

Environmental Releases for Calendar Year 2009

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

Contractor for the U.S. Department of Energy
under Contract DE-AC06-09RL14728



P.O. Box 650
Richland, Washington 99352

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ABBREVIATIONS AND ACRONYMS

aka	also known as
BNI	Bechtel National, Inc.
Bq	becquerel
CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i>
CFR	Code of Federal Regulations
CHPRC	CH2M HILL Plateau Remediation Company
Ci	curie
DCG	derived concentration guide
DL	detection limit
DOE	U.S. Department of Energy
DMR	discharge monitoring report
Ecology	Washington Department of Ecology
EDE	effective dose equivalent
EDP	electronic data processing [code]
EPA	U.S. Environmental Protection Agency
ETF	Effluent Treatment Facility
FH	Fluor Hanford, Inc.
FFTF	Fast Flux Test Facility
ft ³	cubic foot
gal	gallons
gal/mo	gallons per month
gpm	gallons per minute
HEPA	high-efficiency particulate air (filter)
HSER	Hanford Site Environmental Report
HTO	tritium, in the form of condensable water vapor
JCI	Johnson Controls, Inc.
kg	kilogram
L	liters
MASF	Maintenance and Storage Facility
MEI	maximally exposed individual
MGD	million gallons per day
μCi	microcurie
μg/L	microgram per liter
μmhos/cm	micro-mho per centimeter
ml	milliliter
mrem	millirem (unit of dose)
MSA	Mission Support Alliance, LLC
MSGP	multi-sector general permit

ABBREVIATIONS AND ACRONYMS (Cont.)

N	no
ND	no discharge or not detected (as defined within the context)
NPDES	National Pollutant Discharge Elimination System
NM	not measured
NR	not reported or not reported (as defined within the context)
pCi	picocurie
PFPP	Plutonium Finishing Plant
PNNL	Pacific Northwest National Laboratory
POTW	publicly owned treatment works
PM _{2.5}	particulate matter with a diameter of 2.5 µm
PM ₁₀	particulate matter with a diameter of 10 µm
ppm	parts per million
PSD	permanently shutdown
PUREX	Plutonium-Uranium Extraction (Plant)
REDOX	Reduction-Oxidation (S Plant)
RQ	reportable quantity
SALDS	State-Approved Land Disposal Site
TEDF	Treated Effluent Disposal Facility
WAC	Washington Administrative Code
WCH	Washington Closure Hanford, LLC
WESF	Waste Encapsulation Storage Facility
WRAP	Waste Receiving and Processing Facility
WRPS	Washington River Protection Solutions, LLC
WSCF	Waste Sampling and Characterization Facility
WTP	Hanford Tank Waste Treatment and Immobilization Plant

1.0 INTRODUCTION

This report provides summaries of measured and/or estimated data on radioactive air emissions, criteria and/or toxic air pollutant emissions, and liquid effluents released to the environment during calendar year 2009, in keeping with reporting requirements of U.S. Department of Energy (DOE) Order 5400.5, *Radiation Protection of the Public and the Environment*, and DOE Manual 231.1-1A, *Environment, Safety and Health Reporting Manual*. Nonroutine releases of significance are also addressed in this report. This report was prepared in accordance with Title 10 Code of Federal Regulations (CFR) 830, "Nuclear Safety Management;" DOE Order 414.1C, *Quality Assurance*, "Contractor Requirements Document;" and ASME NQA-1, *Quality Assurance Requirements for Nuclear Facility Applications*.

The reported releases are for facilities and activities managed by Bechtel National, Inc. (BNI), CH2M HILL Plateau Remediation Company (CHPRC), Johnson Controls, Inc. (JCI), Fluor Hanford, Inc. (FH), Mission Support Alliance, LLC (MSA), Washington Closure Hanford, LLC (WCH), and Washington River Protection Solutions, LLC (WRPS). The releases were determined from direct sampling and resulting analysis data; calculations based upon approved release factors; and/or inventory records. Releases from facilities and activities managed by Pacific Northwest National Laboratory (PNNL) are not documented in this report.

This report supplements in expanded but not exhaustive detail environmental release data summarized in PNNL-19455, *Hanford Site Environmental Report for Calendar Year 2009*, published by PNNL. PNNL-19455 presents a comprehensive accounting of all notable Hanford Site activities, including PNNL effluent releases that affect the environment; it also denotes the compliance status of the Hanford Site with applicable regulations.

1.1 TYPES AND LOCATIONS OF RELEASES

Radioactive air emissions were released during 2009 from facilities and activities in the 100, 200, 300, 400, and 600 Areas of the Hanford Site. Radioactive liquid effluents were discharged to the soil in the 600 Area and to the Columbia River bordering the 100-K Area. All air emissions and liquid discharges were beneath applicable limits.

Primary sources of criteria and/or toxic air pollutant emissions of industrial origin released to the ambient air at the Hanford Site during 2009 were: (1) fossil-fuel combustion emissions from the operation of package boilers; (2) fossil-fuel combustion emissions from generators; and (3) emissions of nitrogen oxides, ammonia, and volatile organic compounds from the 200 Area Effluent Treatment Facility (ETF), and tanks containing radioactive liquid waste. Most of these sources are located in the 200 and 300 Areas.

Nonradioactive process wastewater in the 200 Area is sent to the 200 Area Treated Effluent Disposal Facility (TEDF) for discharge to ground by way of two percolation basins. Radioactive wastewater from many Hanford Site sources is treated at the 200 Area ETF and then discharged to ground at the State-Approved Land Disposal Site (SALDS). Wastewater generated in the 300 Area is sent to the 300 Area TEDF for treatment before being discharged to the Columbia River via a permitted outfall. The 100-N Sewage Treatment Lagoon receives sanitary wastewater from 100-N facilities and from septic systems in the 100-K and 200 Areas. Sanitary wastewater in the 100-DR and 100-K Areas is discharged into septic systems. In the 200 Areas, sanitary wastewater is discharged to several septic systems and holding tanks. Sanitary wastewater in the 300 Area is discharged to the City of Richland publicly owned treatment works (POTW). Sanitary wastewater in the 400 Area is discharged to the Columbia Generating Station sewage treatment plant. Apart from reporting sanitary wastewater discharges to the 100-N Sewage Lagoon (see

Table 3-8), no attempt was made to compile data on sanitary wastewater, owing to the uncertainty in accurately estimating the volume of wastewater.

1.2 ENVIRONMENTAL RELEASE LIMITS AND GUIDELINES

This section presents relevant environmental release standards for radiological and nonradiological constituents. These standards are applicable to the release and environmental transport of constituents and are important to: (1) demonstrate compliance with any issued federal, state, or local permits, and (2) demonstrate compliance with any federal, state, and local regulations and/or guidelines prescribed by the U.S. Department of Energy, Richland Operations Office.

The Hanford Site Environmental Report (HSER) contains a PNNL assessment of the Hanford Site radiological dose impact to the public, in accordance with DOE Manual 231.1-1A. Effluent and emission data in the HSER and in DOE/RL-2010-17, Rev. 0, *Radionuclide Air Emissions Report for the Hanford Site, Calendar Year 2009*, were used by PNNL to estimate a maximized radiological dose to the public. That radiological dose demonstrates the state of compliance with applicable standards and regulations. Related compliance determinations to federal and state dose standards are also published in the HSER.

1.2.1 Limits for Radioactive Releases

Quantities of radionuclides in air emissions and liquid effluents from the Hanford Site are governed by DOE Order 5400.5. Quantities of radionuclides in air emissions are also regulated by 40 CFR 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;" Washington Administrative Code (WAC) Chapters 173-480, "Ambient Air Quality Standards and Emission Limits for Radionuclides;" and 246-247, "Radiation Protection – Air Emissions." The effective dose equivalent (EDE) received by any member of the offsite public from all Hanford Site routine operational effluents and emissions is not to exceed 100 mrem/yr. For occasional exposure from noncontinuous releases, the EDE is not to exceed 500 mrem/yr. From the air pathway only, the EDE to any member of the public is not to exceed 10 mrem/yr. The derived concentration guide (DCG) values published in DOE Order 5400.5 apply to all radioactive effluents and emissions to which members of the public are exposed. DCG values are not emissions limits and are used for comparison purposes only.

The 300 Area TEDF is regulated by an aquatic-lands sewer outfall lease (Lease Number 20-012257) from the U.S. Department of Natural Resources. Outfall concentration limits for radioactive constituents include 15 pCi/L alpha, 50 pCi/L beta, and 20,000 pCi/L tritium.

1.2.2 Limits for Nonradioactive Releases

The following regulations, as applicable, govern nonradioactive constituents in air emissions and liquid effluents: *Clean Air Act of 1990*, as amended; *Clean Water Act of 1977*; *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA); *Resource Conservation and Recovery Act of 1976*; *Safe Drinking Water Act of 1974*; *Toxic Substances Control Act of 1976*; the State of Washington regulations WAC 173-216, "State Waste Discharge Permit Program"; WAC 173-218, "Underground Injection Control Program"; WAC 173-303, "Dangerous Waste Regulations"; WAC 173-400, "General Regulations for Air Pollution Sources"; WAC 173-401, "Operating Permit Regulation"; WAC 173-460, "Controls for New Sources of Toxic Air Pollutants"; and the Benton Clean Air Agency *Regulation 1*.

The Washington State Department of Ecology (Ecology) issues permits governing Hanford Site liquid effluent discharges to the ground per the requirements of WAC 173-216. Monitoring, sampling, analysis parameters, and release limits for specific constituents are defined in discharge permits issued by Ecology.

The U.S. Environmental Protection Agency (EPA) issues permits governing Hanford Site liquid effluents discharged to the Columbia River per the requirements of the National Pollutant Discharge Elimination System (NPDES) regulations. Monitoring, sampling, analysis parameters, and release limits for specific constituents are defined in discharge permits issued by the EPA.

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2.0 AIR EMISSIONS

Facilities and activities managed by CHPRC, FH, JCI, MSA, WCH, and WRPS released radioactive emissions and criteria and toxic air pollutants to the atmosphere during 2009. Release data for each type of emission are discussed separately.

2.1 RADIONUCLIDE AIR EMISSIONS

Actively ventilated point sources having a potential to emit radioactive material to the atmosphere are routinely monitored. These point source emissions are measured and documented in this report when the following criteria were met during calendar year 2009: (1) the point source requires continuous monitoring or periodic confirmatory measurements in accordance with 40 CFR 61, Subpart H, or WAC 246-247, (2) the point source is listed in the *Hanford Site Title V Air Operating Permit 00-05-006*, and (3) the point source normally emits radioactive material or has the potential to emit radioactive material. Point sources not included in this section either did not meet those criteria or their air emissions were not actively ventilated. Examples of sources without active ventilation include deactivated sources, sources closed off from the ambient atmosphere, and passively ventilated point sources.

