

EFFLUENT AND WASTE DISPOSAL SEMI ANNUAL REPORT
January 1, 1982 - June 30, 1982
SUPPLEMENTAL INFORMATION

FACILITY TMI-Unit-II LICENSE DPR-73-320

1. Regulatory Limits

- a. Fission and activation gases:
b. Iodines:
c. Particulates, half-lives > 8 days: Environmental Tech Specs,
d. Liquid effluents: Article 2.3

2. Maximum Permissible Concentrations

Provide the MPCs used in determining allowable release rates or concentrations.

- a. Fission and activation gases:
b. Iodines:
c. Particulates, half-lives 8 days: 10 CFR, Part 20, Appendix B
d. Liquid effluents:

3. Average Energy

Provide the average energy (\bar{E}) of the radionuclide mixture in releases of fission and activation gases, if applicable 0.253 MeV (Kr-85)

4. Measurements and Approximations of Total Radioactivity

Provide the methods used to measure or approximate the total radioactivity in effluents and the methods used to determine radionuclide composition.

- a. Fission and activation gases: Ge(Li) Spectrometry, Liquid Scintillation
b. Iodines: Ge(Li) Spectrometry
c. Particulates: Ge(Li) Spectrometry, Gas Flow Proportional Counting
d. Liquid effluents: Ge(Li) Spectrometry, Liquid Scintillation

5. Batch Releases

Provide the following information relating to batch releases of radioactive materials in liquid and gaseous effluents.

A. Liquid

	<u>1st Quarter</u>	<u>2nd Quarter</u>
1. Number of batch releases:	15	28
2. Total time period for batch release:	N/A	N/A
3. Maximum time period for a batch release:	N/A	N/A
4. Average time period for batch releases:	N/A	N/A
5. Minimum time period for a batch release:	N/A	N/A
6. Average stream flow during periods of release of effluent into flowing stream:	N/A	N/A

See Note (1) and * on page 6 of this report

N/A - Not Applicable

5. Batch Releases (cont.)

	<u>1st Quarter 1982</u>	<u>2nd Quarter 1982</u>
B. Gaseous		
1. Number of batch releases:	10	15
2. Total time period for batch releases:	54942 min.	25809 min.
3. Maximum time period for a batch release:	16485 min.	10588 min.
4. Average time period for batch release:	5494 min.	1721 min.
5. Minimum time period for a batch release:	60 min.	5 min.

6. Abnormal Releases

A. Liquid

1. Number of releases:	0	0
2. Total activity released:	N/A	N/A

B. Gaseous

1. Number of releases:	1	0
2. Total activity released:	15 μ Ci particulates	N/A

N/A = Not Applicable

TABLE IA
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES

	UNIT	1st QUARTER 1982	2nd QUARTER 1982	EST. TOTAL ERROR, %
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A. Fission & activation gases

1. Total release	Ci	2.73E2	1.03E2	±60%
2. Average release rate for period	µCi/sec.	3.51E1	1.31E1	80% of Tech. Spec. Limit= 5.76E3 µCi/ sec. for Kr-85
3. Percent of Tech Spec limit	%	6.09E-1	2.27E-1	

B. Iodines

1. Total Iodine-131	Ci	< LLD	< LLD	N/A
2. Average release rate for period	µCi/sec.	N/A	N/A	
3. Percent of Tech Spec limit	%	N/A	N/A	

C. Particulates

1. Particulates with half-lives > 8 Days	Ci	5.62E-5	3.25E-6	±60%
2. Average release rate for period	µCi/sec.	7.24E-6	4.13E-7	80% of Tech. Spec. Limit= 1.92E-2 µCi/sec
3. Percent of Tech Spec limit	%	3.77E-2	2.15E-3	
4. Gross alpha radioactivity	Ci	3.48E-8	1.29E-10	

D. Tritium

1. Total release	Ci	4.56E1	1.12E1	±60%
2. Average release rate for period	µCi/sec.	5.87E0	1.42E0	80% of Tech. Spec. Limit= 3.84E3 µCi/ sec for H-3
3. Percent of Tech Spec limit	%	1.51E-1	3.69E-2	

