DOE/RL-2003-43
Revision 1

Radioactive Air Emissions Notice of Construction for Transition of the Plutonium Finishing Plant (PFP), 200 West Area, Hanford Site, Richland, Washington

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

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

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January 2006

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J. D. Aardal — Release Approval
01/17/2006 — Date

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TERMS

ALARA	as low as reasonably achievable
ALARACT	as low as reasonably achievable control technology
APQ	annual possession quantity
ARAR	applicable or relevant and appropriate requirements
BARCT	best available radionuclide control technology
CAM	continuous air monitor
CCC	core component container
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CFR	Code of Federal Regulations
Ci	curie
DOE	U.S. Department of Energy
DOE-RL	U.S. Department of Energy, Richland Operations Office
dpm	disintegrations per minute
EPA	U.S. Environmental Protection Agency
FFTF	Fast Flux Test Facility
HEPA	high-efficiency particulate air (filter)
HPT	health physics technician
ISC	interim storage cask
LIGO	Laser Inferometer Gravitational Wave Observatory
MEI	maximally exposed individual
MPR	maximum public receptor
mrem	millirem
NDA	nondestructive analyses
NOC	notice of construction
PA	protected area
PCM	periodic confirmatory measurements
PFP	Plutonium Finishing Plant
PRF	Plutonium Reclamation Facility
PTRAEU	portable temporary radioactive air emissions unit
RAWP	removal action work plan
RWP	radiation work permit
SEP	Security Enhancement Program
SEPA	*State Environmental Policy Act of 1971*
SNM	special nuclear material

TEDE	total effective dose equivalent
WAC	Washington Administrative Code
WDOH	Washington State Department of Health

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	0.03937	inches
inches	2.54	centimeters	centimeters	0.393701	inches
feet	0.3048	meters	meters	3.28084	feet
yards	0.9144	meters	meters	1.0936	yards
miles (statute)	1.60934	kilometers	kilometers	0.62137	miles (statute)
Area			**Area**		
square inches	6.4516	square centimeters	square centimeters	0.155	square inches
square feet	0.09290304	square meters	square meters	10.7639	square feet
square yards	0.8361274	square meters	square meters	1.19599	square yards
square miles	2.59	square kilometers	square kilometers	0.386102	square miles
acres	0.404687	hectares	hectares	2.47104	acres
Mass (weight)			**Mass (weight)**		
ounces (avoir)	28.34952	grams	grams	0.035274	ounces (avoir)
pounds	0.45359237	kilograms	kilograms	2.204623	pounds (avoir)
tons (short)	0.9071847	tons (metric)	tons (metric)	1.1023	tons (short)
Volume			**Volume**		
ounces (U.S., liquid)	29.57353	milliliters	milliliters	0.033814	ounces (U.S., liquid)
quarts (U.S., liquid)	0.9463529	liters	liters	1.0567	quarts (U.S., liquid)
gallons (U.S., liquid)	3.7854	liters	liters	0.26417	gallons (U.S., liquid)
cubic feet	0.02831685	cubic meters	cubic meters	35.3147	cubic feet
cubic yards	0.7645549	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
Energy			**Energy**		
kilowatt hour	3,412	British thermal unit	British thermal unit	0.000293	kilowatt hour
kilowatt	0.94782	British thermal unit per second	British thermal unit per second	1.055	kilowatt
Force/Pressure			**Force/Pressure**		
pounds (force) per square inch	6.894757	kilopascals	kilopascals	0.14504	pounds per square inch

06/2001

Source: *Engineering Unit Conversions*, M. R. Lindeburg, PE., Third Ed., 1993, Professional Publications, Inc., Belmont, California.

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RADIOACTIVE AIR EMISSIONS NOTICE OF CONSTRUCTION FOR TRANSITION OF THE PLUTONIUM FINISHING PLANT (PFP), 200 WEST AREA, HANFORD SITE, RICHLAND, WASHINGTON

This document serves as a notice of construction (NOC) pursuant to the requirements of Washington Administrative Code (WAC) 246-247-060 for transition of the Plutonium Finishing Plant (PFP). This document is a revision to an earlier NOC [DOE/RL-2003-43, Revision 0A, *Radioactive Air Emissions Notice of Construction for Deactivation of the Plutonium Finishing Plant (PFP), 200 West Area, Hanford Site, Richland, Washington*]. This document also serves to provide the State of Washington Department of Health a notification of the anticipated date of initial startup per WAC 246-247-035.

In addition, the following description and references are provided to the U.S. Environmental Protection Agency (EPA) as an NOC, in accordance with Title 40 Code of Federal Regulations (CFR), Part 61, "National Emission Standards for Hazardous Air Pollutants." The information required for submittal to the EPA is specified in 40 CFR 61.07. This application also is intended to provide notification of the anticipated date of initial startup in accordance with the requirement listed in 40 CFR 61.09(a)(1), and it is requested that approval of this application also constitutes EPA acceptance of this initial startup notification. Written notification of the actual date of initial startup, in accordance with the requirement listed in 40 CFR 61.09(a)(2), will be provided later.

The PFP Complex is described in DOE/EIS-0244-F, *Final Environmental Impact Statement Plutonium Finishing Plant Stabilization.* A deactivation NOC (DOE/RL-2003-43, Rev. 0A) was approved by Washington State Department of Health (WDOH) (AIR 05-1101). DOE/RL-2003-43, Rev. 0A, consolidated previous PFP NOCs and provided for the transition from current operations to a documented removal or remedial action being performed by DOE under *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) *of 1980.*

Applicable CERCLA documentation, including a removal action work plan identifying specific radioactive air emissions monitoring requirements identified through the applicable or relevant and appropriate requirements (ARARs) identification process, has been approved (DOE/RL-2005-13, Rev. 0, *Action Memorandum for the Plutonium Finishing Plant Above-Grade Structures Non-Time Critical Removal Action,* approved May 2005). Implementation of CERCLA actions has been initiated; activity-specific removal action work plans (RAWPs) have been prepared (DOE/RL-2005-14, Rev. 0, *Removal Action Work Plan for the Plutonium Finishing Plant Above-Grade Structures: Facility Deactivation,* approved May 2005). Diffuse and fugitive emissions associated with the activities identified in approved work plans are not part of this NOC. However, as appropriate, any portions of this NOC necessary to support process operations outside of the CERCLA scope will remain in effect concurrent with the aforementioned CERCLA documentation.

This NOC also identifies activities supporting the Security Enhancement Program (SEP) at the PFP. The SEP activities will be conducted concurrently with ongoing deactivation activities identified for the PFP Complex.

The estimated potential total effective dose equivalent (TEDE) to the maximally exposed individual (MEI) resulting from the unabated emissions from SEP activities and continued deactivation of the PFP Complex is 8.9 E+02 millirem per year. The calculated abated TEDE is 2.4 E-02 millirem per year.

1.0 LOCATION

Name and address of the facility, and location (latitude and longitude) of the emission unit:

The PFP Complex is located in the 200 West Area (Figure 1). The address and geodetic coordinates for the PFP Complex are as follows:

U.S. Department of Energy, Richland Operations Office (DOE-RL)
Hanford Site
Richland, Washington 99352
200 West Area, PFP, 232-Z Building

46° 33" North Latitude
119° 37" West Longitude.

2.0 RESPONSIBLE MANAGER

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

Mr. Matthew S. McCormick, Assistant Manager for Central Plateau
U.S. Department of Energy, Richland Operations Office
P.O. Box 550
Richland, Washington 99352
(509) 373-9971.

3.0 PROPOSED ACTION

Identify the type of proposed action for which this application is submitted.

The U.S. Department of Energy (DOE) needs to transition the PFP Complex in the 200 West Area of the Hanford Site to a state of low-risk, low-cost, long-term surveillance and maintenance pending final disposition. This would mitigate radiological and chemical hazards associated with structures (and any remaining processing equipment and ancillary hardware) in the PFP Complex.

In addition, DOE needs to provide extended onsite storage of the PFP special nuclear material (SNM) inventory, and to develop/implement the necessary capabilities to store and protect the inventory to the current DOE SNM protection policy. Enhanced storage will meet programmatic needs for extended storage of SNM throughout the DOE Complex pending future transport to, and disposition at, the Savannah River Site.

The planned activities represent a modification. The significance of the modification [e.g., a "significant modification" per WAC 246-247 (i.e., the anticipated emissions associated with these activities are calculated to result in a potential-to-emit of greater than 1.0 millirem per year)] is noted in Table 2.

4.0 STATE ENVIRONMENTAL POLICY ACT

If the 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 categorically is exempt from the requirements of SEPA under WAC 197-11-845.

5.0 PROCESS DESCRIPTION

Describe the chemical and physical processes upstream of the emission unit.

Descriptions of the PFP Complex and associated deactivation activities are provided in the following sections.

5.1 FACILITY DESCRIPTION

The PFP Complex was established to conduct plutonium processing, storage, and support operations for national defense. Ongoing operations include the following:

- SNM handling and storage
- Plutonium recovery
- Plutonium conversion
- Laboratory support
- Waste handling
- Shutdown and operational facility surveillances.

The analysis in this NOC considers deactivation of indoor and outdoor portions of the PFP Complex. The analysis in this NOC considers 150 kilograms of material, in the form of pure/impure plutonium oxides and/or alloys, and sludges, as the basis for potential radiological releases. The 150-kilogram amount is comprised of a conservative safeguards inventory value (approximately 115 kilograms) and a contingency (35 kilograms). Current conservative safeguards values[1] for residual nuclear material contained throughout the PFP Complex processing systems are estimated to be 115 kilograms. These 115 kilograms of plutonium are the aforementioned hold-up material. Because of the inherent limitations of supporting nondestructive analyses (NDA), and potential locations within the PFP Complex that have not undergone NDA, an additional 35 kilograms also are included as contingency. The total inventory is provided in Table 1.

Additionally, a variety of fuel types presently are, or will be, stored at the PFP Complex in the form of sealed fuel assemblies and fuel pins. This material is considered a sealed source with only a slight potential for airborne radiological contamination (in the form of trace amounts of smearable surface contamination. That is, on the exterior surface of the sealed source containers some trace amounts of surface contamination entirely separate from the sealed material may provide a slight potential for airborne radioactive contamination). PFP will repackage fuel assemblies and pins into appropriate containers. These containers would be stored at PFP or loaded via crane operations onto trucks for transport either to storage at the existing Central Waste Complex, Canister Storage Building, or shipment offsite.

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[1] Conservative values are derived from safeguards accountability records.

5.2 DEACTIVATION ACTIVITIES

The proposed activities involve transitioning the PFP Complex to a state of low-risk, low-cost, long-term surveillance and maintenance pending final disposition. All work would be performed in accordance with the approved radiological control procedures and as low as reasonably achievable (ALARA) program requirements as implemented by the project radiological control manual, as amended. These requirements would be carried out through the activity work packages and associated radiation work permits (RWP).

The scope of this NOC includes continuing deactivation of those buildings and structures previously identified in DOE/RL-2003-43, Rev. 0A. The scope of this NOC also includes deactivation of systems no longer necessary once stabilization and storage activities and planned legacy hold-up removal have been concluded; removal/disposition of equipment/components; contamination characterization and reduction/mitigation; packaging plutonium holdup material meeting waste acceptance criteria; maintaining and operating muffle furnaces, as needed, for removed plutonium holdup material; and demolition of radiologically contaminated, non-process ancillary buildings. The scope of this NOC does not include actions and activities conducted under approved CERCLA documentation [i.e., the aforementioned action memorandum (DOE/RL-2005-13) and RAWPs (e.g., DOE/RL-2005-14)].

