



0059683

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

03-RCA-0239

MAY 22 2003

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

Mr. J. Leitch, Chief
Radiation and Indoor Air Section
U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

Mr. O. S. Wang
Nuclear Waste Program
State of Washington
Department of Ecology
1315 West Fourth Avenue
Kennewick, Washington 99336

Addressees:

DOE/RL-2002-72, REVISION 1, RADIOACTIVE AIR EMISSIONS NOTICE OF CONSTRUCTION FOR TRANSITION OF THE 241 Z LIQUID WASTE TREATMENT FACILITY AT THE PLUTONIUM FINISHING PLANT (PFP), 200 WEST AREA, HANFORD SITE, RICHLAND, WASHINGTON AND NATIONAL EMISSIONS STANDARD FOR HAZARDOUS AIR POLLUTANTS; RADIONUCLIDES: REQUEST FOR APPROVAL OF AN ALTERNATIVE STACK FLOW MEASUREMENT AND SAMPLE EXTRACTION PROCEDURE FOR 296-Z-3 STACK

Reference is made to a letter from J. B. Hebdon, RL, to J. Leitch, U.S. Environmental Protection Agency (EPA), Region 10 "Request for Approval of Alternate Sampling/Monitoring System for 296-Z-3 Stack," 03-RCA-0182, dated March 20, 2003. Enclosure 1 is the subject Notice of Construction (NOC) application. This NOC application is being submitted to the Washington State Department of Health, Division of Radiation Protection (DOH) for approval pursuant to Washington Administrative Code (WAC) 246-247-060. A copy is also being provided to EPA Region 10, for information.

For the activities described in this NOC, which entail deactivation activities at the 241-Z Building in the PFP complex located in the 200 West area of the Hanford Site, the total estimated unabated and abated effective dose equivalents to the hypothetical, maximally exposed

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public individual is 8.6 millirem per year and 4.3 E^{-03} millirem per year, respectively.

This NOC addresses activities performed before undertaking a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) removal action. A CERCLA removal action work plan identifying specific radioactive air emissions monitoring requirements identified through the applicable or relevant and appropriate requirements (ARARs) identification process, will be prepared to address the final disposition of the facility. This NOC will expire upon approval of the CERCLA removal action work plan by the lead agency.

For reasons outlined in Enclosure 2, RL is requesting approval from both EPA and DOH for an alternative procedure for stack flow measurement and sample extraction at the 296-Z-3 stack, which is associated with the 241-Z Building at PFP. As described in the referenced letter, the alternative flow measurement and sample extraction request involves continued use of the existing sampling system operating at certain times in an oversampling (super-isokinetic) mode, and reporting releases based on the stack's maximum design flow rate (3,000 CFM), rather than increasing the periodic stack flow rate measurements during periods of flow change. This approach will result in a very conservative estimate of annual releases. EPA and DOH approvals are requested of this stack flow measurement and sampling procedure as an alternative procedure in accordance with 40 Code of Federal Regulations (CFR) 61.93 and WAC 246-247-075, respectively.

Enclosure 3 is a Notification of Off-Permit Change to incorporate the NOC for potential radioactive air emissions from deactivation activities into the Hanford Site Air Operating Permit (AOP). This information is being provided to the State of Washington Department of Ecology (Ecology) consistent with Ecology's role as lead for the Hanford Site AOP. As a result of the approval, continued use of the 296-Z-3 stack sampler will be considered fully compliant with the CFR 61, Title 40, Subpart H and WAC 246-247-075 requirements.

If you have any questions regarding this matter, please contact me or your staff may contact Mary F. Jarvis, of my staff, on (509) 376-2256.

Sincerely,



Keith A. Klein
Manager

RCA:MFJ

Enclosures:

1. Notice of Construction (NOC) Application
2. Basis of Request
3. Notification of Off-Permit Change

cc: See page 3

Addressees
03-RCA-0239

-3-

cc w/encls:

R. W. Bloom, FHI

R. H. Engelmann, FHI

R. Gay, CTUIR

R. H. Gurske, FHI

K. A. Hadley, FHI

D. A. Isom, Admin. Record, LMSI

M. T. Jansky, FHI

R. Jim, YN

P. Sobotta, NPT

Environmental Portal, LMSI

Enclosure 1

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**RADIOACTIVE AIR EMISSIONS NOTICE OF CONSTRUCTION (NOC), DOE/RL-
2002-72, REVISION 1, 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**

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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</i>
13		<i>1980</i>
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 8.6 millirem per year. The estimated potential TEDE to the MEI from abated emissions is
19 4.3×10^{-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. George H. Sanders, Acting 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
35 The 241-Z Building started operations in 1949 to provide PFP with the capability to treat, store, and
36 dispose of liquid waste. This *Resource Conservation and Recovery Act (RCRA) of 1976*-permitted
37 facility is a buried, reinforced concrete structure with a sheet metal enclosure over the top. The enclosure
38 houses a small hoist for removing cell covers and equipment and provides weather protection. The
39 enclosure is not serviced by the facility ventilation system. The buried structure consists of five separate
40 ventilated cells, each containing a 16,250-liters (4,300-gallons) tank (one tank, TK-D6, has been isolated
41 and left in place). The tank system (TK-D4, TK-D5, TK-D7, TK-D8 and over flow tank) is used to
42 accumulate and treat the radioactive liquid wastes generated in the PFP before transfer to the tank farms.
43 The 241-Z Building is approximately 6 meters (20 feet) wide, 28 meters (92 feet) long, and 7 meters
44 (22 feet) deep, and is located approximately 100 meters (330 feet) south of the 234-5Z Building. The
45 belowgrade tank vaults are posted as airborne radiation areas and require confined space entry
46 considerations for occupational personnel safety.
47

1 At the southwest corner of the 241-Z Building vault deck is the equipment for the 241-Z vessel vent
2 filters and vault ventilation system (initially installed in 1964, and modified to current configuration in
3 1979). The 7.2-meters (24-feet)-high 0.36-meters (14-inches)-diameter stack, 296-Z-3, and associated
4 fans and controls are located on a 4.2-meters (14-feet) by 5.4-meters (18-feet) concrete pad. The
5 241-Z Building also consists of the 241-ZA Sampling Building and the 241-ZG Change Room. The
6 sampling glovebox in 241-ZA Sampling Building is interconnected to the 241-Z cell exhaust system by
7 ventilation piping and a drain line. Next to the 241-ZA Sampling Building is the 241-ZB Bulk Chemical
8 Storage area containing the D-9 tank. The D-9 tank is connected to the 241-Z tank ventilation system.
9 Neither the 241-ZA Sampling Building nor the Bulk Chemical Storage areas have controlled ventilation.

12 5.2 TRANSITION ACTIVITIES

13 The proposed action is to transition the 232-Z Building for dismantlement. All work would be performed
14 in accordance with the approved radiological control procedures and as low as reasonably achievable
15 (ALARA) program requirements [identified in *Occupational Radiation Protection Final Rule*
16 (10 CFR 835), as implemented by the project radiological manual. These requirements would be carried
17 out through the activity work packages and associated radiological work permits.

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

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

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

1 If radiological contamination is detected in locations in the 241-Z Building or 241-ZA Sampling
2 Building not serviced by the 241-Z cell exhaust system, or in the 241-ZB Bulk Chemical Storage or
3 241-ZG Building, spot decontamination and/or stabilization would be conducted. Such activities
4 could result in fugitive and diffuse emissions. Removal of contamination may also use washing with
5 decontamination agents and/or physical removal of part of the surface by mechanical means (as
6 described in Section 5.3.1).

