDF operations waste, and LLW from Hanford Site sources. In the initial phase of the IDF, the volume of remote-handle LLW is projected to be very small. Rather than set up a separate remote-handle operation for this small volume of LLW, remote-handle LLW may be placed in the cell with remote-handle MLLW.

Disposal cells are installed in a sequential manner and are aligned within the disposal site in a north-south orientation to minimize impact to the aquifer beneath the site. The cells have separate leachate collection, handling, and storage systems to maintain waste separation, as shown in Figure 4 (H-2-830830, *IDF Cells 1 and 2 – Grading and Drainage Plan, Integrated Disposal facility Design Drawing Set, February 2004*).

Figure 3. Integrated Disposal Facility Cells 1 and 2 – Site and Access Plan

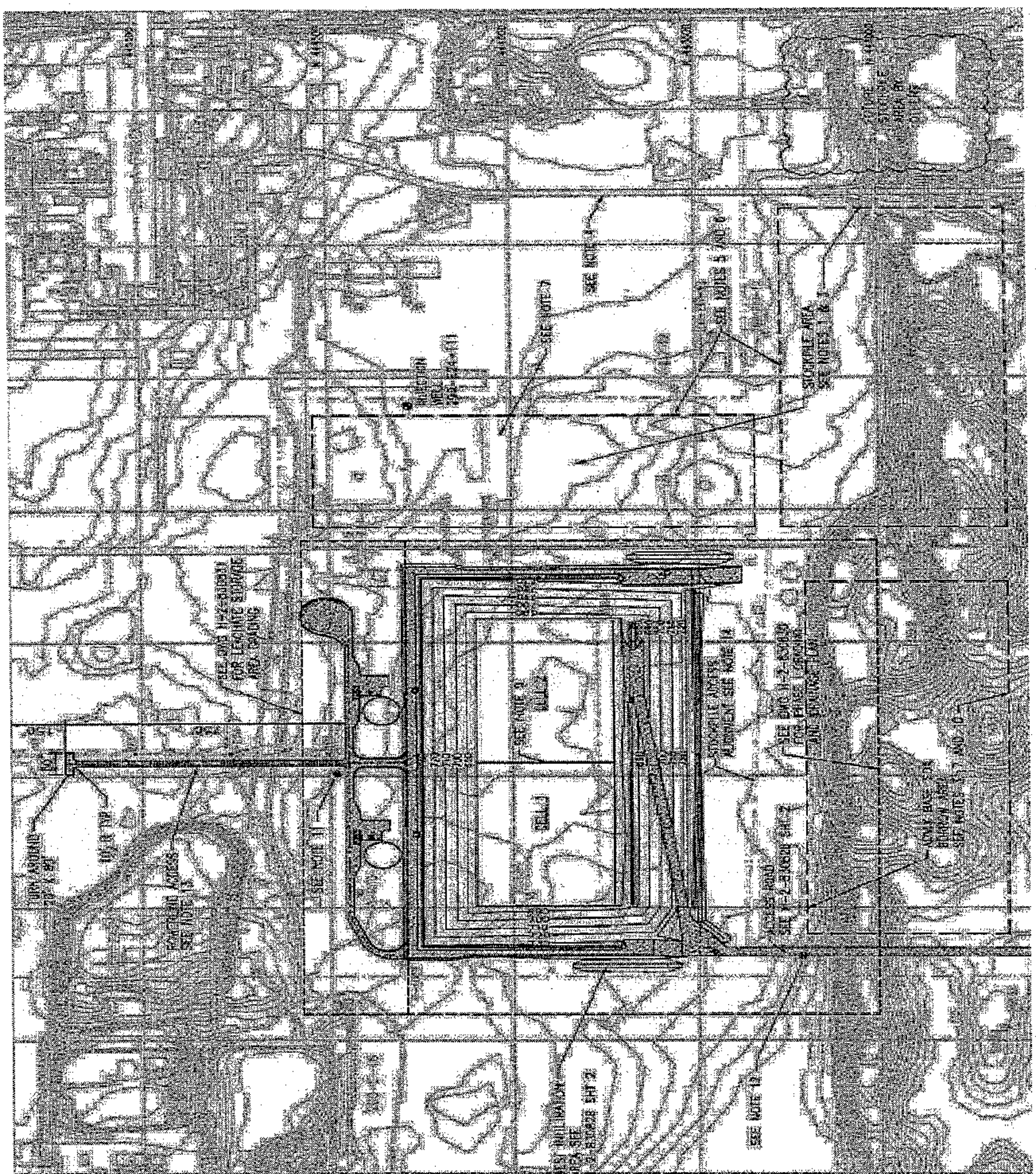
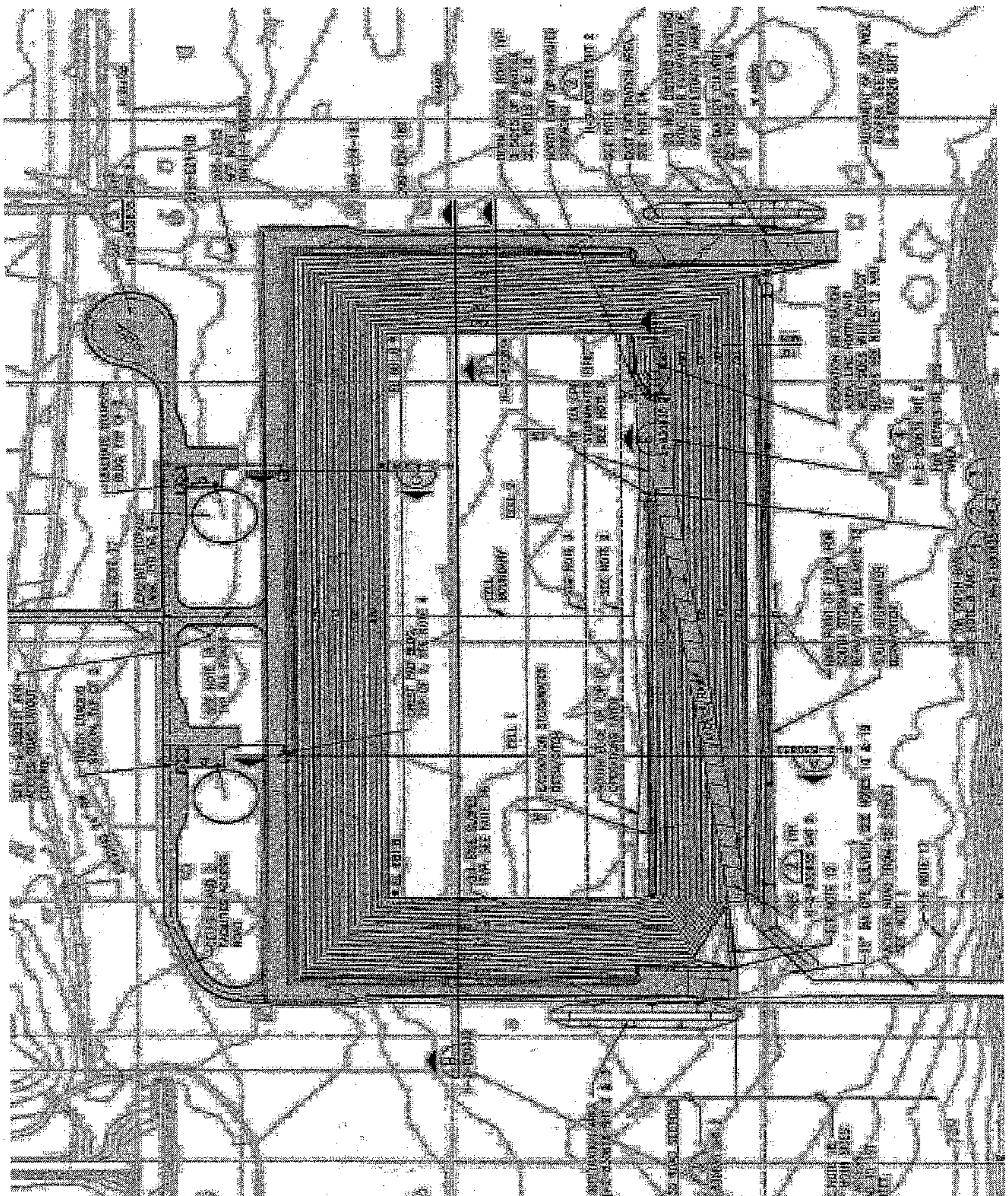


Figure 4. Integrated Disposal Facility Cells 1 and 2 – Grading and Drainage Plan



Two cells will be constructed in the first phase of the IDF, Cell 1 (west half) and Cell 2 (east half). Each cell is approximately 3.2 hectares (8 ac) in size, and when fully developed, the completed IDF will occupy approximately 25 hectares (62 ac) Subsequent phase development of the IDF will connect to the southern edge of Cells 1 and 2 such that the bottom grades are continuous between cells.

Support facilities, such as changing rooms, a lunchroom, and offices, will be provided for IDF personnel. Changing facilities for male and female personnel will be furnished with lockers, showers, restroom facilities, benches, and both clean and dirty laundry storage. The building also will contain office space and a control room, and is planned to be a radiologically clean facility.

5.2.2 Transport Operations

ILAW: The ILAW packages will be transported from the WTP and DBVS to the IDF by the onsite, DOT compliant transportation system. The recommended mode of transport is a commercially available tractor/trailer combination capable of hauling ILAW packages in a DOT-compliant, shielded overpack. The configuration required will depend on the total weight and weight distribution relative to the axles to insure the axle load limitations for roadway use are not exceeded.

LLW and MLLW: Various transport vehicles will be used to transport other wastes to the IDF. Commercially available tractor/trailer combinations typically will be used for LLW. LLW will be transported from various locations within the Hanford Site. Container sizes and shapes will vary but are expected to be mostly rectangular or drums of standard sizes. The timing and frequency of delivery to the IDF will vary, depending on operations and waste generation rates from the facilities where these wastes are generated. Transport to the IDF site for disposal will be coordinated with IDF transport operations to avoid conflicts or disruptions to IDF transport schedules, which will take precedence.

5.2.3 Receiving Operations

Upon arrival at the IDF, the loaded transporter will proceed through the disposal site gate and stop at the receiving station. The receiving station will be provided by the operations contractor.

At the receiving station, the shipping documents will be verified and the packages will be inspected. The operation concepts for the arrival activity will include:

> The truck driver will present shipping documents to facility operations personnel at the receiving station. A shift supervisor or quality control inspector will verify that the shipping documents are acceptable.
>
> After shipping documents are verified and the transporter passes inspection, the loaded transporter will be released to travel to the full trailer staging area for cooling, as needed.

Cool-Down Staging Area – ILAW: When the ILAW packages are received for transportation, they may still be at elevated temperatures. Because of possible elevated temperature, operations restrictions will be in place during transportation and prior to disposal in the IDF. Once the ILAW package is received at the IDF, the full trailer will be staged in a designated area within Cell 1 over the bottom liner in a place where trailer storage will not interfere with other IDF operations. This area will be moved from time to time, to avoid interference with the waste disposal operations.

5.2.4 Waste Placement

ILAW: After the ILAW package has cooled sufficiently, the trailer will be moved to an appropriate unloading position in Cell 1. Once in position, a crawler crane will be used to move the ILAW package from the transportation container into the designated disposal location within the disposal cell.