This NOC identifies ongoing deactivation activities (previously described in DOE/RL-2003-43, Revision 0A). Specific actions include the following work involving the potential for radioactive contamination:

- Draining and/or de-energizing systems as appropriate
- Stabilizing contaminated areas (e.g., with fixatives, sealants, paint)
- Stabilizing or removing gloveboxes, process equipment, tanks, piping, fume hoods, and support equipment
- Removing fencing and paved parking areas adjacent to facilities
- Installing alternate environmental monitoring, surveillance, and safety components (e.g., lighting, fencing) if required
- Removing/packaging radioactive (including equipment calibration sources and laboratory standards) and hazardous materials and waste, including stabilization and/or removal of asbestos, and removal, cleanup, and disposition of polychlorinated biphenyls and other regulated materials and transportation to existing waste management facilities
- Removing equipment and system components
- Size-reducing process equipment for disposal as waste
- Performing physical or chemical treatment processes (e.g., neutralization, solidification, filtering) to render a material less hazardous or to reduce the volume (such processes will not increase the potential release rates provided in this NOC)
- Decontamination to support excessing surplus equipment

- Removing excess combustible material
- Disconnecting utilities, piping, and communication service systems (if the systems are no longer necessary to maintain required environmental monitoring or building safety systems), including associated excavation
- Ensuring adequate freeze and heat protection
- Stabilizing, reducing, combining, or removing waste materials at outdoor locations within the PFP Complex (such processes will not increase the potential release rates provided in this NOC)
- Sealing cracks, gratings, and openings to the building exterior, and repairing roofs
- Conducting general housekeeping activities (e.g., vacuuming, sweeping, dusting) in areas where radiological contamination is not anticipated (e.g., radiological buffer area) but could be encountered
- Removing or reducing radioactive or hazardous contamination from facilities and equipment by washing, heating, chemical or electrochemical action, mechanical cleaning, or other similar techniques
- Removing residual plutonium holdup material, which might remain throughout the PFP Complex after stabilization activities described in the PFP EIS (DOE/EIS-0244-F) have been completed; packaging residual plutonium holdup meeting waste acceptance criteria for shipment to an onsite waste management facility, or thermally stabilizing material in muffle furnace operations and packaging for storage in PFP Complex storage units
- Designing and executing changes to utility service systems and/or utility structures necessary to place a facility in surveillance and maintenance, pending demolition
- Conducting final process operations to stabilize or eliminate residual operational materials or effluents, such as final process runs; cleaning of vessels, valve pits and pipe trenches; installation and operation of small evaporators; flushing piping systems; removal or replacement of filters; and other similar closeout actions
- Demolishing non-process ancillary buildings.

Deactivation activities will require actions to provide for continued routine maintenance, repair, and replacement-in-kind of operating portions of PFP abatement technology.

Other actions include:

- Remove residual plutonium from gloveboxes, filterboxes, equipment, piping, ductwork, and the building surfaces and package for disposition to onsite or offsite disposal facilities
- Remove internal equipment from gloveboxes and building equipment/system components and package for disposition to onsite or offsite disposal facilities
- Decontaminate gloveboxes, filterboxes, ductwork, and equipment to less than transuranic levels if possible

- Remove gloveboxes, filterboxes, ductwork, and equipment and package for disposition to onsite or offsite disposal facilities

- Decontaminate or fix contamination on building interior and exterior

- Disconnect utilities and services not necessary for monitoring

- Perform radiological and chemical characterization in preparation for dismantlement.

In preparation for the proposed transition activities, housekeeping, assays, preventive maintenance, minor decontamination, and reactivation of glovebox access ports would occur.

The proposed methods for removing residual contamination from equipment/systems and for removing equipment would be similar to methods in use today throughout the industry and the DOE Complex. Both direct contact and remote technologies/techniques could be used. General technologies/techniques include heating, crushing, size reducing, and cutting. These could involve laboratory analyses and nondestructive assay; chemical cleaning, brushing, washing, scrubbing, vacuum cleaning, and abrasive jetting; using nibblers, shears, circular saws; potentially a remote-operated laser; and other similar methods. It is expected that should new technology become available, such technology would be evaluated for application in the PFP deactivation activities, and could be used if no increase in the potential-to-emit described in this NOC would result. The activities include the following.

- Size reduction of equipment will be by mechanical means and may be accomplished by compaction, disassembling by use of wrenches, nibblers, shears, cutters, grinders, saws, or other similar methods. This equipment may be manually, hydraulically, pneumatically or electrically powered.

- Decontamination methods include: Scraping, sweeping, chemical cleaning, brushing, washing, scrubbing, scabbling, grinding, vacuum cleaning, strippable coatings, washing using wet rags, spraying, abrasive jetting, low pressure and high pressure wash using water and/or chemicals cleaners, use of fixatives and/or physical removal of contamination by use of mechanical means such as chipping or cutting. The application of fixatives for contamination control would be accomplished via aerosol fogging, paint brush/roller, hand-held spray bottle, or an electric or pneumatic powered sprayer.

- Containment of waste may be accomplished by coating the material with a fixative or placing the material in containers, bags and/or wrapping in plastic sheeting, utilizing adhesive tape, heat sealing or mechanical closure to prevent release of radiological contamination.

- Miscellaneous mechanical processes that could be used to support the proposed activity could include threading of piping, use of hot taps on piping, capping and plugging piping using threaded pipe components and expanding/compressive plugs or caps, drilling of holes in metal and concrete, core drilling concrete surfaces, installation of anchor bolts, installation and removal of bolts, installation of hose and tubing connectors, compression fittings, installation and removal of pumps, agitators and process control filters.

Excavation will take place in the PFP Complex to support site stabilization, isolating/blanking utilities, fence removal/installation/relocation, and soil sampling/cleanup. Access to underground piping and cable would be gained by use of a bucket-type excavator. Manual digging methods with shovels, picks, and rakes also could be used. Contaminated soil removed and covered during excavation activities would remain covered until replaced into the excavation or otherwise dispositioned (backfill would consist of the original material removed or 'clean' soil).

If needed or chosen for use during these activities, the categorical NOCs (with associated controls described in Section 6.0) for sitewide use of the Guzzler™, a portable temporary radioactive air emissions unit (PTRAEU) exhauster, or high-efficiency particulate air (HEPA)-filtered vacuum radioactive air emission unit could be used.

Wastes generated during deactivation would be packaged appropriately. Waste would be generated/packaged throughout the PFP Complex (i.e., in structures with registered stacks, in non-HEPA-filtered structures, or outdoors), resulting in filtered releases and/or diffuse and fugitive emissions. Wastes could be placed in various containers such as plastic bags, metal drums, and standard waste boxes. These wastes could be transferred to other locations within the PFP Complex for interim storage and/or repackaging before subsequent transport to approved locations/facilities pending final disposition.

If necessary, personnel decontamination activities would be conducted in the decontamination trailer (DOE/RL-2003-42).

5.3 SEP ACTIVITIES

The scope of this NOC includes a portion of those activities necessary to support enhanced SNM storage at the PFP Complex, while continuing to be protective of personnel, the public, and the environment during ongoing deactivation. SEP activities would include those actions foreseeably necessary for implementation of the proposed action, such as associated transportation activities, waste removal and disposal, and award of grants and contracts. Specific actions could include the following work involving the potential for radioactive contamination:

- Excavations, inside and outside the PFP protected area (PA) to support installation of utilities and security-related devices and structures (e.g., barricades, patrol offices) and relocation of displaced activities. SEP will require some excavation in areas of potential belowgrade or surface contamination. In addition to excavations for building and structure foundations, it is estimated that approximately 5,000 linear feet of belowgrade ducting will installed, a portion of the water line will require replacement, and connections to sewer and water lines will be required.

- Modifications to existing structures (e.g., moving walls, doors, railing, security monitoring equipment, electrical equipment upgrades) and/or construction of new buildings (non-radioactive).

- Continued operations at 2736-Z/ZB Buildings for 3013-container[2] packaging systems monitoring and maintenance.

There would be no modifications to the existing abatement equipment associated with registered stacks.

Guzzler™ is a trademark of Guzzler Manufacturing, Inc., Birmingham, Alabama.

[2] Plutonium-bearing material was placed into a convenience can, which was inserted into an inner can. The inner can was welded shut. This inner-welded container was placed into an outer container. The outer container was welded shut. This double-welded configuration, referred to as a 3013 container, meets DOE Standard 3013 (DOE-STD-3013, *Criteria for Safe Storage of Plutonium Metals and Oxides*).

5.4 POINT SOURCES

The following sections address point sources (registered stacks) within the scope of this NOC.[3]

5.4.1 291-Z-1 Stack

The 291-Z-1 Stack releases filtered emissions from the 234-5Z, 236-Z [Plutonium Reclamation Facility (PRF)], and 242-Z Buildings (DOE/RL-2005-06).

5.4.2 296-Z-5 Stack

The 296-Z-5 Stack exhausts filtered air from the 2736-ZB Building, used for shipping and receiving operations (DOE/RL-2005-06).

5.4.3 296-Z-6 Stack

The 296-Z-6 Stack exhausts filtered air from the 2736-Z Building used for storage (DOE/RL-2005-06).

5.4.4 296-Z-7 Stack

The 296-Z-7 Stack exhausts filtered air from the 2736-ZB Building used for stabilization and packaging of plutonium-bearing materials (DOE/RL-2005-06).

5.5 DIFFUSE/FUGITIVE SOURCES

Unfiltered releases could occur from various deactivation activities at the PFP Complex. Specifically, these diffuse and fugitive emissions could result from minor amounts of personnel decontamination. Also, waste packaging and excavation activities could occur throughout the PFP Complex. Fuel de-inventory could involve minor amounts of emissions. Outdoor activities, or those activities within structures without powered ventilation, would be considered diffuse and fugitive sources.

5.5.1 Decontamination Trailers

Decontamination of personnel who have external radioactive contaminants on clothing and/or any measurable contamination on their skin could be required. Typically, such contamination would be treated immediately and directly at the location of the event (e.g., within a building or job site). However,

[3] Two point sources at the PFP Complex were not included in DOE/RL-2003-43, Revision 0A. The point sources were the 296-Z-3 Stack (241-Z Facility) and the 296-Z-14 Stack (232-Z Building). These point sources were addressed in separate NOCs; *Radioactive Air Emissions Notice of Construction for Transition of the 241-Z Liquid Waste Treatment Facility at the Plutonium Finishing Plant, 200 West Area, Hanford Site, Richland, Washington* (DOE/RL-2002-72, Revision 1), and *Radioactive Air Emissions Notice of Construction for Transition of the 232-Z Contaminated Waste Recovery Process Facility at the Plutonium Finishing Plant, 200 West Area, Hanford Site, Richland, Washington* (DOE/RL-2002-64, Revision 1), respectively. Those two point sources, and a third point source [the 296-Z-15 Stack (243-Z Low-Level Waste Treatment Facility)], have transitioned to CERCLA. The latter point source was included in the original scope of PFP deactivation.

it might be necessary to provide additional decontamination capabilities in an isolated location within the PFP Complex to minimize personnel exposure and to minimize the potential for spread of radioactive contamination offsite. A decontamination trailer (DOE/RL-2003-42) would be stationed within the PFP Complex fenceline. The decontamination trailers vent directly to the atmosphere. As many as two additional decontamination trailers may be installed to support PFP deactivation.

5.5.2 Waste Packaging and Excavation

Wastes generated during deactivation would be packaged appropriately. Waste would be generated/packaged throughout the PFP Complex (i.e., in structures with registered stacks, in non-HEPA-filtered structures, or outdoors), resulting in filtered releases and/or diffuse and fugitive emissions. Wastes could be placed in various containers such as plastic bags, metal drums, and standard waste boxes. These wastes could be transferred to other locations within the PFP Complex for repackaging before subsequent transport to approved locations/facilities pending final disposition.

Excavation will take place in the PFP Complex to support site stabilization, isolating/blanking utilities, fence removal/installation/relocation, and soil sampling/cleanup. Excavations would be conducted to support both CERCLA-related activities (e.g., 232-Z Building demolition) and non-CERCLA activities (e.g., SEP utilities upgrades). Access to underground piping and cable would be gained by use of a bucket-type excavator. Manual digging methods with shovels, picks, and rakes also could be used. Contaminated soil removed and covered during excavation activities would remain covered until replaced into the excavation or otherwise dispositioned (backfill would consist of the original material removed or 'clean' soil).

Guzzlers, PTRAEU exhausters, or HEPA-filtered vacuum radioactive air emission units could be used (in accord with existing NOCs and associated controls described in Section 6.0), if needed or chosen during these activities, to mitigate diffuse and fugitive emissions.

5.5.3 Fuel De-Inventory

PFP will repackage fuel assemblies and/or fuel pins into storage and/or transport containers for staging at PFP. These containers would be loaded via crane operations onto trucks for transport either to storage onsite or to appropriate offsite facilities pending final disposition. Fuel assemblies and/or fuel pins could be mechanically handled by transferring directly to containers (emissions would be considered as diffuse and fugitive if work conducted in locale providing potential for unfiltered emissions). Fuel pins could be transferred to glovebox(es) where they would be size reduced (using bolt cutters or equivalent means), stabilized, and placed into a container. Emissions, including minor amounts of tracer gases, would be released through the 291-Z-1 or 296-Z-7 stacks. The pins/containers could be subjected to NDA at any point(s) during repackaging activities.

Minor alterations (e.g., removing interior walls, installation of temporary scaffolding) to the 234-5Z Building would be necessary to support fuel de-inventory operations.

5.5.4 SEP Activities

SEP activities could generate diffuse and fugitive radioactive emissions. SEP activities would include excavations, disturbing fixed contamination (e.g., interior/exterior of buildings), and penetrating existing ventilation boundaries (e.g., installing doors, electrical penetrations).