- 7
- 8 • Deactivation - Deactivation will remove some active systems from service to support process
9 equipment removal and decontamination activities. Deactivation will apply to the following systems:
10 electrical, steam, criticality monitoring, and sanitary water. In addition, drain lines that currently
11 route to the 241-Z Building from the PFP Complex will be isolated physically in the
12 234-5Z Building. In the 241-Z Building, after decontamination activities are completed, spool pieces
13 will be removed from the two lines that can be used to transfer waste from TK-D5 to 244-TX. This
14 will isolate the 241-Z Building from Tank Farms. This activity can include cutting of pipe or
15 breaking flanges of the existing piping system. The ventilation system will be physically isolated
16 (blanked off) from the 241-ZB Bulk Product tank D-9.
- 17
- 18 • Equipment Removal From Belowgrade Cells – Removal of contaminated equipment will occur as
19 part of the decontamination of the system components and the remediation of contaminated surfaces
20 where needed. This equipment could include items such as ladders, grating, piping, pumps and
21 agitators associated with the tanks that might have to be removed or replaced to facilitate
22 decontamination of the tanks. Equipment will be size reduced, as necessary, using physical
23 disassembly and or cutting as necessary to facilitate packaging as waste. Additionally, sections of
24 piping could be cut and capped to facilitate removal of holdup material. Existing ventilation systems
25 will be used to the extent possible to control air flow during the activities, supplemented by temporary
26 containment required to be constructed to access the belowgrade cells. It is anticipated that a good
27 portion of the waste generated by these activities will be classified as transuranic (TRU) waste and
28 will be packaged in drums or solid waste boxes and disposed accordingly. Operations such as storing
29 of wrapped contaminated items and unsealed containers as well as packaging operations such as
30 opening, inspecting and preparing for shipment may occur within the space ventilated by the portable
31 temporary radioactive air emissions unit (PTRAEU).
- 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
51 Process activities are addressed in the following sections.

1 **5.3.1 Process activities associated with the 296-Z-3 Stack**

2 The following describes process operations acceptable to be performed within the scope of the controls
3 outlined in Section 6.0:
4

- 5 • Routine operations include: receipt and transfer of liquid waste, manipulation of valves, accessing
6 the belowgrade cells to perform repairs, conducting inspections and performing Non-Destructive
7 Analysis, adding chemicals to the tanks, agitating waste in the tanks, flushing of tanks, sampling of
8 liquid waste using the sample glovebox, bagging out samples and waste material from the glovebox,
9 pumping of liquid waste using steam jet, electric and pneumatic pumps, repair of system equipment
10 within the cells including agitators, pumps, valves, pipes and electrical equipment, fogging
11 belowgrade cells for radiological control purposes, minor decontamination using low pressure wash
12 down, wet wipe down and the use of fixatives. System ventilation control and monitoring equipment
13 requires maintenance of the equipment, testing of HEPA filters, effluent flow rate measurements and
14 replacement of ventilation system HEPA filters and monitoring related sample collection filters.
15
- 16 • Access into the cells will be made through any existing opening to the cell including: manways,
17 equipment access ports, cover block, piping penetrations and pipe ways
18
- 19 • Removal of waste from the cells will be accomplished by: manual lifting or mechanically assisted
20 lifting using cranes, hoists, jacks or similar lift devices.
21
- 22 • Size reduction of equipment will be by mechanical means and could be accomplished by disassembly
23 using of wrenches, nibblers, shears, cutters, grinders or saws. This equipment could be manually,
24 hydraulically, pneumatically, or electrically powered.
25
- 26 • Decontamination methods include: scraping, sweeping, chemical cleaning, brushing, washing,
27 scrubbing, scabbling, grinding, vacuum cleaning, strippable coatings, washing using wet rags,
28 spraying, abrasive jetting, low pressure and high pressure wash using water and/or chemicals
29 cleaners, use of fixatives and/or physical removal of contamination by use of mechanical means such
30 as chipping or cutting. The application of fixatives for contamination control would be accomplished
31 via aerosol fogging, paint brush/roller, hand-held spray bottle, or an electric or pneumatic powered
32 sprayer.
33
- 34 • Containment of waste could be accomplished by coating the material with a fixative or placing the
35 material in containers, bags and/or wrapping in plastic sheeting, using adhesive tape, heat sealing or
36 mechanical closure to prevent release of airborne contamination.
37
- 38 • Miscellaneous mechanical processes that could be used to support the proposed activity could include
39 threading of piping, use of hot taps on piping, capping and plugging piping using threaded pipe
40 components and expanding/compressive plugs or caps, drilling of holes in metal and concrete, core
41 drilling concrete surfaces, installation of anchor bolts, installation and removal of bolts, installations
42 of hose and tubing connectors, compression fittings, installation and removal of pumps, agitators and
43 filters.
44
- 45 • Welding of such things as lifting eyes, temporary supports, and repair of structural components could
46 be performed on surfaces decontaminated to less than 20,000 dpm/100 cm².
47
48

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

2 A PTRAEU (refer to Section 5.4), 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 150 grams/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
12 greenhouse(s) set up at the entrance to the five cells. While normally the area is ventilated via the
13 296-Z-3 Stack, during periods of powered ventilation inactivity contaminated material could be a
14 stored inside the greenhouse while being ventilated by the PTRAEU unit(s). The material will be
15 wrapped in plastic or stabilized by application of fixative before being removed from the cell and
16 isolating the greenhouse from the 241-Z stack. Section 6.0 limits activities that could be expected to
17 occur while wrapped or fixed contaminated items are present in the greenhouse and ventilated by the
18 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. Size reduction of equipment will be by mechanical
26 means and could be accomplished by disassembly use of hand tools, wrenches, nibblers, shears,
27 cutters, and saws. This equipment could be manually, hydraulically, pneumatically or electrically
28 powered.
29

30 Decontamination, using methods described in Section 5.3.1, could be used within the PTRAEU.
31 Decontamination of areas up to 20,000 dpm/100 cm² is allowed as long as airborne levels inside the
32 greenhouse do not exceed 1.5×10^{-10} $\mu\text{Ci/ml}$ alpha contamination.
33
34

35 **5.3.3 PROCESS ACTIVITIES ASSOCIATED FUGITIVE EMISSIONS**

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

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

1 **5.4 PORTABLE/TEMPORARY RADIOACTIVE AIR EMISSION UNITS**

2
3 Existing PTRAEU equipment operated as Type I units under DOE/RL-96-75 will be used. The two
4 existing units consist of one stage of testable HEPA filter (and additional testable HEPA filter stage in
5 series is allowed to facilitate contamination control) up stream of a commercial blower. Additional units
6 used will be of similar design with independent filter unit(s) and a blower; a single stage integrated unit
7 manufactured for this purpose of contamination control or a combination of an independent filter mated to
8 a combination unit. Exhaust flow rate for the units may vary between 50 and 1,000 cubic feet per minute
9 (CFM) but the cumulative flow rate for all units operating at one time is assumed (refer to Section 10.0)
10 to be less than 3,000 CFM.
11

12 **6.0 PROPOSED CONTROLS**

13
14 *Describe the existing and proposed abatement technology. Describe the basis for the use of the proposed*
15 *system. Include expected efficiency of each control device, and the annual average volumetric flow rate*
16 *in cubic meters/second for the emission unit.*
17

18 Many of the emission controls to be used during the deactivation activities are administrative, based on
19 ALARA principles and consist of ALARA techniques, as delineated in the site radiological control
20 procedures. It is proposed that the following controls be approved as low as reasonably achievable
21 control technology (ALARACT) for transition of the 241-Z Building.
22

- 23 1. Health physics technician (HPT) coverage will be provided, as necessary, during transition
24 activities.
25
- 26 2. With the exception of periods when fogging operations are occurring, the existing ventilation
27 system, exhausting through the 296-Z-3 Stack, will be operational during all transition activities.
28 The abatement controls associated with the 296-Z-3 Stack consist of two fans and two parallel banks
29 of two-stage HEPA filters, each with a pre-filter.
30
- 31 3. Appropriate controls such as water, fixatives, covers, containment greenhouses, or windscreens will
32 be applied if needed, as determined by the Health Physics organization as delineated in the site
33 radiological control procedures.
34
- 35 4. Welding on contaminated surfaces will only occur if the affected area has been decontaminated to
36 the extent practical. Welding on contaminated surfaces will not be conducted unless the effluent is
37 exhausting through the 296-Z-3 Stack and contamination is below 20,000 dpm/100 cm² in the area
38 to be a welded.
39
- 40 5. As appropriate, before starting work on isolating utilities and piping, removable contamination in
41 the affected area(s) might be reduced to ALARA (as identified in 10 CFR 835). Measures such as
42 expandable foam, strippable decontamination agents, fixatives, or glovebags also could be used to
43 help reduce contamination.
44
- 45 6. A containment greenhouse will be used at all times for radiological controls during access to the
46 belowgrade cells.
47
- 48 7. Any PTRAEU associated with the containment greenhouse will be turned off before opening access
49 to the belowgrade cells.
50

- 1 8. Activities in the greenhouse being ventilated by the PTRAEU exhaustor while wrapped or stabilized
2 (unsealed) materials are present will be limited to those that have a low risk of disturbing the
3 wrapped or stabilized items. Such activities could include performing routine surveys inside the
4 greenhouse, inspecting the material, preparing to open the access to the belowgrade cells or
5 performing final closure of the waste container. Decontamination of areas up to
6 20,000 dpm/100 cm² is allowed as long as airborne levels inside the greenhouse do not exceed
7 1.5 x 10⁻¹⁰ μCi/ml. Handling of stabilized contaminated materials including size reducing is allowed
8 as long as airborne levels within the greenhouse do not exceed 1.5 x 10⁻¹⁰ μCi/ml alpha
9 contamination.