Fugitive radionuclide emissions, which include those from passively ventilated point sources, are monitored collectively by the Near-Facility Monitoring Program and the Environmental Surveillance Program. Monitoring data for fugitive emission sources are not presented in this report but are available in DOE/RL-2010-17, PNNL-19455, and PNNL-19455, APP. 2, *Hanford Site Near-Facility Environmental Monitoring Data Report for Calendar Year 2009*.

2.1.1 Mitigation of Radionuclide Air Emissions

The following comprise the majority of pollution control equipment used to remove radionuclides from stack emissions associated with powered ventilation systems: (1) high-efficiency particulate air (HEPA) filters, (2) sand filters, (3) charcoal absorbers (for iodine removal), (4) water scrubbers, (5) deep-bed fiberglass filters, (6) fiberglass prefilters, (7) electrostatic precipitators, and (8) pre-filters. No practical air emissions removal systems exist for tritium effluents. Generally, at least one stage of HEPA filtration is used as the final particulate removal method before air is discharged to the atmosphere. All installed HEPA filters are required to have an in-place removal efficiency of ≥ 99.95 percent for polydispersed airborne particles with a median diameter of 0.7 μm . Routine in-place testing of HEPA filters assures ventilation systems operate at the prescribed level of efficiency. HEPA filtration systems have proven effective at mitigating radioactive air emissions as indicated by release concentrations near or below the lowest limits of analytical detection.

2.1.2 Radionuclide Air Emissions Data

Radionuclide air emission release data from facilities are in Table 2-1. Table 2-2 presents radionuclide air emission data for major point sources, while Table 2-3 presents radionuclide air emission data for minor point sources. Major point sources have a potential to discharge radionuclides into the air in quantities that could cause an EDE in excess of 0.1 mrem/yr to the maximally exposed individual (MEI) member of the public. Minor point sources have a potential to discharge radionuclides into the air in quantities that will not cause an EDE to exceed 0.1 mrem/yr to the MEI.

2.1.3 Radionuclide Data Summary

Tables 2-2 and 2-3 list numerical emissions data under a variety of column headings. The column headings and associated technical terms as used in these tables are defined and clarified in this section.

The stack identifiers are alpha-numeric combinations that follow a sequencing pattern. In the 200 Areas, stacks are designated by a number that has a "291" or "296" prefix, depending on stack height. The "291" prefix is used exclusively for stacks 200 feet high, which are the tallest stacks on the Hanford Site and in the 200 Areas only. For stacks less than 200 feet high, the "296" prefix is used. In the 100, 300, and 400 Areas, stacks and vents are usually identified by the corresponding facility number where they are located (an exception is the Cold Vacuum Drying Facility stack, 296-K-142, in the 100-K Area). Stacks in the 600 Area have the prefix of "696." The electronic data processing (EDP) code represents a unique alpha-numeric designator assigned to air sampling locations for data tracking purposes.

Table 2-1. Radionuclide Air Emissions from Facilities Managed by CH2M HILL Plateau Remediation Company, Fluor Hanford, Inc., Mission Support Alliance, LLC, Washington Closure Hanford, LLC, and Washington River Protection Solutions, LLC in 2009.

Radionuclide	Releases, Ci ^a					
	100 Areas	200 East Area	200 West Area	300 Area	400 Area	Total
³ H (as HTO) ^b	NM	NM	NM	NM	4.7 E-04	4.7 E-04
⁹⁰ Sr	1.0 E-04 ^c	5.1 E-04 ^c	2.1 E-05 ^c	1.9 E-07 ^c	NM	6.4 E-04 ^c
¹⁰⁶ Ru	ND	ND	3.2 E-07	ND	NM	3.2 E-07
¹²⁹ I	NM	1.5 E-03	NM	NM	NM	1.5 E-03
¹³⁷ Cs	2.6 E-05	5.9 E-05	1.1 E-05	6.3 E-07	9.9 E-07 ^d	9.8 E-05
¹⁵⁴ Eu	2.3 E-07	ND	ND	ND	NM	2.3 E-07
²³⁸ Pu	1.5 E-06	ND	ND	ND	NM	1.5 E-06
^{239/240} Pu	3.2 E-05 ^e	3.0 E-06 ^e	2.9 E-05 ^e	ND	2.3 E-15 ^e	6.4 E-05 ^e
²⁴¹ Pu	2.1 E-05	ND	5.2 E-06	NM	NM	2.6 E-05
²⁴¹ Am	8.5 E-06	2.1 E-07	2.3 E-06	1.3 E-08	NM	1.1 E-05

^a 1 Ci = 1 curie = 3.7 E+10 becquerels (Bq), with becquerel defined as equal to one nuclear decay or other nuclear transformation per second; ND = not detected (i.e., either the radionuclide was not detected in any sample during the year or the average of all the measurements for that given radionuclide or type of radioactivity made during the year was below background levels); NM = not measured.

^b HTO = tritium in the form of condensable water vapor.

^c This release value includes gross beta data, assumed to be ⁹⁰Sr in dose calculations. **NOTE:** For the 300 Area, the release value is entirely from gross beta, for Sr-90 was not detected in emissions from the single WCH major stack, samples from which are analyzed for Sr-90.

^d This release value derives entirely from data on gross beta emissions from 400 Area stacks.

^e This release value includes data on gross alpha emissions from some stacks, except for those in the 400 Area, the value for which derives entirely from calculations of residual radioactive material in the Fast Flux Test Facility (FFTF) reactor primary piping systems.

Table 2-2. Hanford Site Radionuclide Air Emissions from Major Point Sources in 2009.^a (4 sheets)

Stack (Facility; Contractor; EDP code) ^b	Average Operating Flow Rate, ^c ft ³ /min	Volume, ft ³	Radionuclide or Type of Radioactivity	Average Operating Concentration, ^d μCi/mL	Emissions, Ci
100 Area Major Point Sources					
296-K-142 (CVDF:CHPRC; Y201)	16,375	8.6 E+09	⁹⁰ Sr	≤0	0
			¹³⁷ Cs	≤0	0
			^{239/240} Pu	≤0	0
			²⁴¹ Pu	≤0	0
			²⁴¹ Am	6.6 E-18	2.9 E-09
			gross α	8.9 E-17	3.9 E-08
			gross β	4.3 E-16	1.9 E-07
200 East Area Major Point Sources					
291-A-1 (PUREX Plant; CHPRC; A006)	30,359	1.6 E+10	⁹⁰ Sr	≤0	0
			¹²⁹ I	2.9 E-12	1.5 E-03
			¹³⁷ Cs	5.7 E-16	5.3 E-07
			^{239/240} Pu	1.7 E-16	1.6 E-07
			²⁴¹ Am	2.2 E-16	2.0 E-07
			gross α	8.5 E-16	7.9 E-07
			gross β	3.1 E-15	2.8 E-06
296-A-42 (TF: WRPS: E147)	560	2.9 E+08	⁹⁰ Sr	≤0	0
			¹²⁹ I	≤0	0
			¹³⁷ Cs	≤0	0
			^{239/240} Pu	≤0	0
			²⁴¹ Am	4.9 E-18	5.6 E-11
			gross α	3.7 E-17	4.3 E-10
			gross β	9.3 E-16	1.1 E-08
96-A-44 And 296-A-45 (TF: WRPS: E920 and E922, respectively [these two stacks exhaust the same source])	892 and 1,024	4.9 E+08	¹⁴ C	NM	NM
			⁹⁰ Sr	≤0	0
			⁹⁰ Y	≤0	0
			¹³⁴ Cs	≤0	0
			¹³⁷ Cs	≤0	0
			²²⁷ Ac	NM	NM
			²³¹ Pa	NM	NM
			²³³ U	NM	NM
			^{239/240} Pu	2.6 E-17	5.0 E-10
			²⁴¹ Am	5.3 E-18	1.0 E-10
			²⁴⁴ Cm	NM	NM
			gross α	3.4 E-16	6.4 E-09
			gross β	1.8 E-15	3.5 E-08

Table 2-2. Hanford Site Radionuclide Air Emissions from Major Point Sources in 2009.^a (4 sheets)

Stack (Facility; Contractor; EDP code) ^b	Average Operating Flow Rate, ^c ft ³ /min	Volume, ft ³	Radionuclide or Type of Radioactivity	Average Operating Concentration, ^d μCi/mL	Emissions, Ci
296-A-46 and 296-A-47 (TF; WRPS; E924 and E926, respectively [these two stacks exhaust the same source])	1,063 and 1,052	5.5 E+08	¹⁴ C	NM	NM
			⁹⁰ Sr	≤0	0
			⁹⁰ Y	≤0	0
			¹³⁴ Cs	≤0	0
			¹³⁷ Cs	≤0	0
			²²⁷ Ac	NM	NM
			²³¹ Pa	NM	NM
			²³³ U	NM	NM
			^{239/240} Pu	1.0 E-16	2.1 E-09
			²⁴¹ Am	6.4 E-17	1.4 E-09
			²⁴⁴ Cm	NM	NM
gross α	1.7 E-16	3.7 E-09			
gross β	1.3 E-15	2.7 E-08			
296-B-1 (B Plant; CHPRC; B001)	15,281	8.0 E+09	⁹⁰ Sr	≤0	0
			¹³⁷ Cs	≤0	0
			gross α	3.8 E-16	1.1 E-07
			gross β	3.3 E-15	9.2 E-07
296-B-10 (WESF; CHPRC; B748)	24,390	1.3 E+10	⁹⁰ Sr	2.4 E-13	1.1 E-04
			¹³⁷ Cs	1.3 E-13	5.8 E-05
			gross α	2.0 E-15	1.2 E-06
			gross β	6.7 E-13	3.9 E-04
296-H-212 (CSB; CHPRC; C601)	8,326	4.4 E+09	⁹⁰ Sr	≤0	0
			¹³⁷ Cs	≤0	0
			^{239/240} Pu	≤0	0
			²⁴¹ Pu	≤0	0
			²⁴¹ Am	5.2 E-18	7.8 E-10
			gross α	3.9 E-16	5.9 E-08
			gross β	8.8 E-16	1.3 E-07
296-P-31 (209-E; CHPRC; E209)	5,500	2.9 E+09	²³⁸ Pu	≤0	0
			^{239/240} Pu	2.3 E-17	2.1 E-09
			²⁴¹ Pu	≤0	0
			²⁴¹ Am	1.7 E-17	1.6 E-09
			gross α	2.0 E-16	1.8 E-08
gross β	1.4 E-15	1.3 E-07			
296-P-45 (TF; CHPRC; E043)	did not operate				
296-P-47 (TF; CHPRC; E096)	did not operate				

Table 2-2. Hanford Site Radionuclide Air Emissions from Major Point Sources in 2009.^a (4 sheets)