TABLE 1B
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
GASEOUS EFFLUENTS-GROUND LEVEL RELEASE

Nuclides Released	UNIT II	Continuous Mode		Batch Mode	
		1st QUARTER	2nd QUARTER	1st QUARTER	2nd QUARTER
1. Fission gases		1982	1982	1982	1982
krypton-85	Ci	1.46E2	4.14E1	1.26E2	6.17E1
krypton-85m	Ci	< LLD	< LLD	< LLD	< LLD
krypton-87	Ci	< LLD	< LLD	< LLD	< LLD
krypton-88	Ci	< LLD	< LLD	< LLD	< LLD
xenon-133	Ci	< LLD	< LLD	< LLD	< LLD
xenon-135	Ci	< LLD	< LLD	< LLD	< LLD
xenon-135m	Ci	< LLD	< LLD	< LLD	< LLD
xenon-138	Ci	< LLD	< LLD	< LLD	< LLD
Others (specify)	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
Unidentified	Ci	< LLD	< LLD	< LLD	< LLD
Total for period	Ci	1.46E2	4.14E1	1.26E2	6.17E1

2. Iodines

iodine-131	Ci	< LLD	< LLD	< LLD	< LLD
iodine-133	Ci	< LLD	< LLD	< LLD	< LLD
iodine-135	Ci	< LLD	< LLD	< LLD	< LLD
Total for period	Ci	N/A	N/A	N/A	N/A

NOTE: Refer to Table 4 for typical LLD values

TABLE 1B (cont.)
 EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
 GASEOUS EFFLUENTS-GROUND LEVEL RELEASES

Nuclides Released	UNIT II	Continuous Mode		Batch Mode	
		1st QUARTER 1982	2nd QUARTER 1982	1st QUARTER 1982	2nd QUARTER 1982

3. Particulates

strontium-89	C1	<LLD	<LLD	<LLD	<LLD
strontium-90	C1	9.22E-8	<LLD	<LLD	<LLD
cesium-134	C1	3.89E-6	<LLD	<LLD	<LLD
cesium-137	C1	5.16E-5	3.80E-8	<LLD	<LLD
barium-lanthanum-140	C1	<LLD	<LLD	<LLD	<LLD
Others (specify)					
Cobalt - 60		3.40E-8	<LLD	<LLD	<LLD
Unidentified β	C1	5.69E-7	3.21E-6	<LLD	<LLD

TABLE 2A
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

Tech. Spec. Limits = 10CFR20, Appendix B, Table II, Column 2

	UNIT	1st QUARTER 1982	2nd QUARTER 1982	EST. TOTAL ERROR %
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A. Fission and activation products

1. Total releases (not including tritium, gases, alpha)	Ci	2.54E-6	2.32E-5	±60%
2. Average diluted concentration during period	μCi/ml	1.94E-13	1.03E-12	Based on 2E-5 μCi/ml (Cs-137)
3. Percent of applicable limit	%	9.7E-7	5.15E-6	

B. Tritium

1. Total release	Ci	1.43E-8	7.19E-2	±60%
2. Average diluted concentration during period	μCi/ml	1.09E-15	3.18E-9	Based on 3E-3 μCi/ml (H-3)
3. Percent of applicable limit	%	3.63E-11	1.06E-4	

C. Dissolved and entrained gases

1. Total release	Ci	< LLD	< LLD	±60%
2. Average diluted concentration during period	μCi/ml	N/A	N/A	
3. Percent of applicable limit	%	N/A	N/A	

D. Gross alpha radioactivity

1. Total release	Ci	< LLD	< LLD	±60%
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E. Volume of waste released (prior to dilution)	liters	6.75E4	3.39E5	25
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F. Volume of dilution water used during period	liters	1.31E10	2.26E10	10
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NOTE: Refer to Table 5 for typical LLD values

NOTE: (1) There were no liquid releases from the radwaste system during the first half of 1982, since this system is flanged off from the discharge lines. However, low concentrations of radionuclides have been occasionally found in the industrial waste stream and sanitary waste. No credit is taken for any loss during processing.

* Includes only those releases mentioned in Note (1) which were found to contain radioisotopic concentrations > LLD.