12 7.0 DRAWINGS OF CONTROLS

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

15
16 Figure 4 shows the existing ventilation systems for the 241-Z Building stack (296-Z-3) described in
17 Section 6.0.

18
19 Drawings of controls associated with the PTRAEU currently available are provided in Figure 6;
20 additional units manufactured by NFS-RPS, Inc. are shown in Figure 7.

23 8.0 RADIONUCLIDES OF CONCERN

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

26
27 Isotopes of uranium, plutonium, and americium-241 are expected to be present. Process knowledge
28 indicates that the predominant activity (greater than 95 percent) is due to plutonium. The radionuclides of
29 concern for this activity are calculation-based. As shown in Table 1, the conservative basis for
30 calculation uses plutonium-239/240 (representing all of the alpha contamination).

33 9.0 MONITORING

34 *Describe the effluent monitoring system for the proposed control system. Describe each piece of*
35 *monitoring equipment and its monitoring capability, including detection limits, for each radionuclide that*
36 *could contribute greater than ten percent of the potential to emit TEDE to the MEI, or greater than*
37 *0.1 mrem/yr potential to emit TEDE to the MEI, or greater than twenty-five percent of the TEDE to the*
38 *MEI, after controls. Describe the method for monitoring or calculating those radionuclide emissions.*
39 *Describe the method with sufficient detail to demonstrate compliance with the applicable requirements.*

40
41 The potential unabated offsite dose associated with this activity is calculated to be greater than
42 0.1 millirem per year from the 296-Z-3 Stack. Therefore, in accordance with 40 CFR 61, Subpart H,
43 continuous air monitoring for the 296-Z-3 Stack will occur.

44
45 The record sampler for the 291-Z-3 Stack originally was designed and installed to meet ANSI
46 N13.1-1969, and is operated continuously (refer to Figure 5). Particulate sample air filters are collected
47 biweekly and composited quarterly for subsequent laboratory analysis to support the required annual
48 reporting of emissions. The emissions during the proposed activities will be represented by these
49 samples. Adequacy of the sampling system is demonstrated by inspection, calibration, and maintenance

1 activities as scheduled in current 241-Z Building procedures. EPA and WDOH approval of an alternate
2 monitoring approach has been requested. It has been requested to continue to use the existing sampling
3 system operating in part-time super-isokinetic mode and to report releases based on the maximum design
4 fan flow rate (3,000 CFM), rather than increasing the periodic measurements during periods of flow
5 change. The existing sampling system is designed to sample a 2,500 CFM flow rate, operates in a
6 super-isokinetic mode due to stack flow of ~600 CFM associated with reduced facility operation while
7 one of the two fans operates. The alternate monitoring request involves reporting releases based on the
8 maximum design fan flow rate (3,000 CFM) for both fans operating, regardless of actual system flow.
9 This approach will result in very conservative estimates of annual emissions.

10
11 Portable exhausters, any potential diffuse/fugitive emissions associated with decontamination activities,
12 or periods when the system is shut down for fogging operation will be monitored using the 200 Areas
13 near-field ambient air monitors. Sample collection and analysis will follow that of the near-field
14 monitoring program. Analytical results will be reported in an annual air emissions report.

15
16 When a PTRAEU is used that provides potential emissions to the ambient air as a separate emission
17 point, PCM for emissions from these units will be performed by maintaining an operating log for each
18 unit identifying the operating time, effluent flow rate, and confirmatory measurement reference
19 information. The confirmatory measurement information will be from survey measurements taken within
20 the greenhouse and typically will include surface surveys and portable air monitoring sampling conducted
21 during operation of the PTRAEU. The information included will be the following:

- 22
23 • Location of operation
24 • Type of control equipment connected to the unit
25 • Flow rate of the unit
26 • Operator's name
27 • Date(s) and time of startup/shutdown of ventilation system
28 • PCM (radiological survey) reference.

29
30 The frequency and location of radiological surveys conducted for confirmatory measurements will
31 depend on the nature of activity being performed, as delineated in the site radiological control procedures.
32 As described in Section 10.0, compliance with the possession limits and release evaluation will be
33 confirmed by maintaining the airborne concentration below 1.5×10^{-10} $\mu\text{Ci/ml}$ alpha contamination
34 inside the greenhouse.

35
36 Emissions estimates (included in the project files) supporting the PCM will include the assumptions and
37 methodology used to determine the estimate. For example, assuming continuous operation of six
38 PTRAEUs with a combined flow rate of 3,000 CFM (8.5×10^7 ml/minute), this would allow a
39 concentration of up to 1.5×10^{-10} $\mu\text{Ci/ml}$ alpha contamination within any/all greenhouses
40 (6.6×10^{-3} Ci/year $\times 10^6$ $\mu\text{Ci/Ci}$ / 8.5×10^7 ml/min / 365 days/year / 24 hours/day / 60 min/hour). This
41 limit (1.5×10^{-10} $\mu\text{Ci/ml}$ alpha contamination) is specified for planning purposes only, and could be
42 increased if exhaust flow from the ventilated space were reduced due to reduction in the number or flow
43 rate associated with the individual PTRAEUs.

44 45 46 **10.0 ANNUAL POSSESSION QUANTITY**

47 *Indicate the annual possession quantity for each radionuclide.*

48
49 The annual possession quantity associated with transition of the 241-Z Building is estimated to be a total
50 of 3,500 grams of plutonium. The assumed isotopic distribution of the plutonium is given in Table 1.

1 This represents the approximate combination of throughput anticipated in any one calendar year; the
2 quantity accumulated in the tank heels; and any residual inventory in the remaining piping, cells, and
3 contaminated surfaces in the abovegrade structures, taking into account nondestructive analysis (NDA)
4 uncertainty.

5
6 It is anticipated that the majority of the inventory will be transferred via the 241-Z piping system to tank
7 farms and a fraction (150 grams) of the plutonium (refer to Table 1 isotopic distribution) associated with
8 material external to the tank system could be wrapped and physically removed from the belowgrade cells.
9 This material will be wrapped and packaged inside a greenhouse(s) set up at the entrance to the cells.
10 Normally the area is ventilated via 296-Z-3, but during periods of inactivity this material could be an
11 unsealed source stored inside the greenhouse located over a cell while being ventilated by the
12 PTRAEU(s). The material will be stabilized or wrapped in plastic before being removed from the cell
13 and isolating the greenhouse from the 241-Z stack. Any contamination, external to the wrapped objects
14 that might be subjected to decontamination within the greenhouse is included in the inventory.

15
16 Up to six separate emission units might be used as part of this activity. The release evaluation assumes all
17 the material is in any or all of the units; the 150 grams annual possession limit is to be considered
18 cumulative for all units involved in the activity. [Note: The PTRAEU source term (150 grams) is 4.3% of
19 the 296-Z-3 Stack (4.3% of 3,500 grams = 150 grams).] The release potential for the PTRAEU is
20 assumed to be 10% of 4.3% of the total release potential from the 296-Z-3 Stack (1.53 Ci/year, refer to
21 Table 1) or 6.6×10^{-3} Ci/year.