Construction of new buildings and/or minor alterations (e.g., removing/modifying walls, installation of temporary scaffolding) to several existing structures and construction of new buildings in the PFP Complex would be necessary to support SEP activities.

6.0 PROPOSED CONTROLS

Describe the existing and proposed 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 in cubic meters/second for the emission unit.

Many of the emission controls used during the deactivation activities are administrative, based on ALARA principles and consist of ALARA techniques. It is proposed that these controls satisfy as low as reasonably achievable control technology (ALARACT) for continued deactivation of the PFP Complex and SEP. The transition operations would be performed in accordance with the controls specified in a RWP and/or operating procedures, available for inspection upon request. These controls consist of the following.

1. For those point source emission units currently approved (i.e., 291-Z-1; 296-Z-5; 296-Z-6; and 296-Z-7 are approved under AIR 05-1101), it is proposed that the existing controls will be maintained and be approved as representing ALARACT and best available radioactive control technology (BARCT), as applicable.

2. For other PFP Complex emission units currently approved (i.e., ancillary buildings; decontamination trailer; and fuel storage facility are approved under AIR 05-1101), it is proposed those associated controls be approved as representing ALARACT.

3. Health physics technician (HPT) coverage would be provided, as necessary, during all deactivation and excavation activities.

4. Ventilation systems, for the structures previously identified (DOE/RL-2003-43, Rev. 0A, Appendices A and B) that exhaust through registered stacks with HEPA filtration, would be operational during transition activities as practicable (refer to Section 5.2). An exception includes shutting down a ventilation system for a short period of time to allow fogging operations or sampling.

5. The existing monitoring systems for the registered stacks would be operational during transition activities, other than during periods of shutdown of stack fans.

6. Appropriate controls such as water, fixatives, covers, containment tents, or windscreens would be applied, if needed, as determined by the Radiological Control organization. Soil removed and covered during excavation activities would remain covered until replaced into the excavation or otherwise dispositioned.

7. After leveling, the soil surface radiological contamination levels would be verified to be acceptable per Radiological Control organization guidelines. If contamination is present above identified levels, the soil would be removed and containerized for disposal or covered or fixed to provide containment of the contamination, consistent with radiological work procedures in effect at the time.

8. As appropriate, before starting deactivation activities (such as isolating utilities and piping or dismantling the exhaust system), removable contamination in the affected area(s) would be reduced to ALARA. Measures such as decontamination solutions, expandable foam, fixatives, or glovebags also could be used to help reduce the spread of contamination.

9. If a guzzler, PTRAEU, or HEPA-filtered vacuum radioactive air emission unit is used, controls as described in the AIR 02-302, DOE/RL-96-75 or DOE/RL-97-50, as amended, would be followed.

10. For purging activities, use of a stand alone vacuum pump fitted with a NucFil® metal HEPA filter is allowed, with the control that the filter flow through the system is limited not to exceed the filter rating. Confirmatory measurement of low emissions will be based on radiological technician field survey of either the down stream side of the HEPA filter or at the outlet of the vacuum pump.

11. Field surveys during excavation would identify localized areas of contamination. If contamination levels over 2,000 dpm alpha/100 cm^2 [i.e., a 'hot spot' (of a few square meters or less) of high alpha surface contamination area] are exceeded, additional surveys would be conducted on the perimeter of the 'hot spot' to verify the localized nature. A separate evaluation of the activity against the assumptions of this NOC would be documented to file prior to the activity being performed to ensure overall approved contamination levels are not exceeded.

12. It is proposed that the controls specified in the RWP in effect at the time of operations be approved as ALARACT for the decontamination trailer activities (refer to DOE/RL-2003-42).

7.0 DRAWINGS OF CONTROLS

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.

Figures 2, 3, 4, 5, and 6 show the existing ventilation systems for 291-Z-1 (Figures 2 and 3), 296-Z-5, 296-Z-6, and 296-Z-7, respectively, described in Section 5.2.

The categorical NOCs for sitewide use of the Guzzler, PTRAEU and HEPA-filtered vacuum radioactive air emission unit contain drawings of controls associated with those respective units.

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.

Potential radionuclides expected to be encountered during deactivation activities include: uranium-233, uranium-234, uranium-235, uranium-236, uranium-237, uranium-238, plutonium-238, plutonium-239, plutonium-240, plutonium-241, plutonium-242, americium-241, americium-243, and neptunium-237. Other radioisotopes may be present. These other isotopes may be present due to activation products, fission products, decay products, sources and standards (e.g., thorium, californium), tracer gases (e.g., argon, krypton, xenon) and core component container (CCC) contamination (cobalt-60, strontium-90, and cesium-137). These other isotopes would not contribute significantly to the calculated potential-to-emit. Refer to Table 2 for additional radionuclide information.

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9.0 MONITORING

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 twenty-five percent of the TEDE to the MEI, after controls. Describe the method for monitoring or calculating those radionuclide emissions. Describe the method with sufficient detail to demonstrate compliance with the applicable requirements.

Monitoring details and requirements for the registered stacks are provided in the *Facility Effluent Monitoring Plan for the Plutonium Finishing Plant* (HNF-EP-0476). Figures 8 through 12 show the respective existing monitoring systems for the stacks described in Section 5.2. Specifics pertaining to the record samplers for the registered stacks (i.e., operational parameters, air sample collection and analysis schedules) also are provided in HNF-EP-0476. As described earlier, substantial processing was conducted in the past with a higher source term and the existing systems in place. For these various potential-to-emit sources projected during the proposed work activities, the sample collection equipment continues to demonstrate adequacy of continuous (and/or periodic confirmatory) monitoring of the filtered emissions. In combination with radiological surveys and continued near-field ambient air monitoring, the emissions during the proposed deactivation activity would be verified as remaining low.

Radiological surveys (dose measurements and smear samples) taken during deactivation activities would be performed to demonstrate the conservative nature of the estimated potential-to-emit. These surveys are part of the existing radiological control program.

Diffuse/fugitive emissions would be monitored using the 200 West Area near-field ambient air monitors (PNNL-13910). Sample collection and analysis would follow that of the near-field monitoring program. Analytical results would be reported in an annual air emissions report.

If a sitewide Guzzler, PTRAEU, or HEPA filtered vacuum radioactive air emission unit is used, periodic confirmatory measurement (PCM) for emissions from those units would be performed as required by AIR 02-302, DOE/RL-96-75 and DOE/RL-97-50, as amended, respectively.

The proposed PCM for the diffuse and fugitive emissions also would include radiological surveys during personnel decontamination operations (e.g., smears and hand-held radiation monitoring measurements) on the interior/exterior of the decontamination trailers.

10.0 ANNUAL POSSESSION QUANTITY

Indicate the annual possession quantity for each radionuclide.

For purposes of a conservative calculation of the potential-to-emit, it was assumed that deactivation of the PFP Complex would potentially disturb approximately 150 kilograms of residual material[4]. This assumption includes a mixture predominantly of isotopes of plutonium, uranium, americium and neptunium, with the presence of minor amounts of other decay products (refer to Tables 1 and 2). Contaminated soil associated with deactivation might contain 0.05 curie of transuranic contamination

[4] The 150 kilograms represents a subset of the total annual possession quantity of material at PFP. As identified in DOE/RL-2000-42, Revision 3, a total of 2.3 E+05 curies plutonium-239, 2.5 E+04 curies uranium-233, and 1.3 E+05 curies americium-241, along with neptunium and minor amounts of other radionuclides, are expected to be present predominantly as tightly closed or sealed sources, and as such are not expected to contribute numerically to potential release estimates for deactivation activities.

represented by plutonium-239/240. Additionally, fuels at the PFP Complex (predominantly considered sealed sources) are assumed to contain 9.8 E+05 curies (predominantly plutonium and uranium isotopes).

The annual possession quantity (APQ) for the decontamination trailers is based on alpha (as plutonium-239). For conservatism, 1.4 E-07 curies alpha (including fixed contamination) per trailer would be assumed to be associated with personnel contamination in a calendar year.

The APQ for SEP activities, associated with contaminated soil, is estimated to be approximately 0.8 curies of transuranic contamination (represented by a blend of plutonium-239/240 and americium-241). Additionally, for calculation purposes, the APQ for SEP activities which may disturb fixed contamination on equipment/structures is estimated to be approximately 18 curies (assumes 0.01 percent of original inventory is available for diffuse and fugitive emissions; i.e., 15 grams); represented by a blend of plutonium, americium, uranium, and neptunium isotopes.

A summation of APQs and releases for each emission unit are provided in Table 2.

11.0 PHYSICAL FORM

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

The physical form of the radionuclides in PFP Complex is assumed to be particulate solid, or particulate solids dissolved in liquid. The physical form of the radionuclides associated with excavation is particulate solid. Contributions by any gaseous radionuclides to the calculated air emissions are inconsequential.

12.0 RELEASE FORM

Indicate the release form of each radionuclide in inventory: Particulate solids, vapor or gas. Give the chemical form and ICRP 30 solubility class, if known.

For analysis, the release form of the radionuclides during transition is assumed to be particulate solid (gaseous radionuclide contributions are inconsequential).

13.0 RELEASE RATES

Give the predicted release rates without any emissions control equipment (potential to emit) and with the proposed control equipment using the efficiencies described in subsection (6) of this section. Indicate whether the emission unit is operating in a batch or continuous mode.

Release rates are based on the conservative assumptions provided in Section 10.0 regarding the isotopic mixture amounts and ratios. Further conservatism is added by assuming all material is processed in 1 year. Unabated release rates resulting from these deactivation activities are provided in Tables 2 through 9. Unabated release rates were determined by applying the 40 CFR 61, Appendix D, release factor for particulates (1.0 E-03) to the calculated inventory (contributions by any gaseous radionuclides to the calculated air emissions are inconsequential). Abated emission rates also are provided in Tables 2 through 9.

The proposed modification would be considered continuous operation in accordance with WAC 246-247-110(13)(b).

14.0 LOCATION OF MAXIMALLY EXPOSED INDIVIDUAL

Identify the MEI by distance and direction from the emission unit.

The maximum public receptor (MPR) was assumed to be a non-DOE worker who works within the Hanford Site boundary and who eats food grown regionally. The MPR was assumed to be located at the Laser Interferometer Gravitational Wave Observatory (LIGO) (Figure 1). LIGO is approximately 22,000 meters southeast from PFP.

15.0 TOTAL EFFECTIVE DOSE EQUIVALENT TO THE MAXIMALLY EXPOSED INDIVIDUAL

Calculate the TEDE to the MEI using an approved procedure. For each radionuclide identified in sub section (8) of this section, determine the TEDE to the MEI for existing and proposed emission controls, and without any existing controls using the release rates from subsection 13 of this section. Provide all input data used in the calculations.

The CAP88PC computer code (PNL-3777) was used to model atmospheric releases using Hanford-specific parameters. The MPR was assumed to be located at LIGO. Using those calculated unit dose conversion factors, the estimated potential TEDE to the MEI resulting from the conservative release rates associated with unabated emissions from deactivation of the PFP Complex is 8.9 E+02 millirem per year (refer to Table 2). The calculated abated TEDE is 2.4 E-02 millirem per year (Table 2).

The reported TEDE to the MEI resulting from all 2004 Hanford Site air emissions (point sources, diffuse, and fugitive sources) was 0.032 millirem (DOE/RL-2005-06). The emissions resulting from the deactivation of the PFP Complex, in conjunction with other operations on the Hanford Site, would not result in a violation of the National Emission Standard of 10 millirem per year (40 CFR 61, Subpart H).

16.0 COST FACTORS OF CONTROL TECHNOLOGY COMPONENTS

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

Cost factor inclusion is not applicable. The proposed activities will use existing approved ventilation systems which will remain operational during deactivation activities. The ventilation systems and abatement technology components use HEPA filtration, and previously have been approved as BARCT and ALARACT for particulate radionuclide emissions.

17.0 DURATION OR LIFETIME

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

Deactivation activities were initiated in Calendar Year 2004 and are scheduled to be completed by December 2016 (as transitioned to CERCLA regulatory authority). SEP activities are scheduled to be initiated in Calendar Year 2006, and continue through Calendar Year 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 described in this application:

ASME/ANSI AG-1, ASME/ANSI N509, ASME/ANSI N510, ANSI/ASME NQA-1, 40 CFR 60, Appendix A Methods 1, 1A, 2, 2A, 2C, 2D, 4, 5, and 17, and ANSI N13.1

For each standard not so indicated, give reasons to support adequacy of the design and operation of the emission unit as proposed.

Standards for major and minor stacks are provided in Sections 18.1 and 18.2. Standards for the sitewide Guzzler, PTRAEU, and HEPA filtered vacuum radioactive air emission units are provided in Section 18.3.

