DOE/ID-10890 (10)

U.S. Department of Energy
Idaho Operations Office

National Emission Standards for Hazardous Air Pollutants—Calendar Year 2009 INL Report for Radionuclides

June 2010

Idaho National Laboratory

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Prepared for the
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ABSTRACT

This report documents the calendar year 2009 radionuclide air emissions and resulting effective dose equivalent to the maximally exposed individual member of the public from operations at the Department of Energy's Idaho National Laboratory Site. This report was prepared in accordance with the *Code of Federal Regulations*, Title 40, "Protection of the Environment," Part 61, "National Emission Standards for Hazardous Air Pollutants," Subpart H, "National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities." The effective dose equivalent to the maximally exposed individual member of the public was 6.87E-02 mrem per year, 0.69% of the 10 mrem standard.

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ACRONYMS

AMWTF	Advanced Mixed Waste Treatment Facility
AMWTP	Advanced Mixed Waste Treatment Project
ARP	Accelerated Retrieval Project
ATR	Advanced Test Reactor
ATR Complex	Advanced Test Reactor Complex
BEA	Battelle Energy Alliance, LLC
CAP	Clean Air Act Assessment Package
CEM	Continuous Emission Monitoring
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CFR	Code of Federal Regulations
Ci	curies
CITRC	Critical Infrastructure Test Range Complex
CPP	Chemical Processing Plant
CWI	CH2M-WG Idaho, LLC
CY	calendar year
D&D	decontamination and decommissioning
DOE	Department of Energy
DOE-ID	Department of Energy Idaho Operations Office
EBR-II	Experimental Breeder Reactor-II
EDE	effective dose equivalent
EML	Electron Microscopy Laboratory
EPA	Environmental Protection Agency
FAST	Fluorinel and Storage Facility
FCF	Fuel Conditioning Facility
HEPA	high-efficiency particulate air
HFEF	Hot Fuel Examination Facility
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
IRC	INL Research Center
LLMW	low-level mixed waste
L&O	Laboratory and Office Building
MEI	maximally exposed individual
MFC	Materials and Fuels Complex
mrem	millirem
MTR	Material Test Reactor
MWSF	Mixed Waste Storage Facility
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOAA	National Oceanic and Atmospheric Administration

NRF	Naval Reactors Facility
OCVZ	organic contamination in the vadose zone
OU	operable unit
PBF	Power Burst Facility
QC	quality control
RESL	Radiological and Environmental Sciences Laboratory
RCRA	Resource Conservation and Recovery Act
RH	remote handled
RH-TRU	remote handled transuranic
RWMC	Radioactive Waste Management Complex
SDA	Subsurface Disposal Area
SFE	Storage Facility Exterior
SMC	Specific Manufacturing Capability
TAN	Test Area North
TRA	Test Reactor Area
TRU	transuranic
TSF	Technical Support Facility
VCO	Voluntary Consent Order
VES	vessel
WAG	waste area group
WEDF	Waste Engineering Development Facility
WERF	Waste Experimental Reduction Facility
WIPP	Waste Isolation Pilot Plant
WMF	Waste Management Facility

National Emission Standards for Hazardous Air Pollutants—Calendar Year 2009 INL Report for Radionuclides

1. INTRODUCTION

This report documents radionuclide air emissions for calendar year (CY) 2009 and the resulting effective dose equivalent (EDE) to the maximally exposed individual (MEI) member of the public from operations at the U.S. Department of Energy's (DOE's) Idaho National Laboratory (INL) Site.

The title of each section in this report corresponds to reporting requirements found in 40 *Code of Federal Regulations* (CFR) Part 61.94. A description of the applicable reporting requirements is cited under the titles in italicized text followed by the compliance report for INL Site facilities.

Appendix A contains information specific to the INL Research Center (IRC) located in Idaho Falls, Idaho. Radionuclide emissions from the IRC are not included in the INL Site EDE calculation. Compliance to the 10-mrem-dose standard is demonstrated by limiting the quantities of radioactive material at the IRC, in accordance with possession limits defined in 40 CFR 61, Appendix E.

Appendix B of this report contains information specific to the Naval Reactors Facility (NRF) located within the INL Site boundary. The EDE for NRF radionuclide emissions is included in the INL Site EDE to demonstrate overall compliance to the 10-mrem-dose standard set by 40 CFR 61, Subpart H, "National Emission Standards for Emissions of Radionuclides other than Radon from Department of Energy Facilities."

For CY 2009, modeling was performed using Clean Air Act Assessment Package (CAP)-88PC, Version 3.

2. 40 CFR PART 61.94(a) FOREWORD

"Compliance with this standard shall be determined by calculating the highest effective dose equivalent to any member of the public at any offsite point where there is a residence, school, business or office. The owners or operators of each facility shall submit an annual report to both Environmental Protection Agency (EPA) headquarters and the appropriate regional office by June 30, which includes the results of the monitoring as recorded in DOE's Effluent Information System and the dose calculations required by §61.93(a) for the previous calendar year."

This report documents INL Site radionuclide air emissions and the resulting EDE to the MEI for CY 2009. It was prepared in accordance with the 40 CFR 61, Subpart H. As required, this report is submitted to both the Environmental Protection Agency (EPA) Headquarters and the appropriate regional office (EPA Region 10) no later than June 30, 2010.

Table 1 reports the annual radionuclide emissions for INL Site sources that were continuously monitored for compliance during CY 2009. Table 2 lists the sources used to calculate the EDE to the MEI.

Table 1. Radionuclide emissions, in curies (Ci), from INL Site sources during CY 2009.

Radionuclide	MFC-785-018	MFC-764-001	CPP-708-001	CPP-659-033	ARP 1 [a]	ARP 2 [a]	ARP 3[a]	WMF-676-002 [b]	WMF-676-003 [b]
Am-241	—	—	—	—	6.84E-04	6.12E-04	7.16E-05	—	—
Ar-41	—	—	—	—	—	—	—	—	—
Co-60	—	—	—	—	—	—	—	—	—
Cs-137	—	—	2.34E-05	—	—	—	—	—	—
H-3	4.25E-01	7.30E-01	3.48E-03	—	—	—	—	—	—
I-129	—	—	1.31E-04	—	—	—	—	—	—
Kr-85	3.36E+00	5.68E+01	—	—	—	—	—	—	—
Pu-238	—	—	2.07E-07	—	—	—	—	—	—
Pu-239	1.94E-07	2.05E-07	3.52E-08	—	4.43E-03	4.41E-03	2.63E-05	—	—
Pu-240	—	—	—	—	9.86E-04	9.86E-04	—	—	—
Sb-125	—	—	—	—	—	—	—	—	—
Sr-90	9.70E-07	4.51E-07	1.07E-05	—	—	—	—	—	—

a. The Accelerated Retrieval Project (ARP) monitoring was performed in accordance with 40 CFR Part 61.93 "Emissions Monitoring and Test Procedures" as an applicable or relevant and appropriate requirement under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

b. No measurable emissions in 2009.

Table 2. Sources used to calculate the EDE to the MEI.

Facility	Source
Advanced Mixed Waste Treatment Project (AMWTP):	Waste Management Facility (WMF)-615-001, Drum Vent Facility
	WMF-628-002, Drum Treatment Facility
	WMF-634-001, Characterization Facility
	WMF-636-001, Transuranic Storage Area-Retrieval Enclosure
	WMF-676-002, Advanced Mixed Waste Treatment Facility (AMWTF) Zone 3 Stack
	WMF-676-003, AMWTF Glovebox Stack
ATR Complex:	Test Reactor Area (TRA)-603, -604, -635, -661, -668 MTR Decontamination & Decommissioning (D&D)
	TRA-613A Pump Vault Removal
	TRA-670-074, Advanced Test Reactor (ATR) Chemistry Laboratory fumehood exhaust
	TRA-670-086, laboratory
	TRA-670-098, laboratory
	TRA-670, ATR canal
	TRA-678-001, Radiation Measurements Laboratory fumehoods vent
	TRA-710-001, Material Test Reactor (MTR) stack
	TRA-715-001, Warm Waste Evaporation Pond
	TRA-770-001, ATR main stack
	D&D TRA-630
Central Facilities Area (CFA):	CFA-690-001, -002, -003, -005, -006, -007, -008, -009, -045, -046, -047, -Vent-195, Radiological and Environmental Sciences Laboratory (RESL)
	CFA-625
	Tritium emissions from pumped aquifer water
Critical Infrastructure Test Range Complex (CITRC):	PER-609, 761 and 756 D&D
Idaho Nuclear Technology and Engineering Center (INTEC):	CPP-602-012, laboratory
	CPP-602-014, laboratory
	CPP-603-001, Irradiated Fuels Storage Facility
	CPP-630-012, laboratory hoods and other exhausts
	CPP-640, D&D
	CPP-653-001, Mixed Low-Level Waste Project
	CPP-663-002, Maintenance Building Hot Shop vent
	CPP-684-001, Remote Analytical Laboratory
	CPP-708-001, Main Stack
	CPP-749-001, Spent Fuel Storage Vaults
	CPP-767-001, FAST Stack
	CPP-1608-001, Manipulator Repair Cell
	CPP-1634-001, Drum Venting Facility
	CPP-1774, TMI-2 Independent Spent Storage Installation

