ATTACHMENT 5
4410-88-L-0142
11 Pages

EFFLUENT AND WASTE DISPOSAL SEMI ANNUAL REPORT
January 1, 1988 to June 30, 1988
SUPPLEMENTAL INFORMATION

FACILITY TMI Unit 2 (Including Epicor II) LICENSEE 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

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
   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

	1988 1st Quarter	1988 2nd Quarter
1. Number of batch releases:	20	51
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

N/A = Not applicable

5. Batch Releases (cont.)

B. Gaseous	1988 1st Quarter	1988 2nd Quarter
1. Number of batch releases:	0	0
2. Total time period for batch releases:	N/A	N/A
3. Maximum time period for a batch release:	N/A	N/A
4. Average time period for batch release:	N/A	N/A
5. Minimum time period for a batch release:	N/A	N/A

6. Abnormal Releases

A. Liquid		
1. Number of releases:	None	None
2. Total activity released:	N/A	N/A
B. Gaseous		
1. Number of releases:	None	None
2. Total activity released:	N/A	N/A

TABLE 1A
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES

	UNIT	1st QUARTER	2nd QUARTER	EST. TOTAL ERROR, %
A. Fission & activation gases				
1. Total release	Ci	<LLD	<LLD	± 60%
2. Average release rate for period	µCi/sec.	N/A	N/A	Tech. Spec. Limit = 7.20 E+3 uCi/sec for Kr-85
3. Percent of Tech Spec limit	%	N/A	N/A	
B. Iodines				
1. Total Iodine-131	Ci	<LLD	<LLD	± 60%
2. Average release rate for period	µCi/sec.	N/A	N/A	Tech. Spec. Limit = 2.40 E-2 uCi/sec
3. Percent of Tech Spec limit	%	N/A	N/A	
C. Particulates				
1. Particulates with half-lives > 8 Days	Ci	1.00E-5	4.11E-6	± 60%
2. Average release rate for period	µCi/sec.	1.27E-6	5.23E-7	Tech. Spec. Limit = 2.40 E-2 uCi/sec
3. Percent of Tech Spec limit	%	5.29E-3	2.18E-3	
4. Gross alpha radioactivity	Ci	<LLD	1.39E-7	
D. Tritium				
1. Total release	Ci	2.61E0	1.89E0	± 60%
2. Average release rate for period	µCi/sec.	3.32E-1	2.41E-1	Tech. Spec. Limit = 4.80E+3 uCi/sec for H-3
3. Percent of Tech Spec limit	%	6.92E-3	5.02E-3	

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

Nuclides Released	UNIT	Continuous Mode 1988 1st QUARTER	Continuous Mode 1988 2nd QUARTER	Batch Mode 1988 1st QUARTER	Batch Mode 1988 2nd QUARTER
1. Fission gases					
krypton-85	Ci	<LLD	<LLD	<LLD	<LLD
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	<LLD	<LLD	<LLD	<LLD
	Ci				
	Ci				
	Ci				
	Ci				
Unidentified	Ci	<LLD	<LLD	<LLD	<LLD
Total for period	Ci	N/A	N/A	N/A	N/A
2. Iodines					
iodine-131	Ci	<LLD	<LLD	N/A	N/A
iodine-133	Ci	<LLD	<LLD	N/A	N/A
iodine-135	Ci	<LLD	<LLD	N/A	N/A
Total for period	Ci	N/A	N/A	N/A	N/A

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

Nuclides Released	UNIT	Continuous Mode 1988 1st QUARTER	Continuous Mode 1988 2nd QUARTER	Batch Mode 1988 1st QUARTER	Batch Mode 1988 2nd QUARTER
3. Particulates					
strontium-89	Ci	<LLD	<LLD	N/A	N/A
strontium-90	Ci	<LLD	<LLD	N/A	N/A
cesium-134	Ci	<LLD	<LLD	N/A	N/A
cesium-137	Ci	<LLD	<LLD	N/A	N/A
barium-lanthanum-140	Ci	<LLD	<LLD	N/A	N/A
Others (specify)					
Unidentified		1.00E-5	4.11E-6	N/A	N/A

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

	UNIT	1988 1st QUARTER	1988 2nd QUARTER	EST. TOTAL ERROR %
A. Fission and activation products				
1. Total releases (not including tritium, gases, alpha)	Ci	3.15E-4	4.66E-4	± 60%
2. Average diluted concentration during period	µCi/ml	2.37E-11	3.26E-11	Based on 2E-5 uCi/ml (Cs-137)
3. Percent of applicable limit	%	1.19E-4	1.63E-4	
B. Tritium				
1. Total release	Ci	1.43E-4	4.12E-3	± 60%
2. Average diluted concentration during period	µCi/ml	1.08E-11	2.87E-10	Based on 3E-3 uCi/ml (H-3)
3. Percent of applicable limit	%	3.60E-7	9.57E-6	
C. Dissolved and entrained gases				
1. Total release	Ci	N/A	N/A	± 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	Note (1)	Note (1)	± 25%
E. Volume of waste released * (prior to dilution)	liters	4.46E+4	1.80E+5	± 25%
F. Volume of dilution water used during period	liters	1.33E+10	1.43E+10	± 10%

* Includes only those releases mentioned in Note (1) which were found to contain radioisotope concentration LLD.

Note (1) There were no liquid releases from the radwaste system during the first half of 1988 since this system is flanged off from the discharge lines. However, low concentration of radionuclides have been occasionally found in the industrial waste stream and are appropriately included in Item A2.

Note (2) Refer to Table 5 for Typical LLD values.

Note (3) The values reported include Sr-90 activity and any activity not specifically identified. Thus, the reported Sr-90 value represents a conservative estimate (i.e. overestimate) and contains activity from other beta-gamma emitters which were not positively identified during conduct of analytical procedures.

TABLE 2B
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
LIQUID EFFLUENTS

Nuclides Released	UNIT	Continuous Mode 1988 1st QUARTER	Continuous Mode 1988 2nd QUARTER	Batch Mode 1988 1st QUARTER	Batch Mode 1988 2nd QUARTER
strontium-89	Ci	See Note 2 Page 6	See Note 2 Page 6	<LLD	<LLD
strontium-90 Note 3 Page6	Ci			1.76E-4	2.40E-4
cesium-134	Ci			2.73E-6	9.17E-7
cesium-137	Ci			1.36E-4	2.25E-4
iodine-131	Ci			<LLD	<LLD
cobalt-58	Ci			<LLD	<LLD
cobalt-60	Ci			<LLD	<LLD
iron-59	Ci			<LLD	<LLD
zinc-65	Ci			<LLD	<LLD
managanese-54	Ci			<LLD	<LLD
chromium-51	Ci			<LLD	<LLD
zirconium-niobium-95	Ci			<LLD	<LLD
molybdenum-99	Ci			<LLD	<LLD
technetium-99m	Ci			<LLD	<LLD
barium-lanthanum-140	Ci			<LLD	<LLD
cerium-141	Ci			<LLD	<LLD
Other (specify)	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
	Ci				
Unidentified	Ci			<LLD	<LLD
Total for period	Ci			3.15E-4	4.66E-4
xenon-133	Ci			<LLD	<LLD
xenon-135	Ci			<LLD	<LLD

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

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	87.16 m^3 2524.2 Curies	5%
b. Dry compressible waste, contaminated equipment, etc.	m^3 Ci	274.9 m^3 513.45 Curies	5%
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. Sr90	67.1 %	
Cs137	22.6 %	
Pm147	5.98%	
Sb125	1.06 %	
b. Sr90	83.14%	
Cs137	15.2 %	
Cs134	.295%	
Tc99	.283%	
Pm147	.272%	
c. N/A	%	
	%	
	%	
	%	
	%	
d. N/A	%	
	%	
	%	
	%	

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

B. Irradiated Fuel Shipments (Disposition)

Number of Shipments	Mode of Transportation	Destination
9 Shipments	Rail Car - NuPac 125B	INEL - F[illegible]ville, Idaho

3. A)

Number of Shipments	Mode of Transportation	Destination
12	Tractor - Cask (NuPac 14/190M)	Hanford - Richland, WA
3	Tractor - Flatbed	Hanford - Richland, WA
1	Tractor - Cask (HN-200)	Hanford - Richland, WA
8	Tractor - Cask (CNSI-8-120B)	Barnwell, SC

3. B)

Number of Shipments	Mode of Transportation	Destination
5	Tractor - Flatbed	Hanford - Richland, WA
5	Tractor - Closed Van	Hanford - Richland, WA
8	Tractor - Cask (HN-200)	Hanford - Richland, WA
4	Tractor - Cask (NuPac 14/190M)	Hanford - Richland, WA

TABLE 1

TYPICAL LIQUID EFFLUENT LLD (Lower Limit of Detection) VALUES

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

ISOTOPE		µCi/cc LLD	NOTES
Gross Alpha	α	4E-9	Counted with proportional counter
Gross Beta	β	7E-8	Counted with proportional counter
Tritium	H-3	4E-6	Counted with liquid scintillation counter
Krypton-85	Kr-85	1E-4	
Xenon-131m	Xe-131m	2E-5	
Xenon-133	Xe-133	1E-6	
Xenon-135	Xe-135	3E-7	
Chromium-51	Cr-151	3E-6	
Manganese-54	Mn-54	4E-7	
Cobalt-58	Co-58	4E-7	
Iron-59	Fe-59	9E-7	
Cobalt-60	Co-60	6E-7	
Zinc-65	Zn-65	1E-6	
Zirconium-95	Zr-95	7E-7	
Niobium-95	Nb-95	4E-7	
Molybdenum-99	Mo-99	3E-7	
Technetium-99m	Tc-99m	3E-7	
Silver-110m	Ag-110m	6E-7	
Antimony-125	Sb-125	9E-7	
Cesium-134	Cs-134	5E-7	
Cesium-136	Cs-136	4E-7	
Cesium-137	Cs-137	5E-7	
Barium-140	Ba-140	1E-6	
Lanthanum-140	La-140	7E-7	
Cerium-141	Ce-141	5E-7	
Cerium-144	Ce-144	3E-6	
Iodine-131	I-131	3E-7	
Iodine-133	I-133	4E-7	
Phosphorus-32	P-32	1E-6	These LLD values for liquid sample analyses of gross alpha, P-32, Fe-55, Sr-89, and Sr-90 are the same as Unit 1 which are offsite vendor LLD values.
Iron-55	Fe-55	5E-8	
Strontium-89	Sr-89	5E-8	
Strontium-90	Sr-90	5E-8	
Gross Alpha		1E-7	

TABLE 2

TYPICAL GASEOUS EFFLUENT LLD (Lower Limit of Detection) VALUES

ASSUMPTIONS:

Sample volume (Marinelli)	1640cc
Sample volume (Particulate & Charcoal Filters)	5.7E8cc
Sampling Rate	2 cfm or 5.66E4cc/min
Sampling Time	1 week or 1E4 min
Sample volume (tritium bubbled thru water)	7.56E5cc
Sampling Rate	75cc/min
Sampling Time	1E4 min
Sample Counting Times & H-3 =20min;	=10min; =1000sec
Sample Counters: emitters	25% Ge(Li)
or	Proportional Counter
H-3	Liquid Scintillation Counter

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