

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

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

Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

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August 2003

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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TERMS

1		
2		
3		
4	ALARA	as low as reasonably achievable
5	ALARACT	as low as reasonably achievable control technology
6	ANSI	American National Standards Institute
7	ASME	American Society of Mechanical Engineers
8		
9	BARCT	best available radiological control technology
10		
11	CAM	continuous air monitor
12	CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980</i>
13		
14	CFR	Code of Federal Regulations
15	Ci	curie
16		
17	DOE-RL	U.S. Department of Energy, Richland Operations Office
18	dpm	disintegrations per minute
19		
20	Ecology	Washington State Department of Ecology
21	EPA	U.S. Environmental Protection Agency
22		
23	HEPA	high efficiency particulate air (filter)
24	HPT	health physics technician
25		
26	LIGO	Laser Interferometer Gravitational Wave Observatory
27		
28	MEI	maximally exposed individual
29	MPR	maximum public receptor
30	mrem	millirem
31		
32	NOC	notice of construction
33		
34	PCM	periodic confirmatory measurements
35	PFP	Plutonium Finishing Plant
36	PTRAEU	portable temporary radioactive air emissions unit
37		
38	RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
39		
40	SEPA	<i>State Environmental Policy Act of 1971</i>
41		
42	TEDE	total effective dose equivalent
43	TRU	transuranic
44		
45	WAC	Washington Administrative Code
46	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, P.E., Third Ed., 1993, Professional Publications, Inc., Belmont, California.

1 **RADIOACTIVE AIR EMISSIONS NOTICE OF CONSTRUCTION**
2 **FOR TRANSITION OF THE 241-Z LIQUID WASTE TREATMENT FACILITY AT**
3 **THE PLUTONIUM FINISHING PLANT,**
4 **200 WEST AREA, HANFORD SITE, RICHLAND, WASHINGTON**
5
6

7 This document is a re-submittal requesting approval for a modification and serves as a notice of
8 construction (NOC) pursuant to the requirements of Washington Administrative Code (WAC)
9 246-247-060 for transition of the 241-Z Liquid Waste Treatment Facility (241-Z Building) at the Hanford
10 Site Plutonium Finishing Plant (PFP) in support of cessation of discharges to Tank Farms.
11

12 The 241-Z Building started operations in 1949 to provide PFP with the capability to treat, store, and
13 dispose of liquid mixed waste. The 241-Z Building currently is operational, treating and routing liquid
14 mixed waste effluents to Tank Farms.
15

16 The estimated potential total effective dose equivalent (TEDE) to the maximally exposed individual
17 (MEI) resulting from the unabated emissions from all transition activities addressed in this NOC is
18 8.7 millirem per year. The estimated potential TEDE to the MEI from abated emissions is
19 7.8×10^{-3} millirem per year.
20
21

22 **1.0 LOCATION**

23 *Name and address of the facility, and location (latitude and longitude) of the emission unit:*
24

25 The 241-Z Building is located in the 200 West Area (Figures 1 and 2). The address and geodetic
26 coordinates for the 241-Z Building are as follows:
27

28 U.S. Department of Energy, Richland Operations Office (DOE-RL)
29 Hanford Site
30 Richland, Washington 99352
31 200 West Area, PFP, 241-Z Building
32

33 46° 32' 57.7" North Latitude
34 119° 37' 58" West Longitude.
35
36

37 **2.0 RESPONSIBLE MANAGER**

38 *Name, title, address and phone number of the responsible manager:*
39

40 Mr. Matthew S. McCormick, Assistant Manager for Central Plateau
41 U.S. Department of Energy, Richland Operations Office
42 P.O. Box 550
43 Richland, Washington 99352
44 (509) 372-1786.
45
46

1 **3.0 PROPOSED ACTION**

2 *Identify the type and proposed action for which this application is submitted.*

3
4 The DOE-RL proposes to transition the 241-Z Building in support of cessation of discharges to Tank
5 Farms in accordance with *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement)
6 milestone [negotiated among the Washington State Department of Ecology (Ecology), the
7 U.S. Environmental Protection Agency (EPA), and the DOE-RL] M-83-31, "Discontinue Waste
8 Discharge from the 241-Z Tanks to Tank Farms via Existing Lines". This transition is an anticipated
9 initial phase of the operational activities at the facility, supporting terminal cleanout and stabilization.

10
11 With the exception of periods during fogging operations, the existing ventilation system (with a discharge
12 through the 296-Z-3 Stack) will be operational during all transition activities conducted inside the
13 241-Z Building. The planned activities represent a "significant modification" per WAC 246-247 (i.e., the
14 anticipated emissions associated with these activities are calculated to result in a potential-to-emit of
15 greater than 1.0 millirem per year).

16
17
18 **4.0 STATE ENVIRONMENTAL POLICY ACT**

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

22
23 The proposed action categorically is exempt from the requirements of SEPA under WAC 197-11-845.

24
25
26 **5.0 PROCESS DESCRIPTION**

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

28
29 Descriptions of the 241-Z Building and associated transition activities are provided in the following
30 sections.

31
32
33 **5.1 FACILITY DESCRIPTION**

34 The 241-Z Building started operations in 1949 to provide PFP with the capability to treat, store, and
35 dispose of liquid waste. This *Resource Conservation and Recovery Act (RCRA) of 1976*-permitted
36 facility is a buried, reinforced concrete structure with a sheet metal enclosure over the top. The enclosure
37 houses a small hoist for removing cell covers and equipment and provides weather protection. The
38 enclosure is not serviced by the facility ventilation system. The buried structure consists of five separate
39 ventilated cells, each containing a 16,250-liters (4,300-gallons) tank (one tank, TK-D6, has been isolated
40 and left in place). The tank system (TK-D4, TK-D5, TK-D7, TK-D8 and over flow tank) is used to
41 accumulate and treat the radioactive liquid wastes generated in the PFP before transfer to the tank farms.
42 The 241-Z Building is approximately 6 meters (20 feet) wide, 28 meters (92 feet) long, and 7 meters
43 (22 feet) deep, and is located approximately 100 meters (330 feet) south of the 234-5Z Building. The
44 belowgrade tank vaults are posted as airborne radiation areas and require confined space entry
45 considerations for occupational personnel safety.

46
47 At the southwest corner of the 241-Z Building vault deck is the equipment for the 241-Z vessel vent
48 filters and vault ventilation system (initially installed in 1964, and modified to current configuration in

1 1979). The 7.2-meters (24-feet)-high 0.36-meters (14-inches)-diameter stack, 296-Z-3, and associated
2 fans and controls are located on a 4.2-meters (14-feet) by 5.4-meters (18-feet) concrete pad. The
3 241-Z Building also consists of the 241-ZA Sampling Building and the 241-ZG Change Room. The
4 sampling glovebox in 241-ZA Sampling Building is interconnected to the 241-Z cell exhaust system by
5 ventilation piping and a drain line. Next to the 241-ZA Sampling Building is the 241-ZB Bulk Chemical
6 Storage area containing the D-9 tank. The D-9 tank is connected to the 241-Z tank ventilation system.
7 Neither the 241-ZA Sampling Building nor the Bulk Chemical Storage areas have controlled ventilation.
8
9

10 5.2 TRANSITION ACTIVITIES

11 The proposed action is to transition the 241-Z Building for dismantlement. All work would be performed
12 in accordance with the approved radiological control procedures and as low as reasonably achievable
13 (ALARA) program requirements as implemented by the project radiological manual. These requirements
14 would be carried out through the activity work packages and associated radiological work permits.
15

16 The waste tank system will continue to receive liquid waste from the 234-5Z Building, waste will
17 continue to be sampled in the 241-ZA Sampling Building, and chemical treatment of the waste and
18 transfer to Tank Farms concurrent with clean out activities will continue. In preparation for the proposed
19 transition activities, housekeeping, bag out of contaminated waste from the sample glovebox, assays,
20 routine and preventive maintenance, and minor decontamination will occur as part of continued
21 operations.
22

23 The proposed action will be to transition the 241-Z Building. The transition activities will include the
24 following (refer to Section 5.3 for complete list of activities).
25

- 26 • Decontamination – Personnel entries will be made into the below-grade tank cells to decontaminate
27 the area external to the tanks. Debris will be removed from the cells and disposed as solid waste.
28 Debris will be size reduced as necessary using physical disassembly and or cutting as necessary to
29 facilitate disposal of the waste. Both direct contact and remote technologies/techniques
30 decontamination methods in use throughout industry and the DOE Complex today could be used
31 (refer to Section 5.3). A water wash down may be performed in the cells with existing sumps used to
32 transfer the liquid waste to TK-D4 for eventual transfer to Tank Farms. A fogging agent, wetting
33 and/or fixative agents will be applied as a fixative for loose contamination. This decontamination
34 will facilitate later cell work and samples will be taken to support a RCRA closure plan and
35 *Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980*
36 activities. This activity sampling may involve chipping or boring portions of the concrete surface or
37 painted surfaces of the belowgrade cell. Additional entries will be made into the belowgrade tank
38 cells to remove sludge and to decontaminate the tank interiors to facilitate later size reduction
39 activities. The planning basis uses a high pressure multi-nozzle wash system to decontaminate the
40 tank interiors but other approaches such as low pressure nozzles, chemical agents, agitators or pumps
41 may be used to facilitate suspension or removal of the sludge material from the tanks. Closed loop
42 liquid re-circulation with filtration may also be used to collect residual contamination. Reconfiguring
43 the piping system to facilitate continued use of the facility concurrent with cleanout may occur. This
44 reconfiguration may include breaking of existing piping and tubing to facilitate the installation of
45 pumps, valves and other equipment within the 296-Z-3 ventilated area (i.e., below-grade cells or
46 sample glovebox).
47

48 If radiological contamination is detected in locations in the 241-Z Building or 241-ZA Sampling
49 Building not serviced by the 241-Z cell exhaust system, or in the 241-ZB Bulk Chemical Storage or
50 241-ZG Building, spot decontamination and/or stabilization would be conducted. Such activities
51 could result in fugitive and diffuse emissions. Removal of contamination may also use washing with

1 decontamination agents and/or physical removal of part of the surface by mechanical means (as
2 described in Section 5.3.1).