18.1 MAJOR STACKS

Standards associated with the 291-Z-1 and 296-Z-7 Stacks have been addressed (refer to WDOH approval AIR 05-1101) and are incorporated by reference.

18.2 MINOR STACKS

Standards associated with the 296-Z-5 and 296-Z-6 Stacks have been addressed (refer to WDOH approval AIR 05-1101) and are provided in the following sections for completeness.

18.2.1 296-Z-5 and 296-Z-6 Stacks

The 296-Z-5 and 296-Z-6 Stacks are registered emissions units with WDOH. The standards associated with the 296-Z-5 and 296-Z-6 Stacks are addressed in the Stabilization and Packaging Equipment NOC (DOE/RL-2000-42, Revision 3). Those standards are summarized as follows.

The abatement control systems for the 296-Z-5 and 296-Z-6 stacks were installed in the early 1980's and late 1970's (respectively) before this requirement for control technology standards was specified in WAC 246-247 (April 1994). Although the listed technology standards, if available at time of construction, might have been followed as guidance, there was no regulatory requirement for compliance with the listed standards. Operational history, routine maintenance, testing, and inspections (ANSI N509 and N510) demonstrate adequacy of the design and operation of the existing abatement control technology as proposed. A summary is provided in Table 1 of the status of conformance by the ventilation and monitoring systems. Cited documents will be provided to WDOH on request.

- <u>ASME/ANSI AG-1</u>:

The 296-Z-5 and 296-Z-6 stacks and ventilation systems were built before compliance with the code was required. Regarding the section in AG-1 on HEPA filters, the HEPA filters in the ventilation systems for the 296-Z-5 and 296-Z-6 stacks meet all but two criteria dealing with filter qualification testing. Justification for these sitewide exceptions was discussed with and approved by WDOH at the December 1998 Routine Technical Assistance Meeting. A WDOH approved temporary deviation currently is in place to satisfy this issue (WDOH AIR 99-507). Other sections in AG-1 either are not applicable (e.g., adsorbers or moisture separators) or are addressed under ANSI N509.

- ASME/ANSI N509:

The HEPA filters conform to ASME N509, Section 5.1. Documentation to show full compliance with the remaining sections of ANSI N509 cannot be provided. Instead, the following information is provided to support adequacy of design.

ANSI N510 was established in 1976. ANSI N509 was established in 1977. Before 1976, testing and maintenance was based on DOE Orders, which included guidance provided in ERDA 76-21, *The Nuclear Air Cleaning Handbook*.

Design adequacy of the fans is demonstrated by operational history and/or passing routine functional tests. Regular visual inspections of the fans and motors in accordance with current maintenance procedures and schedules ensure proper and consistent function. The operating fans and motors are inspected for operational variables such as abnormal noise, excessive vibration, and fan bearing temperatures, and are lubricated as needed.

Adequacy of the HEPA filters and housings has been demonstrated by operational history and successful testing in accordance with guidance provided in ASME/ANSI N510. The existing systems have been successfully tested annually in their current configurations since construction.

- ASME/ANSI N510:

As allowed in ASME/ANSI N510, certain sections of N510 can be used as technical guidance for non-N509 systems. To demonstrate the adequacy of the system design and operation, final stages of HEPA filters are aerosol tested individually in-place annually (at a minimum control efficiency of 99.95 percent) to meet the intent of ANSI N510. This annual testing includes a visual inspection of the housing as described in ANSI N510.

- ANSI/ASME NQA-1:

NQA-1 sections addressing abatement technology components design were not applicable during systems construction and so are not addressed. Quality assurance for sampling of emissions and subsequent analysis is addressed in HNF-0528, *NESHAP Quality Assurance Project Plan for Radioactive Airborne Emissions* (all of Sections 2.0, 3.0 and 5.0), which was written in accordance with applicable NQA-1 requirements.

- 40 CFR 60, Appendix A

Sample extraction locations are selected per ANSI N13.1. Stack flow is calculated using pitot tube measurements of velocity pressure at multiple transverse points across the plenum. 40 CFR 60 Appendix A methods are not applicable to minor stacks.

- ANSI N13.1:

The sampling system complies with ANSI N13.1 (1969) criteria. For each stack, emission sampling consists of a record sampler for particulate radionuclides.

- The 296-Z-5 stack record sampler is operational. Stack discharge air is sampled continuously and monitored. Currently the sample systems are operated to provide periodic confirmatory measurements only.

- The 296-Z-6 stack record sampler is operational. Filtered exhaust air is near-isokinetically sampled and monitored continuously. Currently, the sample systems are operated to provide only periodic confirmatory measurements.

Adequacy of the sampling systems is demonstrated by inspection, calibration, and maintenance activities as scheduled in current facility procedures.

18.3 GUZZLER, PTRAEU, AND HEPA-FILTERED VACUUM RADIOACTIVE AIR EMISSION UNIT

Standards associated with the sitewide Guzzler, PTRAEU, or HEPA-filtered vacuum radioactive air emission units have been addressed in AIR 02-302, DOE/RL-96-75 or DOE/RL-97-50, as amended; the aforementioned standards are incorporated by reference.

18.4 ENVIRONMENTAL, ENERGY, AND ECONOMIC IMPACTS OF BEST AVAILABLE RADIOACTIVE CONTROL TECHNOLOGY AND AS LOW AS REASONABLY ACHIEVABLE CONTROL TECHNOLOGY

Replacement systems that are fully compliant with the BARCT and ALARACT technology standards and the existing HEPA-filtration system (both use HEPA filtration, which already has been accepted as BARCT/ALARACT to control particulates) have been evaluated and compared for environmental impacts. The existing systems would allow completion of the work described in this NOC, with the TEDE to the MEI as described in Section 15.0 and Table 1, for the period described in Section 17.0. The fully compliant replacement systems would have those same impacts, plus the additional potential dose impacts (TEDE to MEI from existing source term that would be removed with this NOC) from allowing the radiological inventory to remain in place for several additional years. It could take years to fund (congressional approval needed), design, permit, procure, and install a replacement system that is fully compliant with the ALARACT technology standards. Completion of the work described in this NOC would reduce potential TEDE to the MEI, as source term is removed from the PFP Complex. The work described in this NOC is needed whether relying on the existing system or relying on a fully compliant replacement system. The potential exposure to the public from a 5-year delay is an adverse environmental impact of a fully compliant replacement system. There are additional adverse impacts from installation of a fully compliant replacement system, e.g., waste generation (radioactive and nonradioactive, air and non-air), disposal and stabilization, construction of control equipment, and the health and safety to both radiation workers and to the general public.

The existing systems and fully compliant replacement systems have been evaluated for energy impacts. The existing energy distribution systems would be used for either option, so there are no energy impacts to consider for this BARCT/ALARACT compliance evaluation.

The existing systems and fully compliant replacement systems have been evaluated for economic impacts. There would be no improved reduction in TEDE to the MEI for the replacement systems as compared to the existing systems, because both are effectively equal (minimum removal efficiency for particulates of 99.95 percent); therefore, the beneficial impact is zero.

The work described in this NOC involves a reduction in inventory at the PFP Complex, and thereby reduces the risk to the public. Installing fully compliant systems for the deactivation activities would delay the inventory reduction work, and thereby delay this risk reduction. Fully compliant systems would reduce the risk associated with the work described in this NOC, but would introduce greater additional risk because of delaying the deactivation work while transitioning to fully compliant systems. The most reasonable approach would be to use the existing systems for this NOC to expedite removal of the radiological inventory from the PFP Complex.

Pursuant to WAC 246-247, Appendix B, the most effective technology (i.e., a fully compliant replacement system) could be eliminated from consideration if a demonstration can be made to WDOH that the technology has unacceptable impacts. Because fully compliant replacement systems are not justified by cost/benefit evaluation or adverse environmental impacts because of delaying the work described in this NOC, it is proposed that the existing systems, as described in Section 6.0 and meeting the intent of the technology standards in Section 18.1 of this NOC, be accepted as compliant with the BARCT/ALARACT technology standards.

The use of radiologically-controlled HEPA-type vacuums to perform housekeeping and other maintenance functions (e.g., asbestos abatement) activities in radiological buffer areas is considered the most effective technology for minimizing fugitive and diffuse emissions associated with the activity. If contamination is detected, compliance with the controls as described in DOE/RL-97-50, as amended, would be followed.

19.0 REFERENCES

AIR 99-507, Letter, Allen W. Conklin, WDOH, to James E. Rasmussen, DOE-RL, May 19, 1999, Washington State Department of Health, Olympia, Washington.

AIR 02-302, Letter, Allen W. Conklin, WDOH, to Joel B. Hebdon, RL, and James E. Rasmussen, ORP, March 5, 2002, Washington State Department of Health, Olympia, Washington.

AIR 05-1101, Letter, Allen W. Conklin, WDOH, to Briant L. Charboneau, RL, and James E. Rasmussen, ORP, November 2, 2005, Washington State Department of Health, Olympia, Washington.

DOE/EIS-0244-F, *Final Environmental Impact Statement Plutonium Finishing Plant Stabilization*, U.S. Department of Energy, Washington, D.C.

DOE/RL-96-75 Rev. 2, *Radioactive Air Emissions Notice of Construction Portable/Temporary Radioactive Air Emissions Units,* September 1999, U.S. Department of Energy, Richland Washington.

DOE/RL-97-50, Rev.1, *Radioactive Air Emissions Notice of Construction for HEPA Filtered Vacuum Radioactive Air Emission Units,* September 1999, U.S. Department of Energy, Richland Washington.

DOE/RL-2000-42, Rev. 3, *Radioactive Air Emissions Notice of Construction for Plutonium Finishing Plant Stabilization and Packaging Equipment*, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-2003-42, *Radioactive Air Emissions Notice of Construction for Plutonium Finishing Plant Decontamination Trailer*, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-2003-43, Rev. 0A, *Radioactive Air Emissions Notice of Construction for Deactivation of the Plutonium Finishing Plant (PFP), 200 West Area, Hanford Site, Richland, Washington*, September 2005, U.S. Department of Energy, Richland, Washington.

DOE/RL-2004-38, Rev. 0, *Radioactive Air Emissions Notice of Construction for Construction and Operation of a Fuel Storage Facility at the Plutonium Finishing Plant Complex, 200 West Area, Hanford Site, Richland, Washington*, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-2005-06, *Radionuclide Air Emissions Report for the Hanford Site, Calendar Year 2004*, June 2004, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-2005-13, *Action Memorandum for the Plutonium Finishing Plant Above-Grade Structures Non-Time Critical Removal Action,* Revision 0, U.S. Department of Energy, Richland, Washington.

DOE/RL-2005-14, *Removal Action Work Plan for the Plutonium Finishing Plant Above-Grade Structures: Facility Deactivation,* Revision 0, U.S. Department of Energy, Richland, Washington.

HNF-0528, *NESHAP Quality Assurance Project Plan for Radioactive Airborne Emissions*, Fluor Hanford, Richland, Washington, latest revision.

HNF-2418, *Soil Contamination Standards for Protection of Personnel*, May 1997, Fluor Daniel Hanford, Inc., Richland, Washington.

HNF-3602, Rev. 1, *Calculating Potential-to-Emit Releases and Doses for FEMPs and NOCs*, January 2002, Fluor Hanford, Richland, Washington.

HNF-EP-0476, Rev. 3, *Facility Effluent Monitoring Plan for the Plutonium Finishing Plant*, December 2003, Fluor Hanford, Richland, Washington.

PNL-3777, Rev. 2, *Recommended Environmental Dose Calculation Methods and Hanford-Specific Parameters*, April 1993, Pacific Northwest Laboratory, Richland, Washington.

PNNL-13910, Appendix 2, *Hanford Site Near-Facility Environmental Monitoring Data Report for Calendar Year 2001*, September 2002, Pacific Northwest National Laboratory, Richland, Washington.

