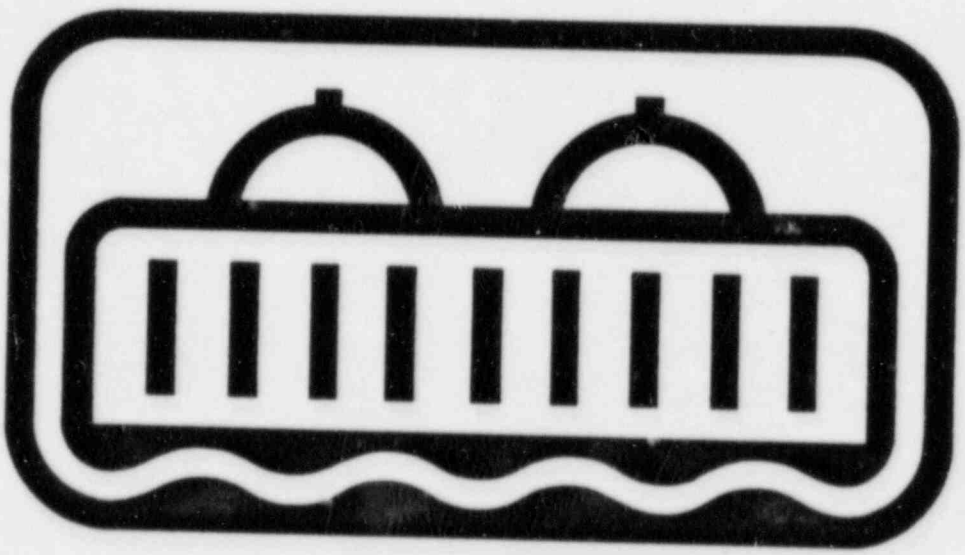
DIABLO CANYON POWER PLANT

SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

JANUARY 1 - JUNE 30, 1985



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INTRODUCTION

This Semiannual Radioactive Effluent Release Report summarizes the gaseous and liquid effluent releases made from Diablo Canyon Power Plant's Unit 1 for the first and second quarters of 1985. This report also includes a summary of solid radwaste shipments. This report contains the information required by Unit 1 Technical Specifications 6.9.1.8 and 6.9.1.9 and is generally presented in the format of Regulatory Guide 1.21, Appendix B.

The Unit 1 reactor was critical for short periods in January and February. As the power ascension testing program continued, Unit 1 achieved 100% power in March. It was shut down during April and commercial operation was achieved on May 7. The Unit 2 reactor had not achieved initial criticality during the report period. Therefore, in accordance with Unit 2 Technical Specification 6.9.1.6, no Unit 2 information is included in this report.

There were no shipments of solid radioactive waste made during this report period. There were no changes made to the Process Control Program during this report period.

PART ONE

GASEOUS AND LIQUID EFFLUENTS

SUPPLEMENTAL INFORMATION

I Regulatory Limits

A. Gaseous Effluents

1. Noble Gas Dose Rate Limit

The dose rate in unrestricted areas due to radioactive noble gases released in gaseous effluents is limited to less than or equal to 500 millirem per year to the total body and less than or equal to 3000 millirem per year to the skin. (Tech. Spec. 3.11.2.1.a.)

2. Particulate and Iodine Dose Rate Limit

The dose rate in unrestricted areas due to radioiodines and radioactive materials in particulate form, and radionuclides (other than noble gases) with half lives greater than 8 days in gaseous effluents is limited to less than or equal to 1500 millirem per year to any organ. (Tech. Spec. 3.11.2.1.b.)

3. Noble Gas Dose Limit

The air dose due to noble gases released in gaseous effluents, from each reactor unit, from the site, is limited to the following.