Periodically, after emplacement of approximately 81 ILAW packages, the crawler crane must move to a new unloading station. Void-fill operations will be performed by a mobile crane after the crawler crane moves to a new unloading position.

LLW and MLLW: Unloading and placement of remote-handle MLLW and LLW will be done using a crane. Unloading and placement of contact-handle MLLW and LLW will be done using a crane or other appropriate equipment.

General Waste Placement and Layer Construction Procedures: The IDF configuration is based on four layers with a uniform height of 3.3 m (10.8 ft) (2.3 m [7.5 ft] ILAW package plus 1 m [3.3 ft] operations layer). Waste containers other than the ILAW packages will be variable height and will be placed in the 3.3 m (10.8 ft) high layers to achieve best use of space. Containers may be stacked on top of each other within each layer if adequate soil cover is provided over the containers. Additional waste container stability analyses will have to be done by the operations contractor to verify waste placement and backfill stability for stacked containers. Containers that have a height greater than the 3.3 m (10.8 ft) layer height will be allowed to project out of the top of the layer. In such cases, it may be necessary to mound cover soil around the individual projecting containers to provide sufficient cover for shielding until they are completely covered by subsequent layers.

Because of the large area available for waste disposal in each cell, flexibility to relocate filling operations to another area within each cell will exist if an event occurs that causes operations to temporarily halt placement of ILAW packages or other waste containers at the current working position. This will allow waste container placement to continue while the situation that caused the operations to cease is resolved. See Figure 5 (H-2-830832, *IDF Cells 1 and 2 – Grading and Drainage Sections, 200 East Area Integrated Disposal (IDF) Detailed Design Drawings, February 2004*).

ILAW: Two basic configurations were developed. Both make use of ecology block shield walls to shield the crane operator from exposure to the ILAW packages, with one using a temporary shield wall and the other using a permanent shield wall. Both of the basic ILAW package configurations include two variations. One variation is a grid pack arrangement of the ILAW packages and the other variation is a tight pack arrangement.

Temporary Shield Wall Configuration: The ILAW package configurations that use a temporary shield wall will require that cover soil be placed over and around the ILAW packages prior to removing the shield wall. This soil cover will have to include the side of the ILAW packages facing the temporary shield wall so that after the wall is removed, the soil will provide the shielding for equipment operators and other operations personnel.

Permanent Shield Wall Configuration: By leaving the ecology block shield wall in place, the wide area between the ILAW packages and the shield wall for the cover soil to slope to the ground can be eliminated. The ILAW package configurations that use a permanent shield wall will allow ILAW packages to be placed up close to the wall, thereby making better use of the available space in the landfill.

Grid Pack and Tight Pack Arrangements: With the grid pack array, the ILAW packages will be placed in a close packed square arrangement. The grid pack array consists of four packages in the array, which is square in shape with a base dimension of slightly over 0.6 m (2 ft). With the tight pack array, the ILAW packages will be placed in a close packed triangular arrangement. The tight pack array consists of three packages in the array, which is triangular in shape with an altitude dimension of approximately 0.5 m (1.5 ft).

LLW and MLLW: Packaging emplacement configurations will depend on opening size and volume of interstitial spaces between LLW and any MLLW containers from IDF operations and on configuration of the containers and the placement of the containers relative to one another. The placement of the containers will be carefully planned to efficiently pack the containers into the smallest volume possible, and to avoid large interstitial spaces.

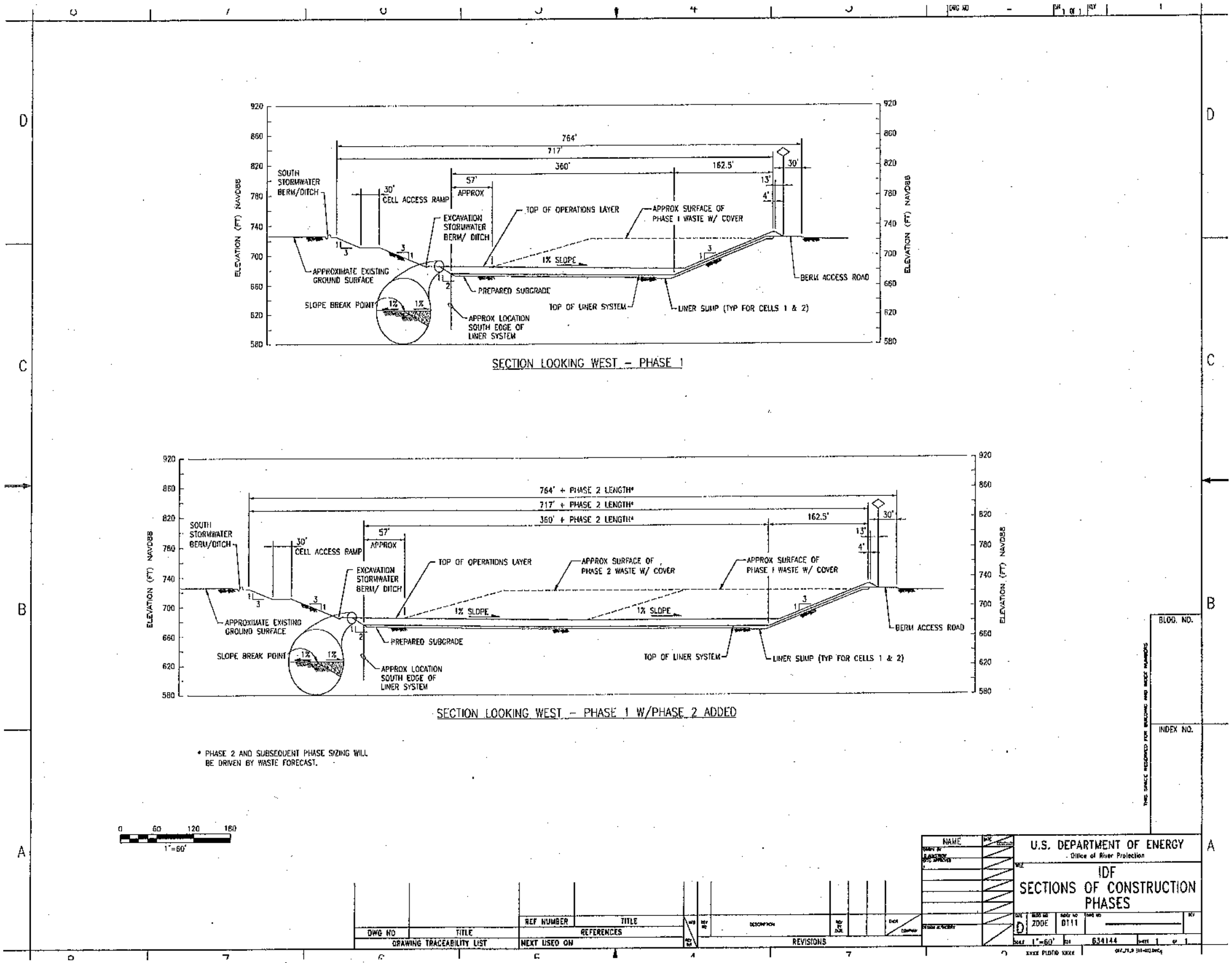


Figure 5. Integrated Disposal Facility Cross Section Dimension

5.2.5 Backfill Operations

The general approach to calculating backfill quantities uses a volume of fill to waste ratio of 1.5 to 1.

Radiation exposure assessment evaluations have determined that 0.5 m (1.5 ft) of soil cover placed over the ILAW packages with a crane prior to operation of equipment on the cover soil will provide adequate radiation shielding to equipment operators. The surface of the initial 0.5 m (1.5 ft) layer will be smoothed and leveled with a bulldozer to facilitate subsequent compaction and placement of the final lift.

After completion of the partial placement of the operations layer with the mobile crane, placement of the operations layer to the full 1 m (3.3 ft) depth will be completed using a loader, dump truck, bulldozer, and compactor. The specific movements and activities of earthmoving equipment will be based on disposal cell configuration plans and elevation monuments established prior to initiating a new layer.

Compaction of the initial 0.5 m (1.5 ft) of the operations layer and placement of the remainder of the operations layer will not take place in the active array in which packages are being placed. Rather, the remainder of operations layer placement will take place in the previous array of ILAW packages so that there will be a placed and partially covered array of ILAW packages in place to stabilize and support the bulldozer. In addition, compaction of the initial 0.5 m (1.5 ft) of operations layer should not take place until all the voids between the permanent shield wall and the ILAW packages have been filled, and the initial 0.5 m (1.5 ft) of the operations layer has been placed in the active array of ILAW packages to provide shielding from the ILAW packages for the bulldozer operator. Compaction of the first 0.5 m (1.5 ft) layer of cover soil placed by the mobile crane and smoothed by the dozer should be accomplished with a vibratory roller. The vibrations of the compactor will help to fill voids that may have occurred during interstitial space filling by promoting cover soil to flow into the voids. As cover soil is moved into the voids below, additional soil placement will be required to replace the migrating material. This material should be the same low moisture content, low fines content sand from the onsite soil source as that used for interstitial fill. The remaining thickness of cover fill, up to the full 1 m (3.3 ft) thickness, will be placed by a bulldozer operating on top of the layer and compacted with a vibratory roller. The soil for this upper layer should include a higher fines content of up to 25 percent, and should be placed and compacted at or slightly below optimum moisture content.

In general, the loader, which will be stationed at the soil stockpile, will fill a dump truck. The dump truck will deliver cover soil to a location near the package array to be covered. The bulldozer then will spread the soil over the package array to the full 1 m (3.3 ft) depth.

A water truck will be provided for compaction and dust control. The truck will be operated as needed to spray water for compaction and to suppress dust by driving to a location safe for the operator to spray water over the cover material being compacted. In addition to dust control and compaction within the trench, an operations dust control plan will be developed to cover other areas within the boundary of the IDF.

A temporary rain curtain may be used to control the amount of clean stormwater run-off that enters the leachate collection system. The rain curtain can be used in areas where no ILAW packages have been placed or in the areas where ILAW packages and the full 1 m (3.3 ft) operations layer have been placed. The rain curtain would be removed prior to placing additional waste in the area that it covered.

5.2.6 Leachate Handling Systems

The Leachate Handling Systems shall be designed to segregate MLLW leachate generated in Cell 1 from the LLW leachate generated in Cell 2. The Leachate Handling System shall be designed to manage the leachate generated from a 25 year, 24 hour storm event collected over the entire footprint of the landfill.

The leachate handling system design shall also comply with the following technical requirements:

> The landfill shall control water that contacts waste through physical barriers and collection through the leachate collection system. This system shall collect, pump, and store any water that migrated through the landfill and shall provide systems for loading leachate into transport trucks. Leachate meeting the treatment facility waste acceptance criteria shall be transported by truck for storage at the treatment facility. The leachate will then be transferred for treatment. Any leachate not meeting treatment facility waste acceptance criteria will be handled on a case-by-case basis and will be handled, stored, and disposed in accordance with federal and state regulations.

Figures 6 and 7 on the following pages provide more details on the leachate system and the transfer from collection system to tanks and from the tanks to the tanker truck (DOE/RL-2003-12).