22
23 Additionally, of the aforementioned 3,500 grams, $1.3 \text{ E-}05$ grams (as Pu-239) are calculated to be
24 associated with isolated areas of surface contamination within the unventilated, unfiltered portions of the
25 241-Z Building, 241-ZA Sampling Building and the 241-ZG Building. Specifically:

- 26
27 • Potential contaminated areas that may be exposed during transition activities are estimated not to
28 exceed 100 square feet ($9.3 \text{ E+}04$ square centimeters), with a maximum contamination level (alpha,
29 assumed for calculations to be Pu-239) of 2,000 disintegrations per minute (dpm) per 100 square
30 centimeters
31 • $9.3 \text{ E+}04 \text{ cm}^2 \times 2,000 \text{ dpm per } 100 \text{ cm}^2 = 1.9 \text{ E+}06 \text{ dpm (Pu-239)}$
32 • For Pu-239, $1.4 \text{ E+}11 \text{ dpm} = \text{one gram}$ or $\text{one dpm} = 7.1 \text{ E-}12 \text{ gram}$
33 • $1.9 \text{ E+}06 \text{ dpm} \times 7.1 \text{ E-}12 \text{ gram/dpm} = 1.3 \text{ E-}05 \text{ gram Pu-239}$

34
35 Further: $0.062 \text{ curies Pu-239 per gram of Pu-239}$

36
37 Therefore: $1.3 \text{ E-}05 \text{ grams Pu-239} = 8.1 \text{ E-}07 \text{ curies of Pu-239.}$

38 39 40 **11.0 PHYSICAL FORM**

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

42
43 The physical form of the radionuclides in the 241-Z Building primarily is particulate solid suspended in
44 an aqueous solution. Packaged waste being removed from the belowgrade cells and potentially contained
45 within the PTRAEU is anticipated to be particulate. As discussed in Section 5.3, welding activities inside
46 the 241-Z cells could be performed on surfaces decontaminated to less than $20,000 \text{ dpm}/100 \text{ cm}^2$.

47 Contributions by any gaseous radionuclides to the 296-Z-3 Stack are inconsequential.
48
49

1 **12.0 RELEASE FORM**

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

4
5 The release form of the radionuclides is particulate solid (gaseous radionuclide contributions are
6 inconsequential).

7
8
9 **13.0 RELEASE RATES**

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

13
14 Unabated and abated release rates associated with 241-Z Building operations and transition activities are
15 provided in Tables 1 and 2.

16
17 The aforementioned 3,500 grams annual possession quantity (Section 10.0) is in non-readily dispersible
18 forms; i.e., fixed particulate and particulates suspended in aqueous solutions. The potential-to-emit of this
19 material is, primarily, a function of activities (e.g., physical removal, decontamination, and water
20 transfers) and, to a lesser degree, quantity and form of material. Therefore, the annual possession quantity
21 results in an extremely conservative estimate for potential releases to the environment. Unabated and
22 abated emission rates for the 296-Z-3 Stack are provided in Table 1.

23
24 Potential unabated total release estimated for a PTRAEU exhaustor is for a unit used in a similar manner
25 as described in the latest revisions of the PTRAEU NOC, DOE/RL-96-75. Most activity in the
26 greenhouse (e.g., wrapping materials, accessing cells) will occur while the ventilation is exhausted via the
27 296-Z-3 Stack. In calculating the potential to emit in Table 2, it was assumed that all but 150 grams of
28 material would be transferred to tank farms via existing piping. The wrapping of the material (i.e., the
29 150 grams) before removal from the pit reduces the potential for release by a factor of 90%. This results
30 in a potential release associated with managing and packaging the wrapped items to be $1/10^{\text{th}}$ (90%
31 reduction due to wrapping of the contaminated equipment) of 4.3% (150/3,500) of the total potential to
32 emit calculated for the 296-Z-3 Stack in Table 1, or 0.015 grams. Material that might be stabilized by
33 application of fixatives is considered bounded by the evaluation of being wrapped. Table 2 shows the
34 unabated and abated emission rates for potential releases associated with the PTRAEU. For any activities
35 that might occur in the greenhouses while exhausted via the PTRAEU, the quantity involved will be
36 inconsequential and the administrative control limit of 2×10^{-11} $\mu\text{Ci/ml}$ alpha contamination airborne
37 within the greenhouse will ensure these activities will be bounded by the assumed PTE.

38
39 Potential diffuse and fugitive emissions are estimated based on applying the 40 CFR 61, Appendix D,
40 release factor (1.0 E-03) for particulate to the calculated inventory subject to fugitive and diffuse
41 emissions (1.3 E-05 grams Pu-239, refer to Section 10.0). Table 2 shows the unabated and abated
42 emission rates for potential diffuse and fugitive releases.

43
44 The proposed modifications will be considered continuous operation in accordance with
45 WAC 246-247-110(13)(b).

46
47
48 **14.0 LOCATION OF MAXIMALLY EXPOSED INDIVIDUAL**

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

1
2 The maximum public receptor (MPR) was assumed to be an individual who works within the Hanford
3 Site boundary at a location with unrestricted public access, and who eats food grown regionally. The
4 MPR was assumed to be located at the Laser Interferometer Gravitational Wave Observatory (LIGO).

5
6
7 **15.0 TOTAL EFFECTIVE DOSE EQUIVALENT TO THE MAXIMALLY EXPOSED**
8 **INDIVIDUAL**

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

13
14 The CAP88PC computer code (Parks 1992) was used to model atmospheric releases using Hanford
15 Site-specific parameters¹. The MPR was assumed to be located at the LIGO. Using these calculated unit
16 dose conversion factors, the estimated potential TEDE to the MEI resulting from the unabated emissions
17 from transition activities at the 241-Z Building is 8.6 millirem per year (refer to Tables 1 and 2). The
18 estimated potential TEDE to the MEI resulting from the abated emissions from transition activities at the
19 241-Z Building is 4.3×10^{-3} millirem per year (refer to Table 1 and 2).

20
21 The TEDE from all 2001 Hanford Site air emissions (point sources, diffuse, and fugitive sources) was
22 0.049 millirem (DOE/RL-2002-20). The emissions resulting from the deactivation of the 241-Z Building,
23 in conjunction with other operations on the Hanford Site, will not result in a violation of the National
24 Emission Standard of 10 millirem per year (40 CFR 61, Subpart H).

25
26
27 **16.0 COST FACTORS OF CONTROL TECHNOLOGY COMPONENTS**

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

30
31 Cost factor inclusion is not applicable because the existing emission controls used during the transition
32 activities will be defined administratively and will consist of ALARA techniques.

33
34 The Washington State Department of Health (WDOH) has provided guidance that HEPA filters generally
35 are BARCT for particulate emissions (AIR 92-107). Because the radionuclides of concern are
36 particulates, it is proposed that the controls described in Section 6.0 for the 241-Z Building stack
37 (296-Z-3) be accepted as BARCT. Compliance with the substantive BARCT standards is described in
38 Section 18.0.

39
40
41 **17.0 DURATION OR LIFETIME**

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

44

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.

1 Transition activities currently are scheduled to take place between May 2003 and December 2006, but
2 could extend to 2010.

3 4 **18.0 STANDARDS**

5 *Indicate which of the following control technology standards have been considered and will be complied*
6 *with in the design and operation of the emission unit described in this application:*

7
8 *ASME/ANSI AG-1, ASME/ANSI N509, ASME/ANSI N510, ANSI/ASME NQA-1, 40 CFR 60, Appendix A*
9 *Methods 1, 1A, 2, 2A, 2C, 2D, 4, 5, and 17, and ANSI N13.1*

10
11 *For each standard not so indicated, give reasons to support adequacy of the design and operation of the*
12 *emission unit as proposed.*

13
14 The 296-Z-3 Stack HEPA filtration system was built in 1979, before the requirement for control
15 technology standards was specified in WAC 246-247 (April 1994). Although the listed technology
16 standards, if available at time of construction, might have been followed as guidance, there was no
17 regulatory requirement for compliance with the listed standards. Adequacy of the design is supported by
18 operational history, maintenance, inspections, and testing, which demonstrate that the intent of the
19 substantive standard is met, as described in the following. In lieu of strict compliance with the current
20 listed standards, or a list of the standards to which the ventilation system actually was designed and built,
21 the 241-Z Building relies on a performance-based approach. Operational history, routine maintenance,
22 testing, and inspections demonstrate adequacy of the design and operation of the existing abatement
23 control technology as proposed.