- 3
- 4 • Deactivation - Deactivation will remove some active systems from service to support process
5 equipment removal and decontamination activities. Deactivation will apply to the following systems:
6 electrical, steam, criticality monitoring, and sanitary water. In addition, drain lines that currently
7 route to the 241-Z Building from the PFP Complex will be isolated physically in the
8 234-5Z Building. In the 241-Z Building, after decontamination activities are completed, spool pieces
9 will be removed from the two lines that can be used to transfer waste from TK-D5 to 244-TX. This
10 will isolate the 241-Z Building from Tank Farms. This activity can include cutting of pipe or
11 breaking flanges of the existing piping system. The ventilation system will be physically isolated
12 (blanked off) from the 241-ZB Bulk Product tank D-9.
- 13
- 14 • Equipment Removal From Belowgrade Cells – Removal of contaminated equipment will occur as
15 part of the decontamination of the system components and the remediation of contaminated surfaces
16 where needed. This equipment could include items such as ladders, grating, piping, pumps and
17 agitators associated with the tanks that might have to be removed or replaced to facilitate
18 decontamination of the tanks. Equipment will be size reduced, as necessary, using physical
19 disassembly and or cutting as necessary to facilitate packaging as waste. Additionally, sections of
20 piping could be cut and capped to facilitate removal of holdup material. Existing ventilation systems
21 will be used to the extent possible to control air flow during the activities, supplemented by temporary
22 containment required to be constructed to access the belowgrade cells. It is anticipated that a good
23 portion of the waste generated by these activities will be classified as transuranic (TRU) waste and
24 will be packaged in drums or solid waste boxes and disposed accordingly. Operations such as
25 housekeeping preparation for cell entry and storing of wrapped stabilized contaminated items in
26 unsealed containers as well as packaging operations such as opening the shipping containers, adding
27 filler material, inspecting and installing final container closure in preparation for shipment may occur
28 within a plastic containment enclosure set up above the cell entry. This space will routinely be
29 ventilated by either the 296-Z-3 stack by providing ventilation communication to belowgrade cell via
30 a cell access opening or by using a portable temporary radioactive air emissions unit (PTRAEU) after
31 a physical barrier is in place between the containment and the belowgrade cell.
- 32
- 33 • Equipment Removal – Equipment removal activities will remove non-contaminated equipment and
34 other non-contaminated components to facilitate future dismantlement. This would include items in
35 the 241-Z Building, as well as the support buildings (the 241-ZA Sample Building and the
36 241-ZG Building). Non-contaminated equipment that may be removed includes light fixture ballasts
37 and fluorescent lamps, criticality detectors, or other nonessential items. Contaminated and potentially
38 contaminated equipment external to the cells may include tanks (D-9, D-10 and D-11), piping,
39 pumps, sample glovebox in 241-ZA, control panels and other equipment external.

40
41 The proposed methods for removing residual contamination from equipment/systems and for removing
42 equipment would be similar to methods in use throughout industry and the DOE Complex today. Both
43 direct contact and remote technologies/techniques could be used. These technologies would include
44 chemical cleaning, brushing, washing, scrubbing, scabbling, vacuum cleaning, strippable coatings and
45 similar technologies (refer to Section 5.3 for complete list of activities). Equipment and piping removal
46 may include using wrenches, nibblers, shears, cutters and saws.

47 48 49 **5.3 PROCESS ACTIVITIES**

50 Process activities are addressed in the following sections.

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5.3.1 Process activities associated with the 296-Z-3 Stack

The following describes process operations acceptable to be performed within the scope of the controls outlined in Section 6.0:

- Routine operations include: receipt and transfer of liquid waste, manipulation of valves, accessing the belowgrade cells to perform repairs, conducting inspections and performing Non-Destructive Analysis, adding chemicals to the tanks, agitating waste in the tanks, flushing of tanks, sampling of liquid waste using the sample glovebox, bagging out samples and waste material from the glovebox, pumping of liquid waste using steam jet, electric and pneumatic pumps, repair of system equipment within the cells including agitators, pumps, valves, pipes and electrical equipment, fogging belowgrade cells for radiological control purposes, minor decontamination using low pressure wash down, wet wipe down and the use of fixatives. System ventilation control and monitoring equipment requires maintenance of the equipment, testing of HEPA filters, effluent flow rate measurements and replacement of ventilation system HEPA filters and monitoring related sample collection filters.
- Access into the cells will be made through any existing opening to the cell including: manways, equipment access ports, cover block, piping penetrations and pipe ways
- Removal of waste from the cells will be accomplished by: manual lifting or mechanically assisted lifting using cranes, hoists, jacks or similar lift devices.
- Size reduction of equipment will be by mechanical means and could be accomplished by disassembly using of wrenches, nibblers, shears, cutters, grinders or saws. This equipment could 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 could be accomplished by a combination of coating the material with a fixative, placing the material in containers, bags and/or wrapping in plastic sheeting, using adhesive tape, heat sealing or mechanical closure to prevent release of airborne 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, installations of hose and tubing connectors, compression fittings, installation and removal of pumps, agitators and filters.
- Welding of such things as lifting eyes, temporary supports, and repair of structural components could be performed on surfaces decontaminated to less than 20,000 dpm/100 cm².

1 **5.3.2 Process Activities Associated with the PTRAEU**

2 A PTRAEU (refer to Section 5.4), is used in a similar manner as described in DOE/RL-96-75 to facilitate
3 access to the belowgrade cells, aids in the management of wrapped but unsealed material removed from
4 the cells and supports operations external to the space ventilated by the 296-Z-3 Stack. Up to six
5 independent exhausters might be required to support this project. Each unit will represent potential
6 emissions to the ambient air as a separate emission point. The following describes process operations that
7 are considered to be within the scope of this activity using the controls outlined in Section 6.0.
8

- 9 • A fraction of the facility inventory (up to 65 curies/year) of the plutonium (refer to Table 1 isotopic
10 distribution) associated with material external to the tank system could be wrapped and physically
11 removed from the belowgrade cells. This material will be wrapped and packaged inside a temporary
12 containment tent area set up at the entrance to the five cells. While normally the area is ventilated via
13 the 296-Z-3 Stack, during periods when the area is isolated from the belowgrade ventilation using a
14 containment devices, contaminated material could be a stored inside the area while being ventilated
15 by the PTRAEU unit(s). The material will be wrapped in plastic and stabilized by application of
16 fixative before being removed from the cell and isolating the area from the 241-Z stack. Section 6.0
17 limits activities that could be expected to occur while wrapped and fixed contaminated items are
18 present in the temporary containment tent area and ventilated by the PTRAEU.
19
- 20 • Contamination control associated with preparation for entry into the cells and post cell exit activities
21 will be provided. This will include housekeeping activities, handling of contaminated clothing, and
22 conducting surveys.
23
- 24 • Contamination control associated with removal; size reduction packaging of the sample glovebox and
25 associated piping from 241-ZA will be provided. Prior to removal, the sampling glovebox would be
26 subjected to some decontamination and stabilization using fixatives while ventilated to the 296-Z-3
27 stack. Size reduction of equipment will be by mechanical means and could be accomplished by
28 disassembly use of hand tools, wrenches, nibblers, shears, cutters, and saws. This equipment could be
29 manually, hydraulically, pneumatically or electrically powered.
30

31 Decontamination, using methods described in Section 5.3.1, could be used within the PTRAEU.
32 Decontamination of areas up to 20,000 dpm/100 cm² is allowed as long as airborne levels inside the
33 temporary containment tent area do not exceed 4.5×10^{-10} μ Ci/ml alpha contamination on average for the
34 period of operation.
35
36

37 **5.3.3 PROCESS ACTIVITIES ASSOCIATED FUGITIVE EMISSIONS**

38 The proposed activity will provide a potential for fugitive emissions beyond those associated with the
39 PTRAEU activities above. The activities providing such a potential include:

- 40
- 41 • Decontaminations of spot contamination up to 2,000 dpm in above grade unventilated areas
 - 42
 - 43 • Securing the 296-Z-3 Stack exhaust for purposes of performing fogging using contamination fixatives
 - 44
 - 45 • Handling of contaminated laundry, step-off pad waste and contaminated equipment with fixed
46 contamination in unsealed containers
 - 47
 - 48 • Bag-out operations associated with the sample glovebox.
 - 49

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5.4 PORTABLE/TEMPORARY RADIOACTIVE AIR EMISSION UNITS

Existing PTRAEU equipment operated as Type I units under DOE/RL-96-75 will be used. The two existing units consist of one stage of testable HEPA filter (and additional testable HEPA filter stage in series is allowed to facilitate contamination control) up stream of a commercial blower. Additional units used will be of similar design with independent filter unit(s) and a blower; a single stage integrated unit manufactured for this purpose of contamination control or a combination of an independent filter mated to a combination unit. Exhaust flow rate for the individual units may be as high as 1,000 cubic feet per minute (CFM) and for basis calculation purposes this flow rate for all units operating is assumed (refer to Section 10.0) to be less than or equal to 1,000 CFM.

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 to be used during the deactivation activities are administrative, based on ALARA principles and consist of ALARA techniques, as delineated in the site radiological control procedures. It is proposed that the following controls be approved as low as reasonably achievable control technology (ALARACT) for transition of the 241-Z Building.

1. Health physics technician (HPT) coverage will be provided, as necessary, during transition activities.
2. With the exception of periods when fogging operations are occurring, the existing ventilation system, exhausting through the 296-Z-3 Stack, will be operational during all transition activities. The abatement controls associated with the 296-Z-3 Stack consist of two fans and two parallel banks of two-stage HEPA filters, each with a pre-filter.
3. Appropriate controls such as water, fixatives, covers, temporary containment tent, or windscreens will be applied if needed, as determined by the Health Physics organization as delineated in the site radiological control procedures.
4. Welding on contaminated surfaces will only occur if the affected area has been decontaminated to the extent practical. Welding on contaminated surfaces will not be conducted unless the effluent is exhausting through the 296-Z-3 Stack and contamination is below 20,000 dpm/100 cm² in the area to be a welded.
5. As appropriate, before starting work on isolating utilities and piping, removable contamination in the affected area(s) might be reduced to ALARA. Measures such as expandable foam, strippable decontamination agents, fixatives, encapsulants or glovebags also could be used to help reduce contamination.
6. A temporary containment tent will be used at all times for radiological controls during access to the belowgrade cells.
7. When possible, ventilation for the containment tent will be provided by drawing air to the belowgrade cells and exhausted via the 296-Z-3 stack.