Stack (Facility; Contractor; EDP code) ^b	Average Operating Flow Rate, ^c ft ³ /min	Volume, ft ³	Radionuclide or Type of Radioactivity	Average Operating Concentration, ^d μCi/mL	Emissions, Ci
296-P-48 (TF; WRPS; E098)	463	1.7 E+08	⁹⁰ Sr	≤0	0
			¹³⁷ Cs	≤0	0
			^{239/240} Pu	≤0	0
			²⁴¹ Am	≤0	0
			gross α	2.6 E-16	1.8 E-09
			gross β	1.7 E-15	1.1 E-09
200 West Area Major Point Sources					
291-T-1 (221-T; CHPRC; T785)	40,000	2.1 E+10	⁹⁰ Sr	1.6 E-17	1.2 E-08
			¹³⁷ Cs	7.2 E-16	5.4 E-07
			^{239/240} Pu	1.1 E-15	8.1 E-07
			²⁴¹ Pu	≤0	0
			²⁴¹ Am	1.0 E-16	7.9 E-08
			gross α	1.4 E-15	1.1 E-06
			gross β	3.5 E-15	2.6 E-06
291-Z-1 (PFP; CHPRC; Z810)	290,000	1.5 E+11	²³⁸ Pu	≤0	0
			^{239/240} Pu	1.6 E-15	7.9 E-06
			²⁴¹ Pu	1.0 E-15	5.2 E-06
			²⁴¹ Am	4.4 E-16	2.2 E-06
			gross α	3.7 E-15	1.9 E-05
			gross β	8.6 E-16	4.3 E-06
296-P-43 (TF; WRPS; E045)	did not operate				
296-P-44 (TF; WRPS; E046)	458	1.4 E+08	⁹⁰ Sr	2.6 E-15	1.4 E-08
			¹³⁷ Cs	2.6 E-14	1.4 E-07
			^{239/240} Pu	1.1 E-17	6.0 E-11
			²⁴¹ Am	3.5 E-17	1.9 E-10
			gross α	7.9 E-16	4.3 E-09
			gross β	4.4 E-14	2.4 E-07
296-S-21 (222-S; WRPS; S289)	74,608	3.9 E+10	⁹⁰ Sr	≤0	0
			¹³⁷ Cs	≤0	0
			^{239/240} Pu	1.9 E-19	2.9 E-10
			²⁴¹ Am	1.3 E-17	1.9 E-08
			gross α	6.3 E-17	9.6 E-08
			gross β	4.3 E-16	6.5 E-07
296-W-4 (WRAP; CHPRC; W123)	15,079	7.9 E+09	⁹⁰ Sr	≤0	0
			¹³⁷ Cs	≤0	0
			^{239/240} Pu	≤0	0
			²⁴¹ Pu	≤0	0
			²⁴¹ Am	9.4 E-18	2.9 E-09

Table 2-2. Hanford Site Radionuclide Air Emissions from Major Point Sources in 2009.^a (4 sheets)

Stack (Facility; Contractor; EDP code) ^b	Average Operating Flow Rate, ^c ft ³ /min	Volume, ft ³	Radionuclide or Type of Radioactivity	Average Operating Concentration, ^d μCi/mL	Emissions, Ci
			gross α	2.7 E-17	8.2 E-09
			gross β	6.3 E-16	1.9 E-07
296-Z-7 (PFP: CHPRC; Z818)	1,079	5.7 E+08	²³⁸ Pu	≤0	0
			^{239/240} Pu	≤0	0
			²⁴¹ Pu	≤0	0
			²⁴¹ Am	4.3 E-18	8.9 E-11
			gross α	7.5 E-17	1.5 E-09
			gross β	6.8 E-16	1.4 E-08
300 Area Major Point Sources					
EP-324-01-S^c (324 Building; WCH; F025)	59,145	3.1 E+10	⁹⁰ Sr	≤0	0
			¹³⁷ Cs	≤0	0
			^{239/240} Pu	≤0	0
			²⁴¹ Am	1.3 E-17	1.3 E-08
			gross α	≤0	0
			gross β	1.8 E-16	1.9 E-07
EP-327-01-S^c (327 Building; WCH; F026)	23,000	4.3 E+09	⁹⁰ Sr	9.4 E-16	1.3 E-07
			¹³⁷ Cs	4.3 E-15	6.2 E-07
			²³⁸ Pu	8.0 E-17	1.1 E-08
			^{239/240} Pu	9.4 E-17	1.3 E-08
			²⁴¹ Am	1.9 E-16	2.7 E-08
			gross α	3.8 E-16	5.5 E-08
			gross β	3.8 E-16	5.5 E-08
[NOTE: The EP-327-01-0S major stack was downgraded to a minor stack February 27, 2009, and then permanently shut down May 11, 2009.]					

General definitions: ≤ 0 = analytical result equal to level of laboratory ambient background radioactivity or less than that level, which in practical terms means the radionuclide or type of radioactivity was not detected in the emission sampled; Ci = curie; 1 Ci = 3.7 E+10 becquerels (Bq), with becquerel defined as equal to one nuclear decay or other nuclear transformation per second; ft³ = cubic feet; min = minute.

^a A major point source has a radiological dose potential of >0.1 mrem/yr EDE to nearest public receptor.

^b Abbreviations in this column are defined as: CHPRC = CH2M HILL Plateau Remediation Company; CSB = Canister Storage Building; CVDF = Cold Vacuum Drying Facility; EDP code = electronic data processing code, used in chain-of-custody activities to identify sampling locations; PFP = Plutonium Finishing Plant; PUREX = Plutonium-Uranium Extraction; TF = Tank Farms; WCH = Washington Closure Hanford, LLC; WESF = Waste Encapsulation and Storage Facility; WRAP = Waste Receiving and Processing Facility; WRPS = Washington River Protection Solutions, LLC.

^c Reflects stack flow rate averaged over time of stack operation.

^d Reflects concentration averaged over time of stack operation.

^e Emissions from these point sources are associated with cleanup operations conducted under the authority of CERCLA.

Table 2-3. Hanford Site Radionuclide Air Emissions from Minor Point Sources in 2009.^a (4 sheets)

Stack (Facility; Contractor; EDP code) ^b	Average Operating Flow Rate, ^c ft ³ /min	Volume, ft ³	Radionuclide or Type of Radioactivity	Average Operating Concentration, ^d µCi/mL	Emissions, Ci
100 Area Minor Point Sources					
105-KE Basin (100-K Area; CHPRC: Y245, Y246, Y248) did not operate; permanently shutdown					
105-KW Basin^c (100-K Area; CHPRC; Y234, Y235, Y236)	17,700	9.3 E+09	⁹⁰ Sr	5.3 E-14	1.5 E-05
			¹³⁷ Cs	9.1 E-14	2.6 E-05
			¹⁵⁴ Eu	7.9 E-16	2.3 E-07
			²³⁸ Pu	5.1 E-15	1.5 E-06
			^{239/240} Pu	3.8 E-14	1.1 E-05
			²⁴¹ Pu	7.4 E-14	2.1 E-05
			²⁴¹ Am	2.9 E-14	8.5 E-06
			gross α	7.3 E-14	2.1 E-05
gross β	3.0 E-13	8.8 E-05			
107-N^c (100 N Area; WCH; Y265)	6,998	1.2 E+09	gross α	≤0	0
			gross β	3.7 E-15	1.7 E-07
[NOTE: The 107-N stack was permanently shut down April 30, 2009.]					
1706-KE (100-K Area; CHPRC; Y243) did not operate; permanently shutdown					
200 East Area Minor Point Sources					
296-A-10 (PUREX; CHPRC/FH; A550) did not operate; no plan to resume operation					
296-A-18 (TF; WRPS; E060)	287	1.3 E+08	gross α	2.8 E-15	1.4 E-08
			gross β	9.9 E-15	5.1 E-08
296-A-19 (TF; WRPS; E061)	939	4.4 E+08	gross α	8.8 E-16	1.5 E-08
			gross β	3.0 E-15	5.1 E-08
296-A-20 (TF; WRPS; E197)	1,823	8.3 E+08	gross α	1.1 E-16	3.0 E-09
			gross β	7.7 E-16	2.1 E-08
296-A-21 (242-A Evaporator; WRPS; E645)	17,520	9.2 E+09	gross α	2.6 E-16	8.7 E-08
			gross β	9.7 E-16	3.2 E-07
296-A-22 (242-A Evaporator; WRPS; E643)	466	2.4 E+08	⁹⁰ Sr	≤0	0
			¹³⁷ Cs	1.1 E-16	9.4 E-10
			²³⁸ Pu	≤0	0
			^{239/240} Pu	≤0	0
			²⁴¹ Am	≤0	0
			gross α	2.3 E-16	2.0 E-09
gross β	2.5 E-15	2.2 E-08			
296-A-26 (TF; WRPS; E297) did not operate					

Table 2-3. Hanford Site Radionuclide Air Emissions from Minor Point Sources in 2009.^a (4 sheets)

Stack (Facility; Contractor; EDP code) ^b	Average Operating Flow Rate, ^c ft ³ /min	Volume, ft ³	Radionuclide or Type of Radioactivity	Average Operating Concentration, ^d μCi/mL	Emissions, Ci
296-A-28 (TF; WRPS; E272)	4,536	1.9 E+09	gross α gross β	1.1 E-15 3.7 E-15	1.2 E-07 4.3 E-07
296-A-30 (TF; WRPS; E903)	5,547	2.2 E+09	gross α gross β	2.7 E-16 4.0 E-15	3.0 E-08 4.6 E-07
296-A-40 (TF; WRPS; E013)	853	4.5 E+08	gross α gross β	2.5 E-16 4.1 E-15	4.0 E-09 6.4 E-08
296-A-41 (TF; WRPS; E015)	7,609	4.0 E+09	gross α gross β	4.7 E-16 1.5 E-15	6.7 E-08 2.1 E-07
296-A-43 (TF; WRPS; E148)	847	4.5 E+08	gross α gross β	1.5 E-15 2.7 E-15	2.6 E-08 4.7 E-08
[NOTE: The emission concentrations are the highest from 2004-2008 and used as surrogate values for 2009 because no samples were collected although the stack operated.]					
296-E-1 (ETF; CHPRC; E036)	55,954	2.9 E+10	gross α gross β	2.0 E-16 5.9 E-16	2.3 E-07 6.7 E-07
200 West Area Minor Point Sources					
291-S-1 (REDOX; CHPRC; S006)	18,194	9.6 E+09	gross α gross β	3.6 E-16 4.7 E-15	1.3 E-07 1.7 E-06
296-P-22 (TF; WRPS; W191)	880	4.6 E+08	gross α gross β	2.1 E-16 1.2 E-15	3.5 E-09 2.0 E-08
296-P-23 (W190) and 296-S-25 (W145) (TF; WRPS; [stacks operate alternately exhausting a single source])	1,020 and 901	4.7 E+08 [combined total for both stacks]	gross α gross β	2.5 E-16 1.5 E-15	4.3 E-09 2.6 E-08
296-S-15 (TF; WRPS; W111) did not operate					
296-S-16 (222-S; WRPS; S264)	39	2.0 E+07	gross α gross β	1.1 E-15 9.1 E-15	8.4 E-10 7.2 E-09
296-S-18 (TF; WRPS; W096)	2,794	4.8 E+08	gross α gross β	3.3 E-16 3.0 E-15	6.5 E-09 6.0 E-08
296-T-7 (2706-T; CHPRC; T154)	166	8.7 E+07	¹³⁷ Cs gross α gross β	≤0 ≤0 ≤0	0 0 0
296-T-17 (TF; WRPS/CH2M HILL; W117) did not operate; no plan to resume operation					
291-U-1^e (U Plant; CHPRC; U771)	20,509	1.1 E+10	⁹⁰ Sr ¹⁰⁶ Ru ¹³⁷ Cs ²³⁴ U	2.4 E-15 7.7 E-16 2.4 E-14 8.4 E-17	9.8 E-07 3.2 E-07 1.0 E-05 3.5 E-08