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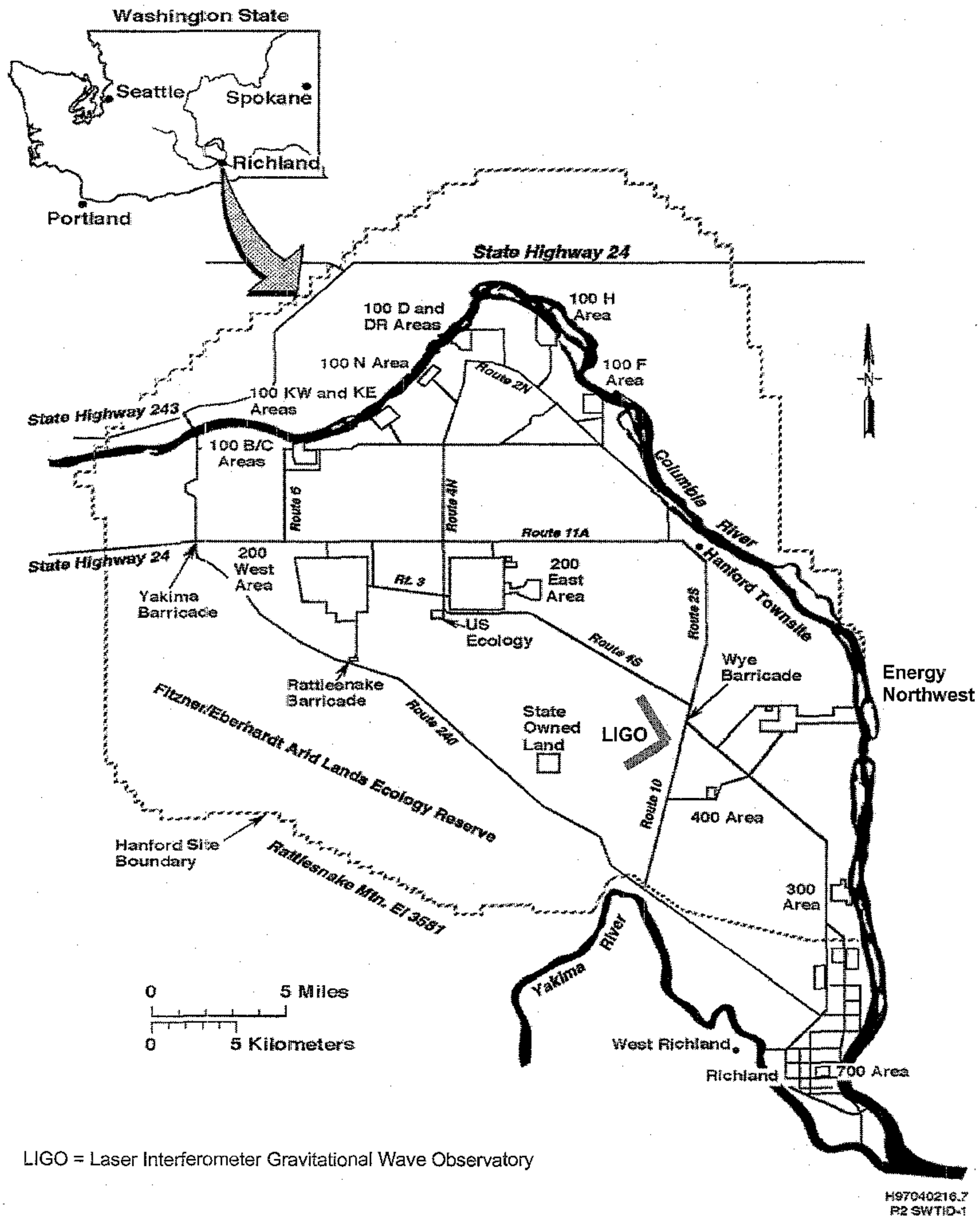

LIGO = Laser Interferometer Gravitational Wave Observatory

Figure 1. Hanford Site.

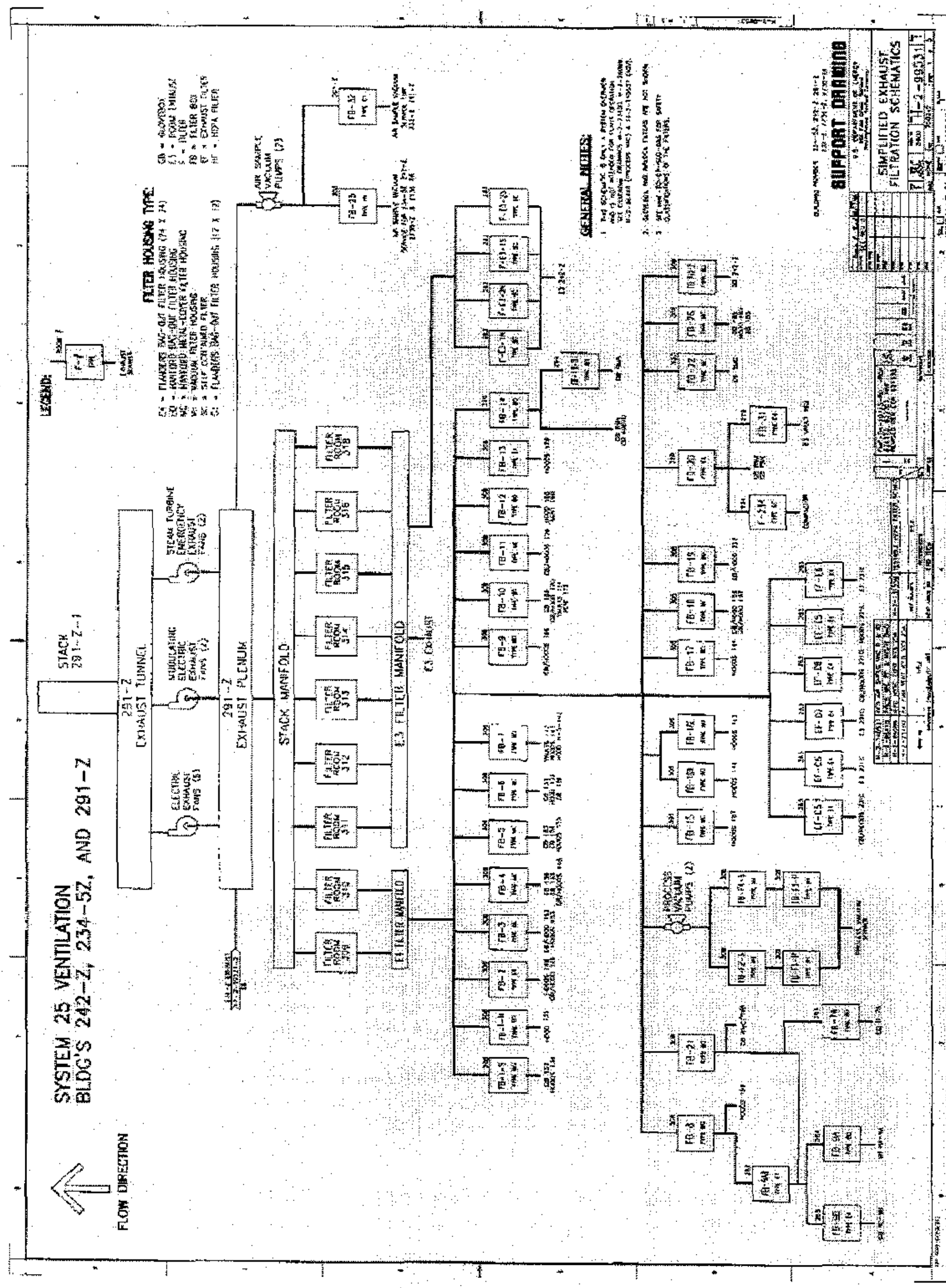

Figure 2. Ventilation Schematic for the 291-Z-1 Stack for the 242-Z and 234-5Z Buildings.

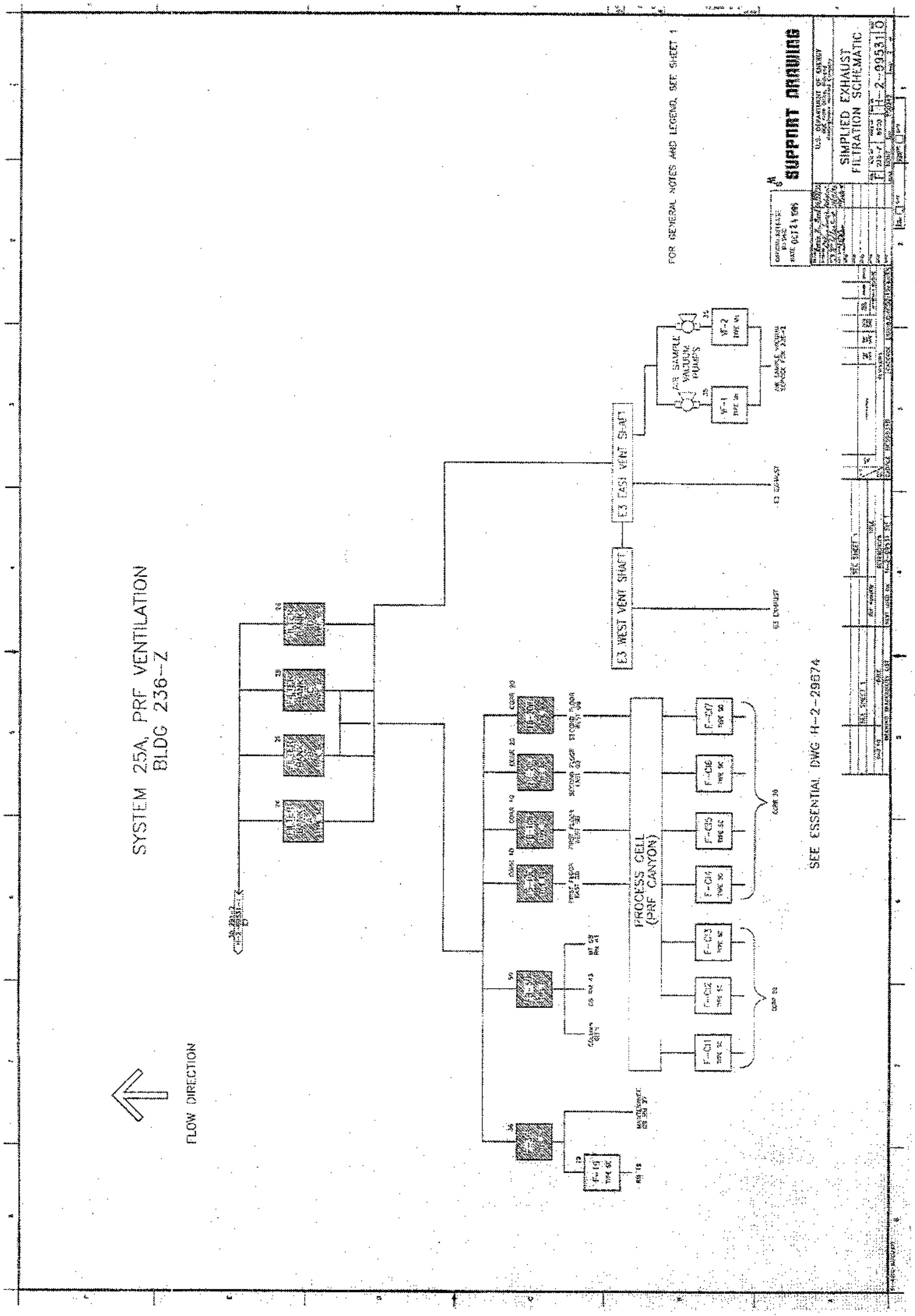

Figure 3. Ventilation Schematic for the 291-Z-1 Stack for the 236-Z Building (PRF).

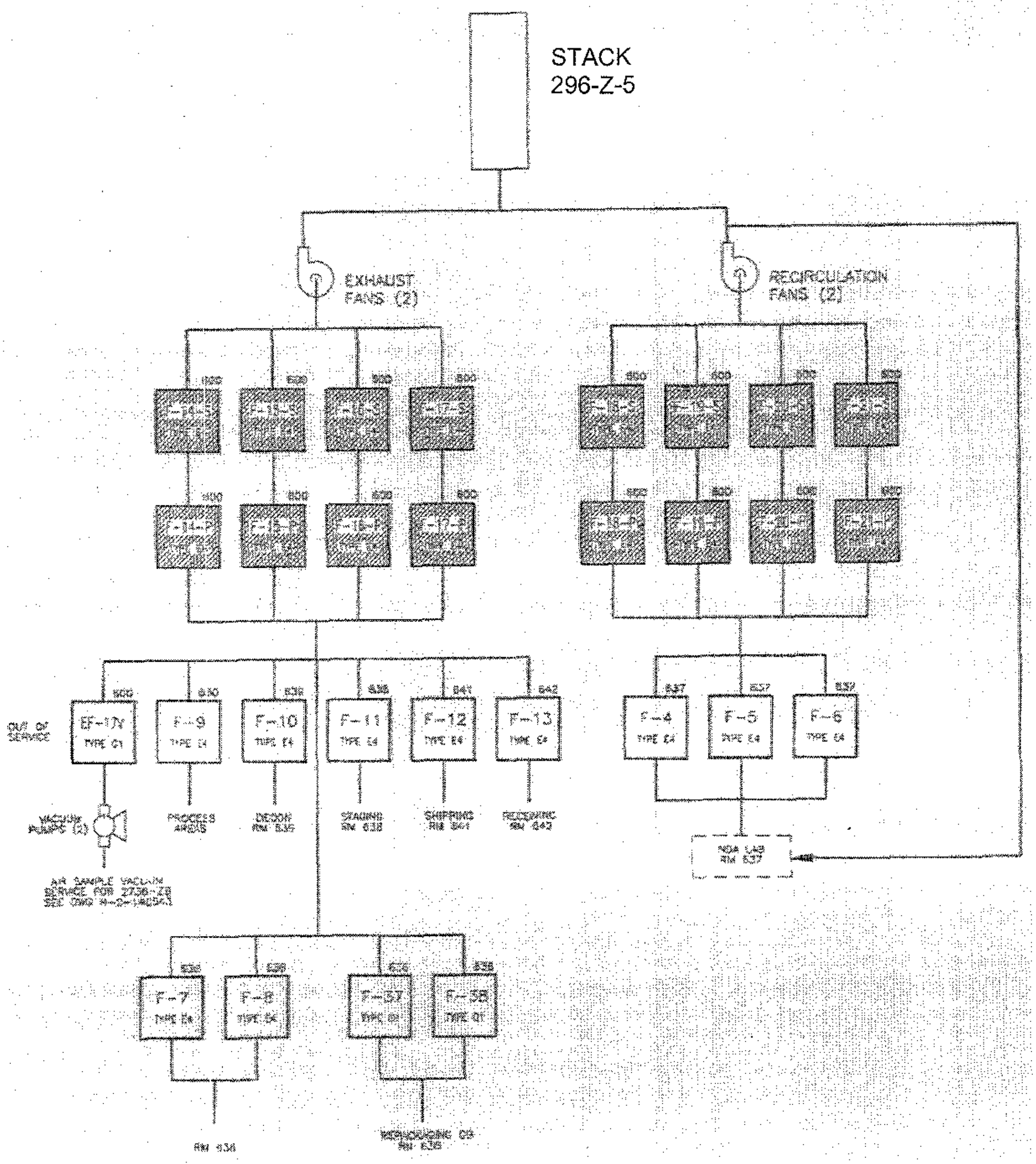

Figure 4. Ventilation Schematic for the 296-Z-5 Stack.

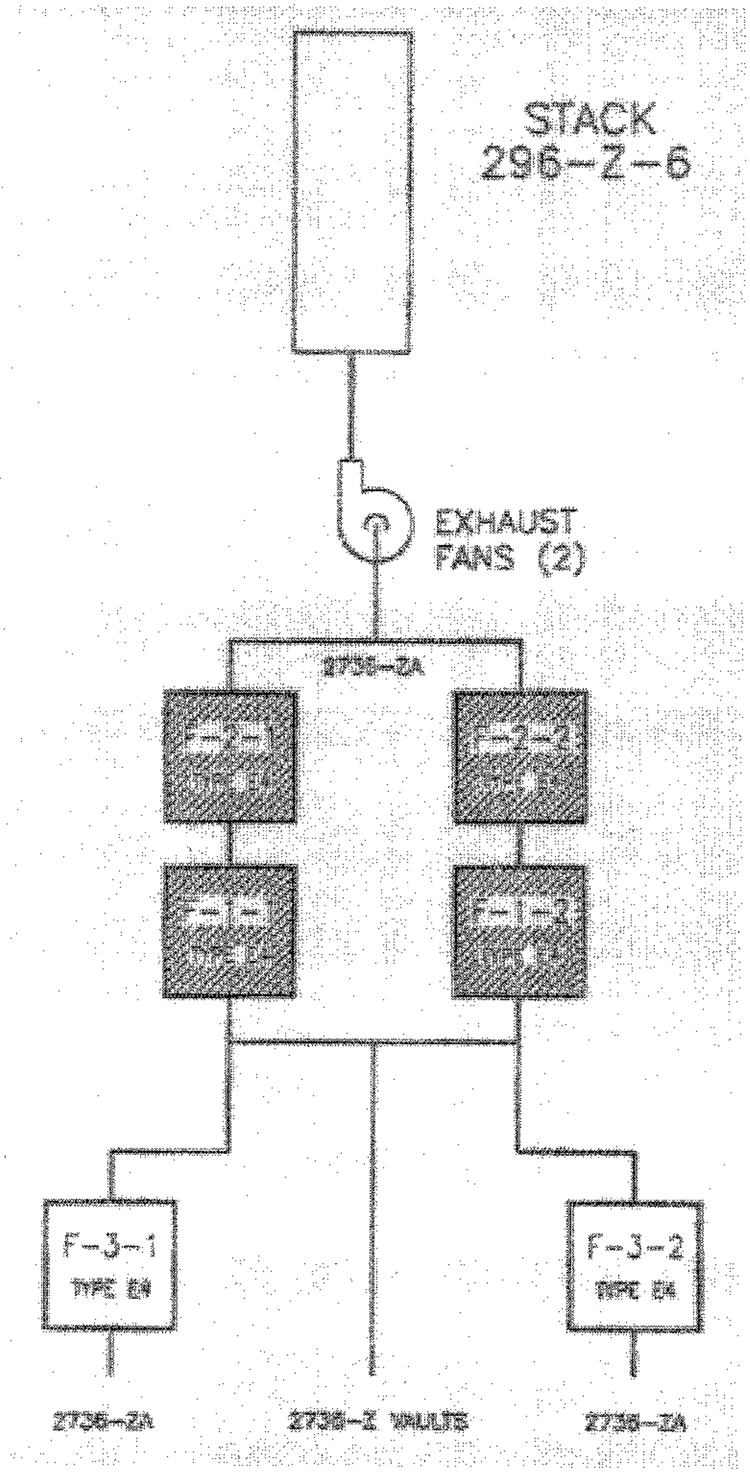

Figure 5. Ventilation System for the 296-Z-6 Stack.

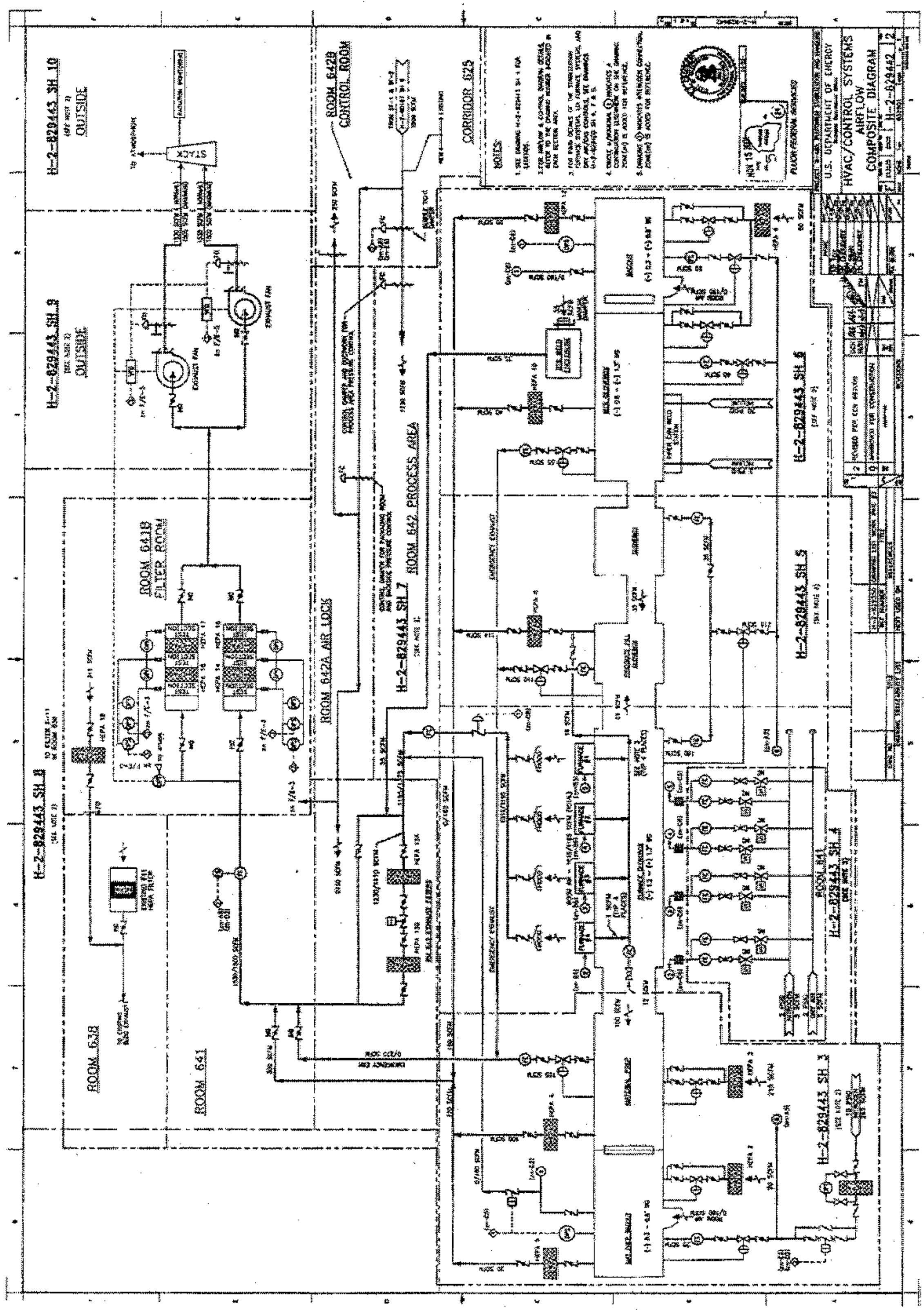

Figure 6. Ventilation System for the 296-Z-7 Stack (2736-ZB Building).

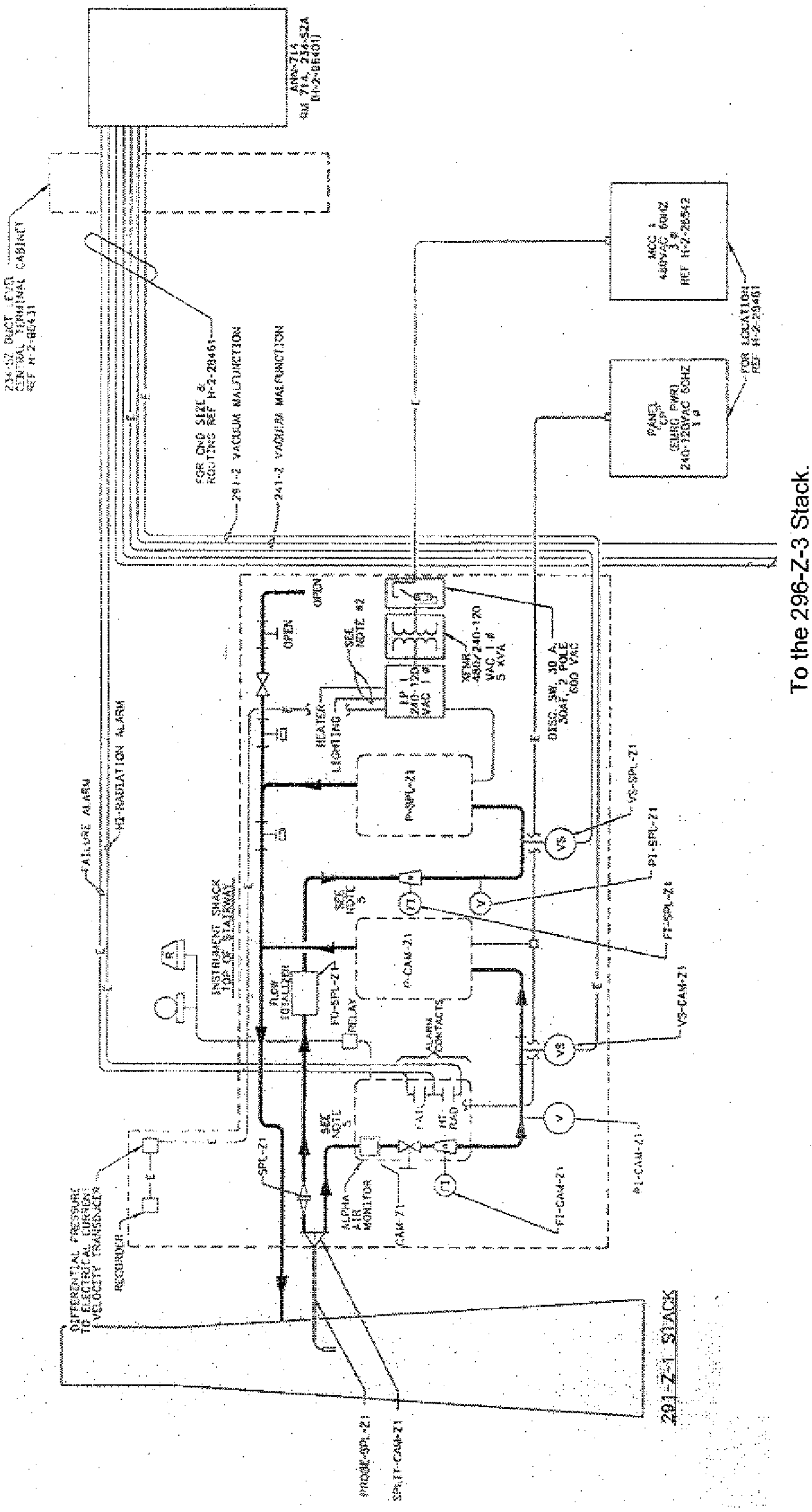

Figure 7. Monitoring System for the 291-Z-1 Stack.