Facility	Source
	CPP-1778, Sewage Treatment Plant
	CPP-1791, INTEC percolation ponds
	CPP-2707, dry cask storage pad
	CPP – undisturbed soil (windblown CPP-88)
	INL Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Disposal Facility Landfill (ICDF) emissions from solid waste disposal
	ICDF pond emissions
	CPP-disturbed soils
	CPP-undisturbed soils
	OU 3-13 Soils
Materials and Fuels Complex (MFC):	MFC-704-008, Fuel Manufacturing Facility stack
	MFC-720-007, Transient Reactor Test Facility reactor cooling air exhaust
	MFC-752-004, Laboratory and Office Building (L&O) main stack
	MFC-752-005, L&O nondestructive assay stack
	MFC-764-001, Main Stack (Experimental Breeder Reactor [EBR]-II/Fuel Conditioning Facility (FCF) exhaust)
	MFC-768-105, decontamination shower suspect waste tank vent
	MFC-768-108, Health Physics Area fumehood
	MFC-771, Radioactive Scrap Waste Facility
	MFC-774-026, Electron Microscopy Laboratory (EML) exhaust
	MFC-774-027, EML exhaust
	MFC-774-028, EML exhaust
	MFC-774-029, EML exhaust
	MFC-777-002, Zero Power Physics Reactor
	MFC-785-018, Hot Fuel Examination Facility stack
	MFC-787-001, Fuel Assembly and Storage Building
	MFC-792A-001, Space, Security and Power Facility
	MFC-793-001, Sodium Components Maintenance Shop stack
	MFC-793A-025, 027, 029, 031, 033, 035; Alcohol Storage Tank vents
	MFC-794-006, Contaminated Equipment Storage Building exhaust
	MFC-798-017, Radioactive Liquid Waste Treatment Facility
Naval Reactors Facility	See Appendix B

Facility	Source
Radioactive Waste Management Complex (RWMC):	ICP Analytical Services
	WMF-601-001, Health Physics Lab Hood
	WMF-671-001, Glovebox Excavator Method
	WMF-697-001, Accelerated Retrieval Project (ARP)-1
	WMF-714, Intermediate-level Transuranic Storage Facility #1
	WMF-720, Intermediate-level Transuranic Storage Facility #2
	WMF-1612-001, ARP-2
	WMF-1614-001, ARP-3
	H-3 from groundwater
	Subsurface Disposal Area (SDA) Organic Contamination in the Vadose Zone (OCVZ)-Unit D (WAG 7)
	OCVZ-Unit E (WAG 7)
	OCVZ-Unit F (WAG 7)
	SDA Buried Beryllium Blocks
Test Area North (TAN) Specific Manufacturing Capability (SMC):	629-013, manufacturing process, Line 2A
	679-022, -023, -024 manufacturing process, north process
	679-025, -026, -027 manufacturing process, south process
	681-018, Process Reclamation Facility
	681-020, Process Reclamation Facility
Test Area North (TAN) Technical Support Facility (TSF):	OU 1-07B, New Pump and Treat Facility
	TSF-07 CERCLA Soils

40 CFR 61, Subpart H requires DOE facilities to calculate the resulting dose to the offsite MEI. As in previous years, Frenchman's Cabin was the location of the INL Site MEI for CY 2009 (see Figure 1). Historically, the calculated EDE for the INL has been less than 0.1 millirem (mrem) per year. The EDE to the MEI was 6.87E-02 mrem/yr (6.87E–07 sievert), which is 0.69% of the 10-mrem/yr federal standard and was calculated using all sources that emitted radionuclides to the environment from the INL. Table 3 provides a summary of the INL Site MEI dose by facility and source type.

Table 3. INL facility dose (mrem) contributions and total INL Site dose (mrem) to the MEI located at Frenchman's Cabin for CY 2009 radionuclide air emissions.

Facility ID	Point source dose (mrem/yr)	Fugitive source dose (mrem/yr)	Total dose (mrem/yr)	Notes
CFA	7.94E-08	1.86E-05	1.87E-05	Central Facilities Area
CITRC		1.13E-09	1.13E-09	Critical Infrastructure Test Range Complex
INTEC	1.68E-02	4.82E-03	2.16E-02	INTEC
INTEC-MS	4.31E-05		4.31E-05	INTEC Main Stack
INTEC Total	1.68E-02	4.82E-03	2.17E-02	Total from INTEC sources
MFC	3.03E-04		3.03E-04	Material Fuels Complex
MFC-MS	1.15E-06		1.15E-06	Material Fuels Complex, Main Stack
MFC Total	3.04E-04		3.04E-04	Total from MFC sources
NRF	1.01E-04	2.75E-06	1.04E-04	Naval Reactor Facility
ATR Complex	3.27E-04	6.52E-04	9.79E-04	Advanced Test Reactor Complex
ATR Complex-ATR	6.81E-03	1.15E-03	7.96E-03	Advanced Test Reactor at ATR Complex
ATR Complex-MTR	1.45E-04		1.45E-04	Materials Test Reactor at ATR Complex
ATR Complex Total	7.28E-03	1.80E-03	9.09E-03	Total from ATR Complex sources
RWMC-AMWTP	1.39E-05		1.39E-05	Advanced Mixed Waste Treatment Project (includes WMF-676, WMF-636, WMF-634, WMF-628, Drum Treatment Facility WMF-615)
RWMC	2.98E-02	7.68E-03	3.75E-02	Others sources at Radioactive Waste Management Complex
RWMC Total	2.98E-02	7.68E-03	3.75E-02	Total from RWMC sources
TAN SMC	2.80E-11		2.80E-11	Test Area North –Specific Manufacturing Capability
TAN-TSF		1.36E-06	1.36E-06	Test Area North – Technical Services Facility
TOTAL	5.44E-02	1.43E-02	6.87E-02	

3. 40 CFR PART 61.94(b) (1)

"Name and location of the facility."

Site Name: Idaho National Laboratory Site.

Site Location: The INL Site encompasses approximately 890 mi^2 on the upper Snake River Plain in southeastern Idaho (see Figure 1). The nearest INL boundaries to population centers are approximately 22 mi (35.3 km) west of Idaho Falls, 23 mi (37 km) northwest of Blackfoot, 44 mi (70.8 km) northwest of Pocatello, 7 mi (11.3 km) east of Arco, 1 mi (1.6 km) north of Atomic City, 3 mi (5 km) west of Mud Lake, and 4 mi (6 km) east of Howe.

Figure 1. INL Site, including major facility areas and off-Site MEI located at Frenchman's Cabin.

4. 40 CFR PART 61.94(b) (2)

"A list of the radioactive materials used at the facility."

The individual radionuclides found in materials used at the INL Site during CY 2009 are listed in Table 4. These materials included, but were not limited to, samples, products, process solids, liquids, and wastes that have potential emissions.

Table 4. Radionuclides in use and potentially emitted to the atmosphere from INL Site facilities in CY 2009.