Figure 6. Integrated Disposal Facility Leachate Collection and Recovery System

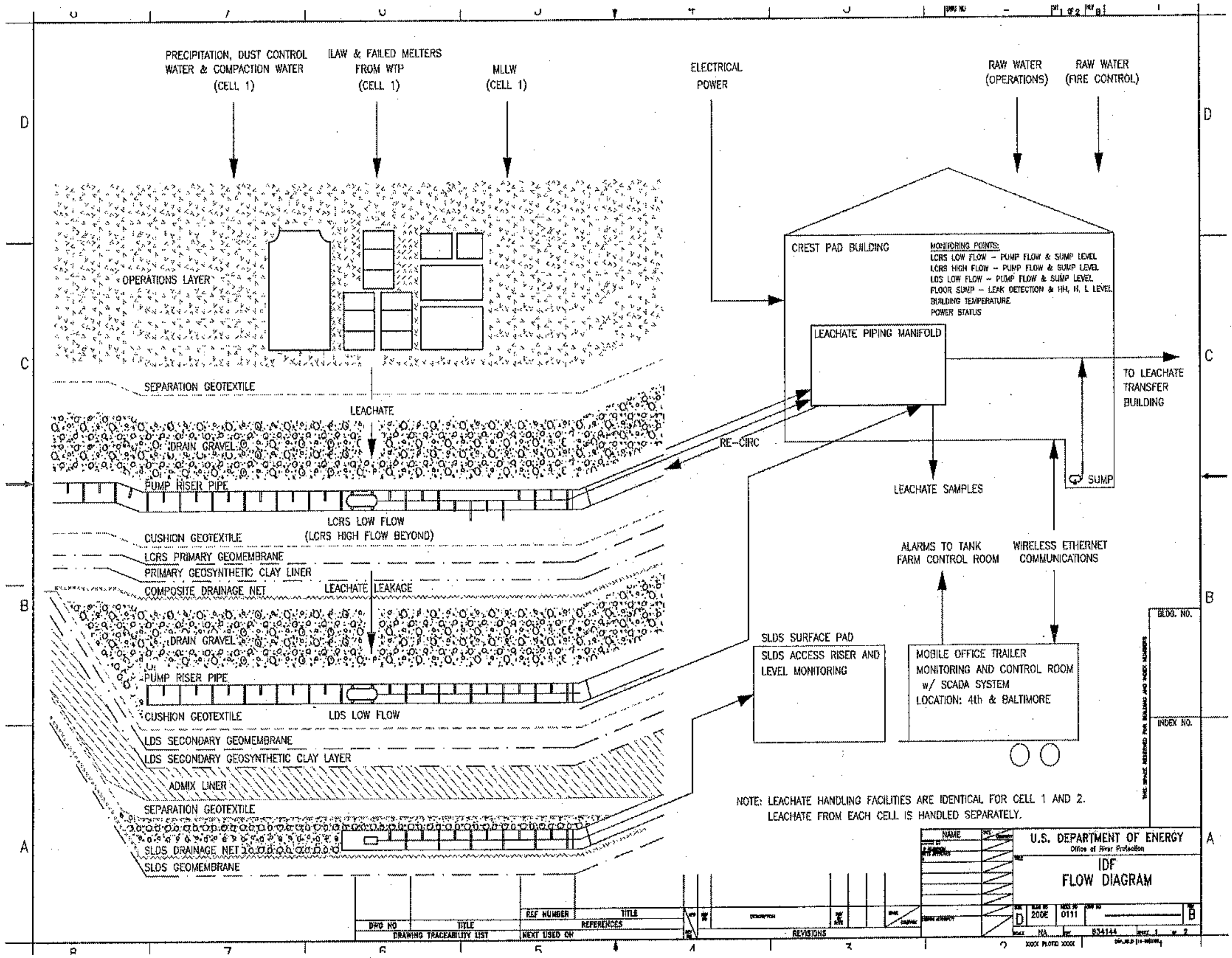
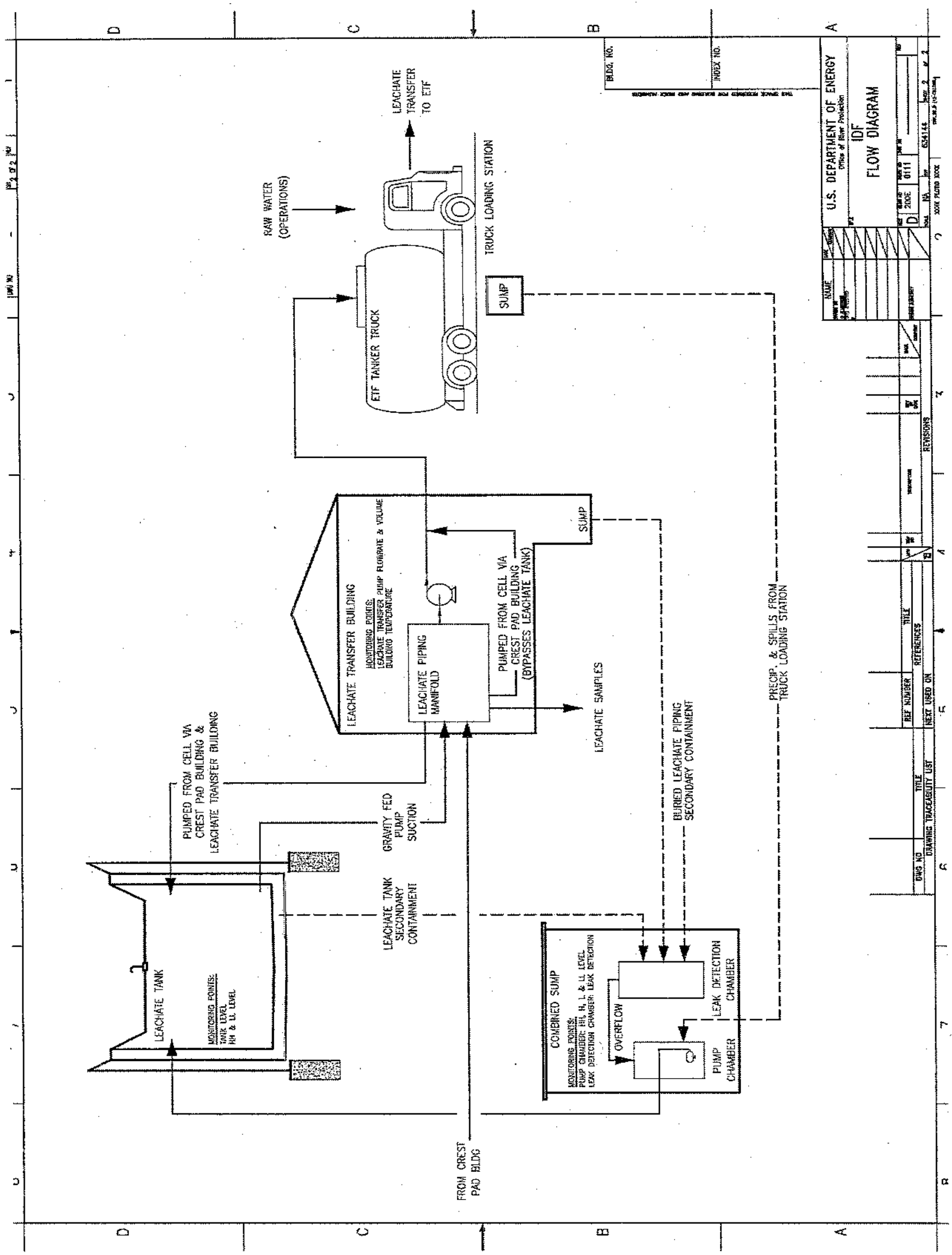


Figure 7. Integrated Disposal Facility Leachate Collection and Transfer Operations



6.0 EXISTING AND PROPOSED ABATEMENT TECHNOLOGY

Describe the existing and proposed (as applicable) abatement technology. Describe the basis for the use of the proposed system. Include expected efficiency of each control device, and the annual average volumetric flow rate(s) in meters^3/sec for the emission unit(s).

The IDF is a MLLW and LLW landfill with a single trench and two disposal cells (Cells 1 and 2). Cell 1 is for MLLW, and Cell 2 is for LLW. The fugitive emissions generated will be particulate solids from ILAW, LLW, newly generated IDF operations, waste packages and containers required to be equipped with vents received, temporarily stored, and disposed at the IDF and the Crest Pad and Leachate Transfer Buildings. These containers, for the most part, will be a combination of vented waste containers typically received at other storage and disposal facilities located on the Hanford Site and non-vented containers for ILAW and some LLW. The Crest Pad and Leachate Transfer Buildings consist of a crest pad building, a leachate transfer building, leachate storage tanks, and a truck loading station. The leachate system is similar to that used at MLLW Trench 31 and 34, and will be managed as a less than 90 day storage unit under WAC 173-303 before the leachate is removed and transferred to the treatment facility for storage and processing.

The leachate system is designed with two tanks that include engineering release points without abatement controls. The leachate emissions will be generated during loading and unloading of the leachate from the collection system to the tanks and from the tanks to the transfer truck. The leachate radionuclide concentrations were derived using the same inventory used to develop risk assessment exposure data and the annual possession quantity (APQ) for the NOC application. The calculated concentrations range from a low for H-3 of 3.93×10^{-9} pCi/L to a high for U (total) 2.71×10^{-2} pCi/L (RPP-18516, *Integrated Disposal Facility (IDF) Operations and Management Philosophy*).

The LLW and newly generated IDF operations waste packages and containers equipped with vents will have approved vents with the equivalent of a high efficiency particulate air (HEPA) filter, as required by DOE orders and similarly approved for other waste storage and disposal facilities on the Hanford Site. The vent filters to be used are listed in Section 7.0. The HEPA type filters are not testable once installed. However, the manufacturer certifies a 99.97 percent removal efficiency at a flow rate of 1×10^{-6} to $3.0 \times 10^{-6} m^3$/sec.

Many of the emissions controls used for the diffuse and fugitive emissions during IDF operations will be administrative, based on as low as reasonably achievable (ALARA) principles and consisting of ALARA techniques. Fugitive emissions will be generated from the leachate tank during collection and pumping, transfer of leachate from the leachate tank to a tanker truck, and waste containers in staging and temporary storage areas of the trench awaiting disposal. Disposal will be the act of covering the waste containers with soil as part of radiation shielding and final construction of the cover layer or lift of the IDF.

7.0 CONTROL TECHNOLOGY DRAWINGS

Provide conceptual drawings showing all applicable control technology components from the point of entry of radionuclides into the vapor space to release to the environment.

Nuclear Filter Technology will be used on waste containers required to have them as part of the waste acceptance criteria for the IDF. The only abatement technology will be the recognized and approved vents for waste containers listed in Table 3 below. See Figures 8 and 9 for details.