Table 2-3. Hanford Site Radionuclide Air Emissions from Minor Point Sources in 2009.^a (4 sheets)

Stack (Facility; Contractor; EDP code) ^b	Average Operating Flow Rate, ^c ft ³ /min	Volume, ft ³	Radionuclide or Type of Radioactivity	Average Operating Concentration, ^d µCi/mL	Emissions, Ci
			²³⁵ U	5.3 E-18	2.2 E-09
			²³⁷ Np	1.1 E-16	1.8 E-09
			²³⁸ U	8.0 E-17	3.4 E-08
			²³⁸ Pu	≤0	0
			^{239/240} Pu	3.7 E-17	1.5 E-08
			²⁴¹ Am	1.7 E-17	7.2 E-09
			gross α	2.3 E-16	9.6 E-08
			gross β	2.5 E-14	1.0 E-05
296-Z-5 (PFP; CHPRC; Z913)	10,265	5.4 E+09	gross α	≤0	0
			gross β	≤0	0
296-Z-6 (PFP; CHPRC; Z802)	14,000	7.4 E+09	gross α	1.1E-16	3.2E-08
			gross β	8.6E-16	2.5E-07
296-Z-15^c (PFP; CHPRC; Z915)	1,378	7.2 E+08	gross α	≤0	0
			gross β	≤0	0
300 Area Minor Point Sources					
340-B (340 Complex; CHPRC/FH; F008) did not operate; locked out, no plan to resume operation					
340-DECON (340 Complex; CHPRC; F009)	7,249	3.8 E+09	gross α	≤0	0
			gross β	5.1 E-16	7.5 E-08
340-NT-EX (340 Complex; CHPRC; F002)	1,420	7.5 E+08	gross α	≤0	0
			gross β	3.4 E-16	8.3 E-09
400 Area Minor Point Sources					
437-1-61 (MASF; CHPRC; F019)	14,914	7.8 E+09	gross α	≤0	0
			gross β	1.2 E-15	3.6 E-07
437-MN&ST (MASF; CHPRC; F014)	13,853	7.3 E+09	gross α	≤0	0
			gross β	2.0 E-15	6.3 E-07
FFTF-CB-EX (FFTF; CHPRC; F011)	18,018	9.5 E+09	³ H (as HTO)	NA	4.7 E-04
			gross α	NA	2.3 E-15
			gross β	NA	3.6 E-10
[Note: No measured flow from stack. Ci values derive from residual radioactive inventory in FFTF reactor primary piping systems, not actually measured from emission samples.]					
FFTF-HT-TR (FFTF; CHPRC; F013) did not operate; permanently shutdown					
FFTF-RE-SB (FFTF; CHPRC; F012) did not operate; permanently shutdown					
600 Area Minor Point Sources					
696-W-1 (WSCF; MSA/FH; W010)	47,418	2.5 E+10	gross α	≤0	0
			gross β	≤0	0

Table 2-3. Hanford Site Radionuclide Air Emissions from Minor Point Sources in 2009.^a (4 sheets)

Stack (Facility; Contractor; EDP code) ^b	Average Operating Flow Rate, ^c ft ³ /min	Volume, ft ³	Radionuclide or Type of Radioactivity	Average Operating Concentration, ^d μ Ci/mL	Emissions, Ci
696-W-2 (WSCF; MSA/FH; W011)	1,178	6.2 E+08	gross α gross β	≤ 0 1.0 E-16	0 2.5 E-09

General definitions: ≤ 0 = analytical result equal to level of laboratory ambient background radioactivity or less than that level, which in practical terms means the radionuclide or type of radioactivity was not detected in the emission sampled; Ci = curie; 1 Ci = 3.7 E+10 becquerels (Bq), with becquerel defined as equal to one nuclear decay or other nuclear transformation per second; ft³ = cubic feet; HTO means tritium in the form of condensable water vapor; min = minute.

^a A minor point source has a radiological dose potential of ≤ 0.1 mrem/yr EDE to nearest public receptor.

^b Abbreviations in this column are defined as: CHPRC = CH2M HILL Plateau Remediation Company; EDP code = electronic data processing code, used in chain-of-custody activities to identify sampling locations; ETF = Effluent Treatment Facility; FFTF = Fast Flux Test Facility; FH = Fluor Hanford, Inc.; MASF = Maintenance and Storage Facility; MSA = Mission Support Alliance, LLC; PFP = Plutonium Finishing Plant; REDOX = Reduction-Oxidation (S Plant); TF = Tanks Farms; WCH = Washington Closure Hanford, LLC; WRPS = Washington River Protection Solutions, LLC; and WSCF = Waste Sampling and Characterization Facility.

^c Reflects stack flow rate averaged over time of stack operation.

^d Reflects concentration averaged over time of stack operation.

^e Emissions from these point sources are associated with cleanup operations conducted under the authority of CERCLA.

2.2 CRITERIA AND TOXIC AIR POLLUTANTS

Criteria and toxic air pollutants reported for calendar year 2009 were from the following areas and facilities: package boilers in the 200 and 300 Areas; East Tank Farms; West Tank Farms, 200 Area ETF, and internal combustion engines with 500 horsepower and greater. Emission data are in Table 2-4.

Hanford Tank Waste Treatment and Immobilization Plant (WTP) emissions of criteria and/or toxic air pollutants in calendar year 2009 are shown in Table 2-5. Emission sources include concrete batch plant point and fugitive emissions; diesel generators, diesel boilers; fuel storage tanks; diesel and propane heaters; and dehumidifiers. Fugitive sources of emissions include aggregate processing, unpaved roads, and stockpiles. These emissions are also estimated to the nearest ton in the *Hanford Site Annual Non-Radioactive Air Emissions Inventory Report, Information Submittal, Calendar Year 2009* (an attachment to Correspondence 211324, from F. M. Russo, Bechtel National, Inc., to S. J. Olinger, U.S. Department of Energy, Office of River Protection, dated March 15, 2010).

Table 2-4. Criteria and Toxic Air Pollutants Reported for Facilities Managed by Bechtel National, Inc., CH2M HILL Plateau Remediation Company, Fluor Hanford, Inc., Johnson Controls, Inc., Mission Support Alliance, LLC, Washington Closure Hanford, LLC, and Washington River Protection Solutions, LLC during 2009.

Constituent	Quantities, lb
Particulate matter total	4,000
Particulate matter 10 μm	2,000
Particulate matter 2.5 μm	0
Sulfur oxides	0
Nitrogen oxides	30,000
Carbon monoxide	26,000
Volatile organic compounds ^{a, b}	24,000
Ammonia ^c	12,000
Lead	1
Total criteria pollutants ^d	84,000

NOTE: Criteria pollutants include PM-total, nitrogen oxides, sulfur oxides, carbon monoxide, lead, and volatile organic compounds (which are regulated as precursors to ozone).

^a This estimated release of volatile organic compounds does not include emissions from certain laboratory operations nor from small non-road and/or mobile sources (e.g., vehicles, grass mowers, chain saws, etc.).

^b From combustion of petroleum to make steam and to power electrical generators; release value includes calculated estimates from tank farms in the 200 East and 200 West Areas; evaporation losses from fuel dispensing; and operation of the 200 Area ETF, Central Waste Complex, T Plant Complex, and WRAP.

^c Ammonia releases are calculated estimates from tank farms in the 200 East and 200 West Areas, from operation of the 200 Area ETF, and from petroleum burned to make steam and to power electrical generators.

^d Criteria pollutants include particulate matter-total, nitrogen oxides, sulfur oxides, carbon monoxide, lead, and volatile organic compounds.

Table 2-5. Waste Treatment and Immobilization Plant Criteria and/or Toxic Air Pollutants Emitted during 2009.

Source	Emissions (kg)		
	Particulate Matter	Sulfur Oxides	Nitrogen Oxides
<u>Emission Pt. No. 33</u> WTP Concrete Batch Plant 200-E Area (BNI)	4.58 E+02	NA	4.1 E+01
<u>Emission Pt. No. 34</u> WTP Concrete Batch Plant (Pit 30) 600 Area (BNI)	1.08 E+03	NA	NA
<u>Emission Pt. No. 35</u> WTP Fuel Dispensing/Evaporation 200-E Area (BNI)	NA	NA	NA
<u>Emission Pt. No. 36</u> WTP Heaters / Dehumidifiers 200-E Area (BNI)	6.60 E+01	1.50 E+01	2.54 E+03

3.0 LIQUID EFFLUENTS

During calendar year 2009, radioactive and nonradioactive liquid effluents were discharged to the ground and to the Columbia River from facilities and activities managed by CHPRC, FH, WCH, and WRPS. All discharges were in accordance with the requirements of state and federal discharge permits.

Wastewater from various 200 Area facilities is piped to the 200 Area TEDF. The wastewater originates from the Plutonium Finishing Plant (PFP), T Plant, the Waste Encapsulation Storage Facility (WESF), 242-A-81 Building, 283-W Water Treatment Plant, 242-A Evaporator (when operating), 241-A Tank Farm, 222-S Laboratory, and several package boiler annexes in the 200 East and 200 West Areas.

ETF treats 242-A Evaporator process condensate, as well as other radioactive liquids generated at the Hanford Site, such as groundwater from the UP-1 Operable Unit and wastewater from cleanup of the 105-KE and 105-KW fuel storage basins. ETF treats liquid waste by filtration, ultraviolet oxidation, pH adjustment, reverse osmosis, and ion exchange. After treatment, the liquid waste is sampled and analyzed before approval is granted for discharge to SALDS.

Table 3-1 lists the permitted discharge points active in calendar year 2009.

3.1 DISCHARGES TO THE COLUMBIA RIVER

Liquid effluents discharged to the Columbia River from the 100-K and 300 Areas were regulated in accordance with NPDES permit WA-002591-7 for the Hanford Site.