Ac-227	Co-57	La-140	Ra-224	Th-229
Ag-108m	Co-58	La-142	Ra-226	Th-230
Ag-110m	Co-60	Mn-53	Rb-88	Th-232
Am-241	Co-60m	Mn-54	Rb-89	Tl-204
Am-243	Cr-51	Mn-56	Re-184	Tl-208
Ar-39	Cs-134	Mo-93	Re-184m	U-232
Ar-41	Cs-136	Mo-99	Re-186	U-233
Ba-133	Cs-137	Na-24	Re-186m	U-234
Ba-137m	Cs-138	Nb-93m	Re-187	U-235
Ba-139	Eu-152	Nb-94	Re-188	U-236
Ba-140	Eu-154	Nb-95	Rh-105	U-237
Ba-141	Eu-155	Ni-59	Rh-106	U-238
Be-7	Eu-156	Ni-63	Ru-103	V-49
Be-10	Fe-55	Np-237	Ru-106	W-181
Bi-210	Fe-59	Np-239	Sb-122	W-185
Bi-210m	Fe-60	Os-185	Sb-124	W-187
Bi-212	Ge-71	Os-191	Sb-125	W-188
Br-83	H-3	P-32	Sc-46	Xe-133
C-14	Hf-175	P-33	Si-32	Xe-135
Ca-45	Hf-181	Pa-231	Sm-151	Xe-135m
Cd-109	Hf-182	Pb-205	Sm-153	Xe-138
Ce-141	Hg-203	Pb-210	Sn-113	Y-88
Ce-144	I-128	Pb-212	Sr-85	Y-90
Cf-249	I-129	Pm-147	Sr-89	Y-91m
Cf-250	I-131	Po-210	Sr-90	Y-92
Cf-251	I-132	Po-212	Sr-91	Zn-65
Cf-252	I-133	Po-216	Sr-92	Zr-95
Cl-36	I-134	Pr-144	Ta-179	Zr-97
Cm-242	I-135	Pu-236	Ta-180m	
Cm-243	Ir-192	Pu-238	Ta-182	
Cm-244	K-40	Pu-239	Ta-183	
Cm-245	Kr-85	Pu-240	Tc-99	
Cm-246	Kr-85m	Pu-241	Tc-99m	
Cm-247	Kr-87	Pu-242	Te-123m	
Cm-248	Kr-88	Pu-244	Th-228	

5. 40 CFR PART 61.94(b) (3)

"A description of the handling and processing that the radioactive materials undergo at the facility."

5.1 Advanced Mixed Waste Treatment Project

The Advanced Mixed Waste Treatment Project (AMWTP) is located at the RWMC in the southwestern corner of the INL and operated by Bechtel BWXT Idaho, LLC. The AMWTP had six potential sources of radionuclides in operation during CY 2009. Radiological air emissions from the AMWTP may result from the retrieval, characterization, and treatment of transuranic waste, alpha-contaminated low-level mixed waste (alpha LLMW), and low-level mixed waste (LLMW). The goal of the AMWTP is to produce final waste forms that are certified for disposal.

5.2 Advanced Test Reactor Complex

The ATR Complex is operated by Battelle Energy Alliance, LLC (BEA) and is located in the south central section of the INL. The ATR Complex has facilities for studying the performance of reactor materials and equipment components under high neutron flux conditions. The major facility at ATR Complex is the Advanced Test Reactor (ATR). Other operations at ATR Complex include research and development, site remediation, analytical laboratory services, and facility decommissioning and demolition activities.

Radiological air emissions from ATR Complex are primarily associated with operation of the ATR. These emissions include noble gases, iodines, and other mixed fission and activation products. Other radiological air emissions are associated with sample analysis, site remediation, research and development activities, and decommissioning and demolition activities.

For CY 2009, CH2M-WG Idaho, LLC (CWI) radiological emissions were the result of decontamination and demolition activities at TRA-603 (MTR Reactor Building), TRA- 635, (Reactor Services Building), TRA-604 (MTR Building Wing A), TRA-661 (MTR Laboratories South Wing), TRA-613A pump vault and the TRA-630 courtyard. Radiological emissions from these activities were associated with contaminated equipment removal, demolition of contaminated structures, closure of mixed waste tank systems, and contaminated soils characterization and disposal.

5.3 Central Facilities Area

The Central Facilities Area (CFA) is located in the south-central section of the INL Site. The CFA provides services that support the following INL Site facilities:

- DOE Radiological and Environmental Sciences Laboratory (RESL; CFA-690)
- Maintenance shops
- Vehicle maintenance facilities
- Instrument calibration laboratories
- Communications and security systems
- Fire protection
- Medical services
- Warehouses
- Laboratory Facilities

- Other support services facilities
- Decontamination, decommission, and remediation activities.

With the exception of RESL, operations at CFA are conducted by BEA. The RESL is operated directly by the Department of Energy Idaho Operations Office (DOE-ID).

Minor emissions occur from CFA facilities where work with small quantities of radioactive materials is routinely conducted. This includes low-level radiological performance testing samples preparation and verification at RESL (CFA-690) and radiochemical research and development (CFA-625). Other minor emissions result from research and development laboratory operations and groundwater usage.

5.4 Critical Infrastructure Test Range Complex

The Critical Infrastructure Test Range Complex (CITRC), operated by BEA, is located in the south-central portion of the INL Site, about 5 miles east of CFA. The CITRC consists of five distinct operation areas: Power Burst Facility (PBF) Control Area, Waste Engineering Development Facility (WEDF), PBF Reactor Area, Waste Experimental Reduction Facility (WERF), and Mixed Waste Storage Facility (MWSF). The WEDF, WERF, and the MWSF are used by BEA for research activities and training.

During CY 2009, CWI radiological air emissions from CITRC resulted from D&D of PER-609, PER-761, and PER-756.

5.5 Idaho Nuclear Technology and Engineering Center

The Idaho Nuclear Technology and Engineering Center (INTEC) is located in the southern portion of the INL. As its primary mission, it began operations in 1953 to recover and reprocess spent nuclear fuel. It was operated for DOE-ID by CWI for this reporting period (CY-09).

Radiological air emissions from INTEC sources are primarily associated with liquid waste operations, including effluents from the Tank Farm Facility, Process Equipment Waste Evaporator, and Liquid Effluent Treatment and Disposal, which are exhausted through the Main Stack. These radioactive emissions include particulates and gaseous radionuclides. Additional radioactive emissions are associated with decommissioning and decontamination activities, decontamination and debris treatment operations, wet-to-dry spent nuclear fuel movements, site remediation, RH-TRU waste management, radiological and hazardous waste storage facilities, and contaminated equipment maintenance.

5.6 Materials and Fuels Complex

The Materials and Fuels Complex (MFC) is located in the southeastern corner of the INL Site. MFC, a research facility operated by BEA, is involved in advanced nuclear power research and development, spent fuel and waste treatment technologies, national security programs, and projects to support space exploration.

Radiological air emissions are primarily associated with spent fuel treatment at the Fuel Conditioning Facility (FCF) and waste characterization at the Hot Fuel Examination Facility (HFEF). Both of these facilities are equipped with continuous emission monitoring (CEM) systems. On a monthly basis, the effluent streams from FCF, HFEF, and other non-CEM radiological facilities are sampled and analyzed for particulate radionuclides. The FCF and HFEF are also sampled monthly for gaseous radionuclides. Gaseous and particulate radionuclides may also be released from other MFC facilities during laboratory research activities, sample analysis, waste handling and storage, and maintenance operations. Both measured and estimated emissions from MFC sources are consolidated for NESHAP reporting on an annual basis.

5.7 Radioactive Waste Management Complex

The Radioactive Waste Management Complex (RWMC), located in the southwestern corner of INL, is a controlled-access area with a primary mission to safely dispose of INL-generated low-level radioactive waste and to temporarily store contact-handled and remote-handled transuranic waste that will be shipped to other designated facilities for disposal. In addition, various activities are being conducted in the Subsurface Disposal Area at the RWMC to complete environmental cleanup of the area such as waste retrieval activities (Accelerated Retrieval Projects - ARP) and operation of several units that extract volatile organic compounds from the subsurface.

To fulfill these missions, the RWMC maintains facilities and processes in separate areas for administrative and operations support, and waste storage and disposal. Administrative and Operations Area buildings are used for security and access control, personnel offices, lunchrooms, change and shower rooms, equipment and materials storage, craft and maintenance shops, and radiological control. This section covers the Operations at the RWMC conducted by CWI, under the administration of DOE Idaho and does not include those operations performed by other contractors under the administration of DOE.

During CY 2009, CWI radiological air emissions resulting from D&D activities occurred at WMF-671 (Glovebox Excavator Method), WMF-714 (Intermediate-Level Transuranic Storage Facility #1), and WMF-720 (Intermediate-Level Transuranic Storage Facility #2).

5.8 Test Area North

Test Area North (TAN) is the northernmost developed area within INL. It was originally established to support the Aircraft Nuclear Propulsion Program, which operated from 1951 to 1961. Since 1961, TAN buildings have been adapted for use by various other programs, including current BEA operations at the Specific Manufacturing Capability (SMC) facility and D&D activities performed by CWI at the Technical Support Facility (TSF).

5.8.1 Specific Manufacturing Capability

The Specific Manufacturing Capability (SMC) Project, managed by BEA, is a manufacturing operation that produces an armor package for the U.S. Department of the Army. The SMC Project was assigned to the INL Site in mid-1983. Operations at SMC include material development, fabrication, and assembly work to produce armor packages. The operation uses standard metal-working equipment in fabrication and assembly. Other activities include developing tools and fixtures and preparing and testing metallurgical specimens. Radiological air emissions from SMC are associated with processing of depleted uranium. Potential emissions are uranium isotopes and associated radioactive progeny.

5.8.2 Technical Support Facility

Radioactive air emissions from the Technical Support Facility (TSF) during CY 2009 were primarily associated with removal of soils for remediation activities in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) conducted by CWI.