TABLE 2B
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
LIQUID EFFLUENTS *

Nuclides Released	UNIT	Continuous Mode		Batch Mode	
		1st QUARTER 1982	2nd QUARTER 1982	1st QUARTER 1982	2nd QUARTER 1982
strontium-89	C1	See Note(2)	See Note(2)	<LLD	<LLD
strontium-90	C1			<LLD	<LLD
cesium-134	C1			<LLD	<LLD
cesium-137	C1			6.38E-6	2.29E-5
iodine-131	C1			<LLD	<LLD
cobalt-58	C1			<LLD	<LLD
cobalt-60	C1			<LLD	<LLD
iron-59	C1			<LLD	<LLD
zinc-65	C1			<LLD	<LLD
managanese-54	C1			<LLD	<LLD
chromium-51	C1			<LLD	<LLD
zirconium-niobium-95	C1			<LLD	<LLD
molybdenum-99	C1			<LLD	<LLD
technetium-99m	C1			<LLD	<LLD
barium-lanthanum-140	C1			<LLD	<LLD
cerium-141	C1			<LLD	<LLD
Other (specify)	C1				
	C1				
	C1				
	C1				
	C1				
	C1				
	C1				
Unidentified Beta	C1			1.99E-6	3.09E-7
Total for period	C1			8.37E-6	2.32E-5
xenon-133	C1			<LLD	<LLD
xenon-135	C1			<LLD	<LLD

Note: Refer to Table 5 for typical LLD values.

Note (2) There was no continuous release of effluent from Unit II during the first half of 1982.

* Includes only those releases mentioned in Note (1) which were found to contain radioisotopic concentrations >LLD.

TABLE 3A
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS Unit 2

A. Solid waste shipped off-site for burial or disposal (not irradiated fuel)

1. Type of waste	UNIT	6 month period	EST. TOTAL ERROR %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m ³ C1	4.248 14	5%
b. Dry compressible waste, contaminated equipment, etc.	m ³ C1	61.746 8.446	5%
c. Irradiated components, control rods, etc.	m ³ C1	N/A	
d. Other (describe)	m ³ C1	N/A	

2. Estimate of major nuclide composition (by type of waste)		
a. Sr 90/Y 90	34.38% each	
Cs 137	11.71%	
Ba 137m	11.13%	
Ce 144/Pr 144	2.02% each	
b. Sr 90/Y 90	2.32% each	
Cs 137	46.4%	
Ba 137m	43.9%	
Cs 134	5.1%	
	%	
c. N/A	%	
	%	
	%	
	%	
	%	
d. N/A	%	
	%	
	%	
	%	

3. Solid Waste Disposition	Mode of Transportation	Destination
Number of Shipments		
1	Tractor/Flatbed	Richland, WA
2	Tractor/Trailer	Richland, WA

B. Irradiated Fuel Shipments (Disposition)

Number of Shipments	Mode of Transportation	Destination
None		

TABLE 4

TYPICAL GASEOUS EFFLUENT LLD (Lower Limit of Detection) VALUES

ASSUMPTIONS:	-Sample Volume (Marinelli)	1640 cc
	Sample Volume (Particulate and Charcoal Filters)	5.7E8 cc
	Sampling Rate	2 cfm or 5.66E4 cc/min
	Sampling Time	1 week or 1E4 min
	Sample Volume (Tritium bubbled thru water)	7.56E5 cc
	Sampling Rate	75 cc/min
	Sampling Time	1E4 min
	Sample Counting Time: α & ^3H - 20min; β - 10min; γ - 1000 sec	
	Sample Counters: γ emitters	25% Ge(Li)
	α or β	Proportional Counter
	^3H	Liquid Scintillation Counter

<u>ISOTOPE</u>		<u>$\mu\text{Ci/cc LLD}$</u>	<u>TYPE SAMPLE</u>
Gross Alpha	α	1E-15	Particulate Filter Paper
Gross Beta	β	1E-14	"
Tritium	^3H	1E-10	Air bubbled thru water by a fritted disc or Fisher Milligan gas washer
Krypton-85	^{85}Kr	5E-6	Marinelli
Krypton-85m	$^{85\text{m}}\text{Kr}$	2E-8	"
Krypton-87	^{87}Kr	6E-8	"
Krypton-88	^{88}Kr	5E-8	"
Xenon-133	^{133}Xe	4E-8	"
Xenon-133m	$^{133\text{m}}\text{Xe}$	1E-7	"
Xenon-135	^{135}Xe	2E-8	"
Xenon-135m	$^{135\text{m}}\text{Xe}$	3E-7	"
Xenon-138	^{138}Xe	3E-7	"
Iodine-131	^{131}I	2E-8	"
Iodine-133	^{133}I	3E-8	"
Iodine-135	^{135}I	2E-7	"
Iodine-131	^{131}I	3E-14	Charcoal Filter
Iodine-133	^{133}I	4E-14	"
Iodine-135	^{135}I	3E-13	"
Manganese-54	^{54}Mn	3E-14	Particulate Filter Paper
Iron-59	^{59}Fe	8E-14	"
Cobalt-58	^{58}Co	3E-14	"
Cobalt-60	^{60}Co	5E-14	"
Zinc-65	^{65}Zn	9E-14	"
Strontium-89	^{89}Sr	2E-14	"
Strontium-90	^{90}Sr	2E-14	"
Molybdenum-99	^{99}Mo	2E-14	"
Ruthenium-103	^{103}Ru	2E-14	"
Silver-110m	$^{110\text{m}}\text{Ag}$	3E-14	"
Cesium-134	^{134}Cs	4E-14	"
Cesium-137	^{137}Cs	3E-14	"
Cerium-141	^{141}Ce	3E-14	"
Cerium-144	^{144}Ce	9E-14	"