Table 3. Approved Vents

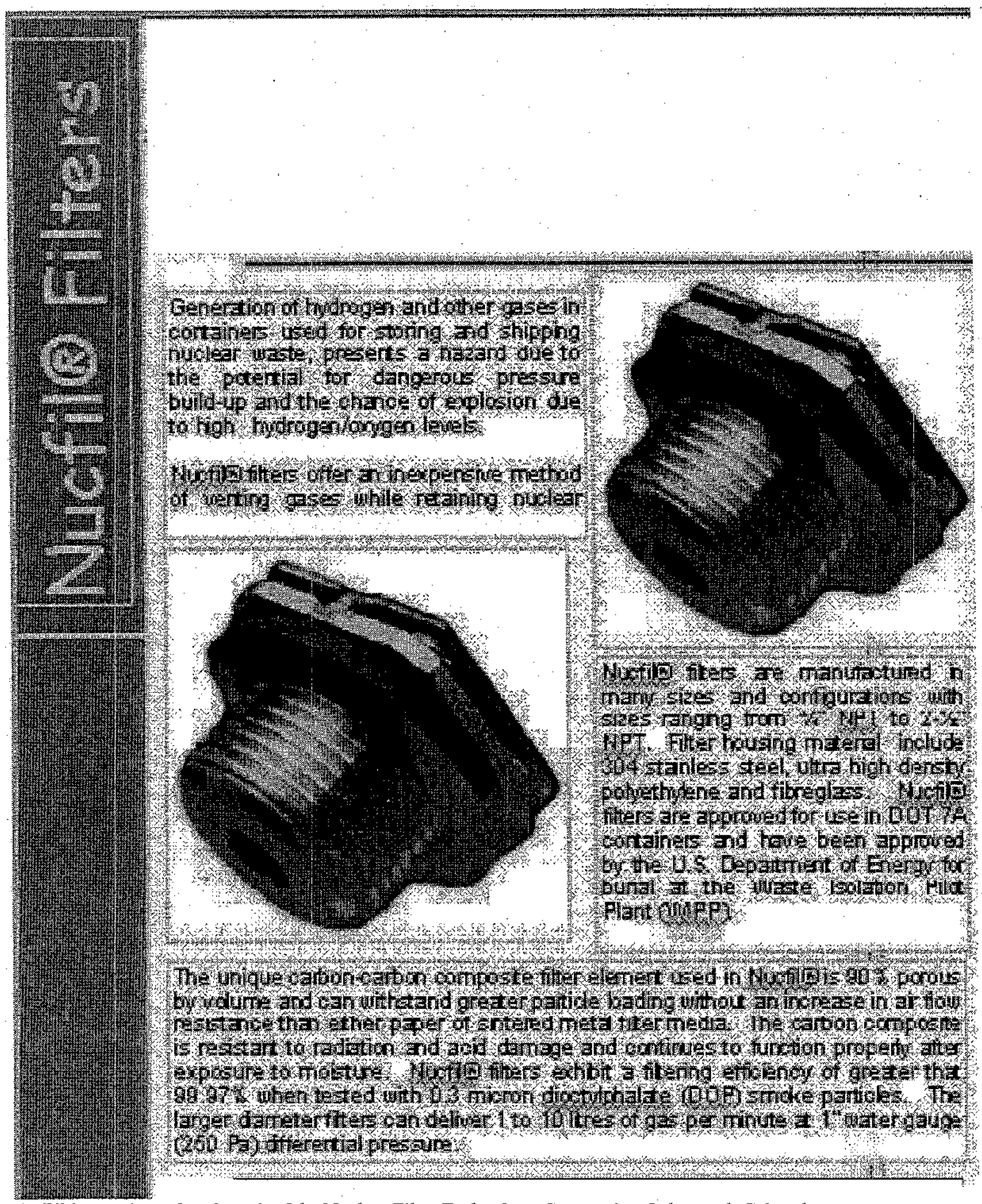
Manufacturer	Model Number
Fairey[a]	98867[b]
Fairey	99421
Nuclear Filter Technology	NucFil[c]-012
Nuclear Filter Technology	NucFil-013
Nuclear Filter Technology	NucFil-013 GorTex
Nuclear Filter Technology	NucFil-013 SSS
Nuclear Filter Technology	NucFil-016
Nuclear Filter Technology	NucFil-019
Nuclear Filter Technology	NucFil-019 DS
Nuclear Filter Technology	NucFil-019-EPD
Nuclear Filter Technology	NucFil-019-HCR
Nuclear Filter Technology	NucFil-020
Nuclear Filter Technology	NucFil-049
Nuclear Filter Technology	NucFil-049LS
Nuclear Filter Technology	NucFil-049S
Nuclear Filter Technology	NucFil-050
Nuclear Filter Technology	NucFil-007
Nuclear Filter Technology	NucFil-007LS
Nuclear Filter Technology	NucFil-007S
Nuclear Filter Technology	NucFil-072
Nuclear Filter Technology	NucFil-072 SSS
Nuclear Filter Technology	NucFil-073
Nuclear Filter Technology	NucFil-074
Nuclear Filter Technology	NucFil-075
Nuclear Filter Technology	NucFil-DVS3
Nuclear Filter Technology	NucFil-DVS3 IP
Nuclear Filter Technology	NucFil-DVS307
UltraTech	9400
UltraTech	9402
UltraTech	9408
UltraTech	9414
UltraTech	9415
UltraTech	9416
UltraTech	9450
UltraTech	9460
UltraTech	9500
UltraTech	9550

Table 3. Approved Vents

Manufacturer	Model Number

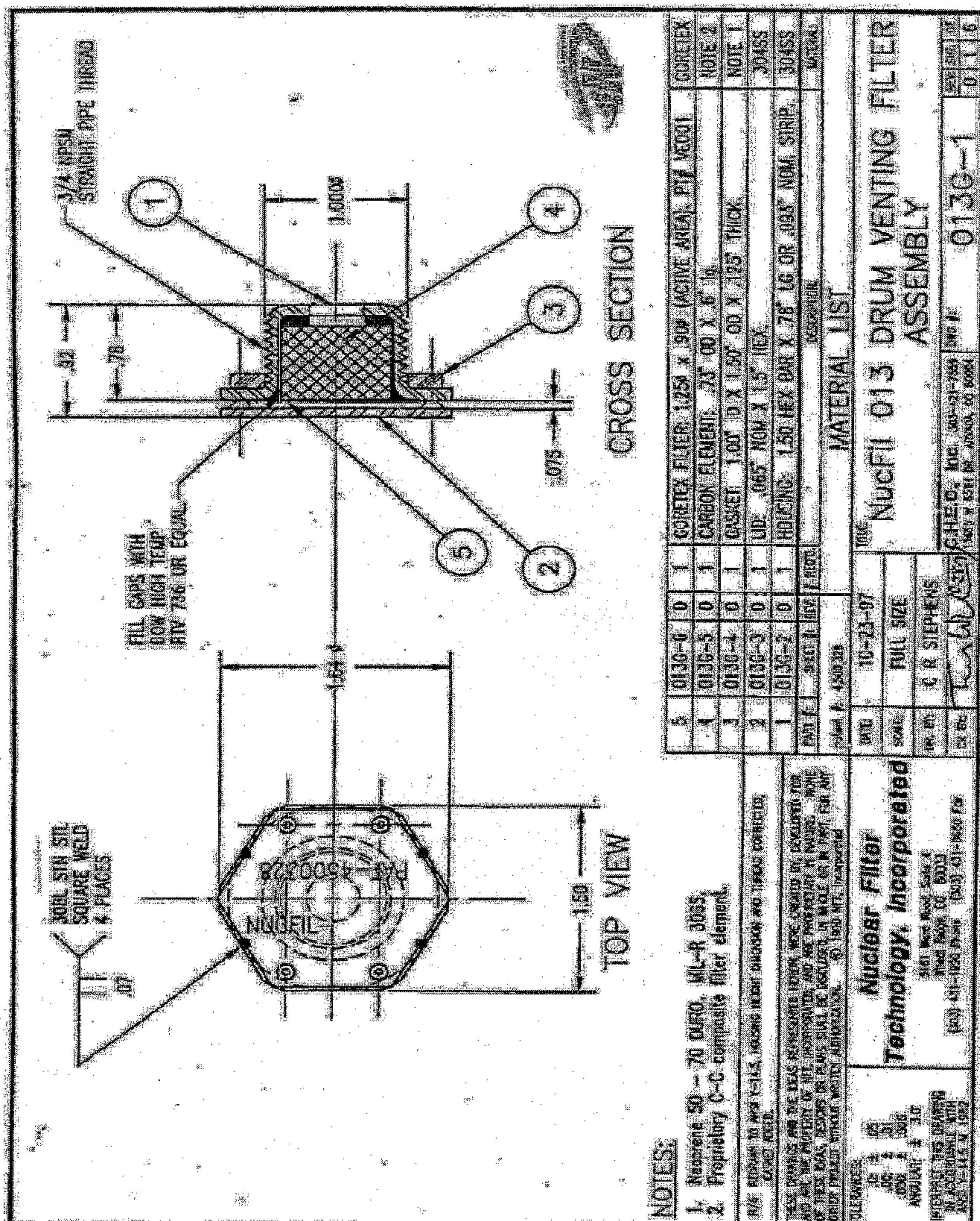
[a]Fairey is a registered trademark of the Fairey Holdings Limited Company, Middlesex, England.
[b]Wildcard designator used by manufacturer.
[c]NucFil is a registered trademark of the Nuclear Filter Technology Corporation, Lakewood, Colorado.

Figure 8. Abatement Technology



NucFil is a registered trademark of the Nuclear Filter Technology Corporation, Lakewood, Colorado.

Figure 9. Abatement Technology Schematic (Typical)



NucFil is a registered trademark of the Nuclear Filter Technology Corporation, Lakewood, Colorado.

8.0 RADIONUCLIDES OF CONCERN

Identify each radionuclide that could contribute greater than ten percent of the potential–to-emit TEDE to the MEI, or greater than 0.1 mrem/yr potential-to-emit TEDE to the MEI.

The radionuclides of concern were identified from the concentration of curies per cubic meter of waste identified in RPP-15834, *Integrated Disposal Facility Risk Assessment* for solid waste (LLW, ILAW, and failed melters). The volume estimates used in the Appendix A calculation methods for each of the waste types to be disposed within the IDF are based on filling the landfill within the forecasted life of the facility.

The release fractions used for estimating the emissions and APQ of the IDF were 2.0×10^{-9}, and the 40 CFR 61 Appendix D release fraction for solids was 1.0×10^{-6}. The 2.0×10^{-9} release fraction was used for fugitive emissions from waste containers in storage and managed at the Waste Recovery and Processing (WRAP) Facility and approved in "Request for Approval Vented Container Annual Release Fraction," (Letter AIR 99-1006). This release fraction was justified for containers with nuclear filters installed as documented in DOE/RL-99-60, *Request for Approval Vented Container Annual Release Fraction*. Although the release fraction study was based on particulates passing through the vent HEPA filter, the study was looking at creating a conservative method to report emissions utilizing a release fraction and not abatement control technology, such as the vent HEPA filter.

The PTE TEDE to the MEI is derived by direct application of the 2.0×10^{-9} release fraction, the 40 CFR 61 Appendix D release fraction 1.0×10^{-6}, and the CAP-88PC dose conversion factors to the inventory values listed in Table 5 and further discussed in Section 14.0. The key constituent radionuclides of concern for the IDF are listed in Table 4. The radionuclides that could contribute greater than 10 percent of the PTE TEDE to the MEI are Sr-90 and Am-241. Am-241 has a PTE TEDE to the MEI greater than 0.1 mrem/yr.

Table 4. Single-Shell Tank Radionuclides of Concern

Isotopes	Offsite Unabated	Percent Contribution to the Total Unabated Dose	Isotopes	Offsite Unabated	Percent Contribution to the Total Unabated Dose
Solid particulate	**mrem/yr**	**Percentage**	**Solid particulate**	**mrem/yr**	**Percentage**
H-3	1.17E-09	0.00%	Ra-228	3.02E-06	0.00%
C-14	2.29E-09	0.00%	Th-229	2.74E-06	0.00%
Ni-59	1.88E-08	0.00%	Pa-231	2.39E-06	0.00%
Co-60	1.16E-03	0.24%	Th-232	7.17E-06	0.00%
Ni-63	1.53E-06	0.00%	Total U	0.00E+00	0.00%
Se-79	1.06E-05	0.00%	U-232	2.71E-04	0.06%
Sr-90	9.13E-02	18.81%	U-233	2.90E-04	0.06%
Nb-93m	1.41E-06	0.00%	U-234	9.11E-05	0.02%
Zr-93	6.58E-07	0.00%	U-235	3.60E-06	0.00%
Tc-99	1.72E-04	0.04%	U-236	1.61E-06	0.00%

Table 4. Single-Shell Tank Radionuclides of Concern

Isotopes	Offsite Unabated	Percent Contribution to the Total Unabated Dose	Isotopes	Offsite Unabated	Percent Contribution to the Total Unabated Dose
Solid particulate	**mrem/yr**	**Percentage**	**Solid particulate**	**mrem/yr**	**Percentage**
Ru-106	6.27E-05	0.01%	Np-237[b]	3.21E-04	0.07%
Cd-113m	4.18E-04	0.09%	Pu-238	3.12E-04	0.06%
Sb-125	2.54E-03	0.52%	U-238	8.52E-05	0.02%
Sn-126	2.94E-06	0.00%	Pu-239	1.18E-02	2.43%
I-129	5.43E-06	0.00%	Pu-240	1.67E-03	0.34%
Cs-134	2.03E-02	4.17%	Am-241	3.30E-01	67.99%
Cs-137	3.62E-03	0.75%	Pu-241	3.87E-04	0.08%
Sm-151	2.73E-04	0.06%	Cm-242	7.14E-05	0.01%
Eu-152	1.52E-04	0.03%	Pu-242	2.00E-07	0.00%
Eu-154	1.84E-02	3.79%	Am-243	1.77E-05	0.00%
Eu-155	8.84E-04	0.18%	Cm-243	6.61E-05	0.01%
Ra-226	1.08E-07	0.00%	Cm-244	6.82E-04	0.14%
Ac-227	7.48E-07	0.00%	**Total**	**4.85E-01**	**100.00%**

9.0 EFFLUENT MONITORING SYSTEM

Describe the effluent monitoring system for the proposed control system. Describe each piece of monitoring equipment and its monitoring capability, including detection limits, for each radionuclide that could contribute greater than ten percent of the potential-to-emit TEDE to the MEI, or greater than 0.1 mrem/yr potential-to-emit TEDE to the MEI, or greater than 25 percent of the TEDE to the MEI, after controls. Describe the method for monitoring or calculating those radionuclide emissions. Describe the method with detail sufficient to demonstrate compliance with the applicable requirements.

The radioactive releases from the activity at the IDF are fugitive emissions. The radionuclides of concern are listed in Section 8.0. There are no abatement controls being used other than the waste containers with vent HEPA filters. Because the WTP ILAW containers will not have vent HEPA filters and because the vent HEPA filters are not testable on an annual basis, no abated PTE was calculated.

Near-field monitoring is the periodic confirmatory measurements for emission units categorized as part of the 200 Area Diffuse and Fugitive Emission unit for the Hanford Site. The following documents are part of the near-field monitoring program:

DOE/RL-91-50, *Environmental Monitoring Plan United States Department of Energy Richland Operations Office.*

HNF-EP-0528, *NESHAPS Quality Assurance Project Plan for Radioactive Air Emissions.*

HNF-EP-0835-10, *Statement of Work for Services Provided by the Waste Sampling and Characterization Facility for Effluent and Environmental Monitoring Program During Calendar Year 2004.*

An example of the calculation methodology is given in Appendix B.

10.0 ANNUAL POSSESSION QUANTITY

Indicate the annual possession quantity (APQ) for each radionuclide.

The APQ for the IDF is based on the waste acceptance criteria for the IDF and the estimated quantity of waste to be disposed. The waste acceptance criteria allow the radionuclides listed in Table 5. The waste acceptance criteria list limits for some isotopes, while others have no limit listed. However, the waste acceptance criteria state that limits can be added, based on process knowledge and the waste type, before the generator ships it to IDF for disposal. Therefore, the facility is requesting that no values be listed for the facility APQ.

The emissions and release rates presented in this NOC are detailed in Appendix A and are based on conservative approaches and assumptions associated with the operations of the IDF being developed and agreed upon by regulators, DOE, and the stakeholders. See Appendix C for the exemption that was in the original NOC application request for WTP ILAW and DBVS ILAW that was not approved by the Washington State Department of Health (WDOH). The exemption is being retained because WDOH is open to revisiting the exemption if a study based on the first set of Bulk Vitrification waste containers processed and sent to the IDF demonstrates that the exemption meets the criteria listed in the regulations.

Table 5. Integrated Disposal Facility Isotopes Listed in the Waste Acceptance Criteria

H-3	Be-7	Be-10	C-14	Na-22	P-32	Si-32	P-33
S-35	Cl-36	Ar-39	K-40	Ca-41	Ar-42	Ti-44*	Ca-45
Sc-46	V-49	Cr-51	Mn-54	Fe-55	Co-56	Co-57	Co-58
Fe-59	Fe-60	Ni-59	Co-60	Ni-63	Zn-65	Ge-68	Se-75
Se-79	Sr-82	Rb-83	Rb-84	Kr-85	Sr-85	Rb-86	Y-88
Sr-89	Sr-90	Nb-91	Mo-93	Nb-93m	Zr-93	Nb-94	Nb-95
Zr-95	Tc-99	Ru-103	Ru-106	Pd-107	Ag-108m	Cd-109	Ag-110m
Cd-113m	Sn-113	Sn-119m	Sn-121m	Te-121	Te-123	Sb-124	I-125
Sb-125	Te-125m	Sb-126	Sn-126	Te-127m	I-129	Te-129m	Xe-131m
Ba-133	Cs-134	Cs-135	Cs-136	Cs-137	Ba-140	Ce-141	Ce-144
Nd-147	Pm-147	Sm-147	Eu-150	Sm-151	Eu-152	Gd-152	Gd-153
Eu-154	Eu-155	Tm-170	Hf-175	Hf-181	Ta-182	W-185	Re-187
Au-195	Hg-203	Tl-204	Bi-207	Pb-210	Po-210	Ra-226	Ac-227
Ra-228	Th-228	Th-229	Th-230	Pa-231	Th-232	U-232	U-233
Th-234	U-234	U-235	Pu-236	U-236	Np-237	Pu-238	U-238
Pu-239	Pu-240	Am-241	Pu-241	Am-242m	Cm-242	Pu-242	Am-243
Cm-243	Cm-244	Pu-244	Cm-245	Cm-246	Bk-247	Cm-247	Cm-248
Cf-249	Cf-250	Cm-250	Cf-251	Cf-252	Es-254		

The emissions estimate APQ is listed in Table 6. The APQ was used as an example from any given year for what the IDF could take in as an APQ from all waste streams. Because of unknowns and the chance that a generator may send for disposal any radionuclide from Table 5, it is requested that the Table 6 APQ data be used only as an estimate for potential emissions in the final approval order, and not as a limit on what isotopes could be accepted at the IDF.

Table 6. Annual Possession Quantity Used to Estimate Potential Emissions

Isotopes	Bounding Inventory (LLW) [450,000 m³] Annual Possession Quantity	Bounding Inventory (ILAW + Failed Melters) [450,000 m³] Annual Possession Quantity	IDF Annual Possession Quality
Solid particulate	**(Ci)**	**(Ci)**	**(Ci)**
H-3	6.03E+05	1.98E+02	6.03E+05
C-14	1.73E+02	3.52E+01	2.08E+02
Ni-59	0.00E+00	1.81E+03	1.81E+03
Co-60	2.82E+05	1.38E+05	4.20E+05
Ni-63	0.00E+00	1.77E+05	1.77E+05
Se-79	5.49E+00	2.45E+03	2.46E+03
Sr-90	1.18E+04	2.49E+07	2.49E+07
Nb-93m	0.00E+00	2.01E+04	2.01E+04
Zr-93	0.00E+00	1.52E+04	1.52E+04
Tc-99	3.23E+03	2.24E+05	2.27E+05
Ru-106	0.00E+00	1.18E+05	1.18E+05
Cd-113m	0.00E+00	9.64E+04	9.64E+04
Sb-125	0.00E+00	2.93E+06	2.93E+06
Sn-126	0.00E+00	1.88E+03	1.88E+03
I-129	8.28E+00	8.15E+02	8.23E+02
Cs-134	0.00E+00	6.08E+06	6.08E+06
Cs-137	5.27E+04	4.02E+06	4.07E+06
Sm-151	0.00E+00	1.09E+07	1.09E+07
Eu-152	0.00E+00	1.90E+04	1.90E+04
Eu-154	0.00E+00	2.76E+06	2.76E+06
Eu-155	0.00E+00	3.31E+06	3.31E+06
Ra-226	8.19E+00	7.02E+00	1.52E+01
Ac-227	0.00E+00	1.50E+00	1.50E+00
Ra-228	0.00E+00	4.77E+02	4.77E+02
Th-229	0.00E+00	5.14E+00	5.14E+00
Pa-231	0.00E+00	5.98E+00	5.98E+00
Th-232	0.00E+00	2.69E+01	2.69E+01
Total U	1.43E+03	0.00E+00	1.43E+03
U-232	0.00E+00	7.39E+02	7.39E+02
U-233	0.00E+00	2.80E+03	2.80E+03
U-234	6.98E+02	8.80E+02	1.58E+03
U-235	3.24E+01	3.60E+01	6.84E+01
U-236	0.00E+00	1.67E+01	1.67E+01
Np-237	1.37E+01	8.02E+02	8.16E+02

Table 6. Annual Possession Quantity Used to Estimate Potential Emissions

Isotopes	Bounding Inventory (LLW) [450,000 m^3] Annual Possession Quantity	Bounding Inventory (ILAW + Failed Melters) [450,000 m^3] Annual Possession Quantity	IDF Annual Possession Quality
Solid particulate	**(Ci)**	**(Ci)**	**(Ci)**
Pu-238	0.00E+00	1.23E+03	1.23E+03
U-238	6.93E+02	9.11E+02	1.60E+03
Pu-239	1.72E+02	4.32E+04	4.34E+04
Pu-240	0.00E+00	6.12E+03	6.12E+03
Am-241	0.00E+00	7.61E+05	7.61E+05
Pu-241	1.51E+05	8.91E+04	2.40E+05
Cm-242	0.00E+00	5.22E+03	5.22E+03
Pu-242	0.00E+00	7.69E-01	7.69E-01
Am-243	9.86E+01	4.07E+01	1.39E+02
Cm-243	0.00E+00	2.33E+02	2.33E+02
Cm-244	0.00E+00	3.05E+03	3.05E+03

11.0 PHYSICAL FORM

Indicate the physical form of each radionuclide in inventory: Solid, particulate solids, liquid, or gas.

Each radionuclide in Table 5 is considered a solid, liquid, or particulate solid. The waste acceptance criteria require that all liquids be treated or managed in such a manner that the containers will contain no free liquids. For some containers this is managed by adding absorbent in a ratio that ensures any liquid would be absorbed before it could be released from the container. The leachate collection transfer will generate an insignificant amount of liquid particulate emissions. These emissions are addressed by using the APQ for the IDF and bounding the emissions by calculating an overall TEDE to the MEI, based on the largest contributor. The APQ and emissions from handling, temporarily storing, and disposing LLW and MLLW waste containers are the largest contributors to the IDF.

12.0 RELEASE FORM

Indicate the release form of each radionuclide in inventory (i.e. particulate solids, vapor, or gas). Give the chemical form and ICRP 30 solubility class, if known.

The radionuclides in Table 5 are released as liquids or particulate solids. Leachate will be a liquid particulate since the transfer operations are conducted in a passive mode, have no controls, and the concentrations are negligible when compared to the waste container inventory. Earth moving activities associated with the operation of the IDF are not considered, since the cover soil was surveyed as the stockpiles were constructed, and the IDF was built in an area with no contamination reported. The operation of the IDF should prevent any of the soil fill and cover material from being contaminated as it is spread between and over the top of the waste containers.

13.0 RELEASE RATES

(a) New emission unit(s): Give predicted release rates without any emissions control equipment (the potential-to-emit) and with the proposed control equipment using the efficiencies described in subsection (6) of this section. (b) Modified emission unit(s): Give predicted release rates without any emissions control equipment (the potential-to-emit) and with the existing and proposed control equipment using the efficiencies described in subsection (6) of this section. Provide the latest year's emissions data or emissions estimates. In all cases, indicate whether the emission unit is operating in a batch or continuous mode.

Abated emissions from passive and diffuse sources (including the 200 East and West Area tank farms) were reported in DOE/RL-2004-09, *Radionuclide Air Emissions Report for the Hanford Site, Calendar Year 2003*. Abated emissions from all the Hanford Site sources were 0.022 mrem.

The PTE TEDE to the MEI is listed in Table 7. The WTP ILAW containers may not contain vent HEPA filters; therefore, it was decided to only present an unabated PTE. Since the emissions are fugitive and there is no testable control equipment, no credit is taken for abatement, and the abated emissions are assumed to be the same as the unabated emissions. Compliance will rely on As Low As Reasonably Achievable Control Technology (ALARACT) practices to ensure emissions from the waste containers do not violate the release rates. The emissions are fugitive and will be monitored by the near-field monitoring stations in the 200 East Area.

Table 7. Integrated Disposal Facility Release Rates

	mrem/yr.
IDF Total Offsite Unabated/Abated Dose	4.85E-01

14.0 LOCATION OF THE MAXIMALLY EXPOSED INDIVIDUAL

Identify the MEI by distance and direction from the emission unit(s). The MEI is determined by considering distance, wind rose data, presence of vegetable gardens, and meat or milk producing animals at unrestricted areas surrounding the emission unit.

The MEI is determined using CAP-88 dispersion factors, which are derived for use on the Hanford Site and published in HNF-3602, *Calculating Potential-to-Emit Releases and Doses for FEMPs and NOCs*. Values used for the IDF calculations were taken from Table 4-9 of HNF-3602 for the 200 East Area with an effective release height of <40 m. Unit dose factors from both the onsite maximum public receptor (MPR) and offsite MPR were calculated, used, and examined.

The 200 East Area offsite MPR unit dose factors were used for the IDF because they were determined to return the highest, most conservative values. In this case, according to HNF-3602, Table 4-2, the MPR is 20,200 m in the east-southeast direction.

15.0 TOTALLY EFFECTIVE DOSE EQUIVALENT TO THE MAXIMALLY EXPOSED INDIVIDUAL

Calculate the TEDE to the MEI using an approved procedure (see WAC 246-247-085). For each radionuclide identified in Subsection 8 of this section, determine the TEDE to the MEI for existing and proposed emission controls, and without any emission controls (the potential-to-emit) using the release rates from Subsection 13 of this section. Provide all input data used in the calculations.

The TEDE to the MEI is calculated to be 4.85×10^{-1}. The APQ listed in Table 6 and used to calculate the PTE TEDE to the MEI is representative of the types of waste to be disposed at the IDF. The radionuclides were chosen from the RPP-15834 which considered representative isotopes for waste currently disposed and waste disposal forecasts for the Hanford Site. The release fractions from 40 CFR 61 Appendix D, DOE/RL-99-60, and the Cap 88–PC Dose per Unit Release factors from HNF-3602 were used to calculate the PTE TEDE for the MPR. These release fractions were chosen because they represent the types of waste and containers that would be handled, temporarily stored, and disposed at the IDF. Appendix B presents the data for calculating the TEDE to the MEI for the IDF APQ (Table 6). Table 4 presents the final TEDE to the MPR calculated using the representative radionuclides of IDF APQ (Table 6) and the resulting total abated TEDE to the MEI. Table 7 presents the release rates used by IDF, while Table 5 represents the potential APQ radionuclide isotopes that could be accepted at the IDF based on the waste acceptance criteria.

16.0 COST FACTOR IF NO ANALYSIS

Provide cost factors for construction, operation, and maintenance of the proposed control technology components and system, if a best available radionuclide control technology (BARCT) or ALARACT demonstration is not submitted with the NOC.

Pursuant to WAC 246-247-110, Appendix A (16), cost factors for construction, operation, and maintenance of proposed technology requirements are not required. The Washington State Department of Health has provided guidance that HEPA filters are generally considered best available radionuclide control technology (BARCT) for particulate emissions. Because the key radionuclides of concern are particulates, it is proposed that the HEPA filter controls described in Section 6.0 and listed in Section 7.0 be accepted as BARCT. Some LLW containers being stored will have a vent HEPA filter or equivalent installed, which are considered BARCT. Compliance with the substantive BARCT standards is described in Section 18.0. Some of the ILAW containers will not have a vent HEPA filter or equivalent installed, but will be a closed/sealed container. ALARA principles and techniques will be implemented for the handling, storage, and disposal of these containers. The project forecast for WTP ILAW containers are that they will be welded and considered an exempt source per the definition of a sealed source.

17.0 DURATION OF LIFETIME

Provide an estimate of the lifetime for the facility process with the emission rates provided in this application.

Waste forecasts will vary through the life of the IDF. Currently, waste disposal is planned to begin in the IDF no earlier than 2006. The waste receipts and forecasts will be monitored to ensure disposal capacity is available for waste disposal. The current forecast is for IDF to accept waste through 2035.

18.0 STANDARDS

Indicate which of the following control technology standards have been considered and will be complied with in the design and operation of the emission unit(s) described in this application: ASME/ANSI AG-1, Code on Nuclear Air and Gas Treatment (where there are conflicts in standards with the other listed references, this standard shall take precedence; ASME/ANSI N509, Nuclear Power Plant Air-Cleaning Units and Components; ASME/ANSI N510, Testing of Nuclear Air Treatment Systems; ASME/ANSI NQA-1, Quality Assurance (QA) Program Requirements for Nuclear Facilities; 40 CFR 60. Appendix A, Methods 1, 1A, 2, 2A, 2C, 2D, 4, 5, and 17. ANSI N13.1, Guide to Sampling Airborne Radioactive materials in Nuclear Facilities. For each standard not so indicated, give reason(s) to support adequacy of the design and operation of the emission unit(s) as proposed.

There is no active ventilation system used at the IDF. The source for emissions will be waste containers equipped with a small vent. The vent will have installed in it a vent HEPA filter or equivalent. Because there is no abatement technology other than the HEPA filter, many of the standards listed in WAC 246-247 are not applicable, and therefore are not addressed. The following section will discuss the applicable standards related to the HEPA filter.

ANSI/ASME AG-1

American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME) AG-1: This equipment specific code consists of several primary sections, which are applicable to this unit. The applicable sections are HEPA filters (Section FC) and Quality Assurance (QA) (Section AA).

The HEPA filter section of AG-1, Section FC, applies in this instance. The vent HEPA filters installed in the waste containers will meet the applicable sections of AG-1, except for filter qualification testing. Justification for the exception was approved by the WDOH, and the filters are considered BARCT. The vent HEPA filters are certified by the manufacturer to have a 99.97 percent removal efficiency.

The QA section of AG-1 relies on ASME NQA-1. The general QA criteria are located in Section AA. Specific component and system criteria are located in each section throughout AG-1. This includes procurement of the safety material/components, along with an appropriate pedigree from an evaluated supplier; tracking and maintaining the material/components after it arrives on site; inspection of the material/components; and witnessing the testing. QA is addressed in TFC-PLN-02, *Quality Assurance Program Description.*

19.0 REFERENCES

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APPENDIX A

ANNUAL POSSESSION QUANTITY CALCULATIONS FOR INTEGRATED DISPOSAL FACILITY OPERATIONS

Table A - 1. Annual Possession Quantity Calculations

Column A	Column B	Column C	Column D	Column E
WAC Table C.2.	Risk Assessment Table 3-1	Risk Assessment Table 3-2	Volume of LLW and ILAW MLLW	
Isotope	ILAW Inventories Maximum Batch Concentration	Solid LLW and MLLW Inventory Concentration (Bounding and Baseline)	LLW Volume 450,000	ILAW MLLW 450,000
	(Ci/cubic meter)	(Ci/cubic meter)	(cubic meter)	(cubic meter)
H-3	0.00E+00	1.34E+00	450,000	450,000
C-14	0.00E+00	3.84E-04	450,000	450,000
Ni-59	4.02E-03	0.00E+00	450,000	450,000
Co-60	3.07E-01	6.26E-01	450,000	450,000
Ni-63	3.91E-01	0.00E+00	450,000	450,000
Se-79	5.45E-03	1.22E-05	450,000	450,000
Sr-90	5.43E+01	2.63E-02	450,000	450,000
Nb-93m	4.47E-02	0.00E+00	450,000	450,000
Zr-93	3.37E-02	0.00E+00	450,000	450,000
Tc-99	4.98E-01	7.17E-03	450,000	450,000
Ru-106	2.59E-01	0.00E+00	450,000	450,000
Cd-113m	2.14E-01	0.00E+00	450,000	450,000
Sb-125	6.50E+00	0.00E+00	450,000	450,000
Sn-126	4.17E-03	0.00E+00	450,000	450,000
I-129	1.81E-03	1.84E-05	450,000	450,000
Cs-134	1.35E+01	0.00E+00	450,000	450,000
Cs-137	7.80E+00	1.17E-01	450,000	450,000
Sm-151	2.42E+01	0.00E+00	450,000	450,000
Eu-152	4.21E-02	0.00E+00	450,000	450,000
Eu-154	6.13E+00	0.00E+00	450,000	450,000
Eu-155	7.36E+00	0.00E+00	450,000	450,000
Ra-226	1.56E-05	1.82E-05	450,000	450,000
Ac-227	1.76E-06	0.00E+00	450,000	450,000
Ra-228	1.06E-03	0.00E+00	450,000	450,000
Th-229	1.14E-05	0.00E+00	450,000	450,000
Pa-231	1.05E-05	0.00E+00	450,000	450,000
Th-232	5.97E-05	0.00E+00	450,000	450,000
Total U	0.00E+00	3.17E-03	450,000	450,000
U-232	1.64E-03	0.00E+00	450,000	450,000
U-233	6.22E-03	0.00E+00	450,000	450,000

Table A - 1. Annual Possession Quantity Calculations

Column A	Column B	Column C	Column D	Column E
WAC Table C.2.	Risk Assessment Table 3-1	Risk Assessment Table 3-2	Volume of LLW and ILAW MLLW	
Isotope	ILAW Inventories Maximum Batch Concentration	Solid LLW and MLLW Inventory Concentration (Bounding and Baseline)	LLW Volume 450,000	ILAW MLLW 450,000
	(Ci/cubic meter)	(Ci/cubic meter)	(cubic meter)	(cubic meter)
U-234	1.95E-03	1.55E-03	450,000	450,000
U-235	7.97E-05	7.19E-05	450,000	450,000
U-236	3.68E-05	0.00E+00	450,000	450,000
Np-237	1.78E-03	3.04E-05	450,000	450,000
Pu-238	2.69E-03	0.00E+00	450,000	450,000
U-238	2.02E-03	1.54E-03	450,000	450,000
Pu-239	9.50E-02	3.83E-04	450,000	450,000
Pu-240	1.34E-02	0.00E+00	450,000	450,000
Am-241	1.69E+00	0.00E+00	450,000	450,000
Pu-241	1.98E-01	3.35E-01	450,000	450,000
Cm-242	1.16E-02	0.00E+00	450,000	450,000
Pu-242	1.69E-06	0.00E+00	450,000	450,000
Am-243	9.01E-05	2.19E-04	450,000	450,000
Cm-243	5.18E-04	0.00E+00	450,000	450,000
Cm-244	6.77E-03	0.00E+00	450,000	450,000

Table A - 1. Annual Possession Quantity Calculations

Column A	Column F	Column G	Column H	Column I	Column J
WAC Table C.2.	Column C * Column D	Column B * Column F	Risk Assessment Table 3-4	Risk Assessment Table 3-4	Column G + Column H + Column I
Isotope	Total LLW APQ [450,000 m^3]	ILAW MLLW APQ [450,000 m^3]	Failed Melters Inventory LAW	Failed Melters Inventory HLW	Bounding Inventory (ILAW + Failed Melters) [450,000 m^3]
	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)
H-3	6.03E+05	0.00E+00	0.00E+00	1.98E+02	1.98E+02
C-14	1.73E+02	0.00E+00	0.00E+00	3.52E+01	3.52E+01
Ni-59	0.00E+00	1.81E+03	3.85E-01	5.56E+00	1.81E+03
Co-60	2.82E+05	1.38E+05	9.59E+00	1.26E+02	1.38E+05
Ni-63	0.00E+00	1.76E+05	3.70E+01	5.49E+02	1.77E+05

Table A - 1. Annual Possession Quantity Calculations

Column A	Column F	Column G	Column H	Column I	Column J
WAC Table C.2.	Column C * Column D	Column B * Column F	Risk Assessment Table 3-4	Risk Assessment Table 3-4	Column G + Column H + Column I
Isotope	Total LLW APQ [450,000 m^3]	ILAW MLLW APQ [450,000 m^3]	Failed Melters Inventory LAW	Failed Melters Inventory HLW	Bounding Inventory (ILAW + Failed Melters) [450,000 m^3]
	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)
Se-79	5.49E+00	2.45E+03	1.10E-01	7.56E-02	2.45E+03
Sr-90	1.18E+04	2.44E+07	1.03E+04	4.46E+05	2.49E+07
Nb-93m	0.00E+00	2.01E+04	2.88E+00	2.31E+01	2.01E+04
Zr-93	0.00E+00	1.52E+04	1.92E+00	1.36E+01	1.52E+04
Tc-99	3.23E+03	2.24E+05	6.64E+01	0.00E+00	2.24E+05
Ru-106	0.00E+00	1.17E+05	2.05E+00	1.01E+03	1.18E+05
Cd-113m	0.00E+00	9.63E+04	1.83E+01	7.02E+01	9.64E+04
Sb-125	0.00E+00	2.93E+06	1.19E+02	1.57E+03	2.93E+06
Sn-126	0.00E+00	1.88E+03	3.89E-01	2.37E+00	1.88E+03
I-129	8.28E+00	8.15E+02	5.05E-02	6.35E-01	8.15E+02
Cs-134	0.00E+00	6.08E+06	1.35E+02	6.98E+02	6.08E+06
Cs-137	5.27E+04	3.51E+06	2.09E+03	5.05E+05	4.02E+06
Sm-151	0.00E+00	1.09E+07	1.79E+03	1.47E+04	1.09E+07
Eu-152	0.00E+00	1.89E+04	7.04E-01	9.19E+00	1.90E+04
Eu-154	0.00E+00	2.76E+06	8.64E+01	1.17E+03	2.76E+06
Eu-155	0.00E+00	3.31E+06	7.23E+01	1.16E+03	3.31E+06
Ra-226	8.19E+00	7.02E+00	1.31E-04	4.91E-05	7.02E+00
Ac-227	0.00E+00	7.92E-01	1.39E-04	7.04E-01	1.50E+00
Ra-228	0.00E+00	4.77E+02	7.59E-02	3.55E-01	4.77E+02
Th-229	0.00E+00	5.13E+00	7.81E-04	1.18E-02	5.14E+00
Pa-231	0.00E+00	4.73E+00	7.88E-04	1.25E+00	5.98E+00
Th-232	0.00E+00	2.69E+01	2.94E-03	2.51E-02	2.69E+01
Total U	1.43E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
U-232	0.00E+00	7.38E+02	7.95E-02	9.20E-01	7.39E+02
U-233	0.00E+00	2.80E+03	3.00E-01	3.55E+00	2.80E+03
U-234	6.98E+02	8.78E+02	1.01E-01	2.40E+00	8.80E+02
U-235	3.24E+01	3.59E+01	4.10E-03	1.03E-01	3.60E+01
U-236	0.00E+00	1.66E+01	3.28E-03	8.82E-02	1.67E+01
Np-237	1.37E+01	8.01E+02	1.86E-01	8.36E-01	8.02E+02
Pu-238	0.00E+00	1.21E+03	2.44E-01	2.09E+01	1.23E+03

Table A - 1. Annual Possession Quantity Calculations

Column A	Column F	Column G	Column H	Column I	Column J
WAC Table C.2.	Column C * Column D	Column B * Column F	Risk Assessment Table 3-4	Risk Assessment Table 3-4	Column G + Column H + Column I
Isotope	Total LLW APQ [450,000 m^3]	ILAW MLLW APQ [450,000 m^3]	Failed Melters Inventory LAW	Failed Melters Inventory HLW	Bounding Inventory (ILAW + Failed Melters) [450,000 m^3]
	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)
U-238	6.93E+02	9.09E+02	1.11E-01	2.25E+00	9.11E+02
Pu-239	1.72E+02	4.28E+04	7.01E+00	4.22E+02	4.32E+04
Pu-240	0.00E+00	6.03E+03	1.21E+00	8.67E+01	6.12E+03
Am-241	0.00E+00	7.61E+05	2.49E+01	7.74E+02	7.61E+05
Pu-241	1.51E+05	8.91E+04	1.64E+01	0.00E+00	8.91E+04
Cm-242	0.00E+00	5.22E+03	1.32E-01	9.20E-01	5.22E+03
Pu-242	0.00E+00	7.61E-01	1.03E-04	8.24E-03	7.69E-01
Am-243	9.86E+01	4.05E+01	1.58E-03	1.36E-01	4.07E+01
Cm-243	0.00E+00	2.33E+02	1.55E-02	2.25E-01	2.33E+02
Cm-244	0.00E+00	3.05E+03	2.31E-01	5.49E+00	3.05E+03

APPENDIX B

INTEGRATED DISPOSAL FACILITY EMISSION LIMITS CALCULATIONS

Table B - 1. Emission Calculation Methodology

Column A	Column B	Column C	Column D	Column E	Column F
Analyte	**IDF Inventory (Based on Volumes and Concentrations for LLW) Annual Possession Quantity (APQ)**	**Release Fraction WRAP NOC Application**	**IDF Inventory (Based on Volumes and Concentrations for ILAW, and Failed Melters) APQ**	**40 CFR 61 Appendix D Release Fraction for a Solid**	**Total Unabated Potential-to-Emit (PTE) (Column B * Column C) + (Column D * Column E)**
Solid particulate	**(Ci)**		**(Ci)**		**(Ci)**
H-3	6.03E+05	2.00E-09	1.98E+02	1.00E-06	1.40E-03
C-14	1.73E+02	2.00E-09	3.52E+01	1.00E-06	3.55E-05
Ni-59	0.00E+00	2.00E-09	1.81E+03	1.00E-06	1.81E-03
Co-60	2.82E+05	2.00E-09	1.38E+05	1.00E-06	1.39E-01
Ni-63	0.00E+00	2.00E-09	1.77E+05	1.00E-06	1.77E-01
Se-79	5.49E+00	2.00E-09	2.45E+03	1.00E-06	2.45E-03
Sr-90	1.18E+04	2.00E-09	2.49E+07	1.00E-06	2.49E+01
Nb-93m	0.00E+00	2.00E-09	2.01E+04	1.00E-06	2.01E-02
Zr-93	0.00E+00	2.00E-09	1.52E+04	1.00E-06	1.52E-02
Tc-99	3.23E+03	2.00E-09	2.24E+05	1.00E-06	2.24E-01
Ru-106	0.00E+00	2.00E-09	1.18E+05	1.00E-06	1.18E-01
Cd-113m	0.00E+00	2.00E-09	9.64E+04	1.00E-06	9.64E-02
Sb-125	0.00E+00	2.00E-09	2.93E+06	1.00E-06	2.93E+00
Sn-126	0.00E+00	2.00E-09	1.88E+03	1.00E-06	1.88E-03
I-129	8.28E+00	2.00E-09	8.15E+02	1.00E-06	8.15E-04
Cs-134	0.00E+00	2.00E-09	6.08E+06	1.00E-06	6.08E+00
Cs-137	5.27E+04	2.00E-09	4.02E+06	1.00E-06	4.02E+00
Sm-151	0.00E+00	2.00E-09	1.09E+07	1.00E-06	1.09E+01
Eu-152	0.00E+00	2.00E-09	1.90E+04	1.00E-06	1.90E-02
Eu-154	0.00E+00	2.00E-09	2.76E+06	1.00E-06	2.76E+00
Eu-155	0.00E+00	2.00E-09	3.31E+06	1.00E-06	3.31E+00
Ra-226	8.19E+00	2.00E-09	7.02E+00	1.00E-06	7.04E-06
Ac-227	0.00E+00	2.00E-09	1.50E+00	1.00E-06	1.50E-06
Ra-228	0.00E+00	2.00E-09	4.77E+02	1.00E-06	4.77E-04
Th-229	0.00E+00	2.00E-09	5.14E+00	1.00E-06	5.14E-06
Pa-231	0.00E+00	2.00E-09	5.98E+00	1.00E-06	5.98E-06
Th-232	0.00E+00	2.00E-09	2.69E+01	1.00E-06	2.69E-05
Total U	1.43E+03	2.00E-09	0.00E+00	1.00E-06	2.85E-06
U-232	0.00E+00	2.00E-09	7.39E+02	1.00E-06	7.39E-04
U-233	0.00E+00	2.00E-09	2.80E+03	1.00E-06	2.80E-03