6. 40 CFR PART 61.94(b) (4) and (5)

"A list of the stacks or vents or other points where radioactive materials are released to the atmosphere. A description of the effluent controls that are used on each stack, vent, or other release point and an estimate of the efficiency of each control device."

Tables 5 through 12 list the facility stacks, vents, or other points where radioactive materials were released to the atmosphere during CY 2009.

Table 5. Stacks, vents, or other points of radioactive materials release to the atmosphere at AMWTP.

Bldg	Vent	Source Description	Effluent Control Description	Efficiency
615	001	Drum Vent Facility	One HEPA filters	99.97% each
628	002	Drum Treatment Facility	Two HEPA filters	99.97% each
634	001	Characterization Facility		
		Drum Vent Facility	Two HEPA filters	99.97% each
		Drum Coring	Three HEPA filters	99.97% each
636	001	Transuranic Storage Area-Retrieval Enclosure	None	NA
676	002	Advanced Mixed Waste Treatment Facility (AMWTF) Zone 3 Stack	Three HEPA Filters	99.97% each
676	003	AMWTF Glovebox Stack	Three HEPA Filters	99.97%

Table 6. Stacks, vents, or other points of radioactive materials release to the atmosphere at ATR Complex.

Bldg	Vent	Source Description	Effluent Control Description	Efficiency
670	074	Laboratory 124 fumehood exhaust	HEPA filter	99.97%
670	086	Laboratory 131 fumehood exhaust	HEPA filter	99.97%
670	098	Laboratory 103 fumehood exhaust (two hoods)	HEPA filter	99.97%
670	N/A	ATR Canal	None	N/A
678	001	Radiation Measurements Laboratory fumehoods vent	HEPA Filter	99.97%
710	001	MTR Stack	Partial HEPA filtered[a]	99.97
715	001	Evaporation Pond	None	N/A
770	001	ATR Main Stack	None	NA

a. HEPA filters are on the effluent from the Safety and Tritium Applied Research Facility (TRA-666)

Table 7. Stacks, vents, or other points of radioactive materials release to the atmosphere at CFA.

Bldg	Vent	Source Description	Effluent Control Description	Efficiency
625	010	Laboratory hoods	HEPA Filter bank[a]	99.97%
690	001	RESL	None	NA
690	002	RESL	None	NA
690	003	RESL	None	NA
690	005	RESL	None	NA
690	006	RESL	None	NA
690	007	RESL	None	NA
690	008	RESL	None	NA
690	009	RESL	None	NA
690	045	RESL	None	NA
690	046	RESL	None	NA
690	047	RESL	None	NA
690	Vent-195	RESL	None	NA

a. Bank includes multiple HEPA filters.

Table 8. Stacks, vents, or other points of radioactive materials release to the atmosphere at INTEC.

Bldg	Vent	Source Description	Effluent Control Description	Efficiency
602	012	Main exhaust for laboratory hoods, gloveboxes, and denitrator	HEPA filter or two HEPA filters in series	99.97% each
602	014	Laboratory hoods and other exhausts	HEPA filter	99.97%
603	001	Irradiated Fuel Storage Facility	Two HEPA filters in series	99.97% each
630	012	Laboratory hoods and other exhausts	Two HEPA filters in series	99.97% each
653	001	Mixed Low-Level Waste Project	HEPA filter	99.97%
663	002	Maintenance building hot shop vent	HEPA filter	99.97%
684	001	Remote Analytical Laboratory	Two HEPA filters in series	99.97% each
708	001	INTEC Main Stack	HEPA filter or up to three HEPA filters in series	99.97% each
767	001	Flourinel and Storage Facility (FAST) Stack	HEPA filter or two HEPA filters in series	99.97% each
1608	001	Manipulator Repair Cell	Two HEPA filters in series	99.97% each
1634	001	Remote Handled Transuranic Project	HEPA filter	99.97%
1774	-	TMI-2 Independent Spent Fuel Storage Installation	HEPA filter	99%

Table 9. Stacks, vents, or other points of radioactive materials released to the atmosphere at MFC.

Bldg	Vent	Source Description	Effluent Control Description	Efficiency
704	008	Fuel Manufacturing Facility stack	Two HEPA filter banks[a] in series	99.97% each
720	007	Transient Reactor Test Facility reactor cooling air exhaust	Two HEPA filter banks in series	99.97% each
752	004	Laboratory and Office (L&O) Building main stack	Two HEPA filter banks in series	99.97% each
752	005	L&O Building nondestructive assay building stack	One to four HEPA filters in series	99.97% each
764	001	Main Stack	EBR-II—HEPA filter bank FCF—Two HEPA filter banks	99.97% each
768	105	Decontamination shower suspect waste tank vent	HEPA filter bank	99.97%
768	108	Health Physics area fumehood	HEPA filter bank	99.97%
771	N/A	Radioactive Scrap Waste Facility	NONE	N/A
774	026	EML exhaust	Two HEPA filter banks in series	99.97% each
	027	EML exhaust	Two HEPA filter banks in series	99.97% each
	028	EML exhaust	Two HEPA filter banks in series	99.97% each
	029	EML exhaust	Two HEPA filter banks in series	99.97% each
777	002	Zero Power Physics Reactor exhaust	Two HEPA filter banks in series	99.97% each
785	018	Hot Fuel Examination Facility stack	Two HEPA filter banks in series	99.97% each
787	001	Fuel Assembly and Storage Building	HEPA filter bank	99.97%
792A	001	Space, Security and Power Facility	Two HEPA filter banks in series	99.97%
793	001	Sodium Components Maintenance Shop stack	HEPA filter bank	99.97%
793A	025, 027, 029, 031, 033, 035	Alcohol storage tank vents	None	NA
794	006	Contaminated Equipment Storage Building exhaust	HEPA filter bank	99.97%
798	017	Radioactive Liquid Waste Treatment Facility	HEPA filter bank	99.97%

a. Bank includes multiple HEPA filters.

Table 10. Stacks, vents, or other points of radioactive materials release to the atmosphere at RWMC.

Bldg	Vent	Source Description	Effluent Control Description	Efficiency
601	1	Health Physics Lab Hood	HEPA filter	99.97%
671	1	Glovebox Excavator Method	2 HEPA filters	99.97% each
697	1	ARP-1	HEPA filter	99.97%
1612	1	ARP-2	HEPA filter	99.97%
1614	1	ARP-3	HEPA filter	99.97%
SDA	1	Organic Contaminated Vadose Zone (OCVZ)-Unit D (WAG 7)	None	None
SDA	1	OCVZ-Unit E (WAG-7)	None	None
SDA	1	OCVZ-Unit F (WAG-7)	None	None

Table 11. Stacks, vents, or other points of radioactive materials release to the atmosphere at SMC.

Bldg	Vent	Source Description	Effluent Control Description	Efficiency
629	013	Line 2, manufacturing process	Two HEPA filter banks	99.97%
679	022	North process (RAD Stack #11) manufacturing process (EF-206) and includes releases from the quality control (QC) laboratory	One HEPA filter bank	99.97%
679	023	North process (RAD Stack #10) manufacturing process (EF-205) and includes releases from the QC laboratory	One HEPA filter bank	99.97%
679	024	North process (RAD Stack #9) manufacturing process (EF-204) and includes releases from the QC laboratory	One HEPA filter bank	99.97%
679	025	South process (RAD Stack #8) manufacturing process (EF-203)	One HEPA filter bank	99.97%
679	026	South process (RAD Stack #7) manufacturing process (EF-202)	One HEPA filter bank	99.97%
679	027	South process (RAD Stack #6) manufacturing process (EF-201)	One HEPA filter bank	99.97%
681	018	Process Reclamation Facility	One HEPA filter bank	99.97%
681	020	Process Reclamation Facility	One HEPA filter bank	99.97%

Table 12. Stacks, vents, or other points of radioactive materials release to the atmosphere at TSF.

Bldg.	Vent	Source Description	Effluent Control Description	Efficiency
NA		OU-107B Air Stripper	None	NA

7. 40 CFR PART 61.94(b) (6)

"List distances from the points of release to the nearest residence, school, business or office and the nearest farms producing vegetables, milk, and meat."

Table 13 shows distances from the points of release to the nearest residence, school, business or office, and the nearest farms producing vegetables, milk, and meat.

Table 13. Distances from INL facility points of release to the nearest off-Site receptor location and to Frenchman's Cabin (INL MEI).