TABLE 5

TYPICAL LIQUID EFFLUENT LLD (Lower Limit of Detection) VALUES

ASSUMPTIONS: (Except for Gross Alpha
Gross Beta
Tritium
and analysis by Teledyne)

Sample volume = 1 liter = 1000 cc
Sample counting time = 1000 sec
Sample counted with a 25% Ce(Li)
for Gamma Emitters

ISOTOPE		$\mu\text{Ci/cc LLD}$	NOTES
Gross Alpha	α	1E-7	Counted with proportional counter
Gross Beta	β	6E-8	Counted with proportional counter
Tritium	^3H	3E-6	Counted with Liquid Scintillation counter
Krypton-85	^{85}Kr	4E-5	
Xenon-131m	$^{131\text{m}}\text{Xe}$	5E-6	
Xenon-133	^{133}Xe	3E-7	
Xenon-135	^{135}Xe	1E-7	
Chromium-51	^{51}Cr	1E-6	The LLD is also <3 times ^{58}Co LLD
Manganese-54	^{54}Mn	2E-7	
Cobalt-58	^{58}Co	2E-7	
Iron-59	^{59}Fe	4E-7	
Cobalt-60	^{60}Co	3E-7	
Zinc-65	^{65}Zn	4E-7	
Zirconium-95	^{95}Zr	3E-7	
Niobium-95	^{95}Nb	2E-7	
Molybdenum-99	^{99}Mo	1E-7	
Technetium-99m	$^{99\text{m}}\text{Tc}$	1E-7	
Silver-110m	$^{110\text{m}}\text{Ag}$	2E-7	
Antimony-125	^{125}Sb	4E-7	
Cesium-134	^{134}Cs	2E-7	
Cesium-136	^{136}Cs	2E-7	
Cesium-137	^{137}Cs	2E-7	
Barium-140	^{140}Ba	4E-7	
Lanthanum-140	^{140}La	3E-7	
Cerium-141	^{141}Ce	3E-7	
Cerium-144	^{144}Ce	9E-7	
Iodine-131	^{131}I	2E-7	
Iodine-133	^{133}I	2E-7	
Phosphorus-32	^{32}P	1E-6	Liquid samples are not currently analyzed for ^{32}P , ^{55}Fe , ^{89}Sr , and ^{90}Sr at Three Mile Island. They are sent to Radiation Management Corporation for analysis. therefore these are Radiation Management Corporation LLD values.
Iron-55	^{55}Fe	5E-8	
Strontium-89	^{89}Sr	5E-8	
Strontium-90	^{90}Sr	5E-8	

EFFLUENT AND WASTE DISPOSAL SEMI ANNUAL REPORT

January 1, 1982-June 30, 1982

SUPPLEMENTAL INFORMATION

FACILITY EPICOR II LICENSE DPR-73-320

1. Regulatory Limits

- a. Fission and activation gases:
- b. Iodines:
- c. Particulates, half-lives > 8 days: Environmental Tech Specs,
Article 2.3
- d. Liquid effluents:

2. Maximum Permissible Concentrations

Provide the MPCs used in determining allowable release rates or concentrations.

- a. Fission and activation gases:
- b. Iodines:
- c. Particulates, half-lives 8 days: 10 CFR, Part 20, Appendix B
- d. Liquid effluents:

3. Average Energy

Provide the average energy (\bar{E}) of the radionuclide mixture in releases of fission and activation gases, if applicable 0.253 MeV (Kr-85)

4. Measurements and Approximations of Total Radioactivity

Provide the methods used to measure or approximate the total radioactivity in effluents and the methods used to determine radionuclide composition.

- a. Fission and activation gases: Ge(Li) Spectrometry; Liquid Scintillation
- b. Iodines: Ge(Li) Spectrometry
- c. Particulates: Ge(Li) Spectrometry; Gas Flow Proportional Counting
- d. Liquid effluents: N/A - See 5A below

5. Batch Releases

Provide the following information relating to batch releases of radioactive materials in liquid and gaseous effluents.

A. Liquid- No liquid releases for EPICOR II for the first half of 1982

- 1. Number of batch releases: 0
- 2. Total time period for batch release: N/A
- 3. Maximum time period for a batch release: N/A
- 4. Average time period for batch releases: N/A
- 5. Minimum time period for a batch release: N/A
- 6. Average stream flow during periods of release of effluent into flowing stream: N/A

N/A Not Applicable

5. Batch Releases (cont.)

B. Gaseous - No batch releases for EPICOR II for the first half of 1982

- 1. Number of batch releases: 0
- 2. Total time period for batch releases: N/A
- 3. Maximum time period for a batch release: N/A
- 4. Average time period for batch release: N/A
- 5. Minimum time period for a batch release: N/A

6. Abnormal Releases

A. Liquid - None for EPICOR II for the first half of 1982

- 1. Number of releases: 0
- 2. Total activity released: N/A

B. Gaseous

- 1. Number of releases: 0
- 2. Total activity released: N/A

TABLE IA
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES

	UNIT	1st QUARTER 1982	2nd QUARTER 1982-	EST. TOTAL ERROR, %
	EPICOR II			

A. Fission & activation gases

1. Total release	Ci	4.71E1	1.38E2	+60%
2. Average release rate for period	μCi/sec.	6.06E0	1.75E1	20% of Tech. Spec. Limit= 1.44E3 μCi/ sec for Kr-85
3. Percent of Tech Spec limit	%	4.21E-1	1.22E0	

B. Iodines

1. Total Iodine-131	Ci	< LLD	< LLD	N/A
2. Average release rate for period	μCi/sec.	N/A	N/A	
3. Percent of Tech Spec limit	%	N/A	N/A	

C. Particulates

1. Particulates with half-lives > 8 Days	Ci	1.29E-6	3.47E-7	+60%
2. Average release rate for period	μCi/sec.	1.66E-7	4.41E-8	20% of Tech. Spec. Limit= 4.8E-3 μCi/ sec
3. Percent of Tech Spec limit	%	3.46E-3	9.19E-4	
4. Gross alpha radioactivity	Ci	1.56E-9	2.01E-9	

D. Tritium

1. Total release	Ci	8.07E-1	2.13E-2	+60%
2. Average release rate for period	μCi/sec.	1.04E-1	2.71E-3	20% of Tech. Spec. Limit= 9.6E2 μCi/ sec
3. Percent of Tech Spec limit	%	1.08E-2	2.82E-4	

TABLE 1B
EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT
GASEOUS EFFLUENTS-GROUND LEVEL RELEASE

Nuclides Released	UNIT EPICOR II	Continuous Mode		Batch Mode	
		1st QUARTER	2nd QUARTER	1st QUARTER	2nd QUARTER
1. Fission gases		1982	1982	1982	1982
				No batch releases for EPIC II the first half of 1982	
krypton-85	Ci	4.71E1	1.38E2 *		
krypton-85m	Ci	<LLD	<LLD		
krypton-87	Ci	<LLD	<LLD		
krypton-88	Ci	<LLD	<LLD		
xenon-133	Ci	<LLD	<LLD		
xenon-135	Ci	<LLD	<LLD		
xenon-135m	Ci	<LLD	<LLD		
xenon-138	Ci	<LLD	<LLD		
Others (specify)	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
Unidentified	Ci	<LLD	<LLD		
Total for period	Ci	4.71E1	1.38E2*		

2. Iodines

iodine-131	Ci	<LLD	<LLD		
iodine-133	Ci	<LLD	<LLD		
iodine-135	Ci	<LLD	<LLD		
Total for period	Ci	N/A	<LLD		

N/A Not Applicable

* Based on monitor data; no Kr-85 detected in samples taken when monitor data was positive (no samples >LLD; 3 mo. average LLD = 4.9E-6 µCi/cc)

TABLE 1B (cont.)
 EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
 GASEOUS EFFLUENTS-GROUND LEVEL RELEASES

Nuclides Released	UNIT EPICOR II	Continuous Mode		Batch Mode	
		1st QUARTER	2nd QUARTER	QUARTER	QUARTER
3. Particulates		1982	1982	No batch releases for EPICOR II for the first half of 1982	
strontium-89	Ci	< LLD	< LLD		
strontium-90	Ci	< LLD	< LLD		
cesium-134	Ci	5.08E-8	< LLD		
cesium-137	Ci	8.46E-7	< LLD		
barium-lanthanum-140	Ci	< LLD	< LLD		
Others (specify)					
Unidentified B	Ci	3.95E-7	3.45E-7		

TABLE 2A
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

No liquid releases from EPICOR II for the first half of 1982	UNIT	QUARTER	QUARTER	EST. TOTAL ERROR %
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A. Fission and activation products

1. Total releases (not including tritium, gases, alpha)	Ci			
2. Average diluted concentration during period	µCi/ml			
3. Percent of applicable limit	%			

B. Tritium

1. Total release	Ci			
2. Average diluted concentration during period	µCi/ml			
3. Percent of applicable limit	%			

C. Dissolved and entrained gases

1. Total release	Ci			
2. Average diluted concentration during period	µCi/ml			
3. Percent of applicable limit	%			

D. Gross alpha radioactivity

1. Total release	Ci			
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E. Volume of waste released (prior to dilution)	liters			
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F. Volume of dilution water used during period	liters			
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TABLE 2B
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
LIQUID EFFLUENTS

No liquid releases from EPICOR II for the first half of 1982

Nuclides Released	UNIT	Continuous Mode		Batch Mode	
		QUARTER	QUARTER	QUARTER	QUARTER
strontium-89	C1				
strontium-90	C1				
cesium-134	C1				
cesium-137	C1				
iodine-131	C1				
cobalt-58	C1				
cobalt-60	C1				
iron-59	C1				
zinc-65	C1				
managanese-54	C1				
chromium-51	C1				
zirconium-niobium-95	C1				
molybdenum-99	C1				
technetium-99m	C1				
barium-lanthanum-140	C1				
cerium-141	C1				
Other (specify)	C1				
	C1				
	C1				
	C1				
	C1				
	C1				
	C1				
	C1				
Unidentified	C1				
Total for period	C1				
xenon-133	C1				
xenon-135	C1				

TABLE 3A
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

No Solid Waste releases from EPICOR II for the first half of 1982

A. Solid waste shipped off-site for burial or disposal (not irradiated fuel)

1. Type of waste	UNIT	6 month period	EST. TOTAL ERROR %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m ³ Ci		
b. Dry compressible waste, contaminated equipment, etc.	m ³ Ci		
c. Irradiated components, control rods, etc.	m ³ Ci		
d. Other (describe)	m ³ Ci		

2. Estimate of major nuclide composition (by type of waste)		
a.	%	
	%	
	%	
	%	
b.	%	
	%	
	%	
	%	
	%	
c.	%	
	%	
	%	
	%	
d.	%	
	%	
	%	
	%	

3. Solid Waste Disposition Number of Shipments.	Mode of Transportation	Destination

B. Irradiated Fuel Shipments (Disposition)

Number of Shipments	Mode of Transportation	Destination

TABLE 4

TYPICAL GASEOUS EFFLUENT LLD (Lower Limit of Detection) VALUES

ASSUMPTIONS:	-Sample Volume (Marinelli)	1640 cc
	Sample Volume (Particulate and Charcoal Filters)	5.7E8 cc
	Sampling Rate	2 cfm or 5.66E4 cc/min
	Sampling Time	1 week or 1E4 min
	Sample Volume (Tritium bubbled thru water)	7.56E5 cc
	Sampling Rate	75 cc/min
	Sampling Time	1E4 min
	Sample Counting Time: α & ^3H - 20min; β - 10min; γ - 1000 sec	
	Sample Counters: γ emitters	25% Ge(Li)
	α or β	Proportional Counter
	^3H	Liquid Scintillation Counter

<u>ISOTOPE</u>		<u>$\mu\text{Ci/cc LLD}$</u>	<u>TYPE SAMPLE</u>
Gross Alpha	α	1E-15	Particulate Filter Paper
Gross Beta	β	1E-14	"
Tritium	^3H	1E-10	Air bubbled thru water by a fritted disc or Fisher Milligan gas washer
Krypton-85	^{85}Kr	5E-6	Marinelli
Krypton-85m	^{85m}Kr	2E-8	"
Krypton-87	^{87}Kr	6E-8	"
Krypton-88	^{88}Kr	5E-8	"
Xenon-133	^{133}Xe	4E-8	"
Xenon-133m	^{133m}Xe	1E-7	"
Xenon-135	^{135}Xe	2E-8	"
Xenon-135m	^{135m}Xe	3E-7	"
Xenon-138	^{138}Xe	3E-7	"
Iodine-131	^{131}I	2E-8	"
Iodine-133	^{133}I	3E-8	"
Iodine-135	^{135}I	2E-7	"
Iodine-131	^{131}I	3E-14	Charcoal Filter
Iodine-133	^{133}I	4E-14	"
Iodine-135	^{135}I	3E-13	"
Manganese-54	^{54}Mn	3E-14	Particulate Filter Paper
Iron-59	^{59}Fe	8E-14	"
Cobalt-58	^{58}Co	3E-14	"
Cobalt-60	^{60}Co	5E-14	"
Zinc-65	^{65}Zn	9E-14	"
Strontium-89	^{89}Sr	2E-14	"
Strontium-90	^{90}Sr	2E-14	"
Molybdenum-99	^{99}Mo	2E-14	"
Ruthenium-103	^{103}Ru	2E-14	"
Silver-110m	^{110m}Ag	3E-14	"
Cesium-134	^{134}Cs	4E-14	"
Cesium-137	^{137}Cs	3E-14	"
Cerium-141	^{141}Ce	3E-14	"
Cerium-144	^{144}Ce	9E-14	"

TABLE 5

TYPICAL LIQUID EFFLUENT LLD (Lower Limit of Detection) VALUES

ASSUMPTIONS: (Except for Gross Alpha
Gross Beta
Tritium
and analysis by Teledyne)

Sample volume = 1 liter = 1000 cc
Sample counting time = 1000 sec
Sample counted with a 25% Ge(Li)
for Gamma Emitters

ISOTOPE		$\mu\text{Ci/cc LLD}$
Gross Alpha	α	1E-7
Gross Beta	β	6E-8
Tritium	^3H	3E-6
Krypton-85	^{85}Kr	4E-5
Xenon-131m	$^{131\text{m}}\text{Xe}$	5E-6
Xenon-133	^{133}Xe	3E-7
Xenon-135	^{135}Xe	1E-7
Chromium-51	^{51}Cr	1E-6
Manganese-54	^{54}Mn	2E-7
Cobalt-58	^{58}Co	2E-7
Iron-59	^{59}Fe	4E-7
Cobalt-60	^{60}Co	3E-7
Zinc-65	^{65}Zn	4E-7
Zirconium-95	^{95}Zr	3E-7
Niobium-95	^{95}Nb	2E-7
Molybdenum-99	^{99}Mo	1E-7
Technetium-99m	$^{99\text{m}}\text{Tc}$	1E-7
Silver-110m	$^{110\text{m}}\text{Ag}$	2E-7
Antimony-125	^{125}Sb	4E-7
Cesium-134	^{134}Cs	2E-7
Cesium-136	^{136}Cs	2E-7
Cesium-137	^{137}Cs	2E-7
Barium-140	^{140}Ba	4E-7
Lanthanum-140	^{140}La	3E-7
Cerium-141	^{141}Ce	3E-7
Cerium-144	^{144}Ce	9E-7
Iodine-131	^{131}I	2E-7
Iodine-133	^{133}I	2E-7
Phosphorus-32	^{32}P	1E-6
Iron-55	^{55}Fe	5E-8
Strontium-89	^{89}Sr	5E-8
Strontium-90	^{90}Sr	5E-8

NOTES

Counted with proportional counter
Counted with proportional counter
Counted with Liquid Scintillation
counter

The LLD is also <3 times ^{58}Co LLD

Liquid samples are not currently analyzed for ^{32}P , ^{55}Fe , ^{89}Sr , and ^{90}Sr at Three Mile Island. They are sent to Radiation Management Corporation for analysis. therefore these are Radiation Management Corporation LLD values.