- 1 8. Any PTRAEU associated with the temporary containment tent will not be operated unless there is a
2 physical barrier to minimize communication with a space ventilated by the 296-Z-3 stack.
3
- 4 9. Activities in the temporary containment tent being ventilated by the PTRAEU exhauster while
5 wrapped and stabilized (unsealed) materials are present will be limited to those that have a low risk
6 of disturbing the wrapped stabilized items. Such activities could include performing routine surveys
7 inside the temporary containment tents, removing the stabilized sample glovebox and associated
8 piping, inspecting the material, preparing to open the access to the belowgrade cells or performing
9 final closure of the waste container. Decontamination of areas up to 20,000 dpm/100 cm² is
10 allowed as long as airborne levels inside the temporary containment tent are not expected to exceed
11 the administrative limit 4.5×10^{-10} $\mu\text{Ci/ml}$ on average for the period of operation. Handling of
12 stabilized contaminated materials including size reducing is allowed as long as airborne levels
13 within the temporary containment tent do not exceed 4.5×10^{-10} $\mu\text{Ci/ml}$ alpha contamination on
14 average for the period of operation.
15
16

17 7.0 DRAWINGS OF CONTROLS

18 *Provide conceptual drawings showing all applicable control technology components from the point of*
19 *entry of radionuclides into the vapor space to release to the environment.*
20

21 Figure 4 shows the existing ventilation systems for the 241-Z Building stack (296-Z-3) described in
22 Section 6.0.
23

24 Drawings of controls associated with the PTRAEU currently available are provided in Figure 6;
25 additional units manufactured by NFS-RPS, Inc. are shown in Figure 7.
26
27

28 8.0 RADIONUCLIDES OF CONCERN

29 *Identify each radionuclide that could contribute greater than ten percent of the potential to emit TEDE to*
30 *the MEI, or greater than 0.1 mrem/yr potential to emit TEDE to the MEI.*
31

32 Isotopes of uranium, plutonium, and americium-241 are expected to be present. Process knowledge
33 indicates that the predominant activity (greater than 99 percent) is due to plutonium and americium. The
34 radionuclides of concern for this activity are calculation-based. The relative distribution of the various
35 isotopes are shown in Table 1, the conservative basis for calculation uses plutonium-239/240
36 (representing all of the alpha contamination).
37
38

39 9.0 MONITORING

40 *Describe the effluent monitoring system for the proposed control system. Describe each piece of*
41 *monitoring equipment and its monitoring capability, including detection limits, for each radionuclide that*
42 *could contribute greater than ten percent of the potential to emit TEDE to the MEI, or greater than*
43 *0.1 mrem/yr potential to emit TEDE to the MEI, or greater than twenty-five percent of the TEDE to the*
44 *MEI, after controls. Describe the method for monitoring or calculating those radionuclide emissions.*
45 *Describe the method with sufficient detail to demonstrate compliance with the applicable requirements.*
46

47 The potential unabated offsite dose associated with this activity is calculated to be greater than
48 0.1 millirem per year from the 296-Z-3 Stack. Therefore, in accordance with 40 CFR 61, Subpart H,
49 continuous air monitoring for the 296-Z-3 Stack will occur.

1
2 The record sampler for the 291-Z-3 Stack originally was designed and installed to meet ANSI
3 N13.1-1969, and is operated continuously (refer to Figure 5). Particulate sample air filters are collected
4 biweekly and composited quarterly for subsequent laboratory analysis to support the required annual
5 reporting of emissions. The emissions during the proposed activities will be represented by these
6 samples. Adequacy of the sampling system is demonstrated by inspection, calibration, and maintenance
7 activities as scheduled in current 241-Z Building procedures. EPA and WDOH approval of an alternate
8 monitoring approach has been requested. It has been requested to continue to use the existing sampling
9 system operating in part-time super-isokinetic mode and to report releases based on the maximum design
10 fan flow rate (3,000 CFM), rather than increasing the periodic measurements during periods of flow
11 change. The existing sampling system is designed to sample a 2,500 CFM flow rate, operates in a
12 super-isokinetic mode due to stack flow of ~600 CFM associated with reduced facility operation while
13 one of the two fans operates. The alternate monitoring request involves reporting releases based on the
14 maximum design fan flow rate (3,000 CFM) for both fans operating, regardless of actual system flow.
15 This approach will result in very conservative estimates of annual emissions.

16
17 Portable exhausters, any potential diffuse/fugitive emissions associated with decontamination activities,
18 or periods when the system is shut down for fogging operation will be monitored using the 200 Areas
19 near-field ambient air monitors. Sample collection and analysis will follow that of the near-field
20 monitoring program. Analytical results will be reported in an annual air emissions report.

21
22 When a PTRAEU is used that provides potential emissions to the ambient air as a separate emission
23 point, periodic confirmatory measurement (PCM) for emissions from these units will be performed by
24 maintaining an operating log for each unit identifying the operating time, effluent flow rate, and
25 confirmatory measurement reference information. The confirmatory measurement information will be
26 from survey measurements taken within the temporary containment tent and typically will include surface
27 surveys and portable air monitoring sampling conducted during operation of the PTRAEU. The
28 information included will be the following:

- 29
30
- 31 • Location of operation
 - 32 • Type of control equipment connected to the unit
 - 33 • Flow rate of the unit
 - 34 • Operator's name
 - 35 • Date(s) and time of startup/shutdown of ventilation system
 - 36 • PCM (radiological survey) reference.

37 The frequency and location of radiological surveys conducted for confirmatory measurements will depend
38 on the nature of activity being performed, as delineated in the site radiological control procedures. As
39 described in Section 10.0, compliance with the possession limits and release evaluation
40 (6.6×10^{-3} Ci/year) could be confirmed by maintaining the average airborne concentration below the
41 administrative planning limit of 4.5×10^{-10} μ Ci/ml alpha contamination inside the temporary containment
42 tent while being ventilated by a PTRAEU unit for the period of operation at 1,000 CFM.. Other methods
43 such as contamination surveys documenting no loose contamination could also be used as a method of
44 PCM.

45
46 Emissions estimates (included in the project files) supporting the PCM will include the assumptions and
47 methodology used to determine the estimate. For example, assuming continuous operation of a
48 PTRAEU with a flow rate of 1,000 CFM (2.8×10^7 ml/minute), this would allow a concentration of up to
49 4.5×10^{-10} μ Ci/ml alpha contamination on average for the period of operation within a temporary
50 containment tent (6.6×10^{-3} Ci/year $\times 10^6$ μ Ci/Ci / 2.8×10^7 ml/min / 365 days/year / 24 hours/day /
51 60 min/hour = 4.5×10^{-10} μ Ci/ml). This limit (4.5×10^{-10} μ Ci/ml alpha contamination on average for the

1 period of operation) is specified for planning purposes only, and could be increased if exhaust flow from
2 the ventilated space were reduced due to reduction in the number of hours of operation or flow rate
3 associated with the individual PTRAEUs.
4
5

6 10.0 ANNUAL POSSESSION QUANTITY

7 *Indicate the annual possession quantity for each radionuclide.*
8

9 296-Z-3 Stack

10
11 The assumed annual possession quantity associated with transition of the 241-Z Building is estimated to
12 be a total of 1,530 curies of plutonium related isotopes. The assumed isotopic distribution of the
13 plutonium is given in Table 1. This represents the approximate combination of throughput anticipated in
14 any one calendar year; the quantity accumulated in the tank heels; and any residual inventory in the
15 remaining piping, cells, and contaminated surfaces in the above grade structures, taking into account
16 nondestructive analysis (NDA) uncertainty.
17

18 During the course of the project the work activity will primarily be ventilated by the 296-Z-3 stack. As
19 described below a portion of this inventory may be removed from the 296-Z-3 and either managed in a
20 separate PTRAEU or represent a potential fugitive emission.
21

22 PTRAEU

23
24 It is anticipated that the majority of the inventory will be transferred via the 241-Z piping system to tank
25 farms as a liquid slurry and a fraction (65 curies) of the plutonium (refer to Table 1 isotopic distribution)
26 associated with material external to the tank system could be physically removed from the belowgrade
27 cells. This material will be stabilized by application of fixatives prior to being moved to the temporary
28 containment set up at the entrance to the cells. Of the 65 curies of stabilized material it is conservatively
29 assumed that use of fixatives failed to capture all of the particulate and 1/10th the activity (6.5 curies) is
30 particulate and 9/10th (58.5 curies) is solid in form. Normally the area is ventilated via 296-Z-3, but the
31 area can be physically isolated from the belowgrade cell and ventilated by a PTRAEU. The material will
32 be stabilized and wrapped in plastic before isolating the temporary containment tent from the 241-Z stack
33 (296-Z-3). Any contamination, external to the wrapped objects that might be subjected to
34 decontamination within the temporary containment tents is included in the above inventory.
35

36 Up to six separate emission units might be used as part of this activity. The release evaluation assumes all
37 the material is in any of the units; the 65 curies annual possession limit is to be applicable to any unit
38 involved in the activity. [Note: The PTRAEU source term (65 curies) is assumed to be 6.5 curies
39 particulate and 58.5 curies agglomerated solid as a result of the use of fixatives prior to the material being
40 removed from the 296-Z-3 ventilation.] The unabated release potential for a PTRAEU is
41 6.6×10^{-3} Ci/year $((6.5 \text{ Ci} \times 1 \times 10^{-3}) + (58.5 \text{ Ci} \times 1 \times 10^{-6}))$.
42

43 Fugitive Emission

44
45 Additionally, of the aforementioned 1,530 curies fugitive emissions are, 8.1 E^{-7} curies (as particulate
46 Pu-239) are calculated to be associated with isolated areas of surface contamination within the
47 unventilated, unfiltered portions of the 241-Z Building, 241-ZA Sampling Building and the
48 241-ZG Building not routinely ventilated by 296-Z-3. Specifically:
49

- 50 • Potential contaminated areas that may be exposed during transition activities are estimated not to
51 exceed 100 square feet ($9.3 \text{ E}+04$ square centimeters), with an average contamination level (alpha,

1 assumed for calculations to be Pu-239) of 2,000 disintegrations per minute (dpm) per 100 square
2 centimeters

- 3 • $9.3 \text{ E}+04 \text{ cm}^2 \times 2,000 \text{ dpm per } 100 \text{ cm}^2 = 1.9 \text{ E}+06 \text{ dpm (Pu-239)}$
- 4 • For Pu-239, $1.4 \text{ E}+11 \text{ dpm} = \text{one gram}$ or $\text{one dpm} = 7.1 \text{ E}-12 \text{ gram}$
- 5 • $1.9 \text{ E}+06 \text{ dpm} \times 7.1 \text{ E}-12 \text{ gram/dpm} = 1.3 \text{ E}-05 \text{ gram Pu-239}$

6
7 Further: 0.062 curies Pu-239 per gram of Pu-239

8
9 Therefore: $1.3 \text{ E}-05 \text{ grams Pu-239} = 8.1 \text{ E}-07 \text{ curies of Pu-239}$.

10
11 Fugitive emissions associated with bag out operations are estimated as being bounded by the sampling
12 operation. The sample glovebox is used to provide containment while liquid samples from the tank
13 system are collected. These samples can involve multiple sample vials containing less than 0.1
14 grams/liter Pu of process liquids or less than 0.001 grams/liter of decontamination rinsate. It is postulated
15 that up to 10 process liquid sampling sets per year may occur involving three liters of liquid per sample
16 set. An additional 20 rinsate liquid sampling event per year involving 1 liter of liquid per sample set.
17 These liquids would be bagged out in sample vials, packaged and transported for analysis. The activity for
18 this operation would be 3.02 grams Pu (10 events x 3 liters/event x 0.1 grams/liter + 20 events x 1
19 liter/event x .001grams/ liter) or a total of 1.3 curies of the isotopes listed in Table 1. Since this material
20 is contained by a sample vial during packaging for shipment while removal from the 296-Z-3 ventilation
21 it is being considered a potential fugitive emission.