24 25 26 **18.1 STANDARDS APPLICABLE TO THE 296-Z-3 STACK**

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

28 29 30 **18.1.1 Compliance With Best Available Radiological Control Technology Standards For The** 31 **296-Z-3 System**

32 Standards pertaining to the 296-Z-3 Stack were identified previously in a NOC for repairs at the
33 241-Z Building (DOE/RL-98-97, Rev. 0), and are discussed as follows

- 34
35 • ASME/ANSI AG-1 (first promulgated in 1985, and revised in 1991, 1994, and 1997):

36
37 The 296-Z-3 Stack HEPA filtration system was built in 1979, before ASME/ANSI AG-1 was issued. The
38 HEPA filters and existing stock of replacement HEPA filters meet MIL-F-51068 and MIL-F-51079.

- 39
40 • ASME/ANSI N509 (first promulgated in 1976, and revised in 1980 and 1989):

41
42 The HEPA filters comply with ANSI N509, Section 5.1. However, documentation to show full
43 compliance with the remaining sections of ANSI N509 cannot be provided. Instead, the following
44 information is provided to support adequacy of the existing design.

45
46 Construction specifications (B-137-C1, *Construction Specification for 241-Z Sump Improvements, Work*
47 *Order No. X13701*) did not reference ANSI N509; however, the specifications did require conformance to
48 Hanford Plant Standards (HPS-151-M), *Standard Specification for High Efficiency Particulate Air*
49 *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
8 (HNF-SD-CP-SAR-021) for potential accident such as seismic event, fire and loss of filtration. No
9 credible unmitigated accident event with a potential of significant release with a probability of greater
10 than one percent was identified.

11 12 13 **18.2 STANDARDS APPLICABLE TO PTRAEU**

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

16 17 18 **18.2.1 Control Technology Standards For PTRAEUs**

19 20 **American Standard Mechanical Engineer/American National Standard Institute AG-1, FC-1100**

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

35 36 **ASME/ANSI N509**

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

40 41 **ASME/ANSI N510**

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

1 3-VB-492, Rev. B-0, Change 0, "In-Place Testing of HEPA Filter Systems (Downstream Base Percent)",
2 3-VB-493, Rev. B-0, and "In-Place Testing of HEPA Filter Systems (Vacuum Cleaner)", 7-GN-062,
3 Rev. 3, Change 0. These test procedures provide a safe, uniform method for determining leaks in the air
4 filter systems containing HEPA filter units. The DOE approved challenge aerosol that is used for these
5 testing procedures is used in accordance with ANSI N510. The test in these procedures determines
6 aerosol penetration as a result of leakage through or around the filter unit due to faulty installation, defects
7 in the filter unit mounting frame and housing, or defects and/or damage to the individual filter units.
8 Although these procedures are not strictly N510 tests, the procedures are proposed as adequate to
9 demonstrate the HEPA filtration system is operating properly and meets the intent of N510. Hence, it is
10 proposed that adherence to these procedures adequately demonstrates that the HEPA filtration systems are
11 operating properly and is compatible with the required standard.

12 13 **ANSI/ASME NQA-1**

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

18 19 **ANSI N13.1**

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

23 24 **40 CFR 60, Appendix A** 25 **Test Methods 1, 1 A, 2, 2A, 2C, 2D and 4**

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

30 31 32 **18.2.2 Discussion of Best Available Radionuclide Control Technology for PTRAEUs**

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

37 38 39 **19.0 REFERENCES**

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

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

- 1 ANSI N13.1-1999, *Sampling and Monitoring Releases of Airborne Radioactive substances from the*
2 *Stacks and Ducts of Nuclear Facilities*, American National Standards Institute, New York,
3 New York.
4
- 5 ANSI/ASME NQA-1, *Quality Assurance Requirements for Nuclear Facility Applications*, 1994,
6 American National Standards Institute and American Society of Mechanical Engineers,
7 New York, New York.
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- 9 ANSI/ASME NQA-2, *Quality Assurance Requirements for Nuclear Power Plants*, 1989, American
10 National Standards Institute and American Society of Mechanical Engineers, New York,
11 New York.
12
- 13 ASME/ANSI AG-1, *Code on Nuclear Air and Gas Treatment*, 1991, American Society of Mechanical
14 Engineers and American National Standards Institute, New York, New York.
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- 16 ASME/ANSI-N509, *Nuclear Power Plant Air-Cleaning Units and Components*, 1989, American Society
17 of Mechanical Engineers and American National Standards Institute, New York, New York.
18
- 19 ASME/ANSI N510, *Testing of Nuclear Air Treatment Systems*, 1989, American Society of Mechanical
20 Engineers and American National Standards Institute, New York, New York.
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- 22 DOE/RL-96-75, Rev. 2, *Radioactive Air Emissions Notice of Construction Portable/Temporary*
23 *Radioactive Air Emissions Units*, September 1999, U.S. Department of Energy, Richland
24 Washington.
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- 26 DOE/RL-97-50, Rev.1, *Radioactive Air Emissions Notice of Construction for HEPA Filtered Vacuum*
27 *Radioactive Air Emission Units*, September 1999, U.S. Department of Energy, Richland
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- 30 DOE/RL-98-97, Rev. 0, *Radioactive Air Emissions Notice of Construction for Agitator/Sample Probe*
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32 Operations Office, Richland, Washington.
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35 June 2001, U.S. Department of Energy, Richland, Washington.
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- 37 Ecology, EPA, and DOE-RL, 1996, *Hanford Federal Facility Agreement and Consent Order*,
38 Washington State Department of Ecology, U.S. Environmental Protection Agency,
39 U.S. Department of Energy, Richland Operations Office, Olympia, Washington, amended
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41
- 42 HNF-0528, *NESHAP Quality Assurance Project Plan for Radioactive Airborne Emissions*, Fluor
43 Hanford, Richland, Washington, updated periodically.
44
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46 *Potential-to-Emit Assessment*, Fluor Hanford, Richland, Washington.
47
- 48 HNF-3602, Rev. 1, *Calculating Potential to Emit Releases and Doses for FEMPs and NOCs*,
49 January 2002, Fluor Hanford, Richland, Washington.
50
- 51 HNF-SD-CP-SAR-021 Rev. 4, *Plutonium Finishing Plant Final Safety Analysis Report*, November 2002,
52 Fluor Hanford, Richland, Washington