Table 3-2 presents radionuclide release data by individual liquid effluent streams. A tabulation of NPDES-regulated discharge parameters is in Table 3-3 and Table 3-4.

3.1.1 1908-K Outfall

The 1908-K Outfall (aka NPDES discharge number 004), located in the 100-K area, discharges water treatment plant filter backwash water, overflow from water storage basins, and miscellaneous discharges from the water treatment plant operations to the Columbia River. The K Area Wastewater Effluent (aka NPDES discharge monitoring report [DMR] designation 004 A) operated in 2009. The Filter Plant Backwash Effluent (aka NPDES DMR designation 004 B) operated a portion of 2009. The Intake Screen Wash Effluent (aka NPDES DMR designation 003 A) did not operate in 2009 and is now permanently inactive. NPDES-permit monitoring and analytical data parameters are in Table 3-3.

3.1.2 300 Area Treated Effluent Disposal Facility

The 300 Area TEDF (aka NPDES DMR number 001 [aka Outfall 001]) treats wastewater prior to discharge to the Columbia River. Until September 2, 2009, 300 Area industrial wastewaters were routed to the 300 Area TEDF for treatment prior to discharge. On that date, the 300 Area TEDF operations were permanently terminated and discharge to and from Outfall 001 ceased. For the remainder of 2009, 300 Area industrial wastewaters were routed to the City of Richland sewer system for treatment and disposal through its POTW. NPDES-permit monitoring and analytical data parameters are in Table 3-4.

3.2 STATE PERMITTED DISCHARGES TO GROUND

State Waste Discharge Permits govern all Hanford Site liquid effluent streams discharged to the ground. The permitted streams are listed in Table 3-1 and described in succeeding sections.

3.2.1 200 Area Effluent Treatment Facility

The 200 Area ETF discharges treated wastewater. The discharges are regulated in accordance with State Waste Discharge Permit ST 4500 (ST 4500). Permit-specified monitoring and analytical data parameters are in Table 3-5.

3.2.2 400 Area Secondary Cooling Water

The 400 Area Secondary Cooling Water Stream discharges cooling water from the secondary cooling loop of the FFTF Cooling Towers. This stream is regulated in accordance with State Waste Discharge Permit ST 4501 (ST 4501). Permit-specified monitoring and analytical data parameters are in Table 3-6.

3.2.3 200 Area Treated Effluent Disposal Facility

The 200 Area TEDF discharges treated wastewater to the ground. The facility consists of a piping network that conveys wastewater from numerous other facilities on the Hanford Site to two 5-acre disposal basins located near the facility. Discharges from the 200 Area TEDF are regulated in accordance with State Waste Discharge Permit ST 4502 (ST 4502). Permit-specified monitoring and analytical data parameters are in Table 3-7. The discharges routinely meet state drinking water standards.

3.2.4 100-N Sewage Treatment Lagoon

The 100-N Sewage Treatment Lagoon treats sewage from the 100-N, 100-K, and 200 Areas. Domestic wastewater from the 100-N Sewage Treatment Lagoon is discharged to ground in accordance with State Waste Discharge Permit ST 4507 (ST 4507). Leachate from residual solids and from radioactive waste is not sanctioned by the permit. Permit-specified monitoring and analytical data parameters are in Table 3-8.

3.2.5 Hydrotest, Maintenance, and Construction Discharges

Hydrotest, maintenance, and construction activities occur at numerous locations throughout the Hanford Site producing wastewater discharges to soil. Such discharges are regulated in accordance with State Waste Discharge Permit ST 4511 (ST 4511), which also includes discharges of cooling water, steam condensate, and industrial stormwater. Sampling the discharges is not required as long as compliance is maintained with an Ecology-approved *Pollution Prevention and Best Management Practices Plan* (DOE/RL-97-67, Rev. 5).

WTP discharges hydrotest, maintenance, and construction water to ground in accordance with ST 4511. Discharge compliance is maintained through the Ecology-approved DOE/RL-97-67, Rev. 5. Significant discharges defined in permit condition S6 are reported annually. No significant discharges at WTP occurred in 2009.

3.2.6 Cooling Water and Steam Condensate Discharges

Cooling water and steam condensate discharges occur at numerous locations throughout the Hanford Site. Such discharges are regulated in accordance with ST 4511, which also includes discharges of hydrotests, maintenance, construction, and stormwater. Discharge sampling is not required as long as compliance is maintained with DOE/RL-97-67, Rev. 5.

3.2.7 Stormwater Discharges

Industrial stormwater discharges collected in engineered structures and then discharged to engineered structures occur at numerous locations throughout the Hanford Site. Such discharges are regulated in accordance with ST 4511, which also addresses discharges from hydrotests, maintenance, construction, cooling water, and steam condensate. Discharge sampling is not required as long as compliance is maintained with DOE/RL-97-67, Rev. 5.

During the first half of 2009, the 100-K Area of the Hanford Site was covered by a multi-sector general permit for stormwater discharges implemented in 2000. That permit establishes the terms and conditions under which storm water discharges associated with industrial activity were authorized. CHPRC was the holder of this permit. On June 22, 2009, CHPRC filed a Notice of Termination for its coverage under that permit.

3.2.8 Waste Treatment and Immobilization Plant Pit 30 and Concrete Batch Plant Operations

WTP discharges process, dewatering, and stormwater to the ground at two locations in the 200 East Area of the Hanford Site: the Concrete Batch Plant (Discharge Permit WAG 50-5180) and Pit 30 (Discharge Permit WAG 50-5181). The Pit 30 site was reactivated June 22, 2009, after having been inactive since 2005. The Concrete Batch Plant was active throughout all of 2009. Permit-specified monitoring and analytical data parameters are in Table 3-9. Those data are from quarterly Sand and Gravel General Permit Discharge Monitoring Reports.

Table 3-1. National Pollutant Discharge Elimination System and State Permitted Discharge Points during 2009.

Designation	Description
Discharge Monitoring Report Points — NPDES Permit No. WA-002591-7	
001 A	300 Area TEDF (Final Discharge to Columbia River Effluent)
001 B	300 Area TEDF (Final Wastes to TEDF Effluent) [no discharge]
003 A	Intake Screen Wash Effluent [at the 100-K Area; permanently inactive]
004 A	K Area Wastewater Effluent [via the 1908-K Outfall]
004 B	Filter Plant Backwash Effluent [via the 1908-K Outfall]
Stormwater Discharge — NPDES Permit No. WAR05A45F	
WAR05A45F	NPDES Stormwater Multi-Sector General Permit for K Basin Closure Project Activities
State-Permitted Discharge Points	
ST 4500	200 Area ETF, Discharge No. 001
ST 4501	400 Area Secondary Cooling Water, Discharge No. 001
ST 4502	200 Area TEDF, Discharge No. 6653
ST 4507	100-N Sewage Lagoon
ST 4511	<ul style="list-style-type: none"> • Hydrotest, maintenance, and construction discharges • Cooling water and steam condensate discharges • Industrial stormwater discharges • WTP hydrostatic discharges
WAG 50-5180	WTP Concrete Batch Plant Sand and Gravel General Permit
WAG 50-5181	WTF Pit 30 Sand and Gravel General Permit

Table 3-2. Radionuclides in Liquid Effluents Discharged to the Environment in 2009.

Liquid Effluent Stream (EDP code) ^a	Discharge Location	Total Flow, gal	Radionuclide or Type of Radioactivity	Average Concentration, $\mu\text{Ci/mL}$ ^b	Annual Release, Ci ^b
100 Area Discharges to the Columbia River					
NPDES Outfall 004, 100-K 1908-K Outfall (Y130)	Columbia River	2.6 E+07	⁹⁰ Sr	1.1 E-07	1.1 E-02
			¹³⁷ Cs	1.4 E-07	1.3 E-02
			²³⁸ Pu	3.6 E-11	3.6 E-06
			^{239/240} Pu	3.0 E-10	3.0 E-05
Discharges to Ground in the 600 Area					
200 Area Effluent Treatment Facility (H129)	616-A Crib (aka SALDS) ^c	2.2 E+06	³ H	7.4 E-06	6.1 E-01

^a EDP code = electronic data processing code, which identifies the sampler (aka "location code").

^b Ci = curie; Ci = 3.7 E+10 becquerels/sec., with becquerel defined as equal to one nuclear decay or other nuclear transformation per second.

^c The 616-A Crib is immediately north of the 200 West Area; SALDS = State-Approved Land Disposal Site.

Table 3-3. 1908-K Outfall National Pollutant Discharge Elimination System Effluents Released to the Columbia River in 2009.

Sample Parameter/Limit	Month											
	Jan	Feb	Mar	Apr	May	June	July	Aug*	Sep*	Oct*	Nov*	Dec*
K Area Wastewater Effluent (Discharge Monitoring Report No. 004 A)												
Temperature/80 (max.; °F)	43	45	49.8	52	63	71	72	69	66	62	57	51
pH/6.0 (min.)	7.0	7.3	7.4	7.2	7.3	7.4	7.7	NR	NR	7.0	6.84	6.8
pH/9.0 (max.)	7.0	7.3	7.4	7.2	7.3	7.4	7.7	7.9	6.6	7.0	6.84	6.8
Flow/2.0 (avg.; MGD)	0.07	0.039	0.071	0.011	0.049	0.138	0.115	0.08	0.053	0.057	0.11	0.27
Flow/4.9 (max.; MGD)	1.12	1.6	2.016	0.32	0.96	1.56	1.76	NR	NA	1.44	1.44	1.6
Chlorine/1.34 (avg.; lb/day)	0.0006	0.0049	0.071	0.0017	0.008	0.196	0.012	NA	0.02	NA	NA	NA
Chlorine/4.09 (max.; lb/day)	0.187	0.401	0.33	0.080	0.241	0.652	0.294	NA	0.03	NA	NA	NA
Chlorine/0.08 (avg.; mg/L)	0.01	0.015	0.012	0.018	0.02	0.017	0.0125	0.02	0.02	0.005	0.015	0.0022
Chlorine/0.1 (max.; mg/L)	0.02	0.03	0.02	0.03	0.03	0.05	0.02	0.02	0.04	0.01	0.03	0.05
Filter Plant Backwash Effluent (Discharge Monitoring Report No. 004 B)												
Total suspended solids/150 (avg.; lb/day) ^a	ND	ND	10.48	ND	ND	12.804	ND	ND	ND	ND	ND	ND
Total suspended solids/225 (max.; lb/day) ^a	ND	ND	12.82	ND	ND	20.786	ND	ND	ND	ND	ND	ND
Total suspended solids/30 (avg.; mg/L) ^a	ND	ND	2.2	ND	ND	2.735	ND	ND	ND	ND	ND	ND
Total suspended solids/45 (max.; mg/L) ^a	ND	ND	2.6	ND	ND	4.44	ND	ND	ND	ND	ND	ND
Flow/0.6 (avg.; MGD)	ND	ND	0.57	ND	ND	0.56	ND	ND	ND	ND	ND	ND
Flow/0.6 (max.; MGD)	ND	ND	0.59	ND	ND	0.56	ND	ND	ND	ND	ND	ND

Max. = maximum; min. = minimum; avg. = average [max. and min. units of quality or loading and units of concentration represent, respectively, a daily maximum and a monthly average]; d= days; mo = month; 0 = less than instrument detection limit; MGD = million gallons per day; NA = not applicable; ND = no discharge; NR = nothing reported; °F = degrees Fahrenheit; lb/day = pounds per day; mg/L = milligrams per liter; pCi/L = picocurie/liter.

^a In accordance with NPDES permit, total suspended solids measured at the filter plant backwash water before mixing at the 004 A Outfall.

* These constituents and parameters were also measured: August: Cs-137 at 63.4 pCi/L max.; gross alpha at 1.1 pCi/L avg. and 1.5 pCi/L max.; and gross beta at 95.6 pCi/L avg. and 112.0 pCi/L max.; September: Cs-137 at 58.0 pCi/L avg. and 58.9 pCi/L max.; gross alpha at 0.51 pCi/L avg. and 0.90 pCi/L max.; and gross beta at 81.5 pCi/L avg. and 95.0 pCi/L max.; October: Cs-137 at 53.9 pCi/L avg. and 66.8 pCi/L max.; gross alpha at 0.99 pCi/L avg. and 1.10 pCi/L max.; and gross beta at 56.0 pCi/L max.; and 56.0 pCi/L max.; November: Cs-137 at 27.9 pCi/L avg. and 28.2 pCi/L max.; gross alpha at 0.28 pCi/L avg. and 0.56 pCi/L max.; and gross beta at 57.6 pCi/L avg. and 62.2 pCi/L max.; December: Cs-137 at 19.45 pCi/L avg. and 27.8 pCi/L max.; gross alpha at 1.25 pCi/L avg. and 1.3 pCi/L max.; and gross beta at 37.75 pCi/L avg. and 49.5 pCi/L max.

Table 3-4. 300 Area Treated Effluent Disposal Facility ("Discharge to Columbia River Effluent," Discharge Monitoring Report No. 001 A)
National Pollutant Discharge Elimination System Effluents Released to the Columbia River in 2009. (5 sheets)

Sample Parameter/Limit	Month											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep*	Oct	Nov	Dec
Temperature/95 (avg.; °F)	54.2	56.0	59.8	64.7	69.7	78.5	84.3	86.1	84.0	PSD	PSD	PSD
Temperature/105 (max.; °F)	63.6	75.6	67.8	71.1	75.5	82.3	89.7	92.5	85.5	PSD	PSD	PSD
pH/6.0 (min.)	6.4	6.5	6.6	6.5	6.7	6.7	6.7	6.8	7.1	PSD	PSD	PSD
pH/9.0 (max.)	7.2	7.7	7.1	7.7	7.2	7.2	7.7	7.3	7.3	PSD	PSD	PSD
Total suspended solids/11 (avg.; lb/day)	1.0138	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Total suspended solids/35 (max.; lb/day)	4.2688	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Total suspended solids/3,000 (avg.; µg/L)	1,000	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Total suspended solids/9,000 (max.; µg/L)	2,000	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Nitrogen, ammonia total/NA (as N; avg.; lb/day)	0.0112	0.3013	0.0346	0.0284	0.0692	0.0629	0.0222	NR	NR	PSD	PSD	PSD
Nitrogen, ammonia total/NA (as N; max.; lb/day)	0.0470	0.5467	0.1088	0.1551	0.3336	0.2232	0.1107	NR	NR	PSD	PSD	PSD
Nitrogen, ammonia total/NA (as N; avg.; µg/L)	11.00	319.8	36.15	32.75	95.78	69.55	25.40	21.65	NR	PSD	PSD	PSD
Nitrogen, ammonia total/NA (as N; max.; µg/L)	22.00	339.0	46.10	65.50	143.0	95.20	50.80	28.70	NR	PSD	PSD	PSD
Arsenic/0.018 (avg.; lb/day)	0.002	0.0003	0.0005	0	0	0	0.0002	NR	NR	PSD	PSD	PSD
Arsenic/0.0351 (max.; lb/day)	0.0010	0.0010	0.0013	0	0	0	0.0009	NR	NR	PSD	PSD	PSD
Arsenic/5 (µg/L)	0.23	0.31	0.50	0	0	0	0.21	<4.00	NR	PSD	PSD	PSD
Arsenic/9 (max.; µg/L)	0.45	0.61	0.53	0	0	0	0.41	<4.00	NR	PSD	PSD	PSD
Iron/3.0469 (avg.; lb/day)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Iron/5.6965 (max.; lb/day)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Iron/846 (µg/L)	0	0	0	0	0	0	0	<16.00	NR	PSD	PSD	PSD
Iron/1,460 (max.; µg/L)	0	0	0	0	0	0	0	<16.00	NR	PSD	PSD	PSD
Selenium/0.0180 (avg.; lb/day)	0.0009	0.0004	0.0005	0.0002	0	0.0002	0	NR	NR	PSD	PSD	PSD
Selenium/0.0273 (max.; lb/day)	0.0022	0.0012	0.0014	0.0009	0	0.0010	0	NR	NR	PSD	PSD	PSD
Selenium/5 (µg/L)	0.88	0.39	0.49	0.20	0	0.21	0	<0.30	NR	PSD	PSD	PSD
Selenium/7 (max.; µg/L)	1.01	0.77	0.59	0.39	0	0.42	0	<0.30	NR	PSD	PSD	PSD
Beryllium/0.0072 (avg.; lb/day)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Beryllium/0.0156 (max.; lb/day)	0.0001	0.0001	0.0001	0	0	0	0	NR	NR	PSD	PSD	PSD
Beryllium/2 (µg/L)	0.04	0.04	0.03	0	0	0	0	NR	NR	PSD	PSD	PSD

Table 3-4. 300 Area Treated Effluent Disposal Facility ("Discharge to Columbia River Effluent," Discharge Monitoring Report No. 001 A)
National Pollutant Discharge Elimination System Effluents Released to the Columbia River in 2009. (5 sheets)

Sample Parameter/Limit	Month											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep*	Oct	Nov	Dec
Beryllium/4 (max.; µg/L)	0.07	0.08	0.06	0	0	0	0	NR	NR	PSD	PSD	PSD
Nickel/0.126 (avg.; lb/day)	0.0009	0.0004	0.0003	0.0001	0.0001	0.0002	0	NR	NR	PSD	PSD	PSD
Nickel/0.2341 (max.; lb/day)	0.0027	0.0008	0.0008	0.0005	0.0005	0.0007	0	NR	NR	PSD	PSD	PSD
Nickel/35 (µg/L)	0.86	0.40	0.32	0.11	0.12	0.26	0	<2.00	NR	PSD	PSD	PSD
Nickel/60 (max.; µg/L)	1.27	0.50	0.34	0.22	0.23	0.30	0	<2.00	NR	PSD	PSD	PSD
Silver/0.0216 (avg.; lb/day)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Silver/0.0390 (max.; lb/day)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Silver/6 (µg/L)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Silver/10 (max.; µg/L)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Zinc/0.09 (avg.; lb/day)	0.0031	0.0013	0.0038	0	0.0004	0.0011	0	NR	NR	PSD	PSD	PSD
Zinc/0.1677 (max.; lb/day)	0.0092	0.0022	0.0096	0	0.0028	0.0040	0	NR	NR	PSD	PSD	PSD
Zinc/25 (µg/L)	3.03	1.36	3.98	0	0.59	1.25	0	<0.80	NR	PSD	PSD	PSD
Zinc/43 (max.; µg/L)	4.32	1.38	4.08	0	1.18	1.69	0	<0.80	NR	PSD	PSD	PSD
Aluminum/0.7743 (avg.; lb/day)	0.0101	0.0093	0.0088	0.0092	0.0132	0.0124	0.03222	NR	NR	PSD	PSD	PSD
Aluminum/1.4514 (max.; lb/day)	0.0299	0.0168	0.0257	0.0289	0.0432	0.0384	0.1327	NR	NR	PSD	PSD	PSD
Aluminum/215 (µg/L)	9.99	9.92	9.20	10.59	18.25	13.70	36.80	<100.0	NR	PSD	PSD	PSD
Aluminum/372 (max.; µg/L)	14.00	10.40	10.90	12.20	18.50	16.40	60.90	<100.0	NR	PSD	PSD	PSD
Cadmium/0.0072 (avg.; lb/day)	0.0001	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Cadmium/0.0156 (max.; lb/day)	0.0003	0.0002	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Cadmium/2 (µg/L)	0.07	0.05	0	0	0	0	0	0	NR	PSD	PSD	PSD
Cadmium/4 (max.; µg/L)	0.13	0.10	0	0	0	0	0	0	NR	PSD	PSD	PSD
Lead/0.0144 (avg.; lb/day)	0.0001	0.0001	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Lead/0.0312 (max.; lb/day)	0.0003	0.0002	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Lead/4 (µg/L)	0.06	0.06	0	0	0	0	0	<0.10	NR	PSD	PSD	PSD
Lead/8 (max.; µg/L)	0.12	0.11	0	0	0	0	0	<0.10	NR	PSD	PSD	PSD
Copper/0.036 (avg.; lb/day)	0.0030	0.0033	0.0032	0.0022	0.0028	0.0033	0.0021	NR	NR	PSD	PSD	PSD
Copper/0.0585 (max.; lb/day)	0.0088	0.0068	0.0078	0.0077	0.0100	0.0088	0.0072	NR	NR	PSD	PSD	PSD

Table 3-4. 300 Area Treated Effluent Disposal Facility ("Discharge to Columbia River Effluent," Discharge Monitoring Report No. 001 A)
National Pollutant Discharge Elimination System Effluents Released to the Columbia River in 2009. (5 sheets)

Sample Parameter/Limit	Month											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep*	Oct	Nov	Dec
Copper/10 (µg/L)	2.91	3.50	3.31	2.57	3.95	3.68	2.45	3.64	NR	PSD	PSD	PSD
Copper/15 (max.; µg/L)	4.11	4.20	3.32	3.27	4.27	3.76	3.31	3.95	NR	PSD	PSD	PSD
Radium/02 (avg.; pCi/L)	0	0	0	0	0	0	0	<0.2	NR	PSD	PSD	PSD
Radium/0.4 (max.; pCi/L)	0	0	0	0	0	0	0	<0.2	NR	PSD	PSD	PSD
Manganese/0.0360 (avg.; lb/day)	0.0001	0.0002	0.0001	0.0003	0.0001	0.0002	0.0006	NR	NR	PSD	PSD	PSD
Manganese/0.0663 (max.; lb/day)	0.0003	0.0004	0.0007	0.0017	0.0005	0.0006	0.0024	NR	NR	PSD	PSD	PSD
Manganese/10 (µg/L)	0.15	0.22	0.15	0.35	0.11	0.24	0.65	<1.00	NR	PSD	PSD	PSD
Manganese/17 (max.; µg/L)	0.15	0.25	0.30	0.70	0.21	0.24	1.11	<1.00	NR	PSD	PSD	PSD
Dichlorobromomethane/0.0079 (avg.; lb/day)	0.0001	0.0002	0.0001	0.0001	0.0003	0.0003	0.0001	NR	NR	PSD	PSD	PSD
Dichlorobromomethane/0.0156 (max.; lb/day)	0.0002	0.0004	0.0004	0.0004	0.0011	0.0009	0.0005	NR	NR	PSD	PSD	PSD
Dichlorobromomethane/2.2 (µg/L)	0.11	0.20	0.15	0.09	0.40	0.38	0.17	<0.09	NR	PSD	PSD	PSD
Dichlorobromomethane/4 (max.; µg/L)	0.11	0.27	0.19	0.17	0.47	0.40	0.22	<2.20	NR	PSD	PSD	PSD
Chloroform/0.0468 (avg.; lb/day)	0.0028	0.0029	0.0031	0.0036	0.0053	0.0064	0.0033	NR	NR	PSD	PSD	PSD
Chloroform/0.0858 (max.; lb/day)	0.0062	0.0053	0.0078	0.0104	0.0180	0.0190	0.0094	NR	NR	PSD	PSD	PSD
Chloroform/15 (µg/L)	2.80	3.10	3.20	4.15	7.40	7.10	3.75	3.40	NR	PSD	PSD	PSD
Chloroform/26 (max.; µg/L)	2.90	3.30	3.30	4.40	7.70	8.10	4.30	3.90	NR	PSD	PSD	PSD
Toluene/0.0216 (avg.; lb/day)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Toluene/0.0351 (max.; lb/day)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Toluene/6 (µg/L)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Toluene/9 (max.; µg/L)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Methylene chloride/0.018 (avg.; lb/day)	0.0001	0.0002	0	0.0001	0.0002	0.0003	0.0002	NR	NR	PSD	PSD	PSD
Methylene chloride/0.036 (max.; lb/day)	0.0003	0.0004	0	0.0004	0.0010	0.0009	0.0008	NR	NR	PSD	PSD	PSD
Methylene chloride/5 (µg/L)	0.11	0.24	0	0.09	0.35	0.35	0.26	<0.09	NR	PSD	PSD	PSD
Methylene chloride/10 (max.; µg/L)	0.12	0.24	0	0.17	0.41	0.42	0.36	<0.09	NR	PSD	PSD	PSD
Tetrachloroethylene/0.0180 (avg.; lb/day)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Tetrachloroethylene/0.0351 (max.; lb/day)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Tetrachloroethylene/5 (µg/L)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD

Table 3-4. 300 Area Treated Effluent Disposal Facility ("Discharge to Columbia River Effluent," Discharge Monitoring Report No. 001 A)
National Pollutant Discharge Elimination System Effluents Released to the Columbia River in 2009. (5 sheets)

Sample Parameter/Limit	Month											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep*	Oct	Nov	Dec
Tetrachloroethylene/9 (max.; µg/L)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
1,1-Dichloroethane/0.0169 (avg.; lb/day)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
1,1-Dichloroethane/0.0273 (max.; lb/day)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
1,1-Dichloroethane/4.7 (µg/L)	0	0	0	0	0	0	0	<0.07	NR	PSD	PSD	PSD
1,1-Dichloroethane/7 (max.; µg/L)	0	0	0	0	0	0	0	<0.07	NR	PSD	PSD	PSD
1,1,1-Trichloroethane/0.0180 (avg.; lb/day)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
1,1,1-Trichloroethane/0.0351 (max.; lb/day)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
1,1,1-Trichloroethane/5 (µg/L)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
1,1,1-Trichloroethane/9 (max.; µg/L)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Bis (2-ethylhexyl) phthalate/0.036 (avg.; lb/day)	0	0	0	0	0	0.0012	0	NR	NR	PSD	PSD	PSD
Bis (2-ethylhexyl) phthalate/0.072 (max.; lb/day)	0	0	0	0	0	0.0061	0	NR	NR	PSD	PSD	PSD
Bis (2-ethylhexyl) phthalate/10 (µg/L)	0	0	0	0	0	1.3	0	NR	NR	PSD	PSD	PSD
Bis (2-ethylhexyl) phthalate/20 (max.; µg/L)	0	0	0	0	0	2.6	0	NR	NR	PSD	PSD	PSD
Trichloroethylene/0.0068 (avg.; lb/day)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Trichloroethylene/0.0117 (max.; lb/day)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Trichloroethylene/1.9 (µg/L)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Trichloroethylene/3 (max.; µg/L)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Flow/NA (monthly avg., MGD)	0.121	0.113	0.114	0.104	0.086	0.108	0.105	0.099	NR	PSD	PSD	PSD
Flow/NA (daily max., MGD)	0.256	0.193	0.283	0.284	0.279	0.281	0.261	0.263	NR	PSD	PSD	PSD
Nitrogen, nitrite total (as NO ₂)/0.2161 (avg.; lb/day)	0.0891	0.0475	0.0443	0.0090	0	0.0114	0.0114	NR	NR	PSD	PSD	PSD
Nitrogen, nitrite total (as NO ₂)/0.4058 (max.; lb/day)	0.2689	0.1100	0.1279	0.0490	0	0.0593	0.0567	NR	NR	PSD	PSD	PSD
Nitrogen, nitrite total (as NO ₂)/60 (µg/L)	87.9	50.45	46.35	10.35	0	12.65	13.00	<18.0	NR	PSD	PSD	PSD
Nitrogen, nitrite total (as NO ₂)/104 (max.; µg/L)	126.0	68.20	54.20	20.70	0	25.30	26.00	<18.0	NR	PSD	PSD	PSD
Mercury/0.0032 (avg.; lb/day)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Mercury/0.0059 (max.; lb/day)	0	0	0.0001	0	0	0	0.0001	NR	NR	PSD	PSD	PSD
Mercury/0.9 (µg/L)	0	0	0.03	0	0	0	0.03	<0.05	NR	PSD	PSD	PSD
Mercury/1.5 (max.; µg/L)	0	0	0.06	0	0	0	0.05	<0.05	NR	PSD	PSD	PSD

Table 3-4. 300 Area Treated Effluent Disposal Facility ("Discharge to Columbia River Effluent," Discharge Monitoring Report No. 001 A) National Pollutant Discharge Elimination System Effluents Released to the Columbia River in 2009. (5 sheets)

Sample Parameter/Limit	Month											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep*	Oct	Nov	Dec
Cyanide/0.0216 (avg.; lb/day)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Cyanide/0.0390 (max.; lb/day)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Cyanide/6 (µg/L)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Cyanide/10 (max.; µg/L)	0	0	0	0	0	0	0	NR	NR	PSD	PSD	PSD
Gross alpha/NA (avg./mo; pCi/L)	1.84	1.17	1.38	1.05	0.27	0	0	<1.40	NR	PSD	PSD	PSD
Gross alpha/NA (max./d; pCi/L)	2.00	1.25	1.48	2.09	0.53	0	0	<1.40	NR	PSD	PSD	PSD
Gross beta/NA (avg./mo; pCi/L)	3.88	4.68	4.06	0.84	1.60	0.78	1.69	<2.60	NR	PSD	PSD	PSD
Gross beta/NA (max./d; pCi/L)	4.04	5.56	4.62	1.68	1.79	1.56	1.72	<2.60	NR	PSD	PSD	PSD

* TEDF outfall to Columbia River permanently shut down on September 2; 2009; max. = maximum; min. = minimum; avg. = average [max. and min. units of quality or loading and units of quality or concentration represent, respectively, a daily maximum and a monthly average]; d= day; mo = month; 0 = less than instrument detection limit; NR = nothing reported; ND = no discharge; MGD = million gallons per day; PSD = permanently shutdown; °F = degrees Fahrenheit; lb/day = pounds per day; mg/L = milligrams per liter; pCi/L = picocurie/liter.

Table 3-5. 200 Area Effluent Treatment Facility Discharge Monitoring Report (ST 4500, Discharge No. 001) for 2009. (2 sheets)

Sample Parameter	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Conductivity (avg., µmhos/cm)	1.82	1.75	1.71	1.69	2.16	3.79	2.35	1.96	1.81	ND	ND	ND
Total suspended solids (µg/L)	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	ND	ND	ND
Nitrate (as N; µg/L)	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	ND	ND	ND
Total organic carbon (µg/L)	303	<DL	<DL	304	<DL	609	<DL	168	<DL	ND	ND	ND
Chloride (µg/L)	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	ND	ND	ND
Sulfate (µg/L)	<DL	<DL	<DL	35	29	<DL	<DL	<DL	<DL	ND	ND	ND
Arsenic, avg. (µg/L)	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	ND	ND	ND
Arsenic, max. (µg/L)	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	ND	ND	ND
Beryllium (µg/L)	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	ND	ND	ND
Cadmium (µg/L)	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	ND	ND	ND
Chromium (µg/L)	<DL	0.541	<DL	<DL	<DL	<DL	<DL	<DL	<DL	ND	ND	ND
Copper (µg/L)	<DL	0.438	0.124	0.290	0.594	<DL	0.114	<DL	0.488	ND	ND	ND

Table 3-5. 200 Area Effluent Treatment Facility Discharge Monitoring Report (ST 4500, Discharge No. 001) for 2009. (2 sheets)

Sample Parameter	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lead (µg/L)	<DL											
Gross beta (pCi/L)	0.96	3.0	0.47	1.9	0.55	0.70	0.38	0.42	<DL	<DL	<DL	<DL
Strontium-90 (pCi/L)	<DL	<DL	<DL	<DL	<DL	1.6	<DL	<DL	<DL	<DL	<DL	<DL
Carbon tetrachloride, avg. (µg/L)	<DL	<DL	<DL	<DL	<DL	1.0	<DL	<DL	<DL	<DL	<DL	<DL
Carbon tetrachloride, max. (µg/L)	<DL	<DL	<DL	<DL	<DL	1.0	<DL	<DL	<DL	<DL	<DL	<DL
Chloroform (µg/L)	<DL											
Benzene (µg/L)	<DL											
Methylene chloride (µg/L)	5.6	<DL										
Tetrachloroethylene, avg. (µg/L)	<DL											
Tetrachloroethylene, max. (µg/L)	<DL											
Effluent flow rate, max. (gal/mo)	1,881,000	1,940,000	1,882,000	2,550,000	2,560,000	1,880,000	3,220,000	3,300,000	2,620,000	2,620,000	2,620,000	2,620,000
Total dissolved solids (µg/L)	<DL	20,000	<DL	<DL	<DL	<DL						
Nitrite (as N; µg/L)	<DL											
Mercury (µg/L)	<DL											
N-nitrosodimethylamine (µg/L)	<DL											
Acetophenone (µg/L)	<DL											
Tetrahydrofuran (µg/L)	<DL											
Gross alpha (pCi/L)	<DL	0.73	0.17	0.49	<DL	<DL	0.80	0.37	0.46	<DL	<DL	<DL
Tritium (pCi/L)	8,100	8,800	6,800	7,900	7,000	6,800	6,800	6,800	8,000	8,000	8,000	8,000
Ammonia (as N; µg/L)	<DL											
Uranium (total; µg/L)	<DL											
Technetium-99 (pCi/L)	<DL											

<DL = less than detection limit; ND = no discharge; gal/mo = gallons per month; µmhos/cm = micro-mho per centimeter; µg/L = micro grams per liter.

Table 3-6. 400 Area Secondary Cooling Water Discharge Monitoring Report (ST 4501, Discharge No. 001) for 2009.

Sample Parameter	Month											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Conductivity (avg., μmhos/cm)	380	380	390	390	388	390	390	350	270	220	380	430
pH (minimum)	8.26	8.27	8.26	8.26	8.32	8.47	8.45	7.8	7.71	7.82	8.08	8.29
pH (maximum)	8.39	8.38	8.38	8.38	8.38	8.52	8.61	8.7	8.88	8.94	8.36	8.53
Flow rate (avg., gpm)	8.69	8.16	8.31	8.31	5.98	3.02	2.83	2.65	2.65	2.65	2.82	2.84

μmhos/cm = micro-mho per centimeter; gpm = gallons per minute; μg/L = micro grams per liter.

Table 3-7. 200 Area Treated Effluent Disposal Facility Discharge Monitoring Report (ST 4502, Discharge No. 6653) for 2009. (2 sheets)

Sample Parameter	Month											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Conductivity (avg., μmhos/cm)	228	184	155	187	151	146	189	189	175	169	160	137
pH (minimum)	6.51	6.54	6.86	6.73	6.50	6.72	6.37	6.75	6.84	6.53	6.30	6.08
pH (maximum)	8.58	7.88	8.36	8.61	8.10	8.86	7.76	7.08	7.65	6.95	7.14	6.90
Nitrate, avg. (as N; μg/L)	329	241	53.4	371	162	89.5	202	136	111	47.9	143	166
Nitrate, max. (as N; μg/L)	329	241	53.4	371	162	89.5	202	136	111	47.9	143	166
Chloride, avg. (μg/L)	14,100	17,000	1,610	8,500	1,350	1,460	3,870	3,490	3,730	2,090	2,950	2,470
Chloride, max. (μg/L)	14,100	17,000	1,610	8,500	1,350	1,460	3,870	3,490	3,730	2,090	2,950	2,470
Sulfate (μg/L)	17,400	20,100	10,500	16,900	9,820	8,610	28,800	23,200	26,100	16,900	21,000	20,200
Arsenic (μg/L)	0.73	0.724	0.58	0.414	0.549	0.606	<DL	0.538	<DL	0.468	<DL	0.513
Cadmium (μg/L)	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Chromium (μg/L)	0.594	0.513	0.510	<DL	<DL	<DL	<DL	<DL	0.557	<DL	<DL	<DL
Iron (ug/L)	64.2	182	65	207	52.1	44.3	55.1	81.9	85.7	30.7	55.3	116
Lead (ug/L)	0.214	0.47	<DL	0.529	<DL	<DL	<DL	0.127	0.683	<DL	0.137	1.30
Manganese (ug/L)	<DL	7.3	9.5	11.4	<DL	7.6	<DL	7.4	7.2	<DL	<DL	5.8
Gross beta (pCi/L)	<DL	<DL	<DL	6.5	<DL	<DL	<DL	<DL	<DL	7.8	<DL	5.8
Flow rate, monthly avg. (gpm)	36	38	1,920	1,200	2,100	2,200	35	30	37	34	40	39

Table 3-7. 200 Area Treated Effluent Disposal Facility Discharge Monitoring Report (ST 4502, Discharge No. 6653) for 2009. (2 sheets)

Sample Parameter	Month											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Total dissolved solids, avg. (µg/L)	142,000	120,000	88,000	132,000	96,000	83,000	37,000	82,000	133,000	87,000	106,000	110,000
Total dissolved solids, max. (µg/L)	142,000	120,000	88,000	132,000	96,000	83,000	37,000	82,000	133,000	87,000	106,000	110,000
Mercury (µg/L)	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Gross alpha (pCi/L)	<DL	0.80	0.72	<DL	<DL	1.3	<DL	<DL	<DL	1.4	<DL	11
Oil and grease (µg/L)	<DL	<DL	<DL	<DL	<DL	<DL	7,200	<DL	<DL	<DL	<DL	<DL
Carbon tetrachloride (µg/L)	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Chloroform (µg/L)	1.19	1.19	1.9	1.9	1.9	1.9	3.5	3.5	3.5	3.5	3.5	3.5
Methylene chloride (µg/L)	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Bis(2-ethylhexyl)phthalate (µg/L)	2.47	2.47	2.47	2.47	2.47	2.47	0.85	0.85	0.85	0.85	0.85	0.85
Total trihalomethanes (µg/L)	1.19	1.19	1.19	1.19	1.19	1.19	3.5	3.5	3.5	3.5	3.5	3.5
Tritium (pCi/L)	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL

<DL = less than detection limit; µmhos/cm = micro-mhos per centimeter; µg/L = microgram per liter; pCi/L = picocuries per liter; gpm = gallons per minute.

Table 3-8. 100-N Sewage Treatment Lagoon Discharge Monitoring Report (ST 4507) for 2009.

Sample Parameter	Month											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Influent (gal/day)	6,947	7,431	8,124	8,699	6,340	9,853	9,101	8,923	13,653	15,943	14,615	8,293
Effluent (gal/day)	ND	ND	ND	ND	ND	ND	0/ND	0/ND	0/ND	27,277	26,611	0/ND
Total suspended solids (mg/L)	ND	ND	8.0	ND								
Total dissolved solids (mg/L)	ND	464	452.5	ND								
Biochemical oxygen demand (mg/L)	ND	LE	38.9	ND								
pH	ND	7.3	7.2	ND								
Nitrate (NO ₃) (as N; mg/L)	ND	2.7	3.45	ND								
Ammonia (NH ₃) (mg/L)	ND	2.5	1.8	ND								
Fecal coliform (colony size per 100 ml)	ND	540	1,486.9	ND								

LE = lab error, no results; ND = no discharge; NR = not reported; gal/day = gallons per day; mg/L = milligrams per liter; avg. = average; min. = minimum; max. = maximum

Table 3-9. Waste Treatment and Immobilization Plant Concrete Batch Plant (WAG 50-5180) and Pit 30 (WAG 50-5181) Discharge Monitoring Report Effluents in 2009. (2 sheets)

Sample Parameter	Month											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
WAG 50-5180: Process / Dewatering Water to Ground												
pH minimum	-	-	-	-	-	-	-	-	-	-	-	-
pH maximum	-	-	-	-	-	-	-	-	-	-	-	-
Total dissolved solids	-	-	-	-	-	-	-	-	-	-	-	-
Visible oil sheen (daily)	-	-	-	-	-	-	-	-	-	-	-	-
No discharge	X	X	X	X	X	X	X	X	X	X	X	X
Stormwater to Ground												
pH minimum	-	8.41	7.89	7.10	-	-	-	-	-	8.01	-	7.7
pH maximum	-	8.47	8.43	7.40	-	-	-	-	-	8.03	-	7.8
Visible oil sheen (daily)	-	N	N	N	-	-	-	-	-	N	-	N
No discharge	X	-	-	-	X	X	X	X	X	-	X	-

Table 3-9. Waste Treatment and Immobilization Plant Concrete Batch Plant (WAG 50-5180) and Pit 30 (WAG 50-5181) Discharge Monitoring Report Effluents in 2009. (2 sheets)

WAG 50-5181: Process/Dewatering Water to Ground				
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
pH minimum	-	-	-	8.20
pH maximum	-	-	-	8.40
Visible oil sheen (daily)	-	-	-	N
No discharge	Inactive	X	X	X
Stormwater to Ground				
pH minimum	-	-	-	-
pH maximum	-	-	-	-
Visible oil sheen (daily)	-	N	N	N
No discharge	Inactive	-	-	-

“-” indicates a non-applicable field; “X” indicates no discharge occurred within the respective month or quarter; “N” indicates “no.”

4.0 HAZARDOUS SUBSTANCE RELEASES

Hazardous substances, whether radioactive or nonradioactive, released to the environment must be evaluated to determine if they are reportable to federal, state, or local regulatory agencies. Agency notification is required when a released amount exceeds reporting thresholds. Reportable releases of hazardous substances are classified as one of the following two types:

- Nonroutine releases
- Continuous, routine releases.

Each type of release is discussed in the following sections.

4.1 NONROUTINE RELEASES

During the second half of 2009, radioanalytical results for composited samples from four ambient air monitors in the 100-K East Area were notably elevated compared to historical averages. Airborne concentrations of $^{239/240}\text{Pu}$ and ^{241}Am at all four locations were greater than initial indicator set points, established as 10 percent of the EPA concentration values listed in Table 2 of 40 CFR 61, Appendix E. The concentration of ^{137}Cs at one location was also greater than 10 percent of the Table 2 value. As required, all results were reported to the Washington State Department of Health. All of these elevated results in the immediate locale were likely attributable to one minor incident involving improper crushing of a section of pipe as well as normal increases due to facility-demolition activities underway at that time in the 100-K East Area.

Aside from the situation in the 100-K East Area, no other known notable elevated ambient conditions occurred nor constituent releases in excess of Reportable Quantity (RQ) thresholds. Furthermore, the effect of any localized elevated emissions showed no discernible effect on cumulative annual routine emissions (i.e., from point sources and fugitive sources) at ambient air monitoring stations at or near the Hanford Site perimeter.

4.2 ROUTINE CONTINUOUS RELEASES

Releases of hazardous substances that exceed CERCLA RQs need not be reported immediately to the National Response Center when both of the following conditions are met:

- An initial notification has been completed
- The routine releases are continuous and stable in quantity and rate.

Historically at the Hanford Site, only the continuous, routine releases of ammonia, ammonium hydroxide, and carbon tetrachloride have posed operational difficulties for staying beneath RQs. During 2009, releases of ammonia, ammonium hydroxide, and carbon tetrachloride were below applicable RQs.

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