	CALENDAR QUARTER	CALENDAR YEAR
Gamma radiation	5 millirad	10 millirad
Beta radiation	10 millirad	20 millirad

(Tech. Spec. 3.11.2.2)

4. Particulate and Iodine Dose Limit

The dose to an individual from radioiodines and radioactive materials in particulate form and radionuclides (other than noble gases) with half lives greater than 8 days in gaseous effluents released, from each reactor unit, from the site, is limited to less than or equal to 7.5 millirem to any organ in any calendar quarter and less than or equal to 15 millirem to any organ during a calendar year. (Tech. Spec. 3.11.2.3)

B. Liquid Effluents

1. Concentration

The concentration of radioactive material released from the site is limited to the concentrations specified in 10 CFR Part 20, Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration is limited to 2×10^{-4} microcuries/ml total activity. (Tech. Spec. 3.11.1.1)

2. Dose

The dose or dose commitment to an individual from radioactive materials in liquid effluents released, from each reactor unit, from the site, is limited to the following:

	CALENDAR QUARTER	CALENDAR YEAR
Total Body	1.5 millirem	3 millirem
Any Organ	5 millirem	10 millirem

(Tech. Spec. 3.11.1.2)

II Maximum Permissible Concentrations

A. Gaseous Effluents

Maximum permissible concentrations are not used in the methodology for determining allowable release rates for gaseous effluents at Diablo Canyon Power Plant.

B. Liquid Effluents

The concentrations listed in 10 CFR 20, Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained noble gases are used for determining the allowable release rate at the point of discharge from the site for liquid effluents. For dissolved or entrained noble gases, the allowable release rate concentration at the point of discharge is limited to 2×10^{-4} microcuries per milliliter total activity for liquid effluents.

III Measurements and Approximations of Total Radioactivity

A. Gaseous Effluents

1. Fission and Activation Gases

The gaseous radioactivity released from the plant vent is measured by a pair of off line monitors each using

Geiger-Mueller detector readings from these monitors. These monitor readings are correlated to isotopic concentration based on isotopic analysis of a grab sample using a germanium detector. A grab sample is obtained and analyzed at least weekly. The isotopic mixture is assumed to remain constant between grab sample analyses. Containment purges, gas decay tank releases and air ejector discharge are all routed through the plant vent for release. The gaseous radioactivity released from the steam generator blowdown tank vent is measured by analyzing grab samples with a germanium detector. The isotopic concentrations are assumed to remain constant between grab samples.

When the plant vent measurements as indicated by the process monitors are below the lower limit of detection, the results of the grab samples are used to quantify releases. In addition, the individual batch release data is used to quantify the radioactivity discharged from the gas decay tanks and containment.

Other potential pathways for releasing gaseous radioactivity are periodically monitored by collecting grab samples and analyzing these samples with a germanium detector system.

2. Iodines

Radioiodines released from the plant vent are monitored by continuous sample collection on silver zeolite cartridges. The cartridges are changed at least weekly and analyzed with a germanium detector. The radioiodine releases are averaged over the period of cartridge sample collection.

Other potential pathways for releasing radioiodines are periodically monitored by collecting samples using charcoal cartridges and analyzing these cartridges with a germanium detector.

3. Particulates

Radioactive materials in particulate form released from the plant vent are monitored by continuous sample collection on particulate filters. The filters are changed at least weekly and analyzed with a germanium detector. The particulate radioactivity is averaged over the period of particulate filter sample collection. Each filter is analyzed for alpha emitters using an internal proportional counter. All of the plant vent particulate filters collected during a quarter are used for the composite analysis for strontium 89 and 90 which is counted on an internal proportional counter after chemical separation.

Other potential pathways for releasing radioactive particulates are periodically monitored by collecting samples using particulate filters and analyzing these filters with a germanium detector.

B. Liquid Effluents

1. Batch Releases

Each tank of liquid radwaste is analyzed for principal gamma emitters using a germanium detector prior to release. The pre-release analysis includes dissolved and entrained gases. Volume proportional monthly and quarterly composites are prepared from aliquots of each tank released. The monthly composite is analyzed for tritium using a liquid scintillation spectrometer, gross alpha radioactivity using an internal proportional counter and phosphorous-32 using an internal proportional counter following chemical separation. The quarterly composite is analyzed for iron-55 using a thin sodium iodide detector and for strontium-89 and 90 using an internal proportional detector following chemical separations.