1
2 Parks, B. S., *User's Guide for CAP88-PC Version 1.0*, 402-B-92-001, 1992, U.S. Environmental
3 Protection Agency, Washington, D.C.
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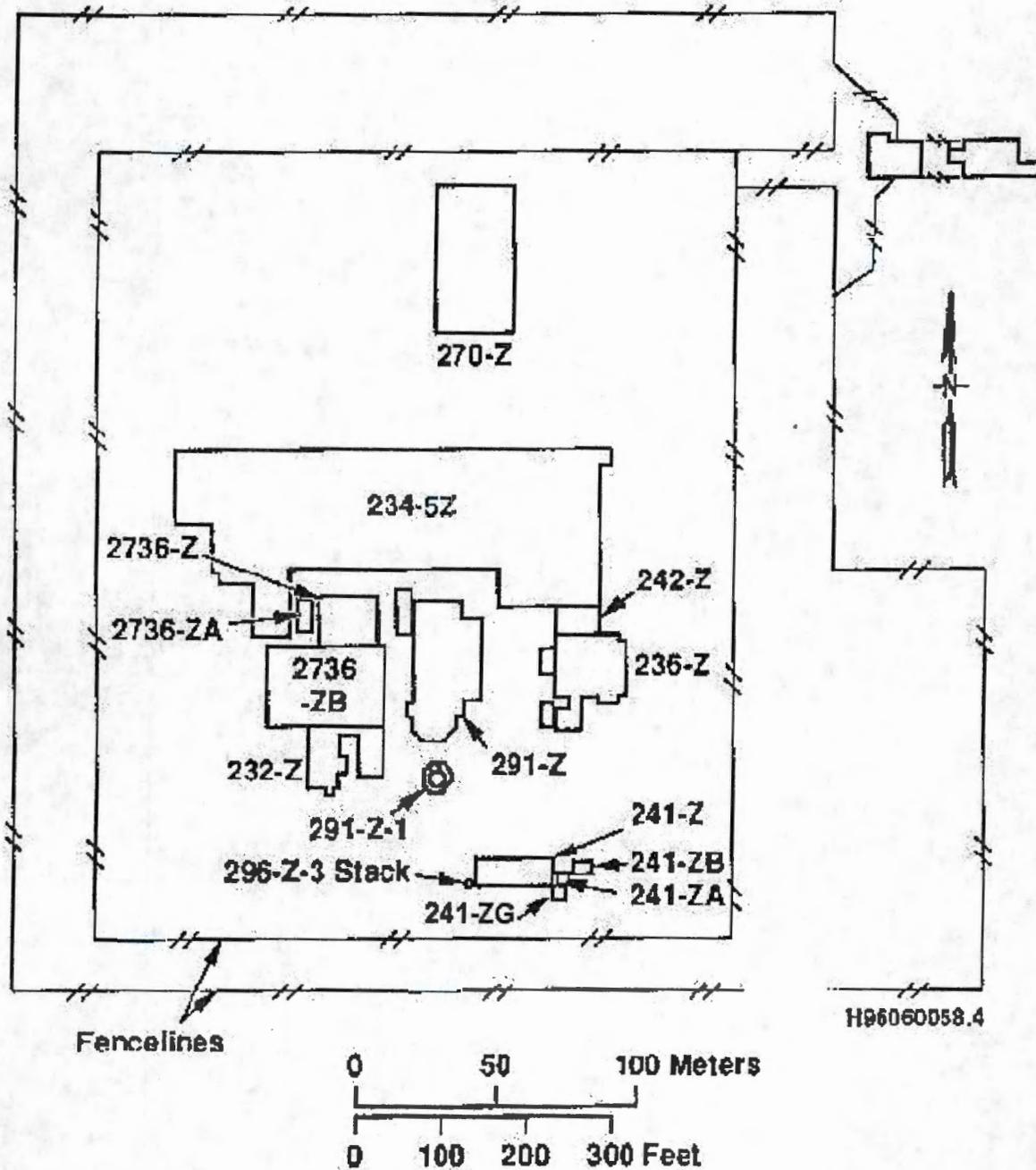


Figure 1. Relative Location of the 241-Z Building within PFP Complex.

241-Z Building Cutaway View

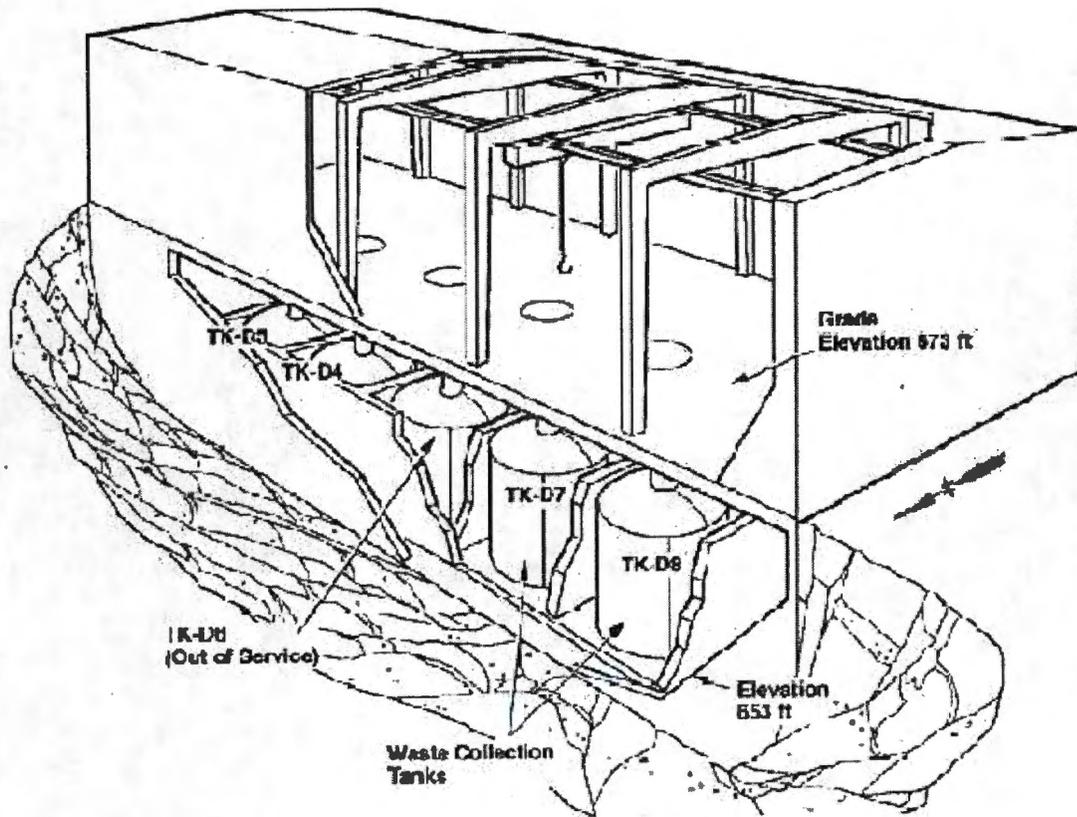
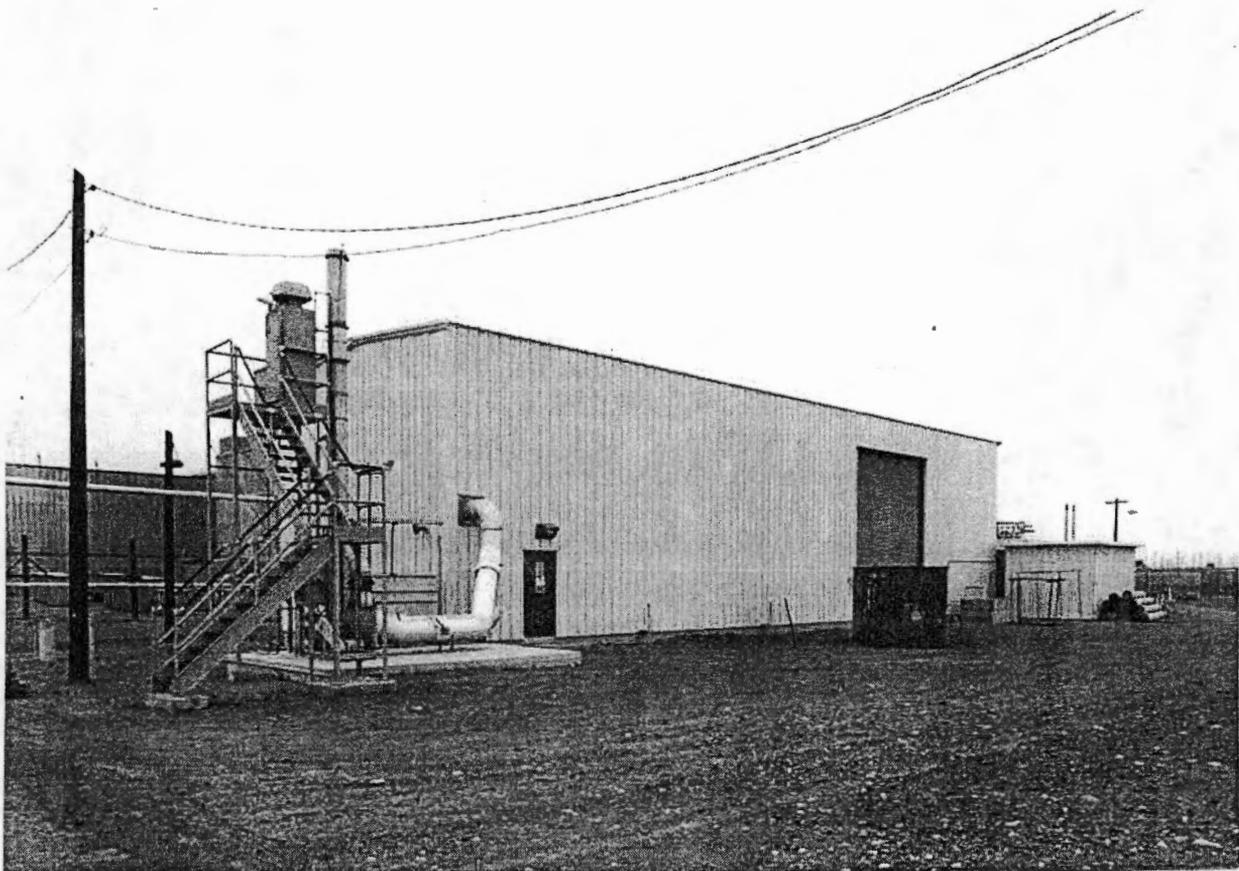


Figure 2. Cutaway of the 241-Z Building.



46°32'58"
119°38'20"

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.

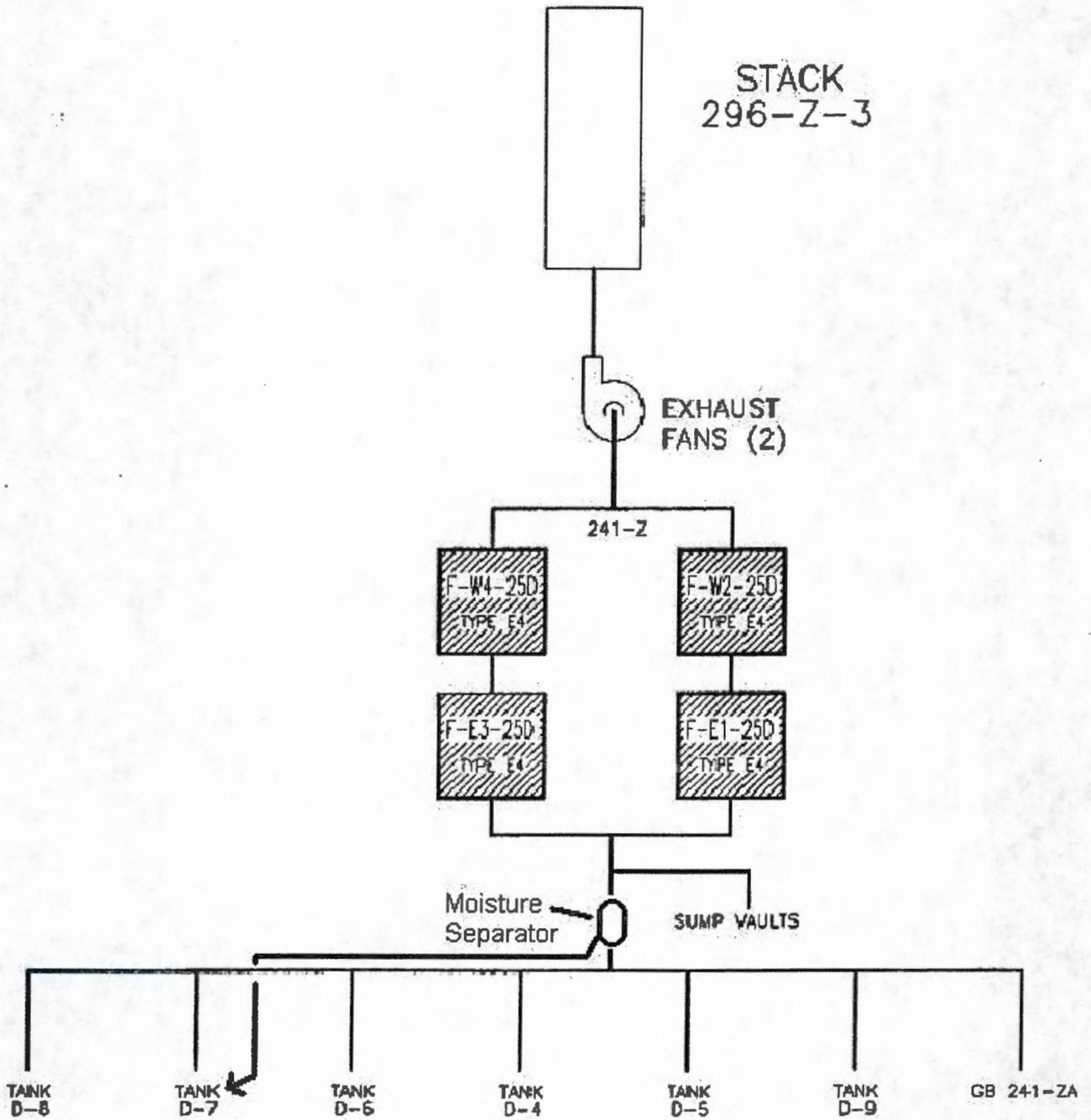
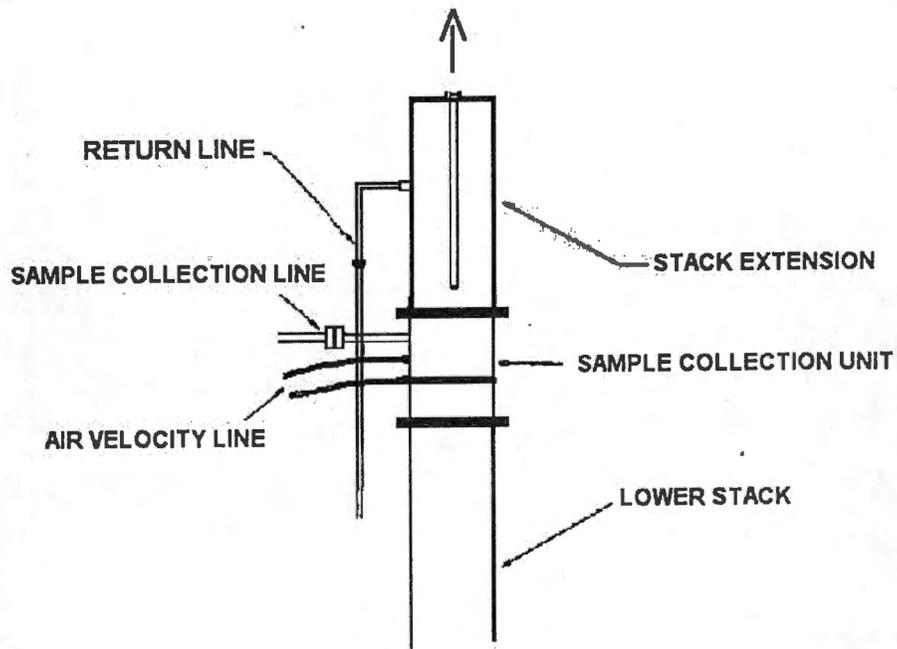


Figure 4. 241-Z Building Ventilation System.



SAMPLE COLLECTION UNIT

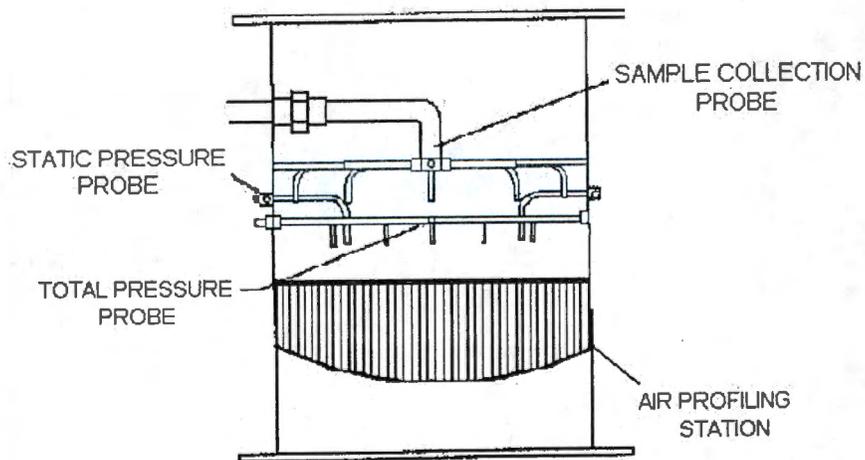
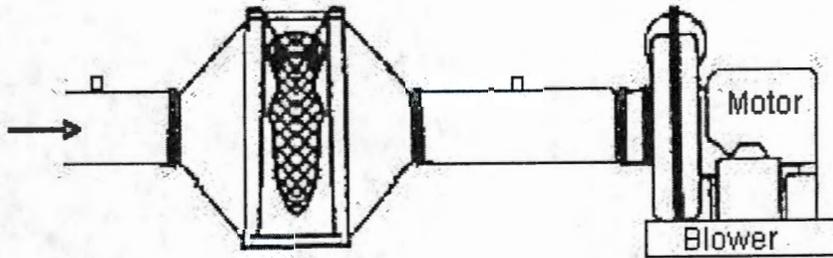
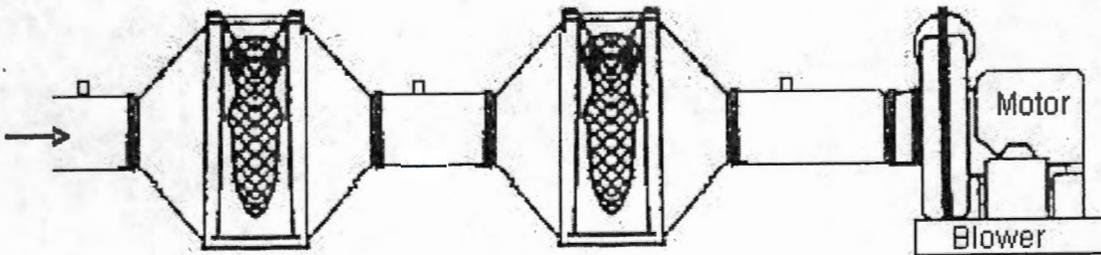


Figure 5. 296-Z-3 Stack Sampler

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	Isotopic Grams (% of 3500 Pu grams) ^a	Activity/gm Ci/gm	Assumed 10^{-3} Release potential (Ci/yr)	Offsite unit dose ^b factor <40m (mrem/yr/curie)	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	.04 (0.01%)	1.0×10^1	3.5×10^{-3}	5.9×10^0	1.0×10^1	3.5×10^{-2}	1.8×10^{-5}
Pu-239	3281.3 (93.75%)	6.2×10^{-2}	2.0×10^{-1}	6.4×10^0	1.1×10^1	2.2×10^0	1.1×10^{-5}
Pu-240	208.3 (5.95%)	2.3×10^{-1}	4.8×10^{-2}	6.4×10^0	1.1×10^1	5.3×10^{-1}	2.6×10^{-4}
Pu-241	9.5 (0.27%)	1.0×10^2	9.5×10^{-1}	1.0×10^{-1}	1.6×10^{-1}	1.5×10^{-1}	7.6×10^{-5}
Pu-242	0.7 (0.02%)	3.9×10^{-2}	2.7×10^{-5}	6.1×10^0	1.1×10^1	2.8×10^{-4}	1.5×10^{-7}
Am-241	98 (2.80%)	3.4×10^0	3.3×10^{-1}	9.8×10^0	1.7×10^1	5.7×10^0	2.8×10^{-3}
Total			1.53×10^0			8.6×10^0	4.3×10^{-3}

^a An annual possession quantity of 3,500 grams of weapons grade Pu with an assumed isotopic distribution shown. Americium-241 estimated as being 2.8% of 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 $\times 5 \times 10^{-4}$ (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 Transition Potential to Emit Summary.

Source	Unabated Onsite Public Dose (millirem/year)	Abated Onsite Public Dose (millirem/year) ^e
296-Z-3 Stack ^a	8.6×10^0	4.3×10^{-3}
PTRAEU ^b	3.7×10^{-2}	1.9×10^{-5}
Diffuse/Fugitive ^c	8.9×10^{-9}	8.9×10^{-9}
Total	8.6×10^0	4.3×10^{-3}

^a Refer to Table 1.

^b Refer to Section 10.0 : The PTRAEU source term (150 grams) is 4.3% of the 296-Z-3 Stack (4.3% of 3,500 grams = 150 grams). The dose represents 4.3% of the potential dose from the 296-Z-3 Stack reduced by a factor of 90% due to the wrapping of the material before being potentially ventilated by a PTRAEU exhauster.

^c Refer to Section 10.0: $(8.1 \times 10^{-7} \text{ curies Pu-239}) \times 10^{-3}$ (release fraction) $\times 11$ millirem per curie^d = 8.9×10^{-9} millirem per year unabated dose.

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

^e Abated dose = unabated dose $\times 5 \times 10^{-4}$ (representing one stage of tested HEPA filters with an efficiency of 99.95 percent.)

Enclosure 2

**BASIS OF REQUEST FOR APPROVAL OF
AN ALTERNATE STACK FLOW AND SAMPLING EXTRACTION PROCEDURE FOR
296-Z-3 STACK**

BASIS OF REQUEST FOR APPROVAL OF
AN ALTERNATE STACK FLOW AND SAMPLING EXTRACTION PROCEDURE FOR
296-Z-3 STACK

Compliance with the 40 CFR 61.93, Emission monitoring and test procedures and WAC 246-247-075

The sample extraction system, designed for a 4 CFM sample flow rate and a 2,500 CFM stack flow rate, operates in a super-isokinetic mode during periods of lower stack flow (~600 CFM) associated with routine facility operation when one of the two fans operates. With both fans operating and access to below grade cells open, exhaust flow rates of the two fans are expected to be near the 2,500 CFM design flow rate. The actual flow rate will be dependent not only on the number of fans operating, but also on the number and location of the cells being accessed. The following describes the intended procedure for compliance with 40 CFR 61.93(b) sections.

- Effluent flow rate measurements (40CFR61.93(b)(1)) - Currently, the effluent flow from the stack is relatively constant and requirements for effluent flow rate measurement are met by periodic measurement. During proposed cleanout activities, the variability of the effluent flow rates from the 296-Z-3 stack would require a significant effort to meet the requirements. Flow rates will vary, depending on configuration and activities, from approximately 600 CFM up to 3000 CFM.
- Radionuclides shall be directly monitored or extracted, collected and measured (40CFR61.93(b)(2)) – The current effluent stream sample extraction equipment was installed to meet the intent of ANSI N13.1-1969. Since the effluent stack flow rate can be as low as 600 CFM, the sampler operating at a fixed sample flow rate is not operating in the isokinetic range. While this introduces some question regarding whether the sampling is representative, an evaluation of the particle-size distribution for this stack, performed in 1977, demonstrates sampling would not be degraded. The results of the analysis indicated that greater than half of the particulates were less than 4 micro-meter (μm) in aerodynamic equivalent diameter, and, as such, the impact of the super-isokinetic sampling will be minimal during periods of reduced stack flow. Proposed cleanout activities could produce different particle-size distributions since cleanout activities are significantly different than the historical collect, pump and treat operations in 241-Z that are currently being performed. However, based on operating experience at other stacks associated with the Plutonium Finishing Plant, a significant fraction of the emitted particulates will remain in the less than 4 micron range. Historical flow measurements indicate that during periods of dual fan operation the expected flow (approximately 2,300 CFM) will result in a near isokinetic sampling condition.
- Request prior approval for alternative effluent flow rate and sample extraction procedures (40CFR61.93(b)(3)) – It is impractical to fully meet the requirements of paragraph (b)(1) during periods of variable effluent exhaust flow, and obtaining a representative sample per (b)(2) during periods of low exhaust flow is questionable due to super-isokinetic sampling. By way of this letter, prior approval is being requested (40CFR61.93(b)(3)(iv)) to utilize the following procedure (40CFR61.93(b)(3)(iii)):

- Manual reduction in sample flow rate during periods of low flow would require the total sample flow of less than 1 cfm being split between the record sampler and the on line continuous air monitor (CAM). At this reduced flow rate the detection limit of the record sample and the responsiveness of the on line CAM would be significantly affected.
- Radionuclide emission measurements must be made at release points (40CFR61.93(b)(4) – The current effluent sampler is positioned at the only release point associated with emissions from the 241-Z Building. The effluent sample analysis addresses all radionuclides that could contribute greater than 10 percent of the potential effective dose equivalent or greater than 0.1 mrem/yr, or greater than 25 percent of the actual expected effective dose equivalent.

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 1, 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 8.6 millirem per year and 4.3 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: