

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT

Supplemental Information

Facility Quad Cities Nuclear Power station

Licensee Commonwealth Edison Company

1. Regulatory Limits

a. For Noble Gases:

Dose rate

1. Less than 500 mrem/year to the whole body.
2. Less than 3000 mrem/year to the skin.

Dose Gamma Radiation

1. Less than or equal to 5 mrad/quarter.
2. Less than or equal to 10 mrad/year.

Beta Radiation

1. Less than or equal to 10 mrad/quarter.
2. Less than or equal to 20 mrad/year.

b.,c. For Iodine-131, for Iodine-133, and for all radionuclides in particulate form with half-lives greater than 8 days.

Dose Rate

1. Less than 1500 mrem/year

Dose

1. Less than or equal to 7.5 mrem/quarter
2. Less than or equal to 15 mrem/year.

d. For Liquid

Less than or equal to 3 mrem to the whole body during any calendar quarter.

Less than or equal to 10 mrem to any organ during any calendar quarter.

Less than or equal to 6 mrem to the whole body during any calendar year.

Less than or equal to 20 mrem to any organ during any calendar year.

2. Maximum Permissible Concentration

a.,b.,c., For fission and activation gases, iodines, and particulates with halflives greater than 8 days, allowable release limits are calculated by solving equations 10.1 and 10.2 from the Offsite Dose Calculation Manual. The alarm setpoint is conservatively set at approximately 10% of the 10CFR20 limit.

d. For liquid effluents allowable release limits are calculated by solving equations 10.3 and 10.4 from the Offsite Dose Calculation manual. The MPC values used for the monitors were as follows:

radwaste discharge $1.78\text{E}-05$ uCi/ml
service water $2.0\text{E}-05$ uCi/ml

3. Average Energy

The average gamma energy used to calculate the alarm setpoints for the noble gas monitors was 0.676 Mev for the Third quarter and 0.754 Mev for the Fourth quarter.

4. Measurements and Approximations of Total Radioactivity

- a. Fission and Activation Gases:
- b. Iodines:
- c. Particulates:

The main chimney and reactor building ventilation exhaust systems are continually monitored for iodines and particulates. These samples are pulled every 7 days and analyzed by gamma isotopic. The particulate papers are composited every 31 days and sent to a vendor for Sr 89-90 and gross alpha analysis. Noble gas grab samples are pulled and analyzed by gamma isotopic weekly. Tritium samples are pulled and analyzed every month.

The continuous strip chart recorders for the monitors on the release points are reviewed monthly for spikes and the activity released is calculated. An additional calculated activity for noble gases is added to the Main chimney release each month. This calculation is done because most of the grab samples show less than the lower limit of detection due to the low amount of activity and the large dilution flow at the sample point. The calculation takes into account the normal offgas train and the gland steam contribution to the release.

The average flow at the release points are used to calculate the curies released.

d. Liquid Effluents

The river discharge tanks are analyzed before discharge by gamma isotopic. A composite representative portion of this sample saved. This is composited with other discharges that occurred every 31 days and is analyzed for tritium and gross alpha. The batch composites are composited quarterly and sent to a vendor for Sr 89-90 and Fe 55. The discharge bay is sampled every 31 days and analyzed by gamma isotopic, for tritium and gross alpha. It is sampled quarterly and sent to a vendor for Sr 89-90 and Fe 55 analysis.

The tank volumes and activities are used to calculate the curies released for the River Discharge Tank. The total water released during the quarter and the activity is used to calculate the diluted activity released at the discharge bay, from batch discharges.

e. Estimated Total Error Percent

The estimated total error percents were calculated by taking the square root of the sum of the squares of errors for sampling and measurement parameters. The estimated total error percent for the solid radwaste curies is 12.3%.

f. Less than the lower limit of detection (<LLD).

Samples are analyzed such that the Technical Specification LLD requirements are met. When a nuclide is not detected during the quarter then <LLD is reported.

5. Batch Releases

a. Liquid

1. number of releases 43
2. total time 34,405 minutes
3. maximum time 895 minutes
4. average time 800 minutes
5. minimum time 615 minutes
6. average stream flow, discharge 63.3 gpm,
dilution 3.40E+05 gpm

b. Gaseous

NONE

6. Abnormal Releases

a. Gaseous

On December 2, 1993, the Unit Two adsorbers were inadvertently bypassed for approximately one minute. The effluent monitors showed no increase in activity, and the short time period did not allow grab samples to be pulled. The release was small and not quantifiable and is reported here for accuracy only.

b. Liquid

On September 14, 1993, a leak was identified on the U-1 "B" RHR Heat Exchanger. Unit One was at full power at this time. The total activity released to the environment from this leak was $3.82\text{E-}02\text{Ci}$ from 09/14/93 to 12/31/93, and was added to the monthly liquid release summary for each month.

c.

On November 12, 1993, a Barrier Load Test Assembly (BLTA) Shipment was made to G.E. Nuclear in Vallecitos, CA. The shipment consisted of 6 barrier fuel rods. General Electric will do testing on the fuel rods and they will dispose of them. This item is only mentioned here for accuracy.

EFFLUENT AND WASTE DISPOSAL
SEMI-ANNUAL REPORT July-December 1993
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

PROCEDURE: QCP 100-7

	Unit	Quarter Third	Quarter Fourth	Est. Total Error, %
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A. FISSION & ACTIVATION GASES

1. Total Release	Ci	1.11E+01	8.89E00	12.4
2. Average release rate for period	uCi/sec	1.40E00	1.12E00	
3. Percent of Tech Spec limit * Chimney & stack	%	4.56E-03 1.97E-04	3.72E-03 1.69E-04	

B. IODINE

1. Total Iodine-131	Ci	2.85E-04	2.45E-04	40.0
2. Average release rate for period	uCi/sec	3.59E-05	3.08E-05	

C. PARTICULATES

1. Particulates with half-lives > 8 days	Ci	4.20E-03	5.38E-03	39.1
2. Average release rate for period	uCi/sec	5.28E-04	6.77E-04	
3. Gross alpha radioactivity	Ci	4.24E-06	1.14E-06**	

D. TRITIUM

1. Total Release	Ci	1.08E+01	8.30E00	6.2
2. Average release rate for period	uCi/sec	1.36E00	1.04E00	

E. IODINE 131 & 133, TRITIUM AND PARTICULATES

Percent of Tech Spec Limit Chimney & Stack	%	7.36E-02	1.49E-01	
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* NOBLE GAS GAMMA/NOBLE GAS BETA DOSE LIMITS

** PROJECTED VALUE BASED ON PREVIOUS SIX MONTHS AVAILABLE DATA

MAIN CHIMNEY
GASEOUS EFFLUENTS

		Continuous Mode		Batch Mode	
Nuclides Released	Unit	Quarter Third	Quarter Fourth	Quarter Third	Quarter Fourth
1. Fission gases					
Kr-85	Ci	< LLD	< LLD	NA	NA
Kr-85m	Ci	9.53E-01	3.00E-01	NA	NA
Kr-87	Ci	2.45E-01	3.16E-01	NA	NA
Kr-88	Ci	7.72E-01	3.62E-01	NA	NA
Xe-133	Ci	1.15E00	2.51E-01	NA	NA
Xe-135	Ci	2.59E-01	2.49E-01	NA	NA
Xe-135m	Ci	1.24E00	1.41E00	NA	NA
Xe-138	Ci	5.10E00	5.82E00	NA	NA
Ar-41	Ci	1.41E00	1.83E-01	NA	NA
	Ci				
	Ci				
	Ci				
Total for Period	Ci	1.11E+01	8.89E00	NA	NA

2. Iodines

I-131	Ci	2.85E-04	2.34E-04	NA	NA
I-133	Ci	1.87E-03	1.38E-03	NA	NA
I-135	Ci	4.54E-04	1.21E-03	NA	NA
Total for Period	Ci	2.61E-03	2.82E-03	NA	NA

MAIN CHIMNEY
GASEOUS EFFLUENTS

Nuclides Released	Unit	Continuous Mode		Batch Mode	
		Quarter Third	Quarter Fourth	Quarter Third	Quarter Fourth
3. Particulates					
Sr-89*	Ci	1.54E-04	1.36E-04	NA	NA
Sr-90*	Ci	4.50E-07	4.50E-07	NA	NA
Cs-134	Ci	< LLD	< LLD	NA	NA
Cs-137	Ci	< LLD	4.63E-06	NA	NA
Ba-140	Ci	1.12E-04	1.47E-04	NA	NA
La-140	Ci	5.13E-05	1.20E-04	NA	NA
Cr-51	Ci	4.75E-05	< LLD	NA	NA
Mn-54	Ci	1.41E-05	< LLD	NA	NA
Co-58	Ci	< LLD	< LLD	NA	NA
Co-60	Ci	2.84E-04	2.52E-04	NA	NA
I-131	Ci	< LLD	6.33E-06	NA	NA
Ag-110m	Ci	< LLD	9.27E-06	NA	NA
I-133	Ci	3.00E-04	3.19E-04	NA	NA
Mo-99	Ci	3.22E-04	6.17E-05	NA	NA
	Ci				
	Ci				
	Ci				
Total for Period	Ci	1.29E-03	1.06E-03	NA	NA

* PROJECTED VALUE BASED ON PREVIOUS SIX MONTHS AVAILABLE DATA

REACTOR VENTILATION
GASEOUS EFFLUENTS

Nuclides Released	Unit	Continuous Mode		Batch Mode	
		Quarter Third	Quarter Fourth	Quarter Third	Quarter Fourth
1. Fission gases					
Kr-85	Ci	< LLD	< LLD	NA	NA
Kr-85m	Ci	< LLD	< LLD	NA	NA
Kr-87	Ci	< LLD	< LLD	NA	NA
Kr-88	Ci	< LLD	< LLD	NA	NA
Xe-133	Ci	< LLD	< LLD	NA	NA
Xe-135	Ci	< LLD	< LLD	NA	NA
Xe-135m	Ci	< LLD	< LLD	NA	NA
Xe-138	Ci	< LLD	< LLD	NA	NA
	Ci				
	Ci				
Total for Period	Ci	< LLD	< LLD	NA	NA

2. Iodines

I-131	Ci	< LLD	4.43E-06	NA	NA
I-133	Ci	2.41E-05	7.88E-05	NA	NA
I-135	Ci	< LLD	< LLD	NA	NA
Total for Period	Ci	2.41E-05	8.32E-05	NA	NA

REACTOR VENTILATION
GASEOUS EFFLUENTS

Nuclides Released	Unit	Continuous Mode		Batch Mode	
		Quarter Third	Quarter Fourth	Quarter Third	Quarter Fourth
3. Particulates					
Sr-89*	Ci	3.48E-06	4.97E-06	NA	NA
Sr-90*	Ci	< LLD	< LLD	NA	NA
Cs-134	Ci	< LLD	< LLD	NA	NA
Cs-137	Ci	< LLD	4.87E-05	NA	NA
Ba-140	Ci	< LLD	< LLD	NA	NA
La-140	Ci	< LLD	< LLD	NA	NA
Cr-51	Ci	1.24E-03	1.14E-04	NA	NA
Mn-54	Ci	1.55E-04	6.09E-04	NA	NA
Co-58	Ci	6.01E-05	1.67E-04	NA	NA
Co-60	Ci	7.13E-04	2.55E-03	NA	NA
I-131	Ci	< LLD	< LLD	NA	NA
Ag-110m	Ci	3.11E-05	< LLD	NA	NA
Mo-99	Ci	6.32E-04	7.96E-04	NA	NA
I-133	Ci	5.06E-05	2.94E-05	NA	NA
Zn-65	Ci	2.77E-05	< LLD	NA	NA
	Ci				
	Ci				
Total for Period	Ci	2.91E-03	4.32E-03	NA	NA

* PROJECTED VALUE BASED ON PREVIOUS SIX MONTHS AVAILABLE DATA

LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	Unit	Quarter Third	Quarter Fourth	Est. Total Error, %
A. FISSION & ACTIVATION PRODUCTS				
1. Total release (not including tritium, gases, alpha)	Ci	1.89E-02	3.23E-02	5.6
2. Average diluted concentration during batch discharges period	uCi/ml	7.91E-10	1.60E-09	
3. Percent of applicable limit *	%	1.23E-01 3.48E-02	1.46E-02 1.90E-02	
4. Maximum diluted concentration during batch discharges	uCi/ml	9.02E-09	3.93E-08	
B. TRITIUM				
1. Total Release	Ci	1.63E+01	1.49E+01	4.0
2. Average diluted concentration during batch discharges	uCi/ml	6.82E-07	7.38E-07	
3. Percent of applicable limit	%	2.25E-02	2.46E-02	
C. DISSOLVED AND ENTRAINED GASES				
1. Total Release	Ci	1.14E-04	1.02E-04	5.6
2. Average diluted concentration during batch discharges	uCi/ml	4.77E-12	5.05E-12	
3. Percent of applicable limit	%	2.39E-06	2.53E-06	
D. GROSS ALPHA RADIOACTIVITY				
1. Total Release	Ci	< LLD	< LLD	NA
2. Average concentration released during batch discharges	uCi/ml	< LLD	< LLD	
E. VOLUME OF WASTE RELEASED (prior to dilution)				
	Liters	3.29E+06	4.95E+06	
F. VOLUME OF DILUTION WATER USED DURING BATCH DISCHARGES				
	Liters	2.39E+10	2.02E+10	
G. TOTAL VOLUME OF DILUTION WATER DURING PERIOD (QUARTER)				
	Liters	3.93E+11	3.94E+11	

* WHOLE BODY/ORGAN

LIQUID EFFLUENTS

Nuclides Released	Unit	Continuous Mode		Batch Mode	
		Quarter Third	Quarter Fourth	Quarter Third	Quarter Fourth
Sr-89	Ci	< LLD	< LLD	1.86E-05	1.53E-05
Sr-90	Ci	< LLD	< LLD	1.41E-05	2.46E-06
Cs-134	Ci	< LLD	< LLD	< LLD	< LLD
Cs-137	Ci	< LLD	< LLD	2.58E-03	7.77E-04
I-131	Ci	< LLD	< LLD	< LLD	< LLD
Co-58	Ci	< LLD	< LLD	1.52E-04	1.85E-03
Co-60	Ci	< LLD	< LLD	1.15E-02	1.87E-02
Fe-59	Ci	< LLD	< LLD	< LLD	2.93E-04
Zn-65	Ci	< LLD	< LLD	< LLD	1.10E-04
Mn-54	Ci	< LLD	< LLD	4.48E-04	5.71E-03
Cr-51	Ci	< LLD	< LLD	1.94E-03	1.68E-03
As-76	Ci	< LLD	< LLD	< LLD	5.13E-05
Nb-95	Ci	< LLD	< LLD	< LLD	6.74E-06
Mo-99	Ci	< LLD	< LLD	< LLD	< LLD
Ag-110m	Ci	< LLD	< LLD	2.17E-04	5.95E-04
Ba-140	Ci	< LLD	< LLD	< LLD	< LLD
Sb-124	Ci	< LLD	< LLD	1.97E-05	< LLD
La-140	Ci	< LLD	< LLD	< LLD	2.16E-05
Fe-55	Ci	< LLD	< LLD	1.83E-03	2.47E-03
Sb-125	Ci	< LLD	< LLD	1.53E-04	< LLD
Total for Period (above)	Ci	< LLD	< LLD	1.89E-02	3.23E-02
Xe-133	Ci	< LLD	< LLD	5.46E-05	2.78E-05
Xe-135	Ci	< LLD	< LLD	5.98E-05	7.45E-05

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(final)