2. Continuous releases

For the continuous liquid releases of steam generator blowdown tank and turbine building sump oily water separator, daily grab samples are collected and volume proportioned for weekly, monthly and quarterly composites. The oily water separator weekly composite is analyzed for gross gamma and principal gamma emitters using a germanium detector. The steam generator blowdown tank weekly composite is analyzed for principal gamma emitters and iodine 131. The steam generator blowdown tank monthly composite is analyzed for tritium using a liquid scintillation spectrometer, for gross alpha using an internal proportional counter and for phosphorous-32 using an internal proportional counter following chemical separation. The steam generator blowdown tank quarterly composite is analyzed for iron-55 using a thin sodium iodide detector and for strontium-89 and 90 using an internal proportional counter following chemical separations. The results for each of the composites is averaged over the period of the composite. In addition, one grab sample of the steam generator blowdown tank is analyzed monthly for dissolved and entrained gases using a germanium detector. The results of this analysis are assumed to remain constant over the period of one month.

IV Batch Releases

A. Liquid

1. Number of batch releases..... 286
2. Total time period for batch releases..... 1056 hours
3. Maximum time period for a batch release..... 11.5 hours
4. Average time period for a batch release..... 3.7 hours
5. Minimum time period for a batch release..... 0.42 hours
6. Average saltwater flow during batch releases..... 7.21 E5 GPM

B. Gaseous

1. Number of batch releases..... 92
2. Total time period for batch releases..... 410.33 hours
3. Maximum time period for a batch release..... 23.75 hours
4. Average time period for a batch release..... 4.46 hours
5. Minimum time period for a batch release..... 0.08 hours

V Abnormal Releases

On March 23, 1985, a planned gaseous release occurred via the steam generator pressure relief valves. A total of 2.54 E-8 curies of Na-24 was released. This occurred in conjunction with the 100% load rejection test which closely followed the Na-24 tracer secondary system performance study.

On May 8, 1985, an unplanned release from a gas decay tank occurred when a pressure relief disc on a boric acid evaporator ruptured. The release occurred inside the auxiliary building and was monitored by the plant vent monitors. A total of 7.99 E-4 curies of Kr-88, 7.83 E-3 curies of Xe-133, 1.01 E-2 curies of Xe-135, and 3.29 E-3 curies of Ar-41 were released during this event.

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TABLE 1

GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

	Units	1st Quarter	2nd Quarter	Est. Total Error,%
A. Fission & activation gases				
1. Total release	Ci	3.95 E-1	6.21 E+1	5.0 E1
2. Average release rate for period	µCi/sec	5.08 E-2	7.90 E+0	
3. Percent of technical specification limit[2]	%	8.90 E-4	2.66 E-2	
B. Iodines				
1. Total iodine-131	Ci	MDA[1]	1.54 E-5	2.3 E1
2. Average release rate for period	µCi/sec	MDA	1.96 E-6	
3. Percent of technical specification limit[2]	%	0.0	1.75 E-2	
C. Particulates				
1. Particulates with half-lives > 8 days	Ci	MDA	5.15 E-10	2.3 E1
2. Average release rate for period	µCi/sec	MDA	6.55 E-11	
3. Percent of technical specification limit[2]	%	0.0	5.15 E-8	
4. Gross alpha radioactivity	Ci	MDA	MDA	
D. Tritium				
1. Total release	Ci	9.43 E-1	1.61 E-1	1.2 E1
2. Average release rate for period	µCi/sec	1.21 E-1	2.05 E-2	
3. Percent of technical specification limit[2]	%	3.30 E-4	5.63 E-5	

[1] MDA = the "a posteriori" minimum detectable activity (microcuries per unit mass or volume)

[2] Technical Specification 3.11.2.1 Limit

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TABLE 2

GASEOUS EFFLUENTS - GROUND-LEVEL RELEASES

		1ST QUARTER		2ND QUARTER	
Nuclides Released	Units	CONTINUOUS MODE	BATCH MODE	CONTINUOUS MODE	BATCH MODE
1. Fission gases					
krypton-85	Ci	MDA	MDA	MDA	MDA
krypton-85m	Ci	MDA	1.76 E-4	MDA	1.37 E-2
krypton-87	Ci	MDA	MDA	MDA	MDA
krypton-88	Ci	MDA	MDA	MDA	MDA
xenon-131m	Ci	MDA	MDA	MDA	2.70 E-2
xenon-133	Ci	MDA	2.76 E-1	3.08 E+1	2.93 E+1
xenon-133m	Ci	MDA	MDA	MDA	3.41 E-1
xenon-135	Ci	MDA	8.88 E-3	5.59 E-2	3.06 E-1
xenon-135m	Ci	MDA	MDA	MDA	MDA
xenon-138	Ci	MDA	MDA	MDA	MDA
argon-41	Ci	MDA	1.10 E-1	5.26 E-1	7.30 E-1
TOTAL FOR PERIOD	Ci	0	3.95 E-1	3.14 E+1	3.07 E+1

2. Iodines

iodine-131	Ci	MDA	1.54 E-5
iodine-133	Ci	MDA	MDA
iodine-135	Ci	MDA	MDA
TOTAL FOR PERIOD	Ci	0.0	1.54 E-5

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TABLE 2 (Continued)

GASEOUS EFFLUENTS - GROUND-LEVEL RELEASES

Nuclides Released	Units	CONTINUOUS MODE	
		1st Quarter	2nd Quarter
3. Particulates			
cerium-141	Ci	MDA	MDA
cerium-144	Ci	MDA	MDA
cesium-134	Ci	MDA	MDA
cesium-137	Ci	MDA	MDA
cobalt-58	Ci	MDA	MDA
cobalt-60	Ci	MDA	MDA
iron-59	Ci	MDA	MDA
manganese-54	Ci	MDA	MDA
molybdenum-99[1]	Ci	MDA	MDA
strontium-89	Ci	MDA	5.15 E-10
strontium-90[1]	Ci	MDA	MDA
zinc-65	Ci	MDA	MDA
TOTAL FOR PERIOD	Ci	0	5.15 E-10

[1] Includes daughters

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TABLE 3

GASEOUS EFFLUENTS - LOWER LIMITS OF DETECTION

Nuclide	Units	Continuous Mode	Batch Mode	
1. Fission gases			Containment Purge	Gas Decay Tank
krypton-85m	µCi/ml	6.90E-9	6.90E-9	9.58E-6
krypton-87	µCi/ml	1.88E-8	1.88E-8	1.36E-5
krypton-88	µCi/ml	2.26E-8	2.26E-8	3.23E-5
xenon-131m	µCi/ml	1.87E-7	1.87E-7	3.39E-4
xenon-133	µCi/ml	1.97E-8	1.97E-8	6.97E-5
xenon-133m	µCi/ml	4.61E-8	4.61E-8	9.35E-5
xenon-135	µCi/ml	4.15E-9	4.15E-9	6.37E-5
xenon-135m	µCi/ml	4.13E-8	4.13E-8	2.67E-5
xenon-138	µCi/ml	1.09E-7	1.09E-7	3.30E-5
argon-41	µCi/ml	3.34E-8	3.34E-8	2.84E-5
2. Tritium				
hydrogen-3	µCi/ml	3.52E-10	4.12E-10	
3. Iodines				
iodine-131	µCi/ml	2.83E-13		
iodine-133	µCi/ml	4.77E-13		
iodine-135	µCi/ml	6.66E-12		

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TABLE 3 (Continued)

GASEOUS EFFLUENTS - LOWER LIMITS OF DETECTION

Nuclide	Units	Continuous Mode
4. Particulates		
cerium-141	µCi/ml	2.82 E-13
cerium-144	µCi/ml	1.51 E-12
cesium-134	µCi/ml	3.45 E-13
cesium-137	µCi/ml	2.72 E-13
cobalt-58	µCi/ml	3.03 E-13
cobalt-60	µCi/ml	4.91 E-13
iron-59	µCi/ml	7.29 E-13
manganese-54	µCi/ml	4.37 E-13
molybdenum-99[1]	µCi/ml	2.36 E-12
strontium-89	µCi/ml	2.98 E-15
strontium-90[1]	µCi/ml	1.57 E-15
zinc-65	µCi/ml	8.12 E-13
gross alpha	µCi/ml	7.23E-15

[1] Includes daughters

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TABLE 4

LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	Units	1ST Quarter	2ND Quarter	Est Total Error, %
A. Fission and activation products				
1. Total release (not including tritium, gases, alpha)	Ci	3.48 E-1	1.91 E0	2.1 E1
2. Average diluted concentration during period	µCi/ml	4.08 E-9	2.18 E-8	
3. Percent of applicable limit[1]	%	6.30 E-3	6.42 E-2	
B. Tritium				
1. Total release	Ci	2.29 E+1	5.11 E+1	7.0 E0
2. Average diluted concentration during period	µCi/ml	2.68 E-7	5.83 E-7	
3. Percent of applicable limit[1]	%	8.93 E-3	1.94 E-2	
C. Dissolved and entrained gases				
1. Total release	Ci	1.11 E-4	2.87 E-3	2.1 E1
2. Average diluted concentration during period	µCi/ml	1.30 E-12	3.27 E-11	
3. Percent of applicable limit[1]	%	6.50 E-7	1.64 E-5	
D. Gross alpha radioactivity				
1. Total release	Ci	MDA	MDA	6.0 E1

[1] Technical Specification 3.11.1.1 Limit

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TABLE 4 (Continued)

LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	Units	1st Quarter	2nd Quarter	Est Total Error, %
E. Volume of waste released (prior to dilution)	liters	6.72 E+6	6.31 E+6	5.0 E0
F. Volume of circulating saltwater used during release	liters	8.54 E+10	8.77 E+10	6.6 E0

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TABLE 5

LIQUID EFFLUENTS

Nuclides Released	Units	1ST QUARTER		2ND QUARTER	
		CONTINUOUS MODE	BATCH MODE	CONTINUOUS MODE	BATCH MODE
antimony-124	Ci	MDA	1.50 E-5	MDA	2.85 E-4
bromine-82	Ci	MDA	1.09 E-5	MDA	MDA
cerium-141	Ci	MDA	MDA	MDA	MDA
cerium-144	Ci	MDA	MDA	MDA	MDA
cesium-134	Ci	MDA	MDA	MDA	4.02 E-5
cesium-136	Ci	MDA	MDA	MDA	2.38 E-5
cesium-137	Ci	MDA	MDA	MDA	6.19 E-4
chromium-51	Ci	MDA	3.90 E-3	MDA	1.70 E-2
cobalt-57	Ci	MDA	1.38 E-4	MDA	1.78 E-3
cobalt-58	Ci	MDA	2.72 E-1	MDA	1.56 E+0
cobalt-60	Ci	MDA	1.75 E-2	MDA	2.38 E-1
iron-55	Ci	MDA	MDA	MDA	3.64 E-3
iron-59	Ci	MDA	2.00 E-2	MDA	5.48 E-3
lanthanum-140	Ci	MDA	1.38 E-4	MDA	2.36 E-2
manganese-54	Ci	MDA	2.20 E-2	MDA	4.04 E-2
molybdenum-99[1]	Ci	MDA	1.26 E-3	MDA	2.77 E-3
phosphorous-32	Ci	MDA	5.71 E-3	MDA	5.64 E-3
sodium-24	Ci	MDA	4.23 E-3	MDA	2.45 E-3

[1] Includes daughters

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TABLE 5 (CONTINUED)

LIQUID EFFLUENTS

Nuclides Released	Units	1ST QUARTER		2ND QUARTER	
		CONTINUOUS MODE	BATCH MODE	CONTINUOUS MODE	BATCH MODE
strontium-89	Ci	MDA	MDA	MDA	3.70 E-4
strontium-90[1]	Ci	MDA	MDA	MDA	MDA
tungsten-187	Ci	MDA	6.09 E-4	MDA	1.18 E-4
zirconium-95[1]	Ci	MDA	1.11 E-5	MDA	5.86 E-4
zinc-65	Ci	MDA	MDA	MDA	MDA
iodine-131	Ci	MDA	7.99 E-5	MDA	8.29 E-3
iodine-133	Ci	MDA	3.89 E-4	MDA	2.30 E-3
iodine-135	Ci	MDA	1.14 E-4	MDA	4.88 E-5
TOTAL FOR PERIOD	Ci	0	3.48 E-1	0	1.91 E+0
xenon-133	Ci	MDA	4.10 E-5	MDA	2.78 E-3
xenon-135	Ci	MDA	7.01 E-5	MDA	8.61 E-5

[1] Includes daughters

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TABLE 6

LIQUID EFFLUENTS - LOWER LIMITS OF DETECTION

Nuclide	Units	LLD
antimony-124	µCi/ml	2.06 E-8
bromine-82	µCi/ml	3.80 E-8
cerium-141	µCi/ml	3.49 E-8
cerium-144	µCi/ml	1.88 E-7
cesium-134	µCi/ml	2.92 E-8
cesium-136	µCi/ml	5.06 E-8
cesium-137	µCi/ml	4.90 E-8
chromium-51	µCi/ml	2.50 E-7
cobalt-57	µCi/ml	2.17 E-8
cobalt-58	µCi/ml	3.82 E-8
cobalt-60	µCi/ml	4.36 E-8
iron-55	µCi/ml	4.80 E-7
iron-59	µCi/ml	6.45 E-8
lanthanum-140	µCi/ml	5.68 E-8
manganese-54	µCi/ml	3.91 E-8
molybdenum-99[1]	µCi/ml	2.79 E-7
phosphorous-32	µCi/ml	3.31 E-7
sodium-24	µCi/ml	4.72 E-8
strontium-89	µCi/ml	4.07 E-8
strontium-90[1]	µCi/ml	4.00 E-8

[1] Includes Daughters

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TABLE 6 (CONTINUED)

LIQUID EFFLUENTS - LOWER LIMITS OF DETECTION

Nuclide	Units	LLD
tungsten-187	µCi/ml	8.96 E-8
zirconium-95[1]	µCi/ml	6.51 E-8
zinc-65	µCi/ml	7.22 E-8
gross alpha	µCi/ml	9.00 E-8
iodine-131	µCi/ml	2.55 E-8
iodine-133	µCi/ml	2.12 E-8
iodine-135	µCi/ml	1.63 E-7
xenon-133	µCi/ml	2.08 E-7
xenon-135	µCi/ml	2.16 E-8

[1] Includes daughters

PART TWO

SOLID RADWASTE SHIPMENTS

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SOLID WASTE AND IRRADIATED FUEL SHIPMENT

A. Solid Waste Shipped Offsite for Burial or Disposal (Not irradiated fuel)

1. Type of Waste	Units	6-Month Period	Est. Total Error, %
a. Spent Resins	m^3 Ci	0.00E+0 0.00E+0	N/A
b. Dry Compressible Waste, Contaminated Equip. Etc.	m^3 Ci	0.00E+0 0.00E+0	N/A
c. Irradiated Components, Control Rods, Etc.	m^3 Ci	0.00E+0 0.00E+0	N/A
d. Absorbed liquids, Sand, Building Rubble, Biological Waste	m^3 Ci	0.00E+0 0.00E+0	N/A

2. Estimate of Major Nuclide Composition (by type of waste)

a.

NOT APPLICABLE	%	0.0E+0

b.

NOT APPLICABLE	%	0.0E+0

c.

NOT APPLICABLE	%	0.00E+0

d.

NOT APPLICABLE	%	0.00E+0

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SOLID WASTE AND IRRADIATED FUEL SHIPMENT

A. Solid Waste Shipped Offsite for Burial or Disposal (Not irradiated fuel) (Continued)

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
NONE	N/A	N/A

B. Irradiated Fuel Shipments (Disposition)

Number of Shipments	Mode of Transportation	Destination
NONE	N/A	N/A