Table B - 1. Emission Calculation Methodology

Column A	Column B	Column C	Column D	Column E	Column F
Analyte	IDF Inventory (Based on Volumes and Concentrations for LLW) Annual Possession Quantity (APQ)	Release Fraction WRAP NOC Application	IDF Inventory (Based on Volumes and Concentrations for ILAW, and Failed Melters) APQ	40 CFR 61 Appendix D Release Fraction for a Solid	Total Unabated Potential-to-Emit (PTE) (Column B * Column C) + (Column D * Column E)
Solid particulate	(Ci)		(Ci)		(Ci)
U-234	6.98E+02	2.00E-09	8.80E+02	1.00E-06	8.81E-04
U-235	3.24E+01	2.00E-09	3.60E+01	1.00E-06	3.60E-05
U-236	0.00E+00	2.00E-09	1.67E+01	1.00E-06	1.67E-05
Np-237[b]	1.37E+01	2.00E-09	8.02E+02	1.00E-06	8.02E-04
Pu-238	0.00E+00	2.00E-09	1.23E+03	1.00E-06	1.23E-03
U-238	6.93E+02	2.00E-09	9.11E+02	1.00E-06	9.13E-04
Pu-239	1.72E+02	2.00E-09	4.32E+04	1.00E-06	4.32E-02
Pu-240	0.00E+00	2.00E-09	6.12E+03	1.00E-06	6.12E-03
Am-241	0.00E+00	2.00E-09	7.61E+05	1.00E-06	7.61E-01
Pu-241	1.51E+05	2.00E-09	8.91E+04	1.00E-06	8.94E-02
Cm-242	0.00E+00	2.00E-09	5.22E+03	1.00E-06	5.22E-03
Pu-242	0.00E+00	2.00E-09	7.69E-01	1.00E-06	7.69E-07
Am-243	9.86E+01	2.00E-09	4.07E+01	1.00E-06	4.09E-05
Cm-243	0.00E+00	2.00E-09	2.33E+02	1.00E-06	2.33E-04
Cm-244	0.00E+00	2.00E-09	3.05E+03	1.00E-06	3.05E-03
Total					

Table B - 1. Emission Calculation Methodology

Column A	Column G	Column H	Column I	Column J
Analyte	Facility Life is 30 years Column F / 30 yrs Annual Unabated PTE	Cap-88 OffSite MPR (E) at <40 m	Offsite Unabated Dose Column G * Column H	% Contribution to the total Unabated Dose Column I / Total of Column I
Solid particulate	(Ci/yr)	(mrem/Ci)	(mrem/yr)	%
H-3	4.68E-05	2.50E-05	1.17E-09	0.00%
C-14	1.18E-06	1.93E-03	2.29E-09	0.00%
Ni-59	6.05E-05	3.10E-04	1.88E-08	0.00%
Co-60	4.63E-03	2.50E-01	1.16E-03	0.24%
Ni-63	5.88E-03	2.60E-04	1.53E-06	0.00%
Se-79	8.18E-05	1.30E-01	1.06E-05	0.00%

Table B - 1. Emission Calculation Methodology

Column A	Column G	Column H	Column I	Column J
Analyte	Facility Life is 30 years Column F / 30 yrs Annual Unabated PTE	Cap-88 OffSite MPR (E) at <40 m	Offsite Unabated Dose Column G * Column H	% Contribution to the total Unabated Dose Column I / Total of Column I
Solid particulate	(Ci/yr)	(mrem/Ci)	(mrem/yr)	%
Sr-90	8.30E-01	1.10E-01	9.13E-02	18.81%
Nb-93m	6.71E-04	2.10E-03	1.41E-06	0.00%
Zr-93	5.06E-04	1.30E-03	6.58E-07	0.00%
Tc-99	7.47E-03	2.30E-02	1.72E-04	0.04%
Ru-106	3.92E-03	1.60E-02	6.27E-05	0.01%
Cd-113m	3.21E-03	1.30E-01	4.18E-04	0.09%
Sb-125	9.76E-02	2.60E-02	2.54E-03	0.52%
Sn-126	6.26E-05	4.70E-02	2.94E-06	0.00%
I-129	2.72E-05	2.00E-01	5.43E-06	0.00%
Cs-134	2.03E-01	1.00E-01	2.03E-02	4.17%
Cs-137	1.34E-01	2.70E-02	3.62E-03	0.75%
Sm-151	3.64E-01	7.50E-04	2.73E-04	0.06%
Eu-152	6.32E-04	2.40E-01	1.52E-04	0.03%
Eu-154	9.20E-02	2.00E-01	1.84E-02	3.79%
Eu-155	1.10E-01	8.00E-03	8.84E-04	0.18%
Ra-226	2.35E-07	4.60E-01	1.08E-07	0.00%
Ac-227	4.99E-08	1.50E+01	7.48E-07	0.00%
Ra-228	1.59E-05	1.90E-01	3.02E-06	0.00%
Th-229	1.71E-07	1.60E+01	2.74E-06	0.00%
Pa-231	1.99E-07	1.20E+01	2.39E-06	0.00%
Th-232	8.96E-07	8.00E+00	7.17E-06	0.00%
Total U	9.51E-08	0.00E+00	0.00E+00	0.00%
U-232	2.46E-05	1.10E+01	2.71E-04	0.06%
U-233	9.34E-05	3.10E+00	2.90E-04	0.06%
U-234	2.94E-05	3.10E+00	9.11E-05	0.02%
U-235	1.20E-06	3.00E+00	3.60E-06	0.00%
U-236	5.55E-07	2.90E+00	1.61E-06	0.00%
Np-237[b]	2.67E-05	1.20E+01	3.21E-04	0.07%
Pu-238	4.11E-05	7.60E+00	3.12E-04	0.06%
U-238	3.04E-05	2.80E+00	8.52E-05	0.02%
Pu-239	1.44E-03	8.20E+00	1.18E-02	2.43%

Table B - 1. Emission Calculation Methodology

Column A	Column G	Column H	Column I	Column J
Analyte	**Facility Life is 30 years Column F / 30 yrs Annual Unabated PTE**	**Cap-88 OffSite MPR (E) at <40 m**	**Offsite Unabated Dose Column G * Column H**	**% Contribution to the total Unabated Dose** **Column I / Total of Column I**
Solid particulate	**(Ci/yr)**	**(mrem/Ci)**	**(mrem/yr)**	**%**
Pu-240	2.04E-04	8.20E+00	1.67E-03	0.34%
Am-241	2.54E-02	1.30E+01	3.30E-01	67.99%
Pu-241	2.98E-03	1.30E-01	3.87E-04	0.08%
Cm-242	1.74E-04	4.10E-01	7.14E-05	0.01%
Pu-242	2.56E-08	7.80E+00	2.00E-07	0.00%
Am-243	1.36E-06	1.30E+01	1.77E-05	0.00%
Cm-243	7.78E-06	8.50E+00	6.61E-05	0.01%
Cm-244	1.02E-04	6.70E+00	6.82E-04	0.14%
Total			**4.85E-01**	**100.00%**

APPENDIX C

EXEMPTION FOR WASTE TREATMENT AND IMMOBILIZATION PLANT IMMOBILIZED LOW-ACTIVITY WASTE AND DEMONSTRATION BULK VITRIFICATION SYSTEM IMMOBILIZED LOW-ACTIVITY WASTE FROM THE INTEGRATED DISPOSAL FACILITY ANNUAL POSSESSION QUANTITY

The below exemption was requested in the original NOC application. As a result of the WDOH not approving the exemption, Revision 0a to the NOC application calculated a new APQ and PTE for the IDF to include 450,000 m^3 of ILAW. The WDOH is still open to the concept of the exemption but would require a study to be completed showing specific air emissions from the glass matrix or its containers before granting the exemption or a different release fraction for ILAW waste containers.

EXEMPTION FOR WASTE TREATMENT AND IMMOBILIZATION PLANT IMMOBILIZED LOW-ACTIVITY WASTE AND DEMONSTRATION BULK VITRIFICATION SYSTEM IMMOBILIZED LOW-ACTIVITY WASTE FROM THE INTEGRATED DISPOSAL FACILITY ANNUAL POSSESSION QUANTITY

The IDF is requesting an exemption from their APQ for the following waste forms: ILAW from the WTP and ILAW from the DBVS. This is similar to the request made by the WTP in its NOC application, 24590-WTP-RPT-ENV-01-008, *Radioactive Air Emissions Notice of Construction Permit Application for the River Protection Project – Waste Treatment Plant.* The difference in this request is that the decision for the exemption will be based on the waste form contained within the container, and not the container and the mechanism used to close or seal the container.

The IDF will handle, temporarily store, and dispose waste forms that could meet the definition of sealed source in WAC 246-247-030(24), and therefore were left out of the APQ in this NOC application.

The waste that contains the radioactive material, which is the basis for the APQ for IDF, will be matrixed in vitrified glass. The vitrified glass forms a matrix that permanently binds the material in such a manner that there would be no airborne release, as stated in WAC 246-247-020(1) for "The following facilities or sources…are exempt… because they release no airborne radioactivity…". The two types of waste are WTP ILAW and DBVS ILAW. Unlike the WTP, the request for DBVS ILAW is new. However, it was accepted as a supplemental treatment technology because it has properties similar to WTP ILAW.

Through vitrification, the radionuclides in the Hanford tank waste will be permanently fixed in a glass matrix. The containers for all three waste types are similar in that they are constructed of steel, which is physically and chemically compatible with the glass produced. The containers may either be welded or mechanically closed and decontaminated to remove smearable contamination from the outer surfaces. This, combined with the radioactive material in each container being "permanently bonded or fixed in a capsule or matrix," as defined in WAC 246-247-030(24), will result in "no airborne radioactivity." It is on this basis, under WAC 246-247-020(1)(b), that the IDF is requesting that the APQ associated with this waste be exempt from the facility's APQ used to calculate the TEDE to the MEI.

It should be noted that the IDF is not requesting an exemption under WAC 246-247(1)(b) for the containers this waste is held in, because the IDF operations does not control the final design of any containers that it will receive. The IDF can only make decisions based on the waste acceptance criteria, and the criteria states that the containers accepted at IDF will meet DOT requirements or equivalent standards. Therefore, the request is made on the basis that the vitrified glass, in combination with the DOT container or equivalent, results in no airborne radioactivity release. This clarifies the point that under WAC 246-247-030(24), the exemption is based on radioactive material "permanently bonded or fixed in a capsule or matrix" and not "radioactive material in airtight containers."