Facility	Distance and Direction to Nearest Residence, School, Farm, or Business	Distance and Direction to Frenchman's Cabin
MFC	8,678 m[a] SSE	37,219 m WSW
CFA	12,453 m SE	14,359 m SW
INTEC	15,333 m SSE	18,718 m SSW
NRF	13,714 m NNW	26,675 m SSW
CITRC	10,775 m SSE	20,140 m SW
RWMC/AMWTP	7,976 m SSW	7,976 m SSW
TAN	10,344 m E	54,611 m SSW
SMC	12,298 m E	54,405 m SSW
ATR Complex	17,421 m NW	19,172 m SSW

a. m = meters.

8. 40 CFR PART 61.94(b) (7)

"The values used for all other user-supplied input parameters for the computer models (e.g. meteorological data) and the source of these data."

Tables 14 and 15 show the CAP-88 modeling input parameters for CY 2009.

Table 14. Description of data tables in NESHAPS CAP88 database

Table Name	Field Name	Type	Description
UnitDoses	FacilityID	Text	Facility Identification (see Table 1)
	Nuclide	Text	Nuclide name
	Direction	Text	Direction to MEI
	Distance	Double	Distance to MEI
	UDose		Unit dose (mrem/Ci)
Releases	SourceID	Text	Source identification
	FacilityID	Text	Facility Identification (see Table 1)
	Fugitive	Text	Fugitive or Non-Fugitive release flag
	Radionuclide	Text	Nuclide name
	Q	Double	Release rate (Ci/yr)
MkMEIsBySecName	FacilityID	Text	Facility Identification (see Table 1)
	SectorName	Text	Text name of the 16, 22.5-degree sectors
	Distance	Text	Distance from the facility to the receptor
	ReceptorNum[a]	Long	Receptor number index

a. The receptor number is the identification assigned to the 62 receptors surrounding the INL. The distance and direction to each receptor varies by facility.

Table 15. INL Site meteorological files and wind measurements heights.

Facility	Facility ID	Wind File	Measurement Height (m)
Central Facilities Area	CFA	690L09.WND	10
Critical Infrastructure Test Range Complex	CITRC	PBFL09.WND	10
Idaho Nuclear Technology and Engineering Center	INTEC-ICDF	GRIL09.WND	10
Idaho Nuclear Technology and Engineering Center-Main Stack	INTEC-MS	GRIU09.WND	30
Materials Fuels Complex	MFC	EBRL09.WND	10
Materials Fuels Complex-Main Stack	MFC-MS	EBRU09.WND	30
Naval Reactor Facility	NRF	NRFL09.WND	10
Advanced Test Reactor Complex	ATR Complex	TRAL09.WND	10
Advanced Test Reactor Complex-Advanced Test Reactor	ATR Complex -ATR	TRAL09.WND	10
Advanced Test Reactor Complex-Materials Test Reactor	ATR Complex -MTR	TRAL09.WND	10
Radioactive Waste Management Complex	RWMC	RWMCL09.WN D	10
Specific Manufacturing Capability	SMC	LOFL09.WND	10
Test Area North	TAN	LOFL09.WND	10

9. 40 CFR PART 61.94(b) (8)

"A brief description of all construction and modifications which were completed in the calendar year for which the report is prepared, but for which the requirement to apply for approval to construct or modify was waived under §61.96 and associated documentation developed by DOE to support the waiver. EPA reserves the right to require that DOE send to EPA all the information that normally would be required in an application to construct or modify, following receipt of the description and supporting documentation"

In 2009, components of the TRA Hot Waste Management System were decommissioned (EDF-9245). The potential unabated dose was estimated at 8.3E-5 mrem/yr.

To meet various waste acceptance criteria at different disposal sites, three containers were inspected and repackaged at CPP-653(EDF- 9092). The potential unabated dose was estimated at 9.83E-04 mrem/yr.

Gloveboxes to support assembly of radioisotope power generators were evaluated for potential emissions in the Space and Security Powers Systems Facilities (SSPSF) MFC-794A. Operation of these gloveboxes has the potential to emit extremely low levels of Pu-238, Pu-239 and Pu-240 to the facility suspect exhaust system. The potential unabated dose was estimated at 3.5E-10 mrem/yr.

Potential emissions from new equipment installed in Fuel Assembly Storage Facility (FASB) MFC-787 were evaluated. Equipment includes, two irradiation assisted stress corrosion cracking instruments, a Reduced Enrichment Research Test Reactor casting furnace and a Metal Waste Furnace. The potential unabated dose from this equipment is 4.4E-03 mrem/yr.

A Mass Isotope Mass Separator was installed in the MFC Analytical Laboratory MFC-752 room B-50. The mass separator will be used to produce pure mono-isotopic standards. The potential unabated dose from the operation of the mass separator is 4.0E-05 mrem/yr.

Appendix A

INL Research Center

Appendix A

INL Research Center

Compliance with the 10-mrem dose standard is demonstrated by use of 40 CFR 61, Appendix E.[a] A comparison of the January 1, 2009 inventory, plus all receipts during the calendar year with the Appendix E limits appears in Table A-1. This table shows the quantity of radioactive material possessed during the calendar year is less than the Appendix E limits.

Table A-1. 40 CFR 61 Appendix E compliance table.

Radionuclide	Physical State of Inventory	IRC Inventory[a] (Ci)	Appendix E Possession Limit (Ci)	NESHAPS Ratio[b]
C-14	Liquid/powder	3.62E-03	2.90E+02	1.25E-05
Cm-244	Liquid/powder	4.86E-14	4.20E-03	1.16E-11
Cs-137	Liquid/powder	2.70E-03	2.30E-02	1.17E-01
H-3	Liquid/powder	2.86E-05	1.50E+04	1.91E-09
I-125	Liquid/powder	2.00E-03	6.20E+00	3.23E-04
Kr-85	Gas	1.03E-02	8.40E+02	1.23E-05
Ni-63	Liquid/powder	9.80E-09	1.40E+02	7.00E-11
Pu-238	Liquid/powder	3.49E-13	2.70E-03	1.29E-10
Pu-239	Liquid/powder	1.01E-10	2.50E-03	4.04E-08
Pu-241	Liquid/powder	3.00E-11	1.30E-01	2.31E-10
Pu-242	Liquid/powder	2.00E-12	2.50E-03	8.00E-10
Pu-244	Liquid/powder	7.00E-14	2.40E-03	2.92E-11
Ra-226	Liquid/powder	5.88E-12	5.50E-03	1.07E-09
Sr-90	Liquid/powder	6.90E-03	5.20E-01	1.33E-02
Tc-99	Liquid/powder	1.73E-06	9.00E+00	1.92E-07
Th-230	Liquid/powder	2.11E-13	3.20E-03	6.59E-11
Th-232	Liquid/powder	3.97E-13	6.00E-04	6.62E-10
U Natural	Liquid/powder	5.30E-05	8.00E-03	6.63E-03
U-234	Liquid/powder	1.60E-06	7.60E-03	2.11E-04
U-235	Liquid/powder	1.56E-06	7.00E-03	2.22E-04
U-238	Liquid/powder	1.21E-06	8.60E-03	1.40E-04
Xe-133	Gas	3.14E-01	5.20E+01	6.04E-03
			TOTAL	**1.44E-01**

a. Includes 1/1/09 inventory plus all materials received in CY 2009.

b. NESHAPS Ratio is IRC Inventory divided by Appendix E Possession Limit. The Sum of Ratios must be less than 1.

a. J. Leitch, Region 10 EPA, letter dated July 5, 1996, in response to John E. Medema letter, "40 CFR 61 Subpart H Compliance for the Idaho National Laboratory Research Center (IRC)," OPE-EP-96-181, dated June 11, 1996 to Ms. Ann Frankel.

40 CFR 61.94(b)

"In addition to paragraph (a), the annual report will include the following information:"

40 CFR 61.94(b)(1)

"The name and location of the facility."

Idaho National Laboratory (INL) Research Center (IRC) facilities are located on a partially developed 14.3-ha (35.5-acre) plot on the north side of the City of Idaho Falls. Though programs and operations at the IRC are affiliated with INL, the IRC is located within the city limits of Idaho Falls and is not contiguous with INL Site, the nearest boundary of which is approximately 22 miles west of Idaho Falls.

Facilities at the IRC include office, laboratory, and technical support buildings. The largest is a three-story office building connected by an enclosed walkway to a one-story laboratory building containing 66 laboratories. Other buildings at the IRC include the Research Office Building, Physics Building, Electric Vehicle Building, and Systems Analysis Facility.

40 CFR 61.94(b)(2)

"A list of the radioactive materials used at the facility."

See Table A-1.

40 CFR 61.94(b)(3)

"A description of the handling and processing that the radioactive materials undergo at the facility."

The IRC is principally an experimental research facility dedicated to a wide range of research areas, including microbiology; geochemistry; materials characterization; welding; ceramics; thermal fluids behavior; materials testing; nondestructive evaluation of materials using standard industrial x-ray processes, x-ray diffraction, and x-ray fluorescence; analytical and environmental chemistry; and biotechnology.

40 CFR 61.94(b)(4)

"A list of the stacks or vents or other points where radioactive materials are released to the atmosphere."

Radiological emissions from the IRC could arise from uncontrolled laboratory fumehoods within the facility. Exhaust from most of the fumehoods is released directly to the outside atmosphere via the heat recovery fan system of the IRC heating, ventilating, and air conditioning system. The heat recovery fan system exhausts to the outside via vents on the north side of the mechanical penthouse on top of the IRC laboratory building. Stack height of these vents is 7.6 m (25 ft). The exhausts from other fume hoods (not exhausted to the heat recovery fan) are released to the atmosphere via a 2.1-m (7.0-ft) stack above the roof or two 8.5-m (28-ft) stacks above the roof.

Emissions can occur from other areas as well. Not all radiological emissions will occur from work in a fumehood. Some work is done on work benches or in bay areas. Work with radionuclides could be done anywhere at the IRC. The likely places include Building 603, System Analysis Facility, and INL Engineering Demonstration Facility.

40 CFR 61.94(b)(5)

"A description of the effluent controls that are used on each stack, vent, or other release point and an estimate of the efficiency of each control device."

No effluent control equipment is associated with any of the IRC's release points.

40 CFR 61.94(b)(6)

"Distances from the points of release to the nearest residence, school, business or office and the nearest farms producing vegetables, milk, and meat."

The nearest business is 0.1 km (0.0620 mi) north of the IRC.

Consistent with 40 CFR 61, Appendix E, no residence is within 10 m of the IRC, and no vegetables, milk, or meat are produced within 100 m of the IRC.

40 CFR 61.94(b)(7)

"The values used for all other user supplied input parameters for the computer models (e.g., meteorological data) and the source of these data."

Not applicable. 40 CFR 61 Appendix E used for compliance.

40 CFR 61.94(b)(8)

"A brief description of all construction and modifications that were completed in the calendar year for which the report is prepared, but for which the requirement to apply for approval to construct or modify was waived under § 61.96 and associated documentation developed by DOE to support the waiver."

None.

Appendix B

Naval Reactors Facility National Emission Standards for Hazardous Air Pollutants—Radionuclides Annual Report for 2009

Naval Reactors Facility

National Emission Standards for Hazardous Air Pollutants

Report on 2009 Radionuclide Emissions

Bechtel Marine Propulsion Corporation
Bettis Atomic Power Laboratory

Prepared for the U.S. Department of Energy
Under Contract No. DE-NR0000031

U. S. Department of Energy

Radionuclide Air Emissions Annual Report

(under Subpart H of 40 CFR Part 61)

Calendar Year 2009

Site Name: Idaho National Laboratory (INL)

Area: Naval Reactors Facility (NRF)

Area Information for NRF

Operator: Bechtel Marine Propulsion Corporation

Address: P. O. Box 2068
Idaho Falls, Idaho 83403-2068

Contact: M. A. DiBattista, Manager, Naval Reactors Facility

Phone: (208) 533-5526

Owner: Naval Reactors Idaho Branch Office

Address: P. O. Box 2469
Idaho Falls, Idaho 83403-2469

Contact: A. C. Kepple, Manager, Naval Reactors Idaho Branch Office

Phone: (208) 533-5317

I. FACILITY INFORMATION

Site Description

The developed area of the Naval Reactors Facility (NRF) covers 84 acres and is located in the west-central part of the Idaho National Laboratory (INL) site (Figure 1). NRF is located approximately 6.7 miles (10.8 kilometers) from the nearest INL border. The nearest residence is 8.5 miles (13.7 kilometers) NNW of NRF. The nearest population center is Howe which is located approximately 10.1 miles (16.2 kilometers) NNW of NRF. Section III provides specific information concerning the distances to locations used for dose modeling.

The climate of the INL is characterized as semi-arid. The INL is located on the Snake River Plain with an elevation of approximately 5000 feet (1500 meters), and it is surrounded by mountains. Air masses entering the Snake River Plain from the west lose most of their moisture to precipitation prior to encountering the INL; therefore, annual precipitation at the INL is light. Winds are channeled over the Snake River Plain by bordering mountain ranges so that wind from the southwest predominates over the INL. The second most frequent winds are from the northeast. The meteorological data for the area is used in the dose modeling, as described in Section III.

Established in 1949, NRF is operated for the U. S. Naval Nuclear Propulsion Program by Bechtel Marine Propulsion Corporation, Bettis Atomic Power Laboratory. The principal facilities at NRF are three former naval reactor prototypes (S1W, A1W, and S5G) and the Expended Core Facility (ECF). The S1W, A1W, and S5G prototypes were shut down in October 1989, January 1994, and May 1995, respectively.

Developmental nuclear fuel material samples, naval spent fuel, and irradiated reactor plant components/materials are examined at ECF. The knowledge gained from these examinations is used to improve current designs and to monitor the performance of existing reactors. The naval spent fuel examined at ECF is critical to the design of longer-lived cores, which results in the creation of less spent fuel requiring disposition. NRF also prepares and packages spent naval fuel for dry storage and eventual transportation to a permanent geologic repository.

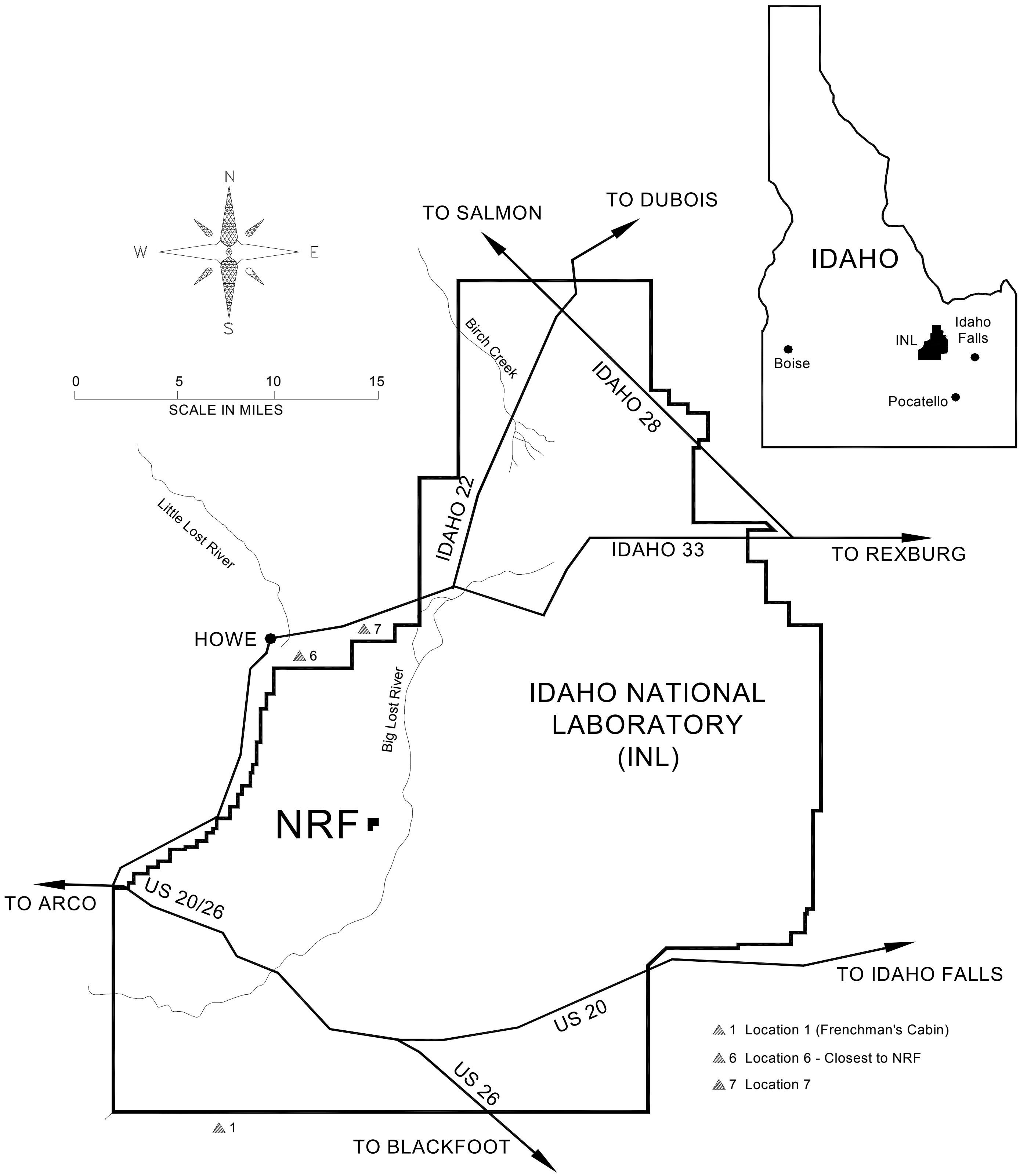

Figure 1. Relation of NRF to the INL.

Source Descriptions

NRF receives spent fuel and radioactive components from the U. S. Naval Nuclear Propulsion Program, shipped in Department of Energy (DOE)/Nuclear Regulatory Commission approved shipping containers in accordance with Department of Transportation requirements. The shipments are processed and examined at ECF.

Radioactive materials at NRF include enriched uranium fuel with associated fission products, activation products, and activated corrosion and wear products. Various radiation sources are used for calibrating and checking equipment, verifying shielding, and performing radiography. Soil with low levels of radioactivity from fallout and from past operations is also present at NRF.

Radioactive materials are handled and processed in several areas at NRF, including shielded hot cells, chemical and metallurgical laboratories, machine shops, and radioactive material storage areas. Physical, chemical, and metallurgical testing of small quantities of highly radioactive material specimens is performed in the ECF shielded hot cells. Radioactive work conducted within the ECF highbay water pools consists of unloading radioactive specimens from shipping containers, fuel examinations, removal of non-fuel structural pieces, and storage of fuel. Segregation and repackaging of radioactive waste are performed within the S5G highbay, and decontamination of inactive radiological systems proceeds throughout NRF controlled areas. Radioactive work is performed in appropriate containment. Storage and movement of radioactive materials are under strict control. Special laboratory facilities are available for the chemical analysis of low-level radioactive samples.

All radioactive material is controlled by a radioactive material accountability system and maintained in designated storage areas. All movements of radioactive material within the facility are performed under escort of qualified radiological controls personnel and tracked in the accountability system.

Radioactive liquids are used to support operations. Radioactive liquids may be processed through a series of filters and demineralizers for reuse. Radioactive liquids that cannot be reused are solidified for disposal as radioactive waste.

Disposable materials and waste products associated with the handling of radioactive materials are controlled and tracked as radioactive waste. The waste is temporarily stored on-site in designated storage areas until sufficient quantities accumulate to comprise a shipment to a DOE low-level disposal site.

Radionuclide emissions to the atmosphere can come from three main sources at NRF:

(1) ECF, where spent fuel from naval cores and contaminated materials such as anti-contamination clothing, tools, and other equipment are handled. Radioactive water is present in the pits where the fuel is located. Analyses are performed on radioactive materials in chemistry laboratories in this building.

(2) S1W, A1W, and S5G Prototype Reactors. Although the reactors have been shut down and defueled, routine inspections of the reactor compartments are conducted and the ventilation from these facilities is monitored. At the S5G prototype, contaminated materials such as tools, equipment, anti-contamination clothing, and contaminated waste are handled. Analyses are performed on radioactive materials in chemistry laboratories in the A1W prototype building.

(3) Fugitive Soil Emissions, from areas surrounding NRF which potentially contain low levels of radioactivity in the soil that are exposed to the wind.

II. AIR EMISSIONS DATA

NRF has a number of stacks and vents with the potential to emit low quantities of radionuclides. These emissions are monitored and calculated by NRF. The data are included in the calculation of the INL's annual effective dose equivalent (EDE) to members of the public.

Continuous monitoring is required by 61.93(b) of 40 CFR 61, Subpart H, for emission points that have a potential to emit radionuclides in quantities that could result in an EDE to a member of the public in excess of 1 percent of the 10 millirem (1 x 10^{-4} sievert) per year standard, which is 0.1 millirem (1 x 10^{-6} sievert) per year. None of the emission points at NRF qualify for the continuous monitoring requirement; all emission points are below the 0.1 millirem (1 x 10^{-6} sievert) per year criteria. Periodic confirmatory measurements are performed as needed to verify that emissions are below 1 percent of the standard.

Table II-1 identifies potential point sources of radionuclide air emissions. The table contains identification codes for area, building, and vent; a general description; a description of the effluent controls and their efficiencies, if applicable; and those emission sources that were monitored.

Table II-2 identifies potential fugitive sources of radionuclide air emissions. The only fugitive source is windblown soil from areas on NRF property surrounding the developed facility, which contain low levels of radioactivity from past releases. Fugitive sources have no effluent control or monitoring.

Tables II-3 and II-4 list the combined radionuclide emissions from the point sources and fugitive sources. The tables include measured values for those radionuclides that are routinely monitored and calculated values for those radionuclides that are not monitored. For determining the EDE, the gross alpha radioactivity is conservatively modeled as plutonium-239 and the gross beta radioactivity is conservatively modeled as strontium-90.

Table II-1. Potential Radiological Air Emission Point Sources at NRF During 2009

Nearest Residence, School, Business or Farm: 13.7 kilometers NNW				
AREA -BLDG -VENT No.	SOURCE DESCRIPTION	EFFLUENT CONTROL DESCRIPTION	EFFICI-ENCY [1]	MONI-TORED [2]
NRF-601-023	S1W Reactor Compartment	None [3]	NA	No
NRF-601-HBRV	S1W High Bay Roof Vents	None [3]	NA	Yes
NRF-616-012, 021	A1W Operations Building and Site Chemistry	None [3]	NA	Yes
NRF-616-PCMA	A1W Primary Components Maintenance Area and Extension	None [3]	NA	No
NRF-617-013	A1W Reactor Compartment 3A	HEPA Filter	99.95%	Yes
NRF-617-020	A1W Reactor Compartment 3B	HEPA Filter	99.95%	Yes
NRF-618-099	ECF Stack Number 1	HEPA Filter Carbon Filter	99.95% 90–99.9%	Yes+
NRF-618-103	ECF Stack Number 2	HEPA Filter	99.95%	Yes+
NRF-618-237	ECF Stack Number 3	HEPA Filter	99.95%	Yes+
NRF-618-HBRV	ECF High Bay Roof Vents	None [3]	NA	Yes
NRF-633A-057	S5G Radioactive Area Ventilation (RAV) System	HEPA Filter	99.95%	Yes
NRF-633A-HBRV	S5G High Bay Roof Vents	None [3]	NA	Yes

1. HEPA filters are tested by the manufacturer prior to delivery to NRF and by NRF during the life of the filter. The manufacturer tests the efficiency for 0.3-micron monodispersed dioctylphthalate (DOP) particles to a minimum of 99.97 percent. NRF tests the efficiency for 0.7-micron polydispersed DOP particles to a minimum of 99.95 percent. The carbon filters have an efficiency of 99.9 percent for the removal of radioactive iodine when new. Their efficiency lessens with use, as the carbon adsorbent depletes. The carbon filters are replaced when efficiency drops to 90 percent.
2. "No" indicates that the source was not monitored during 2009 because it did not operate during 2009.
   "Yes" indicates that the source was monitored, and the measured emissions are included in this report.
   "Yes+" indicates that the source was monitored, and both measured and calculated emissions are included in this report. (Because some gaseous radionuclides could not be measured, the amounts of these radionuclides were calculated based on the amount of process production.)
3. Subsystems that exhaust within the areas ventilated by these sources may have HEPA filters.

Table II-2. Potential Radiological Air Emission Fugitive Sources at NRF During 2009

Nearest Residence, School, Business or Farm: 13.7 kilometers NNW				
AREA-LOCATN-I.D. CODE	SOURCE DESCRIPTION	EFFLUENT CONTROL DESCRIPTION	EFFI-CIENCY	MONI-TORED
NA	Fugitive Soil	None	NA	No

Table II-3. Point Source Releases From NRF During 2009

Radionuclide	Symbol	Release (curies)	Release (becquerels)*
Carbon-14	C-14	8.0E-01	3.0E+10
Gross alpha (modeled as plutonium-239)	Pu-239	1.8E-06	6.7E+04
Gross beta (modeled as strontium-90)	Sr-90	6.5E-05	2.4E+06
Cesium-137	Cs-137	1.7E-07	6.3E+03
Tritium	H-3	2.4E-02	8.9E+08
Iodine-131	I-131	5.1E-06	1.9E+05
Iodine-129	I-129	3.8E-05	1.4E+06
Krypton-85	Kr-85	1.3E-01	4.8E+09
Total		9.5E-01	3.5E+10

* One curie equals 3.7E+10 becquerels.

Table II-4. Fugitive Source Releases From NRF During 2009

Radionuclide	Symbol	Release (curies)	Release (becquerels)*
Cobalt-60	Co-60	3.4E-06	1.3E+05
Cesium-137	Cs-137	1.3E-04	4.8E+06
Total		1.4E-04	5.2E+06

* One curie equals 3.7E+10 becquerels.

III. DOSE ASSESSMENTS

Summary

Table III-1 summarizes the EDE results for point sources, fugitive sources, and both combined. The total EDE from all NRF sources was determined to be 2.9 x 10^{-4} millirem (2.9 x 10^{-9} sievert) and occurred at a location 8.5 miles (13.7 kilometers) north-northwest of NRF. The NRF EDE is for information only; it is the EDE from all INL sources combined that is used to show compliance with the 40 CFR 61.92 standard.

Table III-1. Effective Dose Equivalents from Sources at NRF During 2009

Release Point	EDE [1] (mrem)	EDE [1] (Sv) [2]
1. Point Sources	2.8E-04	2.8E-09
2. Fugitive Sources	5.4E-06	5.4E-11
Total:	2.9E-04	2.9E-09

1. The EDE shown is for the NRF maximally exposed individual (Figure 1, Location 6).
2. One millirem equals 1.0E-05 sievert (Sv).

Description of Dose Model and Summary of Input Parameters

General

The CAP-88 computer code (PC Version 3) was used to calculate the EDE from the NRF releases. CAP-88 is approved for use by the Environmental Protection Agency (EPA) for demonstrating compliance with 40 CFR 61 Subpart H, "National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities." The output from CAP-88 is the EDE, which includes the 50-year committed EDE (CEDE) from internal exposure through the ingestion and inhalation pathways and the external EDE from ground deposition and air immersion.

Site-specific 2009 wind data was used, collected by the National Oceanic and Atmospheric Administration (NOAA) from the 15-meter tower at NRF. Annual rainfall, annual average temperature, and long-term average humidity were used. An average annual atmospheric mixing layer height of 800 meters was used, per NOAA.

The dose from daughter progeny is included by the CAP-88 program. Some radionuclides such as cesium-137 and strontium-90 have daughter progeny that emit radioactivity which is as significant as the parent's radioactivity.

Point Sources

Modeling guidance states that if the release height of an emission point is less than or equal to 2 ½ times the building height from which the stack emerges, then building downwash will lower the release height. For conservatism, all emissions from NRF stacks and vents were modeled as ground-level point emissions.

Fugitive Sources

Fugitive soil releases were calculated using soil resuspension rates based on average annual wind speed. The method used for determining resuspension rates is described in DOE/TIC-22800, Transuranic Elements in the Environment, by Wayne C. Hanson. Fugitive sources were modeled as ground-level releases.

Compliance Assessment

Maximally Exposed Individual

Subpart H of 40 CFR 61 requires that emissions of radionuclides to the ambient air from DOE facilities shall not exceed those amounts which would cause any member of the public to receive an EDE of 10 millirem (1×10^{-4} sievert) per year. "Member of the public" is any offsite point where there is a residence, school, business, or office.

Two locations near the INL boundary were evaluated to determine which received the highest dose from NRF emissions. The first is the nearest "residence, school, business, or office" to NRF. It is a residence 8.5 miles (13.7 kilometers) to the north-northwest (Figure 1, Location 6). The second location is another residence located 9.8 miles (15.8 kilometers) north of NRF (Figure 1, Location 7). Although Location 7 is a greater distance from NRF, wind direction can cause it to receive a higher dose from NRF emissions than Location 6. The dose at both of these locations was evaluated using the CAP-88 program, and Location 6 was found to have the higher dose from 2009 emissions.

The EDE at Location 6 from NRF emissions is given for information only. For compliance purposes, the EDE from all INL emissions combined must comply with the 40 CFR 61.92 standard of 10 millirem per year. NRF emissions are combined with emissions from other INL facilities to determine the overall EDE for the INL.

Statement of Certification

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this report, the Naval Reactors Facility National Emission Standards for Hazardous Air Pollutants Report on 2009 Radionuclide Emissions. Based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment. See 18 U.S.C. 1001.

Owner Signature: ______________________ 5/7/10

(A. C. Kepple) (Date)

Title: Manager, Naval Reactors Idaho Branch Office

For: Naval Reactors Facility

IV. ADDITIONAL INFORMATION

The EPA requires in 40 CFR 61 Subpart H that a "brief description of all construction and modifications which were completed in the calendar year for which the report is prepared, but for which the requirement to apply for approval to construct or modify was waived" be included.

There were no construction projects or modifications completed at NRF during 2009 which fall under this requirement.

V. SUPPLEMENTAL INFORMATION

The following information is provided at the request of DOE Headquarters and is not required as part of the annual National Emission Standards for Hazardous Air Pollutants reporting requirements (under 40 CFR Section 61.94).

REQUEST: Provide an estimate of the collective effective dose equivalent (person-rem per year) for 2009 releases.

An estimate of the collective effective dose equivalent (person-rem per year) will be provided in the *Idaho National Laboratory Site Environmental Report for Calendar Year 2009*.

REQUEST: Provide information on the status of compliance with Subparts Q and T of 40 CFR Part 61 if pertinent.

Subpart Q of 40 CFR Part 61, "National Emission Standards for Radon Emissions From Department of Energy Facilities," is applicable to the design and operation of storage and disposal facilities for radium-containing material that emit radon-222 into the air. Subpart Q is not applicable to the Naval Reactors Facility. Subpart T of 40 CFR Part 61, "National Emission Standards for Radon Emissions From the Disposal of Uranium Mill Tailings," is not applicable to the Naval Reactors Facility.

REQUEST: Provide information on radon-220 emissions from sources containing uranium-232 and thorium-232 where emissions potentially can exceed 0.1 millirem (1 x 10^{-6} sievert) per year to the public or 10 percent of the non-radon dose to the public.

The Naval Reactors Facility does not have any sources of uranium-232 or thorium-232 emissions that potentially can exceed 0.1 millirem (1 x 10^{-6} sievert) per year to the public or 10 percent of the non-radon dose to the public.

REQUEST: Provide information on non-disposal and non-storage sources of radon-222 emissions where emissions potentially can exceed 0.1 millirem (1 x 10^{-6} sievert) per year to the public or 10 percent of the non-radon dose to the public.

The Naval Reactors Facility does not have any non-disposal or non-storage sources of Radon-222 emissions that potentially can exceed 0.1 millirem (1 x 10^{-6} sievert) per year to the public or 10 percent of the non-radon dose to the public.

REQUEST: For the purpose of assessing facility compliance with the National Emission Standards for Hazardous Air Pollutants effluent monitoring requirements of Subpart H under Section 61.93(b), give the number of emission points subject to the continuous monitoring requirements, the number of these emission points that do not comply with the Section 61.93(b) requirements, and if possible, the cost for upgrades. Describe site periodic confirmatory measurement plans. Indicate the status of the quality assurance program described by Appendix B, Method 114.

The Naval Reactors Facility does not have any emission points that require continuous monitoring under Section 61.93(b). However, confirmatory measurements were accomplished by calculating the maximum unabated emissions for radiological emission points at NRF to determine if continuous monitoring is required under Section 61.93. Periodic confirmatory measurements were also accomplished by use of calculations and samples to determine the actual emissions in 2009.

Although no NRF emission points require continuous monitoring, a quality assurance (QA) program is incorporated into the environmental monitoring program. The QA program includes equipment calibration, the use of blanks and known standards, and the annual review and validation of radioactive airborne emission data by peer reviewers.

Department of Energy

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Idaho Falls, Idaho 83403-2469

NR:IBO-10/083

May 7, 2010

D. M. Miotla, Manager
U. S. Department of Energy
Idaho Operations Office
1955 Fremont Avenue
Idaho Falls, ID 83415

Subject: 2009 NESHAP REPORT FOR THE NAVAL REACTORS FACILITY

Reference: (a) 40 CFR 61, Subpart H - National Emission Standards for Emissions of Radionuclides other than Radon from Department of Energy Facilities

Attached is the Calendar Year 2009 National Emission Standards for Hazardous Air Pollutants (NESHAP) Annual Report as required by Reference (a). The report assesses radionuclide emissions from sources at the Naval Reactors Facility (NRF) and the dose to the public that results from those emissions. The effective dose equivalent (EDE) received by a member of the public from NRF's 2009 emissions was 0.00029 millirem, well within the 10 millirem limit that is applicable to the Idaho National Laboratory (INL) as a whole. The attached report is being transmitted independently to Battelle Energy Alliance for inclusion in the overall INL report.

Please contact David Sanderlin of my staff at (208) 533-5363 if you have any questions or comments concerning this submittal.

A. C. Kepple, Manager
Naval Reactors Idaho Branch Office

Attachments:
As stated

cc: T. L. Perkins, DOE-ID