22
23 Fugitive emissions associated with handling of laundry, bagout of trash from the glovebox, step-off pad
24 waste and items with fixed contamination are inconsequential compared to the above items.

25 26 27 **11.0 PHYSICAL FORM**

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

29
30 The physical form of the radionuclides in the 241-Z Building primarily is particulate solid suspended in
31 an aqueous solution. Packaged waste being removed from the belowgrade cells and potentially contained
32 within the PTRAEU is anticipated to be particulate and agglomerated solids. As discussed in Section 5.3,
33 welding activities inside the 241-Z cells could be performed on surfaces decontaminated to less than
34 20,000 dpm/100 cm². Contributions by any gaseous radionuclides to the 296-Z-3 Stack are
35 inconsequential.

36 37 38 **12.0 RELEASE FORM**

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

41
42 The release form of the radionuclides is particulate solid (gaseous radionuclide contributions are
43 inconsequential).

1 **13.0 RELEASE RATES**

2 *Give the predicted release rates without any emissions control equipment (potential to emit) and with the*
3 *proposed control equipment using the efficiencies described in subsection (6) of this section. Indicate*
4 *whether the emission unit is operating in a batch or continuous mode.*
5

6 Unabated and abated release rates associated with 241-Z Building operations and transition activities are
7 provided in Tables 1 and 2 and summarized in Table 3.
8

9 The aforementioned 1,530 curies annual possession quantity (Section 10.0) is in non-readily dispersible
10 forms; i.e., fixed particulate and particulates suspended in aqueous solutions. The potential-to-emit of this
11 material is, primarily, a function of activities (e.g., physical removal, decontamination, and water
12 transfers) and, to a lesser degree, quantity and form of material. Therefore, the annual possession quantity
13 results in an extremely conservative estimate for potential releases to the environment. Unabated and
14 abated emission rates for the 296-Z-3 Stack are provided in Table 1.
15

16 Potential unabated total release estimated for a PTRAEU exhaustor operated under this NOC is for a unit
17 used in a similar manner as described in the latest revisions of the PTRAEU NOC, DOE/RL-96-75.
18 Most activity in the temporary containment tents (e.g., wrapping materials, accessing cells) will occur
19 while the ventilation is exhausted via the 296-Z-3 Stack. In calculating the potential to emit in Table 2, it
20 was assumed that all but 65 curies of material would be transferred to tank farms via existing piping. The
21 stabilization of the material before removal from the pit is conservatively estimated to reduce the
22 potential for un-stabilized particulate to less than one in ten. This results in a potential release associated
23 with managing and packaging the wrapped items to be based on 1/10th the activity being particulate and
24 9/10th the material being an agglomerated solid. Table 2 shows the unabated and abated emission rates for
25 potential releases associated with the PTRAEU. Emissions are estimated based on applying the
26 40 CFR 61, Appendix D, release factor (1.0 E-03) for particulate and liquid and (1.0 E-6) for
27 agglomerated solid to the calculated inventory. For any activities that might occur in the temporary
28 containment tents while exhausted via the PTRAEU, an administrative control limit of 4.5×10^{-10} $\mu\text{Ci/ml}$
29 alpha contamination airborne on average for the period of operation within the temporary containment
30 tents will ensure these activities will be bounded by the assumed PTE.
31

32 Potential diffuse and fugitive emissions are estimated based on applying the 40 CFR 61, Appendix D,
33 release factor (1.0 E-03) for particulate and liquid to the calculated inventory subject to fugitive and
34 diffuse emissions (1.3 E-05 grams Pu-239 for decontamination and 3.02 grams for bagout operations,
35 refer to Section 10.0). Table 2 shows the unabated and abated emission rates for potential diffuse and
36 fugitive releases.
37

38 The proposed modifications will be considered continuous operation in accordance with
39 WAC 246-247-110(13)(b).
40
41

42 **14.0 LOCATION OF MAXIMALLY EXPOSED INDIVIDUAL**

43 *Identify the MEI by distance and direction from the emission unit.*
44

45 The maximum public receptor (MPR) was assumed to be an individual who works within the Hanford
46 Site boundary at a location with unrestricted public access, and who eats food grown regionally. The
47 MPR was assumed to be located at the Laser Interferometer Gravitational Wave Observatory (LIGO).
48
49

1 **15.0 TOTAL EFFECTIVE DOSE EQUIVALENT TO THE MAXIMALLY EXPOSED**
2 **INDIVIDUAL**

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

7
8 The CAP88PC computer code (Parks 1992) was used to model atmospheric releases using Hanford
9 Site-specific parameters¹. The MPR was assumed to be located at the LIGO. Using these calculated unit
10 dose conversion factors, the estimated potential TEDE to the MEI resulting from the unabated emissions
11 from transition activities at the 241-Z Building is 8.7 millirem per year (refer to Table 3). The estimated
12 potential TEDE to the MEI resulting from the abated emissions from transition activities at the
13 241-Z Building is 7.8×10^{-3} millirem per year (refer to Table 3).

14
15 The TEDE from all 2001 Hanford Site air emissions (point sources, diffuse, and fugitive sources) was
16 0.049 millirem (DOE/RL-2002-20). The emissions resulting from the deactivation of the 241-Z Building,
17 in conjunction with other operations on the Hanford Site, will not result in a violation of the National
18 Emission Standard of 10 millirem per year (40 CFR 61, Subpart H).

19
20
21 **16.0 COST FACTORS OF CONTROL TECHNOLOGY COMPONENTS**

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

24
25 Cost factor inclusion is not applicable because the existing emission controls used during the transition
26 activities will be defined administratively and will consist of ALARA techniques.

27
28 The Washington State Department of Health (WDOH) has provided guidance that HEPA filters generally
29 are BARCT for particulate emissions (AIR 92-107). Because the radionuclides of concern are
30 particulates, it is proposed that the controls described in Section 6.0 for the 241-Z Building stack
31 (296-Z-3) be accepted as BARCT. Compliance with the substantive BARCT standards is described in
32 Section 18.0.

33
34
35 **17.0 DURATION OR LIFETIME**

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

38
39 Transition activities currently are scheduled to take place between May 2003 and December 2006, but
40 could extend to 2010. This NOC addresses activities performed before undertaking a Comprehensive
41 Environmental Response, Compensation and Liability Act (CERCLA) removal action. A CERCLA
42 removal action work plan identifying specific radioactive air emission monitoring requirements identified
43 through the applicable or relevant and appropriate requirements (ARARs) identification process will be
44 prepared to address the final disposition of the facility. This NOC will expire upon approval of the
45 CERCLA removal action work plan by the lead agency.

¹ Permission to use Hanford Site-specific parameters granted in letter from D.E. Hardesty of EPA to J.H. Hebdon at DOE-RL, dated March 22, 2001, Subject: U.S. Environmental Protection Agency's third response to the new maximally exposed individual definition.

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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.

The 296-Z-3 Stack HEPA filtration system was built in 1979, before the 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. Adequacy of the design is supported by operational history, maintenance, inspections, and testing, which demonstrate that the intent of the substantive standard is met, as described in the following. In lieu of strict compliance with the current listed standards, or a list of the standards to which the ventilation system actually was designed and built, the 241-Z Building relies on a performance-based approach. Operational history, routine maintenance, testing, and inspections demonstrate adequacy of the design and operation of the existing abatement control technology as proposed.

18.1 STANDARDS APPLICABLE TO THE 296-Z-3 STACK

Standards applicable to the 296-Z-3 Stack are addressed as follows.

18.1.1 Compliance With Best Available Radiological Control Technology Standards For The 296-Z-3 System

Standards pertaining to the 296-Z-3 Stack were identified previously in a NOC for repairs at the 241-Z Building (DOE/RL-98-97, Rev. 0), and are discussed as follows

- ASME/ANSI AG-1 (first promulgated in 1985, and revised in 1991, 1994, and 1997):

The 296-Z-3 Stack HEPA filtration system was built in 1979, before ASME/ANSI AG-1 was issued. The HEPA filters and existing stock of replacement HEPA filters meet MIL-F-51068 and MIL-F-51079.

- ASME/ANSI N509 (first promulgated in 1976, and revised in 1980 and 1989):

The HEPA filters comply with ANSI N509, Section 5.1. However, 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 the existing design.

Construction specifications (B-137-CI, *Construction Specification for 241-Z Sump Improvements, Work Order No. X13701*) did not reference ANSI N509; however, the specifications did require conformance to Hanford Plant Standards (HPS-151-M), *Standard Specification for High Efficiency Particulate Air Filters*. HPS-151-M, and standards incorporated by reference, required that the HEPA filters demonstrate

1 fire resistance, moisture resistance, HEPA filter efficiency (penetration), adequate by reference flow
2 resistance, and filter frame integrity.

3
4 The construction specifications (B-137-CI) also incorporated ductwork standards by reference, including
5 Publication 99, *Standard Handbook*, Air Moving and Conditioning Association, Inc. (AMCA), and
6 Industrial Duct Construction Standards, *High Pressure Duct Construction – 1975*, and *Low Pressure Duct*
7 *Construction – 1976*, Sheet Metal and Air Conditioning Contractors National Association, Inc.
8 (SMACNA). These standards addressed duct system construction quality and durability. The versions of
9 these two documents that existed in 1979 are not available. Current revisions are available for review by
10 WDOH upon request.

11
12 • ASME/ANSI N510 (first promulgated in 1975, and revised in 1980 and 1989):

13
14 Since a system that is not compliant with ANSI/ASME N509 is by definition noncompliant with
15 ANSI/ASME N510, documentation to show full compliance with ANSI/ASME N510 cannot be provided.
16 The following information is provided for the purpose of demonstrating the adequacy of the design and
17 operation of the emission unit as proposed.

18
19 The individual 296-Z-3 Stack exhaust HEPA filters are tested annually.

20
21 Although the filter leak test ports do not strictly conform to ASME/ANSI N510 (portable sample
22 manifold and downstream baseline), the HEPA filters are in-place leak tested to meet the intent of
23 ANSI/ASME N510, Section 10. The location of the port used to inject the leak test aerosol allows for
24 mixing of the aerosol with the exhaust, before reaching the primary filter bank. Additionally, test ports
25 are located such that each filter bank can be tested independently.

26
27 • ANSI/ASME NQA-1 (first promulgated in 1985):

28
29 Quality assurance for sampling of emissions and subsequent analysis is addressed in HNF-0528,
30 *NESHAP Quality Assurance Project Plan for Radioactive Airborne Emissions* (all of
31 Sections 2.0, 3.0 and 5.0), which was written in accordance with applicable NQA-1 requirements.

32
33 • ANSI/ASME NQA-2:

34
35 The standard is no longer an active National Standard and has been incorporated into NQA-1.
36 Compliance compatible with NQA-1 was described previously.

37
38 • 40 CFR 60, Appendix A:

39
40 Stack flow is tested using Methods 1 and 2. Methods 1A, 2A, 2C, and 2D are not applicable to the stack
41 dimensions/design. Methods 4, 5, and 17 are not applicable to radioactive airborne emissions.

42
43 • ANSI N13.1:

44
45 The sampling system for the 241-Z Building stack (296-Z-3) meets ANSI N13.1-1969 criteria. Sample
46 tubing and number of bends are minimized as much as physically practical. Adequacy of the sampling
47 system is demonstrated by inspection, calibration, and maintenance activities as scheduled in current
48 241-Z Building procedures. Because of reduced discharge airflows from the stack during single exhaust
49 fan operation, the existing sampling system operates in a super-isokinetic mode (refer to discussion in
50 Section 9.0).

1 **18.1.2 Environmental, Energy, and Economic Impacts of Best Available Radiological Control**
2 **Technology for the 296-Z-3 System**

3 A replacement system that is fully compliant with the BARCT technology standards and the existing
4 HEPA filtration system (both use HEPA filtration, which already has been accepted as BARCT to control
5 particulates) have been evaluated and compared for environmental impacts. The existing system will
6 allow completion of the work described in this NOC, with the TEDE to the MEI as described in
7 Section 15.0 and Table 1, for the period described in Section 17.0. The fully compliant replacement
8 system would have those same impacts, plus the additional potential dose impacts (TEDE to MEI from
9 existing source term in the 241-Z Building that will be removed with this NOC) from allowing the
10 241-Z Building radiological inventory to remain in place for several additional years. It could take years
11 to fund, design, permit, procure, and install a replacement system that is fully compliant with the BARCT
12 technology standards. Completion of the work described in this NOC will reduce potential TEDE to the
13 MEI, as source term is removed from the 241-Z Building and transferred in a more stabilized form to
14 other facilities that are a further distance from the MEI. The work described in this NOC is needed
15 whether relying on the existing system or relying on a fully compliant replacement system. The potential
16 exposure to the public from a delay is an adverse environmental impact of a fully compliant replacement
17 system. There are additional adverse impacts from installation of a fully compliant replacement system,
18 e.g., waste generation (radioactive and nonradioactive, air and non-air), disposal and stabilization,
19 construction of control equipment, and the health and safety to both radiation workers and to the general
20 public.

21
22 The existing system and a fully compliant replacement system have been evaluated for energy impacts.
23 The existing energy distribution system would be used for either option, so there are no energy impacts to
24 consider for this BARCT compliance evaluation.

25
26 The existing system and a fully compliant replacement system have been evaluated for economic impacts.
27 There would be no improved reduction in TEDE to the MEI for the replacement system as compared to
28 the existing system, because both are effectively equal (minimum removal efficiency for particulates of
29 99.95 percent); therefore, the beneficial impact is zero.

30
31 The work described in this NOC involves a reduction in inventory at the 241-Z Building, and thereby
32 reduces the risk to the public. Installing a fully compliant system would delay the inventory reduction
33 work, and thereby delay this risk reduction. A fully compliant system would reduce the risk associated
34 with the work described in this NOC, but would introduce greater additional risk because of delaying the
35 cleanout work while transitioning to a fully compliant system. The most reasonable approach would be to
36 use the existing system for this NOC to expedite removal of the radiological inventory from the
37 241-Z Building.

38
39 Pursuant to WAC 246-247, Appendix B, the most effective technology (i.e., a fully compliant
40 replacement system) could be eliminated from consideration if a demonstration can be made to WDOH
41 that the technology has unacceptable impacts. Because a fully compliant replacement system is not
42 justified by cost/benefit evaluation or adverse environmental impacts because of delaying the work
43 described in this NOC, it is proposed that the existing system, as described in Section 6.0 and meeting the
44 intent of the technology standards in Section 18.1 of this NOC, be accepted as compliant with the
45 BARCT technology standards.

46
47
48 **18.1.3 Potential Accidental Releases with a Probability of Occurrence of Greater Than 1 Percent**

49 WAC 246-247 requires that the planning for any proposed new construction or significant modification of
50 the emission unit must address accidental releases with a probability of occurrence during the expected

1 life of the emission unit of greater than one percent. The 241-Z Building is a Hazard Category 2
2 nonreactor nuclear facility. The hazards analysis requirements for a Category 2 facility are quite
3 stringent, and currently are found in DOE orders and standards. These requirements define the operating
4 limits, surveillance requirements, administrative controls, and design features necessary to protect the
5 health and safety of the public and onsite workers, and to minimize the risk to facility workers from an
6 uncontrolled release of radioactive or other hazardous material. The operation of the 241-Z facility has
7 been evaluated in conjunction with the Plutonium Finishing Plant final safety analysis for potential
8 accident such as seismic event, fire and loss of filtration. No credible unmitigated accident event with a
9 potential of significant release with a probability of greater than one percent was identified.

12 **18.2 STANDARDS APPLICABLE TO PTRAEU**

13 Standards pertaining to the operation of PTRAEU(s) were identified previously in a NOC
14 (DOE/RL-96-75, Rev. 2) and are provided as follows for completeness.

17 **18.2.1 Control Technology Standards For PTRAEUs**

18 **American Standard Mechanical Engineer/American National Standard Institute AG-1, FC-1100**

19 This section of the Code provides minimum requirements for the performance, design, construction,
20 acceptance testing, and quality assurance for HEPA filters used in nuclear safety related air or gas
21 treatment systems in nuclear facilities. Many of the units included in this NOC meet industry standards
22 for asbestos work. HEPA filters that meet asbestos standards are required to remove 99.97 percent of
23 0.3 micron monodispersed particles, which is equivalent to the nuclear-grade HEPA filter standards. The
24 asbestos standards do not require compliance with radiation resistance and fire resistance found in
25 nuclear-grade HEPA filters. The asbestos standards do not require compliance with any design standards,
26 other than the previously mentioned performance standard for removal efficiency, but rely instead on
27 industry standards such as ANSI Z9.2-1979, "Fundamentals Governing the Design and Operation of
28 Local Exhaust Systems", and MIL-STD-282, "Filter Units, Protective Clothing, Gas-Mask Components,
29 and Related Products: Performance Test Methods". However, the units included in this NOC are
30 continuously attended while in use to ensure the filters are not subjected to extremes of temperature or
31 radiation. For this NOC and the intended uses, HEPA filters are adequate in lieu of AG-1 requirements
32 under operating conditions.

34 **ASME/ANSI N509**

35 The HEPA filters do not fully comply with ANSI N509. Some of the units are cylindrical HEPA filters,
36 which are not addressed by this standard. Performance testing of these HEPA filters to demonstrate
37 adequacy of design and testing is addressed in the discussion for ASME/ANSI N510.

39 **ASME/ANSI N510**

40 A system that is not compliant with ANSI/ASME N509 is by definition noncompliant with ANSI/ASME
41 N510. Documentation to show full compliance with the standards cannot be provided. However, the
42 HEPA filters are tested in-place to meet the intent of ANSI/ASME N510. The systems are tested
43 annually (or before startup if inactive for more than 1 year) as described in the current versions of
44 Hanford Site procedures, "In-Place Testing of HEPA Filter Systems (Single Stage or Overall Filter Test)",
45 7-GN-055, Rev. 4 Change D, "In-Place Testing of HEPA Filter Systems (Upstream Base Percent)",
46 3-VB-492, Rev. B-0, Change 0, "In-Place Testing of HEPA Filter Systems (Downstream Base Percent)",
47 3-VB-493, Rev. B-0, and "In-Place Testing of HEPA Filter Systems (Vacuum Cleaner)", 7-GN-062,

1 Rev. 3, Change 0. These test procedures provide a safe, uniform method for determining leaks in the air
2 filter systems containing HEPA filter units. The DOE approved challenge aerosol that is used for these
3 testing procedures is used in accordance with ANSI N510. The test in these procedures determines
4 aerosol penetration as a result of leakage through or around the filter unit due to faulty installation, defects
5 in the filter unit mounting frame and housing, or defects and/or damage to the individual filter units.
6 Although these procedures are not strictly N510 tests, the procedures are proposed as adequate to
7 demonstrate the HEPA filtration system is operating properly and meets the intent of N510. Hence, it is
8 proposed that adherence to these procedures adequately demonstrates that the HEPA filtration systems are
9 operating properly and is compatible with the required standard.

11 ANSI/ASME NQA-1

12 Quality assurance is addressed by HNF-MP-599, Rev. 2, "Project Hanford Quality Assurance Program
13 Description" (Chapter 2.0, Section 3.3 and Chapter 7.0, Section 3.2) and by HNF-0528, "NESHAP
14 Quality Assurance Project Plan for Radioactive Airborne Emissions", (all of Sections 2.0, 3.0, and 5.0) as
15 a compatible alternative to NQA-1.

17 ANSI N13.1

18 There are no sampling systems on these units. Therefore, the sampling criteria in ANSI N13.1 are not
19 applicable. The methods discussed in Section 9.0 will be used to provide periodic confirmatory
20 measurements of low emissions.

22 40 CFR 60, Appendix A

23 Test Methods 1, 1 A, 2, 2A, 2C, 2D and 4

24 These units typically do not have a stack that can be tested using 40 CFR 60, Appendix A test methods.
25 Therefore, these methods cannot be applied to the PTRAEUs addressed in this NOC. Instead, air flow
26 measurements are incorporated into the HEPA filter test procedures referred to previously addressing
27 ASME/ANSI N510.

30 18.2.2 Discussion of Best Available Radionuclide Control Technology for PTRAEUs

31 It is proposed that the HEPA filtration systems, as described in Section 8.0 of the NOC, be approved as
32 BARCT for the PTRAEUs. The WDOH has stated that HEPA filters generally are accepted as BARCT
33 for particulate radionuclide air emissions. HEPA filter units have been used extensively on the Hanford
34 Site to control particulate radionuclide air emissions.

37 19.0 REFERENCES

38 AIR 92-107, Letter, WDOH to DOE-RL, *Surveillance Report Generated by the DOH of KE & KW Basin*
39 *on 09/16/1992*, October 05, 1992, Washington State Department of Health.

41 ANSI N13.1-1969, *Guide to Sampling Airborne Radioactive Materials in a Nuclear Facility*, American
42 National Standards Institute, New York, New York.

44 ANSI N13.1-1999, *Sampling and Monitoring Releases of Airborne Radioactive substances from the*
45 *Stacks and Ducts of Nuclear Facilities*, American National Standards Institute, New York,
46 New York.

- 1 ANSI/ASME NQA-1, *Quality Assurance Requirements for Nuclear Facility Applications*, 1994,
2 American National Standards Institute and American Society of Mechanical Engineers,
3 New York, New York.
4
- 5 ANSI/ASME NQA-2, *Quality Assurance Requirements for Nuclear Power Plants*, 1989, American
6 National Standards Institute and American Society of Mechanical Engineers, New York,
7 New York.
8
- 9 ASME/ANSI AG-1, *Code on Nuclear Air and Gas Treatment*, 1991, American Society of Mechanical
10 Engineers and American National Standards Institute, New York, New York.
11
- 12 ASME/ANSI-N509, *Nuclear Power Plant Air-Cleaning Units and Components*, 1989, American Society
13 of Mechanical Engineers and American National Standards Institute, New York, New York.
14
- 15 ASME/ANSI N510, *Testing of Nuclear Air Treatment Systems*, 1989, American Society of Mechanical
16 Engineers and American National Standards Institute, New York, New York.
17
- 18 DOE/RL-96-75, Rev. 2, *Radioactive Air Emissions Notice of Construction Portable/Temporary*
19 *Radioactive Air Emissions Units*, September 1999, U.S. Department of Energy, Richland
20 Washington.
21
- 22 DOE/RL-97-50, Rev.1, *Radioactive Air Emissions Notice of Construction for HEPA Filtered Vacuum*
23 *Radioactive Air Emission Units*, September 1999, U.S. Department of Energy, Richland
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25
- 26 DOE/RL-98-97, Rev. 0, *Radioactive Air Emissions Notice of Construction for Agitator/Sample Probe*
27 *Repair (Tanks D-5 and D-8) at the 241-Z Building*, U.S. Department of Energy, Richland
28 Operations Office, Richland, Washington.
29
- 30 DOE/RL-2002-20, *Radionuclide Air Emissions Report for the Hanford Site, Calendar Year 2001*,
31 June 2001, U.S. Department of Energy, Richland, Washington.
32
- 33 Ecology, EPA, and DOE-RL, 1996, *Hanford Federal Facility Agreement and Consent Order*,
34 Washington State Department of Ecology, U.S. Environmental Protection Agency,
35 U.S. Department of Energy, Richland Operations Office, Olympia, Washington, amended
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37
- 38 HNF-0528, *NESHAP Quality Assurance Project Plan for Radioactive Airborne Emissions*, Fluor
39 Hanford, Richland, Washington, updated periodically.
40
- 41 HNF-1974, Rev. 1, *Radionuclide National Emission Standards for Hazardous Air Pollutants*
42 *Potential-to-Emit Assessment*, Fluor Hanford, Richland, Washington.
43
- 44 HNF-3602, Rev. 1, *Calculating Potential to Emit Releases and Doses for FEMPs and NOCs*,
45 January 2002, Fluor Hanford, Richland, Washington.
46
- 47 Parks, B. S., *User's Guide for CAP88-PC Version 1.0*, 402-B-92-001, 1992, U.S. Environmental
48 Protection Agency, Washington, D.C.
49
50

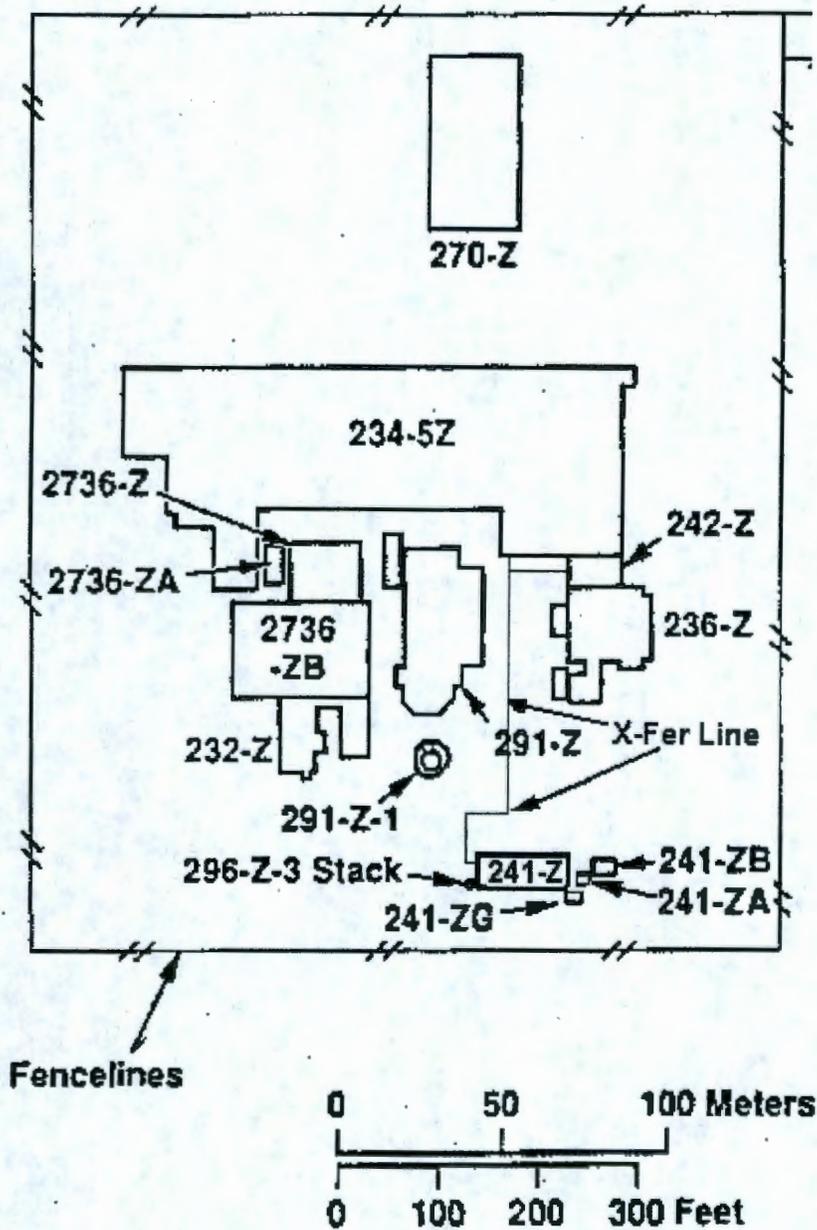


Figure 1. Relative Location of the 241-Z Building within PFP Complex.

241-Z Building Cutaway View

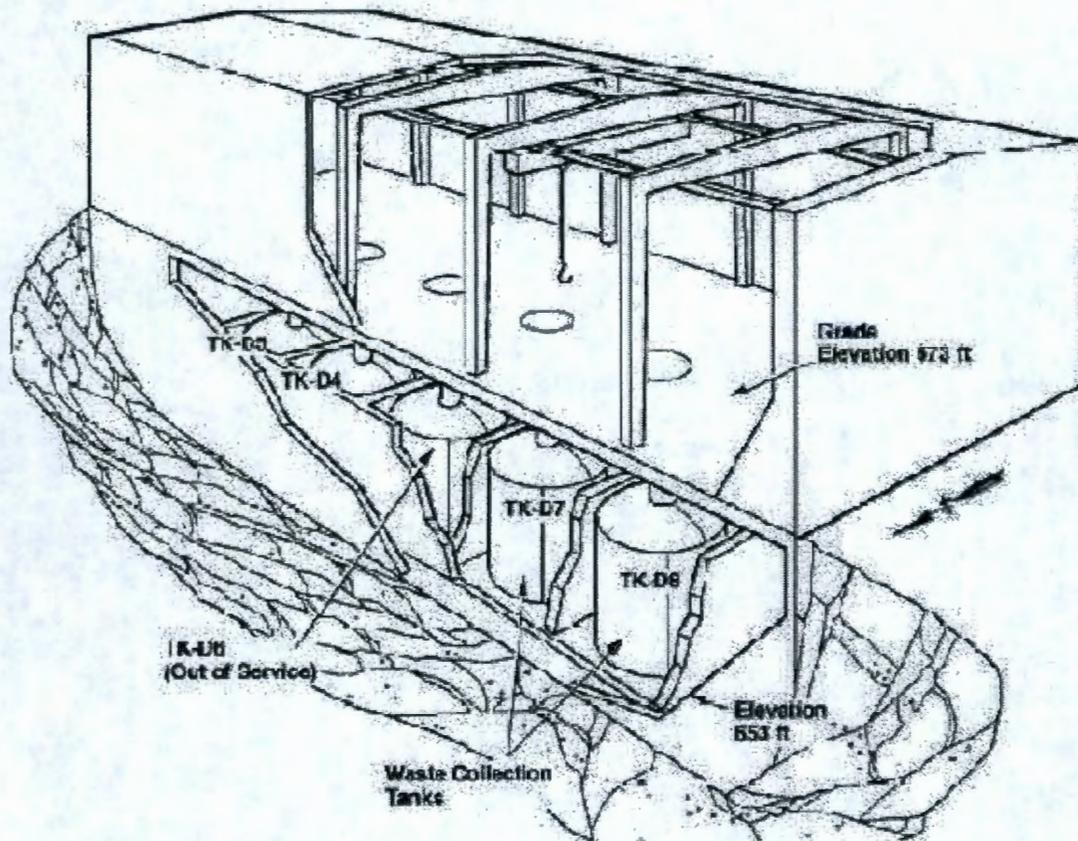
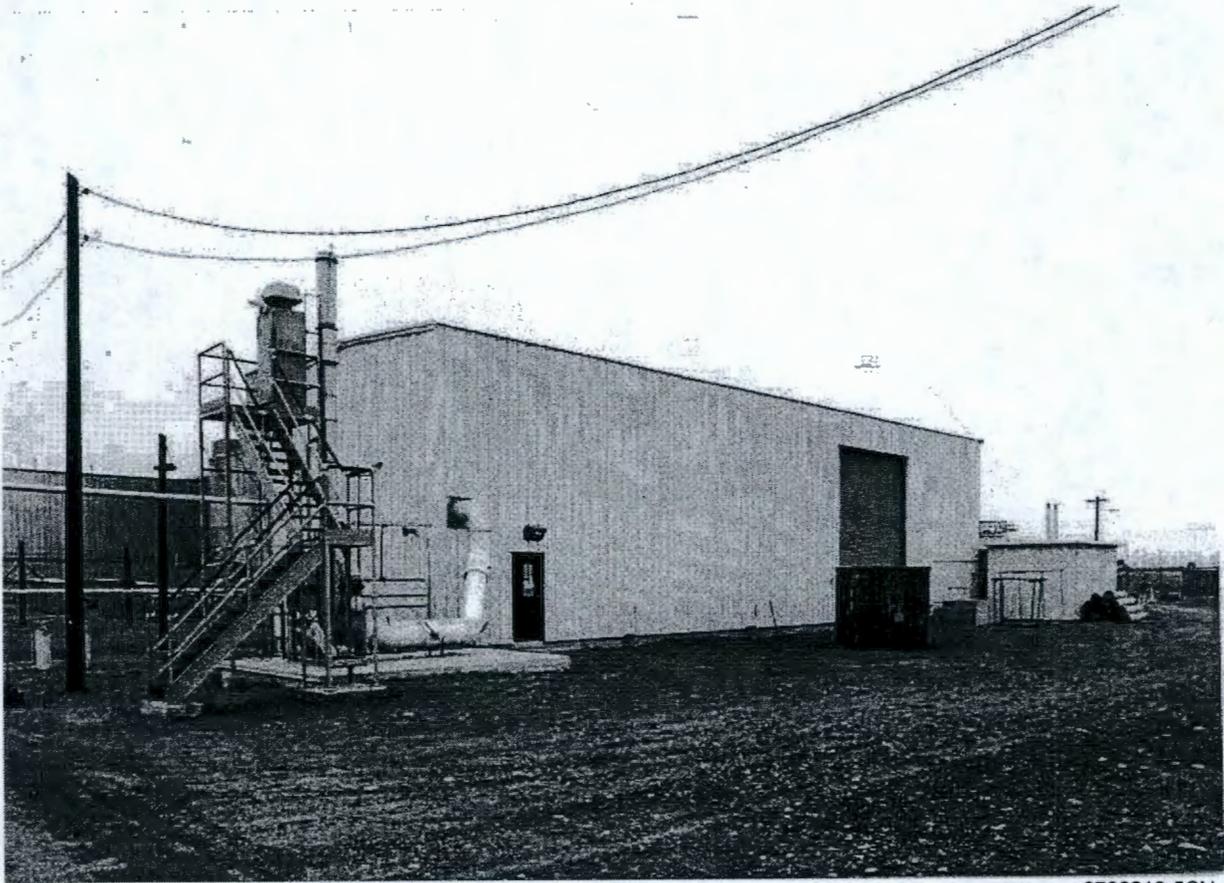