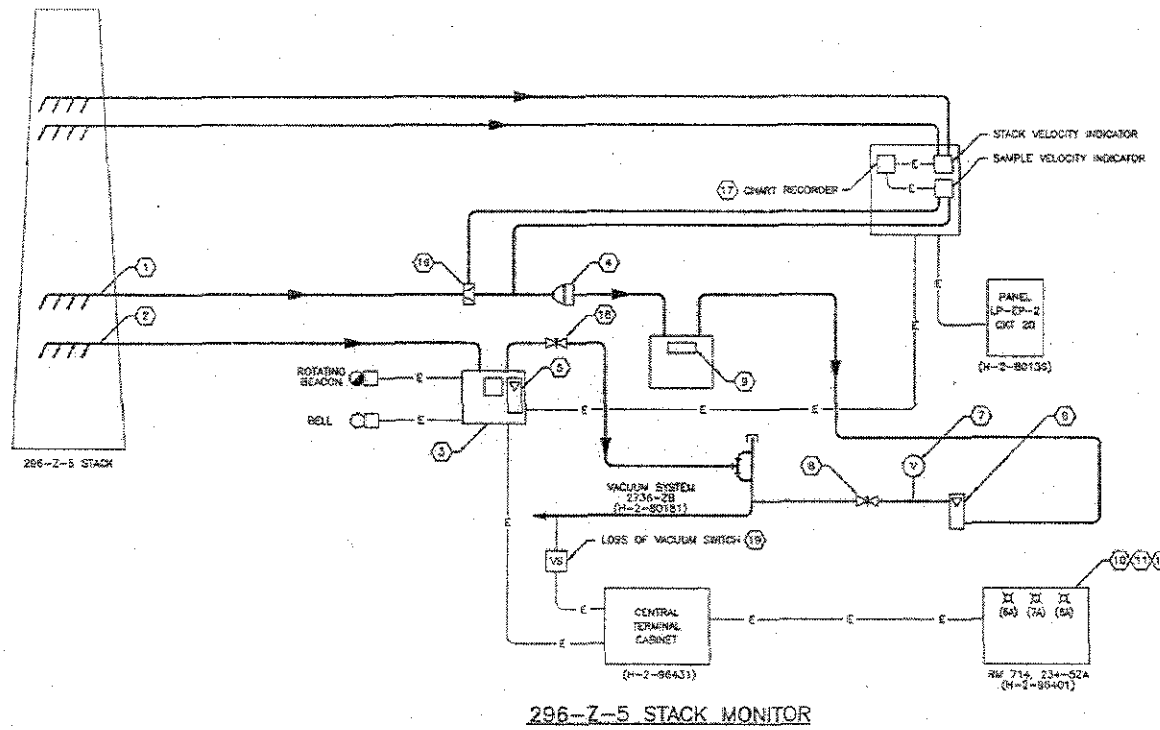

Figure 8. Monitoring System for the 296-Z-5 Stack.

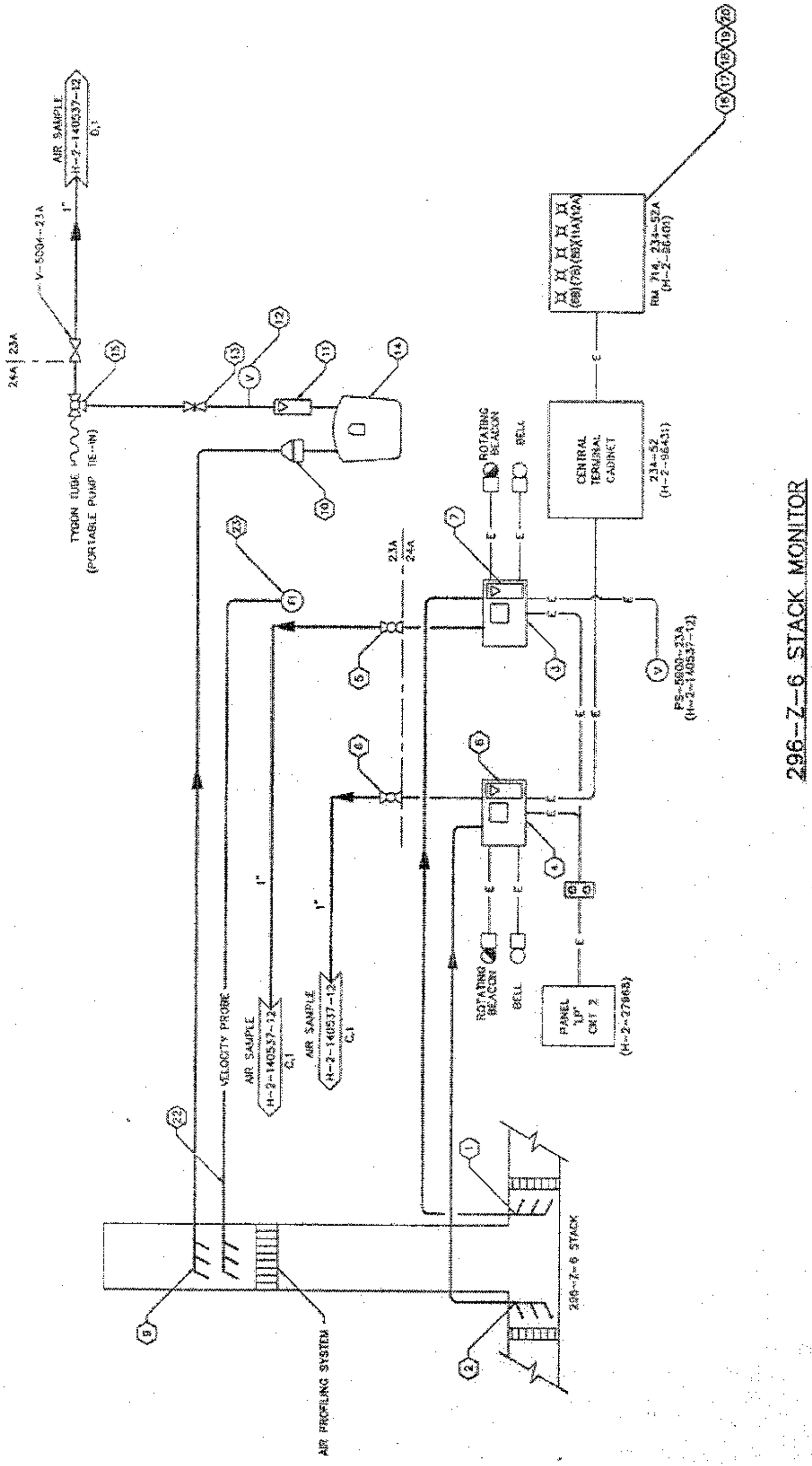

Figure 9. Monitoring System for the 296-Z-6 Stack.

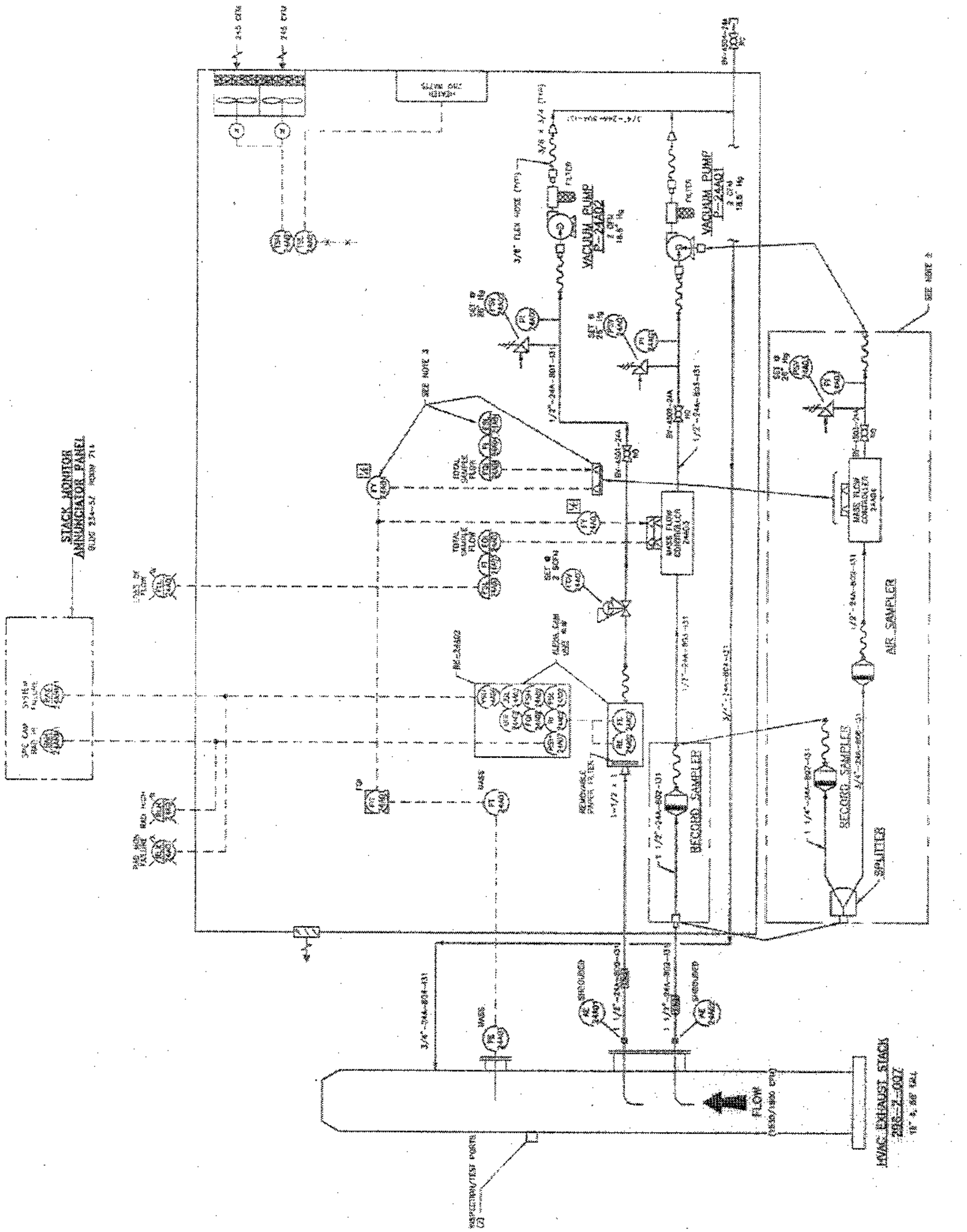

Figure 10. Monitoring System for the 296-Z-7 Stack.

Table 1. Plutonium Inventory for NOC Analysis.

Basis	Plutonium Inventory (kilograms)
NDA measurements (high-end ranges)	115
Contingency	35
Total	150

NDA = nondestructive analyses.
NOC = notice of construction.

Table 2. PFP Complex Deactivation Release Rates and Dose Estimates.
(Assumed isotopic mixture for conservative calculations of potential-to-emit.)

Point source	Significant modification[a] Y/N	Radionuclide	Annual possession quantity (curies)	Release factor	Unabated release (curies)	Unit dose factor[b]	Unabated TEDE to the MEI (millirem per year)	Abated TEDE to the MEI (millirem per year)
291-Z-1	Y	Refer to Table 3	212,500	1.0 E-03	213	Refer to Table 3	350	1.8 E-02
Diffuse and Fugitive	N	PFP SEP Excavation Activities Refer to Table 4	0.8	1.0 E-03	4.0 E-04	Refer to Table 4	9.6 E-03	9.6 E-03
Diffuse and Fugitive	N	PFP SEP General Activities Refer to Table 5	18.3	1.0 E-03	1.8 E-02	Refer to Table 5	4.8 E-02	4.8 E-04
296-Z-7	Y	Refer to Table 6	212,500	1.0 E-03	213	Refer to Table 6	542	1.5 E-04
296-Z-5	N	Refer to DOE/RL-2000-42, Rev. 3, Table 4					5.5 E-02	2.8 E-05
296-Z-6	N	Refer to DOE/RL-2000-42, Rev. 3, Table 5					5.5 E-02	2.8 E-05
Diffuse and Fugitive[c]	Y	Deactivation/Demolition activities.	Activities now under CERCLA; refer to DOE/RL-2005-13.					
Diffuse and Fugitive	N	PFP Decontamination Trailer (DOE/RL-2003-42) Refer to Table 7	4.2 E-04	1.0 E-03	4.2 E-07	Refer to Table 7	4.5 E-06	4.5 E-06
Diffuse and Fugitive[c]	N	Deactivation excavation activities.	Activities now under CERCLA; refer to DOE/RL-2005-13.					
Diffuse and Fugitive	N	Fuel De-Inventory Refer to Table 8	1.3 E-02	1.0 E-03	1.3 E-05	Refer to Table 8	7.0 E-05	7.0 E-05
Concrete Containers[d]	N	Refer to Table 9	6.9 E-03	1.0 E-03	6.9 E-06	Refer to Table 9	5.5 E-05	5.5 E-05
		Total					**8.9 E+02**	**2.4 E-02**

[a] WAC 246-247-110(3).
[b] HNF-3602, Rev.1, *Calculating Potential-to-Emit Releases and Doses for FEMPs and NOCs.*
[c] CERCLA activity. Identified in PFP deactivation NOC (DOE/RL-2003-43, Rev. 0A).
[d] From DOE/RL-2004-38, Rev. 0.

CERCLA = *Comprehensive Environmental Response, Compensation, and Liability Act*
MEI = maximally exposed individual
NOC = notice of construction
PFP = Plutonium Finishing Plant
SEP = Security Enhancement Program
TEDE = = total effective dose equivalent

Table 3. Potential Releases/Doses through the 291-Z-1 Stack during PFP Deactivation.[a]

Isotopes	Curies	Release fraction	Unabated release (curies)	Total abated release (curies)[b]	Dose-per unit release factor (millirem per curie)[c]	Unabated dose (millirem per year)	Abated dose (millirem per year)
Pu-238	5,946	1 E-03	6.0 E+00	3.0 E-04	6.5 E+00	3.9 E+01	2.0 E-03
Pu-239	9,012	1 E-03	9.0 E+00	4.5 E-04	7.0 E+00	6.3 E+01	3.2 E-03
Pu-240	6,015	1 E-03	6.0 E+00	3.0 E-04	7.0 E+00	4.2 E+01	2.1 E-03
Pu-241	174,100	1 E-03	1.7 E+02	8.5 E-03	1.1 E-01	1.9 E+01	9.4 E-04
Pu-242	2.6	1 E-03	2.6 E-03	1.3 E-07	6.7 E+00	1.7 E-02	8.7 E-07
Am-241	17,421	1 E-03	1.7 E+01	8.5 E-04	1.1 E+01	1.9 E+02	9.4 E-03
U-233	14.4	1 E-03	1.4 E-02	7.0 E-07	2.8 E+00	3.9 E-02	2.0 E-06
U-234	0.2	1 E-03	2.0 E-04	1.0 E-08	2.7 E+00	5.4 E-04	2.7 E-08
U-235	0.0038	1 E-03	3.8 E-06	1.9 E-10	2.6 E+00	9.9 E-06	4.9 E-10
U-236	0.002	1 E-03	2.0 E-06	1.0 E-10	2.6 E+00	5.2 E-06	2.6 E-10
U-237	3.6	1 E-03	3.6 E-03	1.8 E-07	1.4 E-04	5.0 E-07	2.5 E-11
U-238	0.027	1 E-03	2.7 E-05	1.4 E-09	2.4 E+00	6.5 E-05	3.4 E-09
Np-237	0.05	1 E-03	5.0 E-05	2.5 E-09	1.0 E+01	5.0 E-04	2.5 E-08
Total	**212,500**		**213**	**1.0 E-02**		**350**	**1.8 E-02**

[a] Hold-up material and fuel handling.

[b] Credit for one stage of testable HEPA filtration. An additional factor of 10 was applied to account for existing HEPA-type filtration associated with the process gloveboxes and packaging of material removed from process areas.

[c] HNF-3602, Rev. 1; 200 West Area, onsite MPR, effective release height ≥40 meters.

Table 4. Diffuse and Fugitive Emissions from PFP SEP Activities.[a]

Isotope	Curies	Release fraction	Potential-to-emit (curies)	Dose per unit release factor (millirem per curie)[b]	Unabated dose (millirem per year)	Abated dose (millirem per year)[c]
Pu-238/239	0.56	1 E-03	5.6 E-04	1.0 E+01	5.6 E-03	5.6 E-03
Am-241	0.24	1 E-03	2.4 E-04	1.7 E+01	4.0 E-03	4.0 E-03
Total	**0.8**		**8.0 E-04**		**9.6 E-03**	**9.6 E-03**

[a] SEP Basis

1. Excavation will be required in and around PFP to support the SEP project. SEP will require some excavation in areas of potential belowgrade contamination. In addition to excavations for building and structure foundations, it is estimated that approximately 5,000 linear feet of belowgrade ducting will installed, a portion of the water line will require replacement, connections to sewer and water lines will be required.
   - Assume 60 cubic meters of contaminated soil (additional volume of uncontaminated soil will be excavated).
   - 2,000 dpm/100cm^2 alpha as the average detected activity in the radiologically-contaminated soil.
2. From HNF-2418; assuming Pu 6%, 10 year:
   - (2.25E+05 pCi/g) x (1.57 E+06 g/m^3) = 3.54 E+11 pCi = 0.354 curies. Rounded to 0.4 curies.
3. Double for consistency (uncertainty of excavation locations); 0.8 curies of contamination in soil.
4. Assume soil contamination is a Pu/Am blend (ratio of 70/30)
   - APQ = 0.8 Ci blend = 0.56 curies Pu-238/239, and 0.24 curies Am-241.
5. Assume a release fraction of 1 E-03 (hand dig)
   - PTE = 5.6 E-04 curies Pu-238/239 + 2.4 E-04 curies Am-241 = 8.0 E-04 curies unabated.

[b] HNF-3602, Rev. 1.

[c] Diffuse/fugitive; unabated = abated.

Table 5. Diffuse and Fugitive Emissions from PFP SEP General Activities.[a]

Isotope	Curies	Release fraction	Potential-to-emit (curies)	Dose-per unit release factor (millirem per curie)[b]	Unabated dose (mrem per year)	Abated dose (mrem per year)[c]
Pu-238	5.1 E-01	1 E-03	5.1 E-04	1.0 E+01	5.1 E-03	5.1 E-05
Pu-239	7.8 E-01	1 E-03	7.8 E-04	1.1 E+01	8.6 E-03	8.6 E-05
Pu-240	5.2 E-01	1 E-03	5.2 E-04	1.1 E+01	5.7 E-03	5.7 E-05
Pu-241	1.5 E+01	1 E-03	1.5 E-02	1.6 E-01	2.4 E-03	2.4 E-05
Pu-242	2.3 E-04	1 E-03	2.3 E-07	1.0 E+01	2.3 E-06	2.3 E-08
Am-241	1.5 E+01	1 E-03	1.5 E-03	1.7 E+01	2.6 E-02	2.6 E-04
U-233	1.4 E-03	1 E-03	1.4 E-06	4.2 E+00	5.9 E-06	5.9 E-08
U-234	2.0 E-05	1 E-03	2.0 E-08	4.2 E+00	8.4 E-08	8.4 E-10
U-235	2.0 E-08	1 E-03	2.0 E-11	4.0 E+00	8.0 E-11	8.0 E-13
U-236	2.0 E-07	1 E-03	2.0 E-10	3.9 E+00	7.8 E-10	7.8 E-12
U-237	3.6 E-05	1 E-03	3.6 E-07	2.1 E-04	7.6 E-11	7.6 E-13
U-238	3.5 E-13	1 E-03	3.5 E-06	3.7 E+00	1.3 E-15	1.3 E-17
Np-237	5.0 E-06	1 E-03	5.0 E-09	1.6 E+01	8.0 E-08	8.0 E-10
Total	**1.8 E+01**		**1.8 E-02**		**4.8 E-02**	**4.8 E-04**

[a] Assumes 1 percent of inventory available for diffuse and fugitive emissions; i.e., 1.5 kilogram of hold-up material.
[b] HNF-3602, Rev. 1; 200 West Area, onsite MPR, effective release height <40 meters.
[c] Credit taken for abatement controls such as air movers, vacuum devices (e.g., PTRAEUs, HEPA vacuum), application of fixatives, initial containment (e.g., plastic wrap, facility structure), and radiological control practices. Such controls reduce emissions by a factor of 100.
HEPA = high-efficiency particulate air.
MPR = maximum public receptor.

Table 6. Potential Releases/Doses through the 296-Z-7 Stack during PFP Deactivation.[a]

Isotope	Curies	Release fraction	Unabated release (curies)	Abated release (curies) 2 HEPA (2.7 E-07)	Dose-per unit release factor (millirem per curie)[b]	Unabated dose (millirem per year)	Abated dose (millirem per year)
Pu-238	5,946	1 E-03	6.0 E+00	1.6 E-06	1.0 E+01	6.0 E+01	1.6 E-05
Pu-239	9,012	1 E-03	9.0 E+00	2.4 E-06	1.1 E+01	9.9 E+01	2.6 E-05
Pu-240	6,015	1 E-03	6.0 E+00	1.6 E-06	1.1 E+01	6.6 E+01	1.8 E-05
Pu-241	174,100	1 E-03	1.7 E+02	4.7 E-05	1.6 E-01	2.7 E+01	7.5 E-06
Pu-242	2.6	1 E-03	2.6 E-03	7.0 E-10	1.0 E+01	2.6 E-02	7.0 E-09
Am-241	17,421	1 E-03	1.7 E+01	4.7 E-06	1.7 E+01	2.9 E+02	8.0 E-05
U-233	14.4	1 E-03	1.4 E-02	3.8 E-09	4.2 E+00	5.9 E-02	1.6 E-08
U-234	0.2	1 E-03	2.0 E-04	5.4 E-11	4.2 E+00	8.4 E-04	2.3 E-10
U-235	0.0038	1 E-03	3.8 E-06	1.0 E-12	4.0 E+00	1.5 E-05	4.0 E-12
U-236	0.002	1 E-03	2.0 E-06	5.4 E-13	3.9 E+00	7.8 E-06	2.1 E-12
U-237	3.6	1 E-03	3.6 E-03	9.7 E-10	2.1 E-04	7.6 E-07	2.0 E-13
U-238	0.027	1 E-03	2.7 E-05	7.3 E-12	3.7 E+00	1.0 E-04	2.7 E-11
Np-237	0.05	1 E-03	5.0 E-05	1.4 E-11	1.6 E+01	8.0 E-04	2.2 E-10
Total	**212,500**		**213**	**5.7 E-05**		**542**	**1.5 E-04**

[a] Hold-up material plus fuel handling.
[b] HNF-3602, Rev. 1; 200 West Area, onsite MPR, effective release height <40 meters.
HEPA = high-efficiency particulate air.
MPR = maximum public receptor.

Table 7. Decontamination Trailer Potential to Emit.

Radionuclides	Potential unabated release (curies/year)	Potential abated release (curies/year)	Dose-per unit release factor (millirem per curie)	Unabated onsite public dose (millirem per year)	Abated onsite public dose (millirem per year)
Plutonium-239	1.4 E-07	1.4 E-07	11	1.5 E-06	1.5 E-06
Total (per trailer)*	**1.4 E-07**	**1.4 E-07**	11	**1.5 E-06**	**1.5 E-06**
Total (3 trailers)	**4.2 E-07**	**4.2 E-07**	11	**4.5 E-06**	**4.5 E-06**

*From DOE/RL-2003-42.

Table 9. PFP Fuel Repackaging and Storage Dose Calculations.[a]

Isotope	Inventory (curies)	Release fraction	Unabated release (curie)	Dose per unit release factor (millirem per curie)[b]	Dose (millirem per year)
Cs-137	4.3 E-04	1 E-03	4.3 E-07	0.31	1.3 E-07
Co-60	1.4 E-05	1 E-03	1.4 E-08	0.34	4.8 E-09
Sr-90[c]	3.2 E-03	1 E-03	3.2 E-06	0.011	3.5 E-08
Am-241	3.2 E-03	1 E-03	3.2 E-06	17	5.4 E-05
Total	**6.9 E-03**		**6.9 E-06**		**5.5 E-05**

[a] From DOE/RL-2004-38, Rev. 0, Table 1.
[b] HNF-3602, Rev. 1, onsite MPR, <40 meters effective release height.
[c] Total Sr-90 from CCC and fuel.

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