Figure 2. Cutaway of the 241-Z Building.



8706219-5CN
(PHOTO TAKEN 1987)

Figure 3. South Side of 241-Z Building, Showing the 296-Z-3 Stack on the Left and the 241-ZG Change Building on the Right.

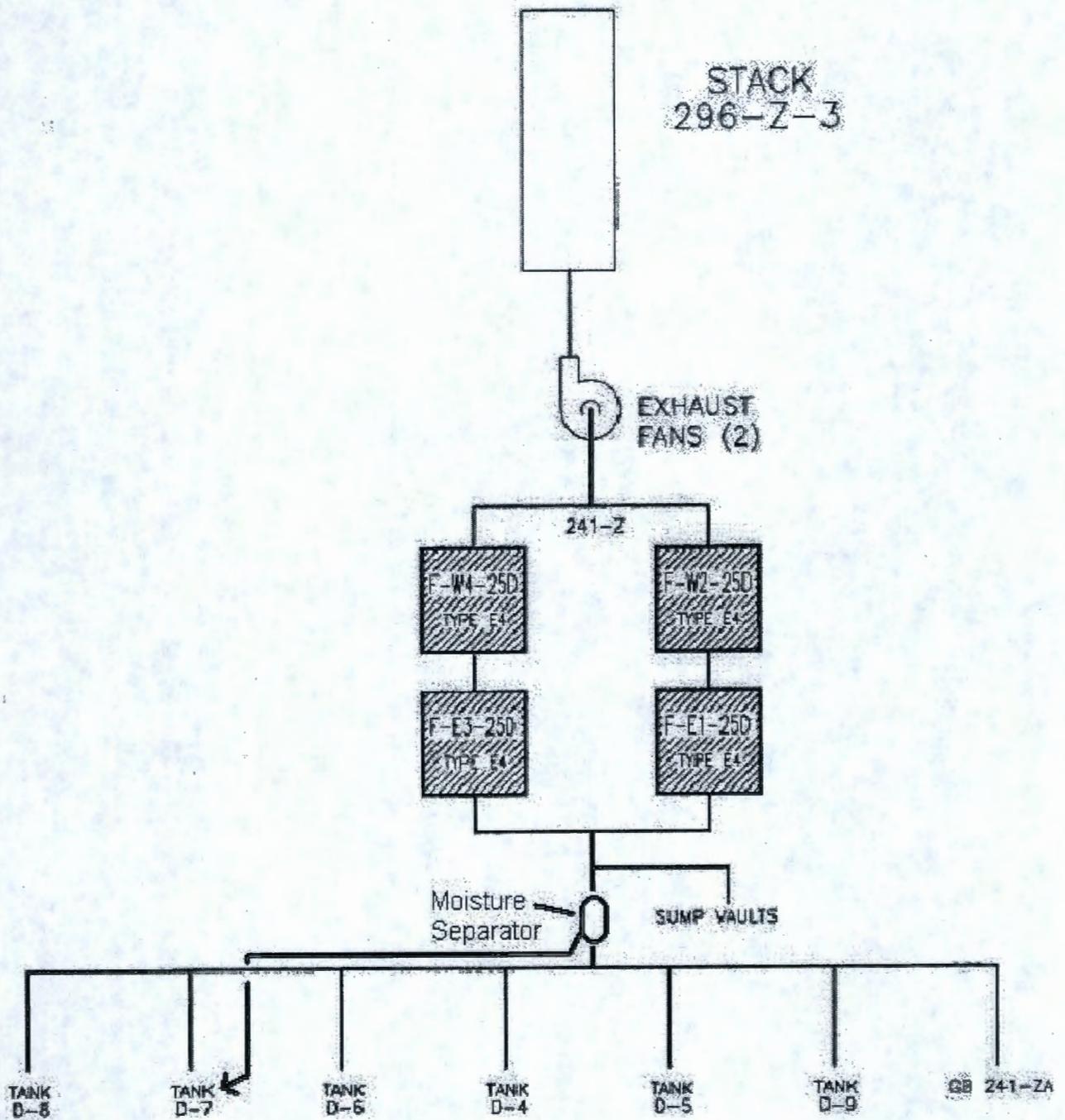
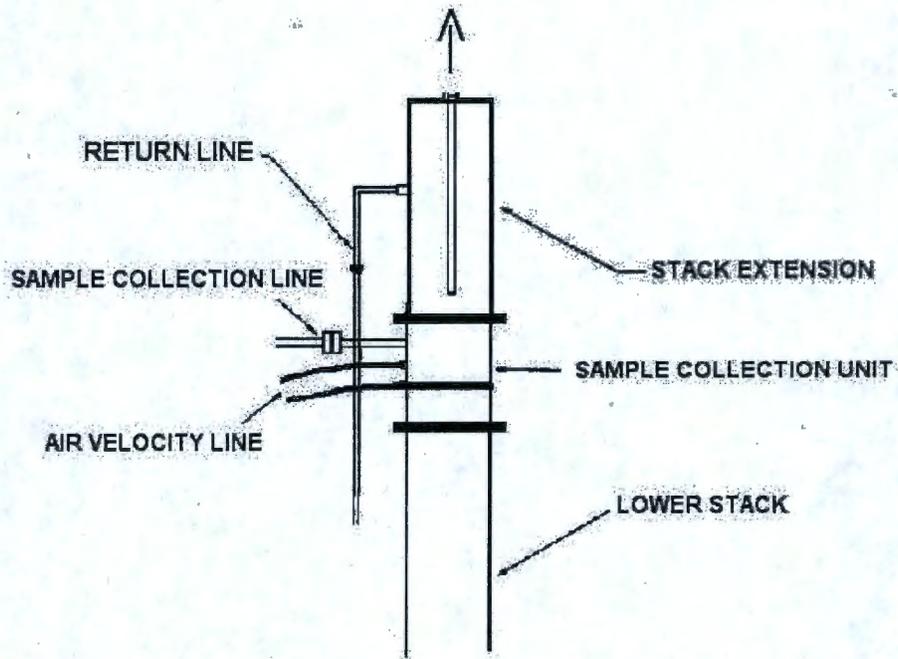


Figure 4. 241-Z Building Ventilation System.



SAMPLE COLLECTION UNIT

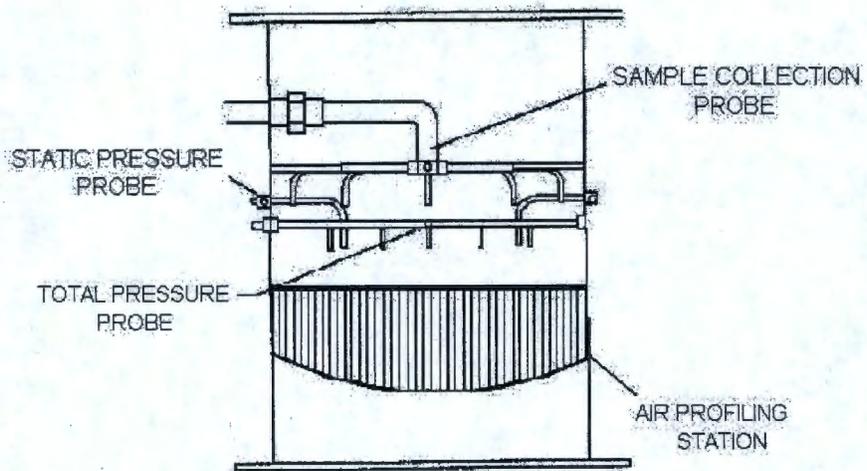
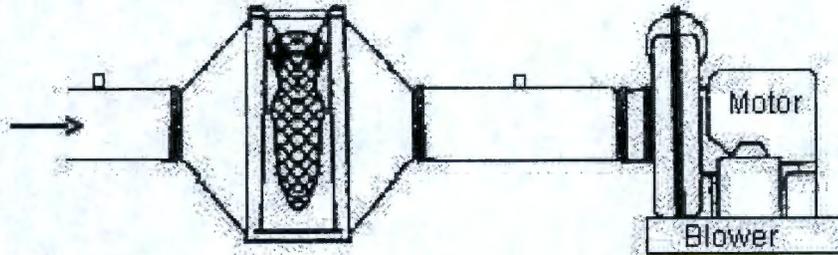
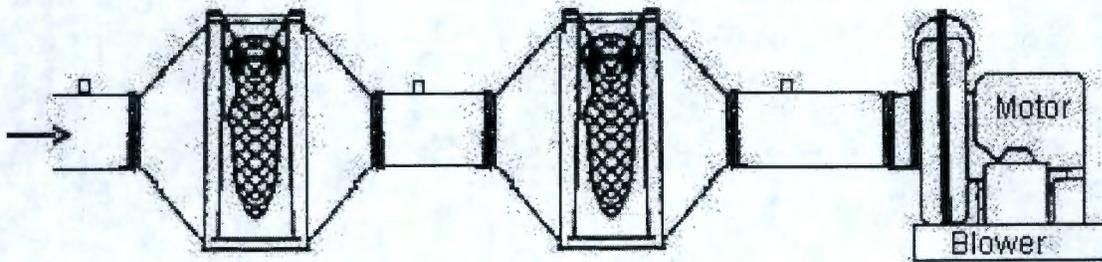


Figure 5. 296-Z-3 Stack Sampler

Typical PTRAEU Arrangement



(shown with optional two HEPA filtration)



(Optional)

Figure 6. Typical PTRAEU Arrangements

Table 1. 241-Z Building Rates and Dose Estimates for 296-Z-3 Stack.

Radio nuclide	Assumed weight distribution (% of Pu) ^a	Assumed Annual Isotopic Activity (Curies)	Assumed 10 ⁻³ Release potential (Ci/yr)	Onsite unit dose ^b factor <40m (mrem/yr/curie)	Unabated TEDE to the MEI (onsite) (millirem per year)	Abated TEDE to the MEI (onsite) (millirem per year) ^c
Pu-238	0.01%	0.4	4.0 x 10 ⁻⁴	10	4.0 x 10 ⁻³	2.0 x 10 ⁶
Pu-239	93.75%	202	2.0 x 10 ⁻¹	11	2.2 x 10 ⁰	1.1x 10 ⁻³
Pu-240	5.95%	48	4.8 x 10 ⁻²	11	5.3 x 10 ⁻¹	2.6x 10 ⁻⁴
Pu-241	0.27%	950	9.5 x 10 ⁻¹	0.16	1.5 x 10 ⁻¹	7.6 x 10 ⁻⁵
Pu-242	0.02%	0.03	3 x 10 ⁻⁵	11	3.3 x 10 ⁻⁴	1.5 x 10 ⁻⁷
Am-241	2.8%	330	3.3 x 10 ⁻¹	17	5.6 x 10 ⁰	2.8 x 10 ⁻³
Total	-	1530	1.53 x 10 ⁰		8.5x 10⁰	4.3 x 10⁻³

^a An amount of 1,530 curies with an assumed isotopic weight distribution shown was used to support calculation of potential for emissions. Americium-241 is estimated as being 2.8% of total Pu values based on D-8 log sheets for transfers over the past 3 years.

^b Dose calculations for unit curie release of radionuclides from 200-W Area per HNF-3602, Rev. 1.

^c Abated dose = unabated dose x 5 x 10⁻⁴ (representing one stage of tested HEPA filters with an efficiency of 99.95 percent.)

MEI = maximally exposed individual.
TEDE = total effective dose equivalent.

Table 2. 241-Z Building Dose Estimates for PTRAEU and Fugitive.

Radionuclide	Assumed Annual Isotopic Activity (curies) ^a	Assumed Annual Activity (curies) as agglomerate or particulate ^b	Release factor	Unabated release (Ci)	Unit dose factor ^e	Unabated TEDE to the MEI (millirem per year)	Abated TEDE to the MEI (millirem per year)
PTRAEU Unit							
Pu-239	8.5	7.7	10 ⁻⁶	7.7 x 10 ⁻⁶	11	8.4 x 10 ⁻⁵	4.2 x 10 ⁻⁸
		0.9	10 ⁻³	9.0 x 10 ⁻⁴	11	9.4 x 10 ⁻³	4.7 x 10 ⁻⁶
Pu-240	2.0	1.8	10 ⁻⁶	1.8 x 10 ⁻⁶	11	2.0 x 10 ⁻⁵	1.0 x 10 ⁻⁸
		0.2	10 ⁻³	2.0 x 10 ⁻⁴	11	2.2 x 10 ⁻³	1.1 x 10 ⁻⁶
Pu-241	40.4	36.4	10 ⁻⁶	3.6 x 10 ⁻⁵	0.16	5.8 x 10 ⁻⁶	2.9 x 10 ⁻⁹
		4.0	10 ⁻³	4.0 x 10 ⁻³	0.16	6.5 x 10 ⁻⁴	3.2 x 10 ⁻⁷
Am-241	14.0	12.6	10 ⁻⁶	1.3 x 10 ⁻⁵	17	2.1 x 10 ⁻⁴	1.1 x 10 ⁻⁷
		1.4	10 ⁻³	1.4 x 10 ⁻³	17	2.4 x 10 ⁻²	1.2 x 10 ⁻⁵
PTRAEU Unit SubTotal	65					3.6 x 10 ⁻²	1.8 x 10 ^{-5 f}
Fugitive							
Decon as Pu-239/240 ^c	8.1 x 10 ⁻⁷		10 ⁻³	8.1 x 10 ⁻¹⁰	11	8.9 x 10 ⁻⁹	8.9 x 10 ⁻⁹
Bagout ^d Pu-239/240	0.2		10 ⁻³	2.0 x 10 ⁻⁴	11	2.2 x 10 ⁻³	2.2 x 10 ⁻³
Pu-241	0.8		10 ⁻³	8.0 x 10 ⁻⁴	0.16	1.3 x 10 ⁻⁴	1.3 x 10 ⁻⁴
Am-241	0.3		10 ⁻³	3.0 x 10 ⁻⁴	17	5.1 x 10 ⁻³	5.1 x 10 ⁻³
Fugitive Subtotal	1.3					7.4 x 10 ⁻³	7.4 x 10 ⁻³

^a Amount estimated to support calculation of potential for emissions is based on the assumed quantity moved from the ventilation of 296-Z-3 during deactivation activities. Based on the assumption that, excluding samples, all but 65 Curies will be transferred to tank farms and assumed sampling events as described in section 10.0. Dose contributions from Pu-238 and Pu-242 are inconsequential (see table 1 calculation) and omitted for simplicity.

^b It is assumed that stabilization activities may allow some particulate matter to be available while being ventilated by PTRAEU. For conservatism, it is assumed that 10 percent of the inventory is dispersible particulate and 90 percent remains agglomerated solid.

^c Refer to Section 10 for discussion of decontamination activities in unventilated areas

^d Refer to Section 10 for discussion of potential source associated with sample glovebox bagout operations.

^e HNF-3602, Revision 1, *Calculating Potential-to-Emit Releases and Doses for FEMPs and NOCs*. For conservatism, Table 4-10: Pu-239, effective release height <40 meters, onsite MPR.

^f Abated dose = unabated dose x 5 x 10⁻⁴ (representing one stage of tested HEPA filters with an efficiency of 99.95 percent.)

Table 3. 241-Z Building Transition Potential to Emit Summary.

Source	Unabated Onsite Public Dose (millirem/year)	Abated Onsite Public Dose (millirem/year) ^e
296-Z-3 Stack ^a	8.5×10^0	4.3×10^{-3}
241-Z PTRAEU #1 ^b	3.6×10^{-2}	1.8×10^{-5}
241-Z PTRAEU #2 ^b	3.6×10^{-2}	1.8×10^{-5}
241-Z PTRAEU #3 ^b	3.6×10^{-2}	1.8×10^{-5}
241-Z PTRAEU #4 ^b	3.6×10^{-2}	1.8×10^{-5}
241-Z PTRAEU #5 ^b	3.6×10^{-2}	1.8×10^{-5}
241-Z PTRAEU #6 ^b	3.6×10^{-2}	1.8×10^{-5}
Diffuse/Fugitive ^c	7.4×10^{-3}	7.4×10^{-3}
Total	8.7×10^0	7.8×10^{-3}

^a Refer to Table 1.

^b Refer to Table 2. Up to six PTRAEU exhausters may be used as part of this activity,

^c Refer to Table 2. This includes decontamination activities and bagout operation.

^d Dose calculations for unit curie release of radionuclides from 200-W Area per HNF-3602, Rev. 1.

^e With the exception of fugitive emissions, abated dose = unabated dose $\times 5 \times 10^{-4}$ (representing one stage of tested HEPA filters with an efficiency of 99.95 percent.)

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Enclosure 3

NOTICE OF OFF-PERMIT CHANGE FOR THE HANFORD SITE AIR OPERATING
PERMIT (AOP) (NUMBER 00-05-006) FOR RADIOACTIVE AIR EMISSIONS NOTICE OF
CONSTRUCTION (NOC), DOE/RL-2002-72, REVISION 1,
TRANSITION OF THE 241-Z LIQUID WASTE TREATMENT FACILITY AT THE
PLUTONIUM FINISHING PLANT, 200 WEST AREA, HANFORD SITE, RICHLAND,
WASHINGTON

HANFORD SITE AIR OPERATING PERMIT

Notification of Off-Permit Change

Permit Number: 00-05-006

This notification is provided to Washington State Department of Ecology, Washington State Department of Health, and the U.S. Environmental Protection Agency as notice of an off-permit change described as follows.

This change is allowed pursuant to WAC 173-401-724(1) as:

1. Change is not specifically addressed or prohibited by the permit terms and conditions
2. Change does not weaken the enforceability of the existing permit conditions
3. Change is not a Title I modification or a change subject to the acid rain requirements under Title IV of the FCAA
4. Change meets all applicable requirements and does not violate an existing permit term or condition
5. Change has complied with applicable preconstruction review requirements established pursuant to RCW 70.94.152.

Provide the following information pursuant to WAC-173-401-724(3):

Description of the change:

A Radioactive Air Emissions Notice of Construction, *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*, Revision 2, is being submitted to the Washington Department of Health (Health) for approval and the U.S. Environmental Protection Agency (EPA) for information. A change in the Hanford Site Air Operating Permit is required to indicate this source of air emissions. This terminal clean out activity temporarily changes the stack from a minor to a major emission unit during the cleanout activities.

Date of Change:

Effective date will be the latter of either the approval by DOH of the NOC or the approvals of the alternate monitoring procedure by both DOH and the EPA.

Describe the emissions resulting from the change:

Radioactive air emissions with the total estimated unabated and abated effective dose equivalents to the hypothetical, maximally exposed public individual are 8.7 millirem per year and 7.8 E-03 millirem per year, respectively.

Describe the new applicable requirements that will apply as a result of the change:

Applicable requirements will be identified in approval notifications by Health and EPA.

For Hanford Use Only:

AOP Change Control Number:

Date Submitted: