GEORGIA POWER COMPANY

PLANT E. I. HATCH

UNITS NO. 1 & 2

SEMI-ANNUAL REPORT

PLANT RADIOACTIVE EFFLUENT RELEASES

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PLANT RADIOACTIVE EFFLUENT RELEASES

1 LIQUID EFFLUENTS

1.1. REGULATORY LIMITS

1. The concentration of radioactive materials released in liquid wastes from all reactors at the site shall not exceed the values specified in 10 CFR Part 20, Appendix B, Table II, Column 2, for unrestricted area.

2. The cumulative release of radioactive materials in liquid wastes, excluding tritium and dissolved gases, shall not exceed 10 Ci/reactor/calendar quarter.

3. The cumulative release of radioactive materials in liquid wastes, excluding tritium and dissolved gases, shall not exceed 20 Ci/reactor in any 12 consecutive months.

4. During release of radioactive wastes, the effluent control monitor shall be set to alarm and to initiate the automatic closure of the waste discharge valve prior to exceeding the limits specified in 1. above.

5. The operability of the automatic isolation valve in the liquid radioactive waste discharge line shall be demonstrated quarterly.

6. The equipment installed in the liquid radioactive waste system shall be maintained and shall be operated to process radioactive liquid wastes prior to their discharge when the projected cumulative release rate could exceed 1.25 Ci/reactor/calendar quarter, excluding tritium and dissolved gases.

7. The maximum radioactivity to be contained in any liquid radwaste tank that can be discharged directly to the environs shall not exceed 10 Ci, excluding tritium and dissolved gases.

8. If the cumulative release of radioactive materials in liquid effluents, excluding tritium and dissolved gases, exceeds 2.5 Ci/reactor/calendar quarter, the licensee shall make an investigation to identify the causes of such releases, define and initiate a program of action to reduce such releases to the design objective levels and report these actions to the Commission within 30 days from the end of the quarter during which the release occurred.

9. An unplanned or uncontrolled offsite release of radioactive materials in liquid effluents in excess of 0.5 Ci excluding dissolved gases shall be reported.

1.2. MAXIMUM PERMISSIBLE CONCENTRATIONS

The MPC values used in determining allowable liquid radwaste release concentrations are taken from 10 CFR Part 20, Appendix B, Table II, Column 2. Release rate and dilution ratio for each batch are determined by a mixed nuclide MPC calculation performed before the release of the batch. To facilitate the measurements and calculations, the nuclides of Column 2 which can be produced in a fission reactor have been grouped according to MPC value and type of radiation as shown in Figure 1-1.

The concentration of each of the 29 gamma emitting nuclides specifically noted in Figure 1-1 is measured individually because of interest in that nuclide or because of inadequate sensitivity for the nuclide from a gross activity measurement. For any of the 29 nuclides not detected in the gamma scan, the MDA limit is computed from the measured data for that sample.

Only two pure beta emitters, Sr-89 and Sr-90, have MPC values less than 9×10^{-6} uCi/ml. Individual measurements are made on proportional composite liquid radwaste samples to determine the Sr-89 and Sr-90 concentration or MDA value to be applied to individual batch release calculations.

Although the MPC limit for tritium is greater than 9×10^{-6}, a separate measurement is made for tritium since the gross beta technique does not provide an acceptable tritium measurement. A distillation and liquid scintillation counting technique is used to measure tritium concentration.

The maximum activity of gamma and beta emitting nuclides with MPC values greater than 9×10^{-6} uCi/ml, except for the 29 nuclides noted above, is determined by gross gamma and gross beta measurements. Measurement sensitivity limits of approximately 2 cpm/ml allow a null measurement to show that the sum (Ci/MPCi), is less than 0.1 for gamma and beta nuclides not measured directly.

The sum of the ratios, (Ci/MPCi), for alpha emitters can be shown to be less than 0.1 by a null measurement with a sensitivity limit of approximately 1×10^{-2} cpm/ml. Gas flow counting is used to achieve the required sensitivity of measurement.

Thus, except for radionuclides produced in negligible quantities in a fission reaction (eg. I-125, I-129 etc.), the methods outlined above provide a means to assign a quantitatively measured or MDA value to all nuclides in Column 2. These measured and calculated concentration values for each batch are used to calculate the dilution ratio, release rate, and dilution rate prior to release of each batch. Both the concentration and release data are stored on a computer disc file. The disc file data is used to assure that quarterly and annual release limits are not exceeded. Bases used for the data of Table 1-1 are as follows:

A. Fission and activation products - The total release values (not including tritium, gases, alpha) are comprised of the sum of the individual radionuclide activities and include the LLD concentration of all isotopes that were not measured but did not meet the minimum sensitivity limit as set forth in the Environmental Tech Specs. This sum is for each batch released to the river for the respective quarter. Percent of applicable limit is determined from a mixed nuclide MPC calculation. The average concentration for each nuclide summed over all batches is divided by the corresponding individual MPC value. The sum over all nuclides of the Ci/MPCi ratios times 100 is the percent of applicable limit for effluent releases during the quarter.

B. Tritium - The measured tritium concentration in a composite sample is used to calculate the total release and average diluted concentration during each period. Average diluted concentration divided by the MPC limit, 3×10^{-3} uCi/ml, is converted to percent to give the percent of applicable limit.

C. Dissolved and entrained gases - Concentrations of dissolved and entrained gases in liquid effluents are measured on each batch by Ge(Li) spectroscopy on a one liter sample from each liquid radwaste batch. Dissolved and entrained gases for which measured or MDA concentrations are determined include noble gases with half lives greater than 8 hours; Xe-135, Xe-133m, Xe-133, and Kr-85. Iodine radionuclides in any form are also determined during the isotopic analysis for each batch, therefore a separate analysis for possible gaseous forms is not performed because it would not provide additional information.

A conservative release limit, the maximum sensitivity limit of 4×10^{-5} uCi/ml of each dissolved and entrained radionuclide as specified in Regulatory Guide 1.21, has been applied in determining the percent of applicable limit.

1.3 MEASUREMENTS AND APPROXIMATIONS OF TOTAL RADIOACTIVITY.

Details of the analytical procedures for liquid radwaste analysis are contained in operating procedure HNP-7601. The following measurements are performed as indicated:

	MEASUREMENT	FREQUENCY	METHOD
1.	Gamma Isotopic	Each Batch	Ge(Li) spectrometry with on-line computer.
2.	Gross Gamma	Each Batch	2 X 2 NaI well crystal counting
3.	Gross Beta	Each Batch	Gas flow proportional counting
4.	Sr-89	Quarterly Composite	Chemical separation and gas flow proportional counting
5.	Sr-90	Quarterly Composite	Chemical separation and gas flow proportional counting
6.	Tritium	Monthly Composite	Distillation and liquid scintillation counting
7.	Alpha	Monthly Composite	Gas flow proportional counting
8.	Dissolved Gases	Each Batch	Ge(Li) spectrometry with on-line computer

If a liquid radwaste tank cannot be reprocessed, a sample for analysis is taken from the tank after the required recirculation time. The sample is used for gamma-ray spectroscopy, gross gamma and gross beta counting, and for preparation of a composite sample.

The Ge(Li) detector consist of a 10% and two 15% efficiency, 2.0 FWHM resolution detectors in 4-inch thick lead shields. A one-liter radwaste liquid sample is poured in to a Marinelli beaker in preparation for a 2000-3000 second Ge(Li) count. A peak search of the resulting gamma ray spectrum is performed by the on-line computer system. Energy and net count data for all significant peaks are determined, and quantitative reduction or MDA calculations are performed for the nuclides listed in Figure 1-1. The quantitative calculations include corrections for counting time, decay time, sample volume, sample geometry, detector efficiency, baseline counts, and branching ratio. MDA calculations, including the above corrections, are made based on the counts in two standard deviations of the baseline count at the location on the spectrum where a peak for that nuclide would be located if present.

The calculated radionuclide concentrations or MDA values from the gamma scan and from previously stored Sr-89 and Sr-90 values are used to calculate the dilution ratio (Ci/MPCi) and allowable release parameters. A sample printout is shown in Figures 1-2 and 1-3.

The Liquid Radwaste Discharge Permit Printout is transferred item by item to the first portion of the release permit (Figure 1-4) by a laboratory technician. Although the computer could printout the release permit and will inform the technician if a batch cannot be discharged as desired, a manual transfer of calculated results to the release permit by the technician was implemented as more likely to catch abnormal conditions in the data.

The liquid radwaste monitor setting is calculated by the computer based on the gamma activity as measured in the sample used for laboratory analysis. A coefficient has been determined which relates laboratory gamma counts to the monitor count rate. If the monitor count rate exceeds the calculated setting during discharge, then the liquid passing through the monitor is not representative of the sample which was analyzed in the lab. A monitor reading in excess of the calculated setpoint therefore results in an automatic termination of the liquid effluent discharge. Liquid effluent discharge is also automatically terminated if the dilution flow rate falls below the flow rate used in the computer calculation.

When the release permit is returned from Radwaste Operations following discharge, the discharge data is combined with the analysis results on the computer disc file. The disc file may be scanned to display trends in any recorded parameter, or may be summed for reporting purposes as shown in Figure 1-5a and b.

All other radionuclide concentration measurements are performed as indicated in the table given previously in this section and as detailed in the procedure HNP-7601. The dissolved gases calculation is performed in the Ge(Li) spectrometry system with computer data reduction using the Liquid Radwaste Library which includes gases.

Several comments are indicative of the success of the HNP liquid radwaste program during this reporting period:

1. The total measured activity released in liquid effluent for both Units was 3.11 E-1 curies for the first quarter and 2.04 E-1 curies for the second quarter. These values were approximately 1/42 for Unit 1 and 1/117 for Unit 2 for the first quarter and 1/55 for Unit 1 and 1/458 for Unit 2 for the second quarter of the allowed 10 curies per quarter per reactor.

2. The radwaste release procedure strongly emphasized reprocessing rather than discharge of liquid radwaste. During this report period 41.5% of the liquid radwaste reaching the sample tanks was discharged; 58.5% was recycled back into both of the reactor water systems.

3. A complete isotopic scan, gross beta, and gross gamma counts and computer analysis were performed prior to the release of each of the 999 discharge batches for both Units.

1.4 LIQUID EFFLUENT RELEASE DATA

Regulatory Guide 1.21 Tables 2A and 2B are found in this report as Table 1-1a, b and 1-2a, b. Data is presented on a quarterly basis as per Regulatory Guide 1.21.

Other data pertinent to batch releases of radioactive effluent from both units is as follows:

Number of batch releases: 999

Total time period for releases: 130,471 minutes

Maximum time period for a batch release: 460 minutes

Average time period for batch release: 130.5 minutes

Minimum time period for a batch release: 60 minutes

Average stream flow during periods of release of effluent into a flowing stream: 21,430 CFS

FIGURE 1-1
METHODS OF MEETING, TABLE II, COLUMN 2 MPC LIMITS

MPC RANGE (U Ci/ml)	GAMMA-RAY EMITTERS	BETA EMITTERS	ALPHA EMITTERS
9×10^{-6}	I-131, I-132, I-133 I-135, Cs-134 (Ge(Li) Gamma-Ray Spectroscopy)	Sr-89, Sr-90 (Separation & Gas Flow Counting)	ALL (Gas Flow Counting, Sensitivity 0.01 CPM/ml)
9×10^{-6}	Tc-99m, Ce-141, Zn-69m, W-187, Zr-97, Mn-56, Cs-138, Sb-125, Rb-88, Cs-136, Sb-124, Ru-103, Nb-97, Br-82, Lu-174m, Sr-91 Ba-La-140, Na-24, Cu-64 CO-60, Fe-59, Zn-65 Ag-110m, Mn-54, CO-58 Zr-Nb-95, Cs-Ba-137 As-76, F-18, Cr-51 Np-239, Ce-141 Mo-Tc-99, Ce-Pr-144 (Ge(Li) Gamma-Ray Spectroscopy) All others (Gross Gamma-Well Counter; Sensitivity 5 CPM/ml)	Tritium (Distillation & Liquid Scintillation Counting) All Others (Gas Flow Counting Sensitivity 2 CPM/ml	

FIGURE 1-2

HNP-7601 DATE /

****
* E. I. Hatch Nuclear Plant *
* Liquid Radwaste Analysis *
****

Reactor# 1
Tank: FDST1

Batch# 558
Recirc time: 75 minutes

Comment: HIGH COND.,TURB.,F.S.

Run date: 6/24/84 0710
Sample volume: 1000.00 ml
Geometry code: 1LHB-0
Detector# 1
Library: LRWLB2

Count start date: 6/24/84 0525
Clock time: 3000 secs
Live time: 3000 secs
MCA# 1
Operator: CJW

Energy(keV)= .14 + 1.000*Ch# + 0.000E+00*Ch#^2 + 0.000E+00*Ch#^3 : 06/23/84 1457

Eff = 1/[7.186E-01 * E^(-1.7261E+00) + 642.799 * E^(9.6141E-01)] : 06/03/84 1444
where E = Energy in MeV.

Initial Peak Search

Peak #	Energy (Kev)	Address Channel	Net Counts	Error Counts	LLD Counts	Channels In Peak	Isotope	Flag
1	76.77	76.63	926	88	89	15	Pb X-ray	Max Chan.
1	76.77	76.63	926	88	89	15	Pb X-ray	Mult. ID
2	364.75	364.65	323	24	23	5	I-131	
3	511.68	511.59	109	18	20	6	F-18	
3	511.68	511.59	109	18	20	6	I-133	Mult. ID
4	605.85	605.76	213	24	23	10	Cs-134	
5	662.11	662.02	193	17	15	5	Cs-137	
6	795.70	795.63	113	13	11	5	Cs-134	
6	795.70	795.63	113	13	11	5	Ac-228	Mult. ID
7	1116.57	1116.53	87	13	12	9	Zn-65	
7	1116.57	1116.53	87	13	12	9	Xe-138	Mult. ID
8	1173.51	1173.48	36	8	9	4	Co-60	
8	1173.51	1173.48	36	8	9	4	Kr-87	Mult. ID
9	1460.51	1460.50	147	13	6	8	K-40	
10	1764.54	1764.56	15	4	3	4	Bi-214	

REPLACED---Peak at 76.77 kev
Energy = 74.22 Net= 466 Error= 51 LLD= 148 Channels= 7
ADDED------Peak at 1332.24 kev.
Energy = 1332.24 Net= 32 Error= 8 LLD= 19 Channels= 6

FIGURE 1-2
(CONTINUED)

Energy(keV)= .14 + 1.000*Ch# + 0.000E+00*Ch#^2 + 0.000E+00*Ch#^3 : 06/23/84 1457

Eff = 1/[7.186E-01 * E^(-1.7261E+00) + 642.799 * E^(9.6141E-01)] : 06/03/84 1444
where E = Energy in MeV.

ISOTOPE	ENERGY (keV)	CONCENTRATION (uCi/ml)	ERROR (uCi/ml)	MPC (uCi/ml)	C/MPC
Ce-144	133.54	<3.862E-07		1E-05	<3.86E-02
Tc-99m	140.51	<4.536E-08		3E-03	<1.51E-05
Ce-141	145.44	<9.188E-08		9E-05	<1.02E-03
Np-239	277.60	<3.197E-07		1E-04	<3.20E-03
Cr-51	320.08	<4.752E-07		2E-03	<2.38E-04
I-131	364.75	8.912E-07	6.591E-08	3E-07	2.97E+00
Zn-69m	438.63	<5.075E-08		6E-05	<8.46E-04
W-187	479.53	<2.067E-07		6E-05	<3.45E-03
F-18	511.68	1.045E-07	1.685E-08	5E-04	2.09E-04
I-133	529.87	<6.519E-08		1E-06	<6.52E-02
Ba-140	537.32	<2.141E-07		2E-05	<1.07E-02
As-76	559.10	<1.151E-07		2E-05	<5.75E-03
Cs-134	605.85	7.891E-07	8.845E-08	9E-06	8.77E-02
Cs-137	662.11	8.922E-07	8.016E-08	2E-05	4.46E-02
Mo-99	739.58	<3.092E-07		4E-05	<7.73E-03
Zr-97	743.36	<5.750E-08		2E-05	<2.87E-03
Zr-95	756.72	<9.708E-08		6E-05	<1.62E-03
Nb-95	765.79	<4.964E-08		1E-04	<4.96E-04
I-132	772.61	<4.731E-08		8E-06	<5.91E-03
Co-58	810.76	<6.303E-08		9E-05	<7.00E-04
Mn-54	834.83	<5.648E-08		1E-04	<5.65E-04
Ag-110m	884.67	<8.470E-08		3E-05	<2.82E-03
Zn-65	1116.57	1.106E-06	1.681E-07	1E-04	1.11E-02
I-135	1260.41	<1.471E-07		4E-06	<3.68E-02
Fe-59	1291.56	<1.338E-07		6E-05	<2.23E-03
Co-60	1332.24	2.463E-07	6.205E-08	3E-05	8.21E-03
Cu-64	1345.90	<5.215E-06		2E-04	<2.61E-02
Na-24	1368.53	<2.572E-08		3E-05	<8.57E-04
La-140	1596.49	<4.191E-08		2E-05	<2.10E-03
Mn-56	1810.69	<9.178E-08		1E-04	<9.18E-04
Sr-89	(BETA)	6.600E-08	4.990E-08	3E-08	2.20E+00
Sr-90	(BETA)	<2.810E-08		1E-08	<2.81E+00
H-3	(BETA)	2.700E-03	3.000E-04	3E-03	9.00E-01
Fe-55	(BETA)	<9.000E-07		8E-04	<1.13E-03
P-32	(EC)	<1.000E-07		2E-05	<5.00E-03
Measured totals		2.704E-03	3.000E-04		6.22E+00
LLD totals		<9.419E-06			<3.04E+00
Totals		2.714E-03			9.26E+00

DISSOLVED GASES

Xe-133	81.00	<1.522E-07		4E-05	<3.80E-03
Kr-88	196.32	<1.351E-07		4E-05	<3.38E-03
Xe-133M	233.22	<4.706E-07		4E-05	<1.18E-02
Xe-135	249.79	<4.599E-08		4E-05	<1.15E-03
Kr-85M	304.87	<2.677E-07		4E-05	<6.69E-03
Kr-87	402.58	<5.032E-08		4E-05	<1.26E-03
Xe-138	434.49	<3.883E-09		4E-05	<9.71E-05
Measured gas totals		0.000E+00	0.000E+00		0.00E+00
LLD gas totals		<1.126E-06			<2.81E-02

FIGURE 1-2
(CONTINUED)

Total gas 1.126E-06 2.81E-02

GROSS ACTIVITY

Counter	Gross Counts	Background Counts	Time (Min)	Vol ml	Net Activity(cpm/ml)	Error 1 Sigma
Well Crystal	1268	891	20.0	2	9.43E+00	1.16E+00
Proportional	287	220	10.0	2	3.35E+00	1.13E+00

ESTIMATED WASTE TANK VOLUME= 11470.00 gallons

ESTIMATED ACTIVITY THIS BATCH
EXCLUDING GASES: 1.17E-01 Curies (1.17E+05 Microcuries)
EXCLUDING H-3 AND GASES: 1.78E-04 Curies (1.78E+02 Microcuries)

Liquid Radwaste Release Summary

1)Meas. conc., excluding H-3 and dissolved gases (uCi/ml): 4.10E-06 +- 2.31E-07
Meas. conc., including H-3, excluding gases : 2.70E-03 +- 3.00E-04

2)Calculated LLD concentration, excluding dissolved gases (uCi/ml): 9.42E-06

3)Calculated MPC ratio (C/MPC of meas.,including gases): 6.22E+00

4)Minimum dilution flow rate (gpm): 10000

5)Maximum tank discharge flow rate (gpm): 1915

6)Specified tank flow rate (gpm): 75

7)Radwaste monitor trip setting: 1335
A = 4.03E-06 ,uCi/ml B = 1100 ,Monitor BG CPS
C = 16810000.00 ,Monitor CPS per uCi/ml F = 2 ,Conserv. Factor
A includes measured 'selected','other' nuclides and gases but excludes:
Sr-89, Sr-90, H-3, Fe-55, P-32

8)Estimated conc. of meas. nuclides at point of release (uCi/ml): 2.013E-05

9)Monitor maximum to ensure 10CFR20 limits are not exceeded: 1462

FIGURE 1-3

HNP-7601 DATE /

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**********************************************
*         E. I. Hatch Nuclear Plant          *
*          Liquid Radwaste Analysis          *
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Reactor# 2
Tank: FDST2

Batch# 409
Recirc time: 105 minutes

Comment: HIGH COND

Run date: 6/19/84 0742
Sample volume: 1000.00 ml
Geometry code: 1LHB-0
Detector# 3
Library: LRWLB2

Count start date: 6/19/84 0615
Clock time: 3000 secs
Live time: 3000 secs
MCA# 3
Operator: CJW

Energy(keV)= .26 + 1.000*Ch# + 0.000E+00*Ch#^2 + 0.000E+00*Ch#^3 : 06/18/84 1540

E/f = 1/[5.032E-01 * E^(-1.7287E+00) + 589.639 * E^(8.9371E-01)] : 06/04/84 1752
where E = Energy in MeV.

Initial Peak Search

Peak #	Energy (Kev)	Address Channel	Net Counts	Error Counts	LLD Counts	Channels In Peak	Isotope	Flag
1	365.31	365.00	76	10	8	4	I-131	
2	662.70	662.35	40	8	7	5	Cs-137	
3	1117.24	1116.84	39	9	7	11	Zn-65	
3	1117.24	1116.84	39	9	7	11	Xe-138	Mult. ID
4	1173.37	1172.97	23	6	5	5	Co-60	
5	1332.92	1332.49	39	7	4	5	Co-60	
6	1461.39	1460.95	86	10	4	6	K-40	

FIGURE 1-3
(CONTINUED)

ISOTOPE	ENERGY (keV)	CONCENTRATION (uCi/ml)	ERROR (uCi/ml)	MPC (uCi/ml)	C/MPC
Ce-144	133.54	<1.285E-07		1E-05	<1.28E-02
Tc-99m	140.51	<1.542E-08		3E-03	<5.14E-06
Ce-141	145.44	<2.571E-08		9E-05	<2.86E-04
Np-239	277.60	<1.317E-07		1E-04	<1.32E-03
Cr-51	320.08	<1.702E-07		2E-03	<8.51E-05
I-131	365.31	2.055E-07	2.783E-08	3E-07	6.85E-01
Zn-69m	438.63	<1.367E-08		6E-05	<2.28E-04
W-187	479.53	<6.552E-08		6E-05	<1.09E-03
F-18	510.99	<6.165E-09		5E-04	<1.23E-05
I-133	529.87	<1.366E-08		1E-06	<1.37E-02
Ba-140	537.32	<4.928E-08		2E-05	<2.46E-03
As-76	559.10	<2.411E-08		2E-05	<1.21E-03
Cs-134	604.70	<3.294E-08		9E-06	<3.66E-03
Cs-137	662.70	1.754E-07	3.384E-08	2E-05	8.77E-03
Mo-99	739.58	<2.101E-07		4E-05	<5.25E-03
Zr-97	743.36	<1.901E-08		2E-05	<9.51E-04
Zr-95	756.72	<2.138E-08		6E-05	<3.56E-04
Nb-95	765.79	<2.239E-08		1E-04	<2.24E-04
I-132	772.61	<2.001E-08		8E-06	<2.50E-03
Co-58	810.76	<2.528E-08		9E-05	<2.81E-04
Mn-54	834.83	<2.236E-08		1E-04	<2.24E-04
Ag-110m	884.67	<2.647E-08		3E-05	<8.82E-04
Zn-65	1117.24	4.561E-07	1.012E-07	1E-04	4.56E-03
I-135	1260.41	<4.133E-08		4E-06	<1.03E-02
Fe-59	1291.56	<6.967E-08		6E-05	<1.16E-03
Co-60	1332.92	2.701E-07	4.807E-08	3E-05	9.00E-03
Cu-64	1345.90	<3.891E-06		2E-04	<1.95E-02
Na-24	1368.53	<1.352E-08		3E-05	<4.51E-04
La-140	1596.49	<1.674E-08		2E-05	<8.37E-04
Mn-56	1810.69	<5.061E-08		1E-04	<5.06E-04
Sr-89	(BETA)	1.770E-07	7.900E-08	3E-08	5.90E+00
Sr-90	(BETA)	<3.770E-08		1E-08	<3.77E+00
H-3	(BETA)	6.570E-04	7.200E-05	3E-03	2.19E-01
Fe-55	(BETA)	<9.000E-07		8E-04	<1.13E-03
P-32	(EC)	<5.000E-07		2E-05	<2.50E-02
Measured totals		6.583E-04	7.200E-05		6.83E+00
LLD totals		<6.564E-06			<3.88E+00
Totals		6.648E-04			1.07E+01

DISSOLVED GASES

Xe-133	81.00	<3.780E-08		4E-05	<9.45E-04
Kr-88	196.32	<4.814E-08		4E-05	<1.20E-03
Xe-133M	233.22	<1.589E-07		4E-05	<3.97E-03
Xe-135	249.79	<1.645E-08		4E-05	<4.11E-04
Kr-85M	304.87	<1.102E-07		4E-05	<2.75E-03
Kr-87	402.58	<2.254E-08		4E-05	<5.64E-04
Xe-138	434.49	<2.342E-09		4E-05	<5.85E-05
Measured gas totals		0.000E+00	0.000E+00		0.00E+00
LLD gas totals		<3.963E-07			<9.91E-03
Total gas		3.963E-07			9.91E-03

FIGURE 1-3
(CONTINUED)

GROSS ACTIVITY

Counter	Gross Counts	Background Counts	Time (Min)	Vol ml	Net Activity(cpm/ml)	Error 1 Sigma
Well Crystal	1240	994	20.0	2	6.15E+00	1.18E+00
Proportional	193	186	10.0	2	3.50E-01	9.73E-01

ESTIMATED WASTE TANK VOLUME= 9135.00 gallons

ESTIMATED ACTIVITY THIS BATCH
EXCLUDING GASES: 2.28E-02 Curies (2.28E+04 Microcuries)
EXCLUDING H-3 AND GASES: 4.44E-05 Curies (4.44E+01 Microcuries)

LIQUID RADWASTE RELEASE SUMMARY

1)Meas. conc., excluding H-3 and dissolved gases (uCi/ml): 1.28E-06 +- 1.44E-07
Meas. conc., including H-3, excluding gases : 6.58E-04 +- 7.20E-05

2)Calculated LLD concentration, excluding dissolved gases (uCi/ml): 6.56E-06

3)Calculated MPC ratio (C/MPC of meas.,including gases): 6.83E+00

4)Minimum dilution flow rate (gpm): 10000

5)Maximum tank discharge flow rate (gpm): 1716

6)Specified tank flow rate (gpm): 75

7)Radwaste monitor trip setting: 2361
A = 1.11E-06 ,uCi/ml B = 2000 ,Monitor BG CPS
C = 102300000.00 ,Monitor CPS per uCi/ml F = 2 ,Conserv. Factor
A includes measured 'selected','other' nuclides and gases but excludes:
Sr-89, Sr-90, H-3, Fe-55, P-32

8)Estimated conc. of meas. nuclides at point of release (uCi/ml): 4.900E-06

9)Monitor maximum to ensure 10CFR20 limits are not exceeded: 2229

FIGURE 1-4

PLANT C.I. BATCH
LIQUID RADWASTE DISCHARGE PERMIT

BATCH NO. _____
UNIT # _____

TANK TO BE RELEASED _____ DATE _____
REASON FOR NECESSITY OF DISCHARGE _____
RECIRC. START TIME _____ SAMPLE TIME _____ RECIRC. DURATION _____ MINUTES

I. LABORATORY ANALYSIS

(1) MEASURED RADIONUCLIDE CONCENTRATION _____.E + _____.E ___ uCi/ml
(2) CALCULATED LLD LIMIT CONCENTRATIONS _____ uCi/ml
(3) CALCULATED MPC RATIO: Σ (Ci/MPCi) _____
(4) MINIMUM DILUTION FLOW RATE _____ GPM
(5) MAX. CALCULATED TANK DISCHARGE RATE: (SEE SEC. F.5.1) _____ GPM
(6) SPECIFIED TANK DISCHARGE RATE: Σ(5)/2 _____ GPM
(7) RADWASTE MONITOR TRIP SETTING: _____ CPS

A = Ge(Li)(1) _____ uCi/ml
B = MONITOR BG _____ CPS
C = MONITOR CPS PER Ge(Li) uCi/ml _____
F = CONSERVATIVE FACTOR _____

MONITOR ALARM SETPOINT (CPS) = (C X A X F) + B + 3 $\sqrt{B}$

COMPLETED BY	DATE
LAB FOREMAN APPROVED	

COMPOSITE LITER STORED _____ (INITIALS)

(8) RADWASTE MONITOR MAX. CPS TO BE WITHIN 10 CFR 20 LIMITS:
CXAX $\frac{(6)+(4)}{(6)\ (3)}$ _____ cps

II. OPERATIONS

		INIT.
(9)	LIQUID RADWASTE MONITOR TRIP SET AT: _____ CPS	_____
(10)	CONFIRMED DILUTION FLOW RATE _____ GPM	_____
(11)	VALVE LINEUP CHECKED AS PER HNP-_____	_____

	DATE	TIME	TANK LEVEL -%	DIS. INTEGRATOR RDNG.	DIS. RATE GPM	DIL. TOTAL GAL	RIVER EL. FT.	MONITOR CPS
START					*			*
END								**

_____ MIN. DURATION

_____ GAL. TOTAL RELEASE

COMPLETED BY	DATE

* @ 10 MIN AFTER START
** AFTER FLUSHING

III. LABORATORY

(12) TOTAL TANK VOLUME DISCHARGED (GAL. X 3,785) _____ ml
(13) TOTAL ACTIVITY DISCHARGED ((1) X (12)) _____ uCi
(14) RIVER FLOW RATE (FROM FSAR 2.4-6) _____ CFS

COMPLETED BY	DATE

FIGURE 1-5a

Liquid Radwaste Data Compilation for Reg. Guide 1.21 Report

E. I. Hatch Nuclear Plant UNIT 1

Total Activity (Curies)

	Quarter 1, 1984 Batches 1 thru 290				Quarter 2, 1984 Batches 291 thru 574			
Name	Measured	Error	High LLDs	Total	Measured	Error	High LLDs	Total
Ce-144	5.66E-04	9.11E-05	0.00E+00	5.66E-04	1.17E-03	1.39E-04	0.00E+00	1.17E-03
Tc-99m	4.64E-04	5.80E-06	*	4.64E-04	4.13E-04	6.03E-06	*	4.13E-04
Ce-141	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Np-239	2.05E-05	6.35E-06	*	2.05E-05	0.00E+00	0.00E+00	*	0.00E+00
Cr-51	3.43E-03	8.05E-05	*	3.43E-03	3.04E-03	9.70E-05	*	3.04E-03
I-131	7.03E-03	3.14E-05	0.00E+00	7.03E-03	7.86E-03	3.30E-05	0.00E+00	7.86E-03
Zn-69m	1.62E-05	2.47E-06	*	1.62E-05	0.00E+00	0.00E+00	*	0.00E+00
W-187	0.00E+00	0.00E+00	*	0.00E+00	0.00E+00	0.00E+00	*	0.00E+00
F-18	1.45E-03	1.28E-05	*	1.45E-03	1.43E-02	2.06E-05	*	1.43E-02
I-133	9.10E-04	1.15E-05	*	9.10E-04	1.35E-03	1.59E-05	*	1.35E-03
Ba-140	0.00E+00	0.00E+00	*	0.00E+00	0.00E+00	0.00E+00	*	0.00E+00
As-76	2.68E-04	1.05E-05	*	2.68E-04	2.29E-04	1.25E-05	*	2.29E-04
Cs-134	6.59E-02	7.72E-05	0.00E+00	6.59E-02	3.38E-02	6.47E-05	0.00E+00	3.38E-02
Cs-137	9.02E-02	9.62E-05	0.00E+00	9.02E-02	5.23E-02	8.46E-05	0.00E+00	5.23E-02
Mo-99	1.61E-04	5.02E-05	0.00E+00	1.61E-04	6.48E-04	1.09E-04	0.00E+00	6.48E-04
Zr-97	0.00E+00	0.00E+00	*	0.00E+00	0.00E+00	0.00E+00	*	0.00E+00
Zr-95	1.16E-04	6.52E-06	*	1.16E-04	3.28E-05	6.87E-06	*	3.28E-05
Nb-95	1.81E-04	6.71E-06	*	1.81E-04	1.26E-04	8.23E-06	*	1.26E-04
I-132	6.88E-08	9.27E-08	*	6.88E-08	1.25E-07	2.17E-07	*	1.25E-07
Co-58	1.24E-03	1.68E-05	0.00E+00	1.24E-03	9.69E-04	1.75E-05	0.00E+00	9.69E-04
Mn-54	3.41E-03	2.70E-05	0.00E+00	3.41E-03	3.31E-03	3.07E-05	0.00E+00	3.31E-03
Ag-110m	0.00E+00	0.00E+00	*	0.00E+00	1.16E-05	2.73E-06	*	1.16E-05
Zn-65	2.56E-02	9.78E-05	0.00E+00	2.56E-02	2.93E-02	1.23E-04	0.00E+00	2.93E-02
I-135	5.03E-04	1.26E-05	*	5.03E-04	2.96E-04	1.68E-05	*	2.96E-04
Fe-59	1.04E-04	8.13E-06	0.00E+00	1.04E-04	5.66E-05	5.70E-06	0.00E+00	5.66E-05
Co-60	1.06E-02	4.51E-05	0.00E+00	1.06E-02	1.50E-02	6.10E-05	0.00E+00	1.50E-02
Cu-64	6.54E-03	5.69E-04	*	6.54E-03	7.08E-03	8.50E-04	*	7.08E-03
Na-24	5.10E-03	2.68E-05	*	5.10E-03	1.05E-02	4.01E-05	*	1.05E-02
La-140	2.16E-05	2.16E-06	*	2.16E-05	2.70E-05	3.25E-06	*	2.70E-05
Mn-56	7.14E-06	2.66E-06	*	7.14E-06	0.00E+00	0.00E+00	*	0.00E+00
Cs-138	2.68E-06	3.97E-07	*	2.68E-06	0.00E+00	0.00E+00	*	0.00E+00
Cs-136	8.72E-04	1.35E-05	*	8.72E-04	3.95E-04	1.09E-05	*	3.95E-04
Sb-125	1.47E-04	1.27E-05	*	1.47E-04	5.13E-05	8.39E-06	*	5.13E-05
Sb-124	1.85E-04	1.43E-05	*	1.85E-04	0.00E+00	0.00E+00	*	0.00E+00
Nb-97	0.00E+00	0.00E+00	*	0.00E+00	5.77E-06	1.12E-06	*	5.77E-06
Sr-89	6.46E-04	4.88E-04	0.00E+00	6.46E-04	5.00E-04	4.51E-04	0.00E+00	5.00E-04
Sr-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
P-32	7.84E-04	3.14E-04	0.00E+00	7.84E-04	0.00E+00	0.00E+00	4.67E-02	4.67E-02
Totals	2.26E-01	8.42E-04	0.00E+00	2.26E-01	1.83E-01	1.00E-03	4.67E-02	2.29E-01
Xe-133	2.38E-02	5.63E-05	0.00E+00	2.38E-02	3.36E-03	3.24E-05	0.00E+00	3.36E-03
Kr-88	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-133M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-135	7.65E-03	2.00E-05	0.00E+00	7.65E-03	8.00E-03	2.75E-05	0.00E+00	8.00E-03
Kr-85M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-87	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-138	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-135M	3.82E-10	1.07E-10	0.00E+00	3.82E-10	1.16E-07	1.55E-08	0.00E+00	1.16E-07
Totals	3.14E-02	5.97E-05	0.00E+00	3.14E-02	1.14E-02	4.25E-05	0.00E+00	1.14E-02

FIGURE 1-5b

Liquid Radwaste Data Compilation for Reg. Guide 1.21 Report

E. I. Hatch Nuclear Plant UNIT 2

Total Activity (Curies)

	Quarter 1, 1984 Batches 1 thru 313				Quarter 2, 1984 Batches 314 thru 425			
Name	Measured	Error	High LLDs	Total	Measured	Error	High LLDs	Total
Ce-144	1.83E-04	5.78E-05	0.00E+00	1.83E-04	8.18E-05	3.56E-05	0.00E+00	8.18E-05
Tc-99m	3.55E-04	6.32E-06	*	3.55E-04	6.25E-06	6.77E-07	*	6.25E-06
Ce-141	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Np-239	0.00E+00	0.00E+00	*	0.00E+00	0.00E+00	0.00E+00	*	0.00E+00
Cr-51	1.68E-03	4.98E-05	*	1.68E-03	9.50E-05	1.61E-05	*	9.50E-05
I-131	1.77E-02	2.99E-05	0.00E+00	1.77E-02	2.11E-05	2.58E-06	0.00E+00	2.11E-05
Zn-69m	0.00E+00	0.00E+00	*	0.00E+00	0.00E+00	0.00E+00	*	0.00E+00
W-187	1.73E-06	2.09E-06	*	1.73E-06	0.00E+00	0.00E+00	*	0.00E+00
F-18	3.30E-04	4.18E-06	*	3.30E-04	9.80E-05	2.74E-06	*	9.80E-05
I-133	1.73E-03	9.95E-06	*	1.73E-03	0.00E+00	0.00E+00	*	0.00E+00
Ba-140	0.00E+00	0.00E+00	*	0.00E+00	0.00E+00	0.00E+00	*	0.00E+00
As-76	1.14E-05	1.84E-06	*	1.14E-05	0.00E+00	0.00E+00	*	0.00E+00
Cs-134	1.52E-02	3.77E-05	0.00E+00	1.52E-02	4.61E-03	2.05E-05	0.00E+00	4.61E-03
Cs-137	2.05E-02	4.65E-05	0.00E+00	2.05E-02	7.87E-03	2.88E-05	0.00E+00	7.87E-03
Mo-99	5.64E-05	2.18E-05	0.00E+00	5.64E-05	1.28E-04	3.20E-05	0.00E+00	1.28E-04
Zr-97	0.00E+00	0.00E+00	*	0.00E+00	0.00E+00	0.00E+00	*	0.00E+00
Zr-95	6.23E-04	6.11E-06	*	6.23E-04	0.00E+00	0.00E+00	*	0.00E+00
Nb-95	9.51E-04	5.36E-06	*	9.51E-04	0.00E+00	0.00E+00	*	0.00E+00
I-132	7.90E-06	9.30E-07	*	7.90E-06	0.00E+00	0.00E+00	*	0.00E+00
Co-58	2.86E-04	9.19E-06	0.00E+00	2.86E-04	3.24E-05	3.09E-06	0.00E+00	3.24E-05
Mn-54	6.37E-04	1.17E-05	0.00E+00	6.37E-04	4.15E-04	1.01E-05	0.00E+00	4.15E-04
Ag-110m	2.47E-05	3.17E-06	*	2.47E-05	1.19E-05	2.02E-06	*	1.19E-05
Zn-65	1.28E-02	6.51E-05	0.00E+00	1.28E-02	5.53E-03	5.04E-05	0.00E+00	5.53E-03
I-135	2.78E-04	1.08E-05	*	2.78E-04	5.74E-06	2.02E-06	*	5.74E-06
Fe-59	7.63E-05	6.68E-06	0.00E+00	7.63E-05	2.15E-05	4.11E-06	0.00E+00	2.15E-05
Co-60	4.43E-03	2.87E-05	0.00E+00	4.43E-03	2.83E-03	2.62E-05	0.00E+00	2.83E-03
Cu-64	1.57E-03	2.83E-04	*	1.57E-03	0.00E+00	0.00E+00	*	0.00E+00
Na-24	1.55E-03	1.20E-05	*	1.55E-03	2.12E-06	5.99E-07	*	2.12E-06
La-140	7.07E-06	1.14E-06	*	7.07E-06	0.00E+00	0.00E+00	*	0.00E+00
Mn-56	0.00E+00	0.00E+00	*	0.00E+00	0.00E+00	0.00E+00	*	0.00E+00
Cs-138	3.30E-06	5.98E-07	*	3.30E-06	0.00E+00	0.00E+00	*	0.00E+00
Cs-136	1.12E-03	1.11E-05	*	1.12E-03	0.00E+00	0.00E+00	*	0.00E+00
I132	5.24E-07	8.38E-08	*	5.24E-07	0.00E+00	0.00E+00	*	0.00E+00
Ba-139	1.41E-03	1.05E-04	*	1.41E-03	0.00E+00	0.00E+00	*	0.00E+00
Ag110m	1.23E-05	2.45E-06	*	1.23E-05	0.00E+00	0.00E+00	*	0.00E+00
Sn-113	2.67E-05	2.13E-06	*	2.67E-05	0.00E+00	0.00E+00	*	0.00E+00
Sb-125	1.59E-05	3.35E-06	*	1.59E-05	0.00E+00	0.00E+00	*	0.00E+00
Sr-89	1.58E-03	7.07E-04	0.00E+00	1.58E-03	1.34E-04	1.12E-04	0.00E+00	1.34E-04
Sr-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.73E-05	0.00E+00	0.00E+00	3.73E-05
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
P-32	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Totals	8.51E-02	7.80E-04	0.00E+00	8.51E-02	2.19E-02	1.40E-04	0.00E+00	2.19E-02
Xe-133	1.13E-01	8.89E-05	0.00E+00	1.13E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-88	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-133M	3.01E-04	2.19E-05	0.00E+00	3.01E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-135	2.56E-03	1.00E-05	0.00E+00	2.56E-03	5.30E-05	2.87E-06	0.00E+00	5.30E-05
Kr-85M	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-87	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-138	1.40E-10	1.55E-10	0.00E+00	1.40E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-131m	3.93E-03	1.41E-04	0.00E+00	3.93E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Totals	1.20E-01	1.68E-04	0.00E+00	1.20E-01	5.30E-05	2.87E-06	0.00E+00	5.30E-05

TABLE 1-1a

E. I. Hatch Nuclear Plant UNIT 1

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1984

LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	Quarter 1	Quarter 2	Est Total Error %
A. Fission & activation products				
1. Total release (not including H3, gases, alpha)	Ci	2.26E-01	1.83E-01	4.79E+01
2. Average diluted concentration during period	uCi/ml	9.02E-08	8.06E-08	
3. Percent of applicable limit	%	1.49E+00	1.57E+00	
B. Tritium				
1. Total release	Ci	2.31E+01	2.43E+01	3.73E+01
2. Average diluted concentration during period	uCi/ml	9.19E-06	1.07E-05	
3. Percent of applicable limit	%	3.06E-01	3.57E-01	
C. Dissolved and entrained gases				
1. Total release	Ci	3.14E-02	1.14E-02	1.01E+02
2. Average diluted concentration during period	uCi/ml	1.25E-08	5.01E-09	
3. Percent of applicable limit	%	3.13E-02	1.25E-02	
D. Gross alpha radioactivity				
1. Total release	Ci	1.34E-07	3.23E-06	1.20E+02
E. Volume of waste (prior to dilution)	liters	9.79E+06	9.79E+06	1.00E+01
F. Volume of dilution water used	liters	2.50E+09	2.26E+09	1.60E+02

TABLE 1-1b

E. I. Hatch Nuclear Plant UNIT 2

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1984

LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	Quarter 1	Quarter 2	Est Total Error %
A. Fission & activation products				
1. Total release (not including H3, gases, alpha)	Ci	8.51E-02	2.19E-02	5.02E+01
2. Average diluted concentration during period	uCi/ml	4.35E-08	1.96E-08	
3. Percent of applicable limit	%	3.35E+00	1.17E-01	
B. Tritium				
1. Total release	Ci	1.00E+01	1.87E+00	3.78E+01
2. Average diluted concentration during period	uCi/ml	5.12E-06	1.67E-06	
3. Percent of applicable limit	%	1.71E-01	5.56E-02	
C. Dissolved and entrained gases				
1. Total release	Ci	1.20E-01	5.30E-05	1.00E+02
2. Average diluted concentration during period	uCi/ml	6.12E-08	4.74E-11	
3. Percent of applicable limit	%	1.53E-01	1.18E-04	
D. Gross alpha radioactivity				
1. Total release	Ci	4.39E-09	2.15E-06	1.20E+02
E. Volume of waste (prior to dilution)	liters	8.95E+06	3.33E+06	1.00E+01
F. Volume of dilution water used	liters	1.95E+09	1.12E+09	1.60E+02

TABLE 1-2a

E. I. Hatch Nuclear Plant UNIT 1

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1984

LIQUID EFFLUENTS

Nuclides Released	Unit	CONTINUOUS MODE Quarter 1	CONTINUOUS MODE Quarter 2	BATCH MODE Quarter 1	BATCH MODE Quarter 2
Ce-144	Ci			5.66E-04	1.17E-03
Tc-99m	Ci			4.64E-04	4.13E-04
Ce-141	Ci			0.00E+00	0.00E+00
Np-239	Ci			2.05E-05	0.00E+00
Cr-51	Ci			3.43E-03	3.04E-03
I-131	Ci			7.03E-03	7.86E-03
Zn-69m	Ci			1.62E-05	0.00E+00
W-187	Ci			0.00E+00	0.00E+00
F-18	Ci			1.45E-03	1.43E-02
I-133	Ci			9.10E-04	1.35E-03
Ba-140	Ci			0.00E+00	0.00E+00
As-76	Ci			2.68E-04	2.29E-04
Cs-134	Ci			6.59E-02	3.38E-02
Cs-137	Ci			9.02E-02	5.23E-02
Mo-99	Ci			1.61E-04	6.48E-04
Zr-97	Ci			0.00E+00	0.00E+00
Zr-95	Ci			1.16E-04	3.28E-05
Nb-95	Ci			1.81E-04	1.26E-04
I-132	Ci			6.88E-08	1.25E-07
Co-58	Ci			1.24E-03	9.69E-04
Mn-54	Ci			3.41E-03	3.31E-03
Ag-110m	Ci			0.00E+00	1.16E-05
Zn-65	Ci			2.56E-02	2.93E-02
I-135	Ci			5.03E-04	2.96E-04
Fe-59	Ci			1.04E-04	5.66E-05
Co-60	Ci			1.06E-02	1.50E-02
Cu-64	Ci			6.54E-03	7.08E-03
Na-24	Ci			5.10E-03	1.05E-02
La-140	Ci			2.16E-05	2.70E-05
Mn-56	Ci			7.14E-06	0.00E+00
Cs-138	Ci			2.68E-06	0.00E+00
Cs-136	Ci			8.72E-04	3.95E-04
Sb-125	Ci			1.47E-04	5.13E-05
Sb-124	Ci			1.85E-04	0.00E+00
Nb-97	Ci			0.00E+00	5.77E-06
Sr-89	Ci			6.46E-04	5.00E-04
Sr-90	Ci			0.00E+00	0.00E+00
Fe-55	Ci			0.00E+00	0.00E+00
P-32	Ci			7.84E-04	0.00E+00
Total for period (above)	Ci			2.26E-01	1.83E-01
Xe-133	Ci			2.38E-02	3.36E-03
Kr-88	Ci			0.00E+00	0.00E+00
Xe-133M	Ci			0.00E+00	0.00E+00
Xe-135	Ci			7.65E-03	8.00E-03
Kr-85M	Ci			0.00E+00	0.00E+00
Kr-87	Ci			0.00E+00	0.00E+00
Xe-138	Ci			0.00E+00	0.00E+00
Xe-135M	Ci			3.82E-10	1.16E-07

TABLE 1-2b

E. I. Hatch Nuclear Plant UNIT 2

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1984

LIQUID EFFLUENTS

Nuclides Released	Unit	CONTINUOUS MODE Quarter 1	CONTINUOUS MODE Quarter 2	BATCH MODE Quarter 1	BATCH MODE Quarter 2
Ce-144	Ci			1.83E-04	8.18E-05
Tc-99m	Ci			3.55E-04	6.25E-06
Ce-141	Ci			0.00E+00	0.00E+00
Np-239	Ci			0.00E+00	0.00E+00
Cr-51	Ci			1.68E-03	9.50E-05
I-131	Ci			1.77E-02	2.11E-05
Zn-69m	Ci			0.00E+00	0.00E+00
W-187	Ci			1.73E-06	0.00E+00
F-18	Ci			3.30E-04	9.80E-05
I-133	Ci			1.73E-03	0.00E+00
Ba-140	Ci			0.00E+00	0.00E+00
As-76	Ci			1.14E-05	0.00E+00
Cs-134	Ci			1.52E-02	4.61E-03
Cs-137	Ci			2.05E-02	7.87E-03
Mo-99	Ci			5.64E-05	1.28E-04
Zr-97	Ci			0.00E+00	0.00E+00
Zr-95	Ci			6.23E-04	0.00E+00
Nb-95	Ci			9.51E-04	0.00E+00
I-132	Ci			7.90E-06	0.00E+00
Co-58	Ci			2.86E-04	3.24E-05
Mn-54	Ci			6.37E-04	4.15E-04
Ag-110m	Ci			2.47E-05	1.19E-05
Zn-65	Ci			1.28E-02	5.53E-03
I-135	Ci			2.78E-04	5.74E-06
Fe-59	Ci			7.63E-05	2.15E-05
Co-60	Ci			4.43E-03	2.83E-03
Cu-64	Ci			1.57E-03	0.00E+00
Na-24	Ci			1.55E-03	2.12E-06
La-140	Ci			7.07E-06	0.00E+00
Mn-56	Ci			0.00E+00	0.00E+00
Cs-138	Ci			3.30E-06	0.00E+00
Cs-136	Ci			1.12E-03	0.00E+00
I132	Ci			5.24E-07	0.00E+00
Ba-139	Ci			1.41E-03	0.00E+00
Ag110m	Ci			1.23E-05	0.00E+00
Sn-113	Ci			2.67E-05	0.00E+00
Sb-125	Ci			1.59E-05	0.00E+00
Sr-89	Ci			1.58E-03	1.34E-04
Sr-90	Ci			0.00E+00	3.73E-05
Fe-55	Ci			0.00E+00	0.00E+00
P-32	Ci			0.00E+00	0.00E+00
Total for period (above)	Ci			8.51E-02	2.19E-02
Xe-133	Ci			1.13E-01	0.00E+00
Kr-88	Ci			0.00E+00	0.00E+00
Xe-133M	Ci			3.01E-04	0.00E+00
Xe-135	Ci			2.56E-03	5.30E-05
Kr-85M	Ci			0.00E+00	0.00E+00
Kr-87	Ci			0.00E+00	0.00E+00
Xe-138	Ci			1.40E-10	0.00E+00
Xe-131m	Ci			3.93E-03	0.00E+00

2 GASEOUS EFFLUENTS

2.1. REGULATORY LIMITS

a. (1) The release rate limit of noble gases from the site shall be:

$$\sum_{i \rightarrow n} Q_{is} \left[1.9\ \bar{E}_{\delta} + 1.0\ \bar{E}_{B}\right] + Q_{iv} \left[11\ \bar{E}_{\delta} + 44\ \bar{E}_{B}\right] \leq 1$$

where Q_s = Total release rate from main stack for both Units in Ci/sec (elevated release)

Q_v = Total release rate from vent in Ci/sec (ground release)

i = The individual nuclide n = total nuclides

$\bar{E}_{\delta}$ = The average gamma energy per disintegration

$\bar{E}_{\beta}$ = The average beta energy per disintegration

(2) The release rate limit of all radioiodines and radioactive materials in particulate form with half lives greater than eight days, released from the site to the environs as part of the gaseous wastes, shall be.

$$1.0 \times 10^{5}\ Qps + 1.5 \times 10^{6}\ Qpv \leq 1$$

Where Q_{ps} = Total release rate from the main stack for both Units in Ci/sec (as elevated release)

Q_{pv} = Total release rate from vents for both Units in Ci/sec (ground releases)

b. (1) The average release rate of noble gases from the site during any calendar quarter shall be:

$$\sum_{i \rightarrow n} Q_{is} \left[12\ \bar{E}_{\delta} + 3.0\ \bar{E}_{B}\right] + Q_{iv} \left[66\ \bar{E}_{\delta} + 140\ \bar{E}_{B}\right] \leq 1$$

(2) The average release rate of noble gases during any 12 consecutive months shall be:

$$\sum_{i \rightarrow n} Q_{is} \left[24\ \bar{E}_{\delta} + 6.1\ \bar{E}_{B}\right] + Q_{iv} \left[130\delta\ \bar{E} + 270\ \bar{E}_{B}\right] \leq 1$$

(3) The average release rate of all radio iodines and radioactive materials in particulate form from the site with half lives greater than eight days during any calendar quarter shall be:

$$1.3 \times 10^{6}\ Qps + 1.9 \times 10^{7}\ Qpv \leq 1$$

(4) The average release rate of all radio iodines and radioactive materials in particulate form from the site

with half lives greater than eight days during any period of 12 consecutive months shall be:

$$2.6 \times 10^6 \, Qps + 3.7 \times 10^7 \, Qpv \leq 1$$

(5) The amount of Iodine - 131 released during any calendar quarter shall not exceed 2 Ci/reactor.

(6) The amount of Iodine - 131 released during any period of 12 consecutive months shall not exceed 4 Ci/reactor.

c. Should the conditions of 2.1. c (1), (2), or (3) listed below occur, the licensee shall make an investigation to identify the causes of the release rates, define and initiate a program of action to reduce the release rates to design objective levels listed in subsection 2.1 of the HNP-ETS and report these actions to the Commission within 30 days from the end of the quarter during which the releases occurred in accordance with section 5.7.2.

(1) If the average release rate of noble gases during any calendar quarter is:

$$\sum_{i \to n} Q_{is} \left[47 \, \bar{E}_\delta + 12 \, \bar{E}_B\right] + Q_{iv} \left[260 \, \bar{E}_\delta + 540 \, \bar{E}_B\right] > 1$$

(2) If the average release rate from the site of all radio iodines and radioactive materials in particulate form with half lives greater than eight days during any calendar quarter is:

$$5.0 \times 10^6 \, Qps + 7.2 \times 10^7 \, Qpv > 1$$

(3) If the amount of Iodine - 131 released during any calendar quarter is greater than 0.5 Ci/reactor.

d. The post-treatment offgas monitors shall be operating and set to alarm and to initiate the automatic closure of the waste gas discharge valve prior to exceeding the limits specified in Section 2.1. a above. The operability of the automatic isolation valve shall be demonstrated quarterly.

e. If the post-treatment offgas monitor is not operating, a shutdown shall be initiated so that the reactor will be in the hot shutdown condition within 10 hours.

f. If the release rate of noble gases measured at the pretreatment monitor exceeds 260,000 uci/sec for a period greater than 48 hours, notify the Commission in writing within 10 days, identifying the causes of activity and in accordance with section 5.7.2 of the E.T.S.

g. The reactor containment for each Unit shall be purged through the standby gas treatment system for that Unit.

h. (1) Potentially - explosive gas mixtures of hydrogen and oxygen contained in the offgas system downstream of the recombiners shall be continuously monitored during reactor power operation for hydrogen concentration. The hydrogen gas monitoring system shall provide alarms locally and in the control room at a set point of 4% hydrogen concentration by volume. At least one continuous gas monitoring system and its associated alarm system shall be operable during reactor power operation. If both of the hydrogen gas monitors or both of the associated alarm systems are inoperable, reactor operation may be continued for a period of time not to exceed 2 weeks, provided that either (a) grab samples are taken and analyzed for hydrogen concentration once every 4 hours, or (b) using a temporary hydrogen gas analyzer installed in the offgas system line downstream of the recombiner, hydrogen concentration readings are taken and logged every 4 hours.

(2) The hydrogen concentration in the offgas system downstream of the recombiners shall not exceed 4% concentration by volume. If at any time during reactor power operation, it is determined that the hydrogen concentration limit is being exceeded, action shall be initiated within 4 hours to return the hydrogen concentration to within the prescribed limit. If the hydrogen concentration is not reduced to less than 4% by volume within 24 hours, the offgas system flow shall be stopped.

(3) The installed hydrogen monitoring systems shall have daily sensor checks, monthly functional checks, and quarterly calibrations. The portable hydrogen gas analyzer shall be calibrated immediately prior to installation and shall be subject to daily sensor checks, monthly functional checks, and quarterly calibrations until removed from service.

i. An unplanned or uncontrolled offsite release of radioactive materials in gaseous effluents in excess of 150 Ci. of noble gas or 0.02 Ci. of radioiodines in gaseous form shall be reported to the NRC within 30 days in accordance with section 5.7.2 of the E.T.S.

2.2 MEASUREMENTS AND APPROXIMATIONS OF TOTAL RADIOACTIVITY

Waste gas release at Hatch is confined to four paths. Each of these four paths is continuously monitored for gaseous concentration and each has an integrating type collection device which concentrates particulates and iodine for each seven day period (Procedures are such that shorter collection times are used where applicable to Technical Specification requirements).

Each of these continuous samplers has a flow controller which maintains sample flow within about a 10 percent range over each seven day collection period. The offgas vent (elevated release) and the reactor building vents have flow measurement devices which continously record the flow rate of the gas released (accurary of these devices are within 10% of the actual flows as measured during preoperational testing). The recombiner building vent flow on Unit One is conservatively assumed to be constant at 500 CFM. In addition to the gaseous, particulate, and iodine release measurements tritium, gross alpha and gaseous isotopic measurements of each vent stream are conducted on a monthly schedule.

After each calendar quarter (13 weeks) a summary of waste gas release from the four vents is compiled and as such is designed to meet the requirements for preparation of the 6-month report as specified in Regulatory Guide 1.21. Unit one and two releases were calculated together because the Tech. Specifications for the two reactors are identical in this respect. The methods for compilation of the quarterly releases are as follows:

1. FISSION AND ACTIVATION GAS

The total curie release is determined from the continuously reading gaseous monitors in addition to the vent flow recorders. Activity monitors and vent flow rate readings are read hourly and input into the computer. From these readings a daily release is calculated. The calibration factors for the monitors are determined from the monthly isotopics when sufficient activity allows or by injection of a known amount of off-gas into the sample chambers. The total curie release is calculated by the computer for each of the individual nuclides released. This number is multiplied by the average energy per disintegration (E_γ & E_β) along with the coefficients in the release limit formula in our Environmental Technical Specifications. All of the nuclides are summed and stored in their respective data files until the end of the quarter. Then the computer divides the sum of the nuclides by the seconds in the quarter to determine the percent of the tech. spec. limit released.

2. RADIOIODINE RELEASES

Iodine releases are determined weekly for I-131, I-133, and I-135, for each vent. Where significant activity is not measured MDA releases are calculated. Since calculated MDA's are below Technical Specification detectable concentrations then 0 (zero) release is used for the weeks with only MDA values. Weekly releases are summarized with the aid of the counting room calculator - computer system and a quarterly total is prepared from the weekly summaries. The percent Technical Specification for I-131 on Table 2-1 is based on the quarterly Technical Specification limit.

3. PARTICULATE RELEASES

Particulate releases are determined weekly for each vent. Where significant activity is not measured MDA release is calculated. Since calculated MDA's are below Technical Specification detectable concentrations, then 0 (zero) release is used for weeks with only MDA values. Weekly releases are summarized with the aid of the counting room calculator - computer.
After each calendar month the particulate filters from each vent are combined, fused, and strontium separation is made. Since sample flows and vent flows are almost constant over each monthly period the filters from each vent can be dissolved together. Decay corrections are made back to the middle of the quarterly collection period. Again the counting room calculator - computer is used to aid in the calculation of the Sr-89, 90 release. Where significant strontium activity is not detected MDAs are calculated. The percent of Technical Specification was calculated using quarterly average equation.

4. GROSS ALPHA RELEASE

The gross alpha release is computed each month by counting the particulate filters each week for gross alpha activity in a proportional counter. The four or five weeks numbers are then recorded on a data sheet and the activity is summed at the end of the month.

5. TRITIUM RELEASE

Tritium samples are obtained monthly from each vent by passing the sample stream from a cold trap immersed in a liquid nitrogen or an acetone and ice mixture. The grams of water vapor/cubic foot gas is measured upstream of the cold trap in order to alleviate the difficulties in determining water vapor collection efficiencies. The tritium samples are analyzed by an independent laboratory. From the uCi/ml tritium concentration, the grams water/ft^3, and the vent flow rates, the monthly tritium release is calculated for each vent, and the quarterly summary can be generated from the monthly calculation forms.

Hatch has attempted to maintain all calculated MDAs as low as possible by counting samples longer than what would be normally practical. For example, at this time all weekly particulate and iodine counting times are 3000 sec and strontium separations are counted for 100 minutes.

Regulatory Guide 1.21 requires that estimated total error in analysis techniques be reported. These estimates are required for the total fission and activation gas release, total I-131 release, total particulates with half-lives greater than 8-day release, and total tritium release.

"The total or maximum error associated with the effluent measurement will include the cumulative errors resulting from the total operation of sampling and measurement. Because it may be very difficult to assign error terms for each parameter affecting the final measurement, detailed statistical evaluation of error are not suggested. The objective should be to obtain an overall estimate of the error associated with measurements of radioactive materials released in liquid and gaseous effluents and solid waste."

Estimated errors are based on errors in counting equipment calibration, counting statistics, vent flow rates, vent sample flow rates, non-steady release rates, chemical yield factors, and sample losses for such items as charcoal cartridges.

1. Fission and Activation Gas Total Release was calculated from process monitor readings. As 69.09% of this release was from the main stack the MDA release values of the ground level release points were small to the total release.

Monitor Error in Calibration	50%
Vent Flow Rate	10%
Non-Steady Release Rate	20%
	80%

2. I-131 Release was calculated from each weekly sample:

Statistical error	60%
Counting Equipment Calibration	10%
Vent Flow Rates	10%
Vent Sample Flow Rates	10%
Non-Steady Release Rates	10%
Losses From Charcoal Cartridge	10%
	110%

3. Particulates with half-lives greater than 8 days release was dominated by the MDA calculations for I-131 and Ba-La-140 hence the errors in the strontium determinations and gross alpha had negligible affects on the estimated error in the total particulate release:

Statistical Error at MDA concentration	60%
Countng Equipment Calibration	10%
Vent Flow Rates	10%
Vent Sample Flow Rates	10%
Non-Steady Release Rates	10%
	100%

4. Total Tritium Release was dominated by the reactor building vent tritium release, hence, the larger statistical errors of the off-gas vent and recombiner building vent tritium releases do not affect the error in the total tritium release:

Water Vapor in Sample Stream Determination	20%
Vent Flow Rates	10%
Counting Calibration and Statistics	10%
Non-Steady Release	50%
	90%

2.3. GASEOUS EFFLUENT RELEASE DATA

Regulatory Guide 1.21 Tables 1A, 1B, and 1C are found in this report as Tables 2-1a-c, 2-2a-c, and 2-3a-c.

Data is presented on a quarterly basis as per Regulatory Guide 1.21.

3. SOLID WASTE

3.1 REGULATORY SPECIFICATIONS

a. Measurements shall be made to determine or estimate the total curie quantity and principal radionuclide composition of all radioactive solid waste shipped offsite.

b. Solid wastes in storage and preparatory to shipment shall be monitored and packaged to assure compliance with the applicable portions of 10 CFR Part 20, 10 CFR Part 71, and 49 CFR Parts 171-178.

c. Reports of the radioactive solid waste shipments, volumes, principal radionuclides, and total curie quantity shall be submitted in accordance with subsection 5.6.1 of the HNP-ETS.

3.2 SOLID WASTE DATA

Regulatory guide 1.21 Table 3 is found in this report as Table 3-1.

TABLE 2-1a

Unit I

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1984

GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES

E. I. Hatch Nuclear Power Plant UNIT 1	Unit	Quarter 1	Quarter 2	Est Total Error %
A. Fission & activation gases				
1. Total release	Ci	3.61E+03	1.60E+03	8.00E+01
2. Average release rate for period	uCi/sec	4.59E+02	2.04E+02	
3. % of Technical specification limit	%	1.62E-01	2.26E-01	
B. Iodines				
1. Total iodine-131	Ci	8.69E-03	6.10E-03	1.10E+02
2. Average release rate for period	uCi/sec	1.11E-03	7.76E-04	
3. % of Technical specification limit	%	4.35E-01	3.05E-01	
C. Particulates				
1. Particulates with half-lives>8 days	Ci	8.81E-04	2.93E-03	1.00E+02
2. Average release rate for period	uCi/sec	1.12E-04	3.73E-04	
3. % of Technical specification limit	%	1.98E-01	6.53E-01	
4. Gross alpha radioactivity	Ci	2.17E-06	2.07E-06	
D. Tritium				
1. Total release	Ci	1.09E+01	1.26E+01	9.00E+01
2. Average release rate for period	uCi/sec	1.38E+00	1.60E+00	
3. % of Technical specification limit	%	1.22E+01	2.22E+01	

TABLE 2-1b

Unit II

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1984

GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES

E. I. Hatch Nuclear Power Plant UNIT 2	Unit	Quarter 1	Quarter 2	Est Total Error %
A. Fission & activation gases				
1. Total release	Ci	1.32E+03	1.05E+02	8.00E+01
2. Average release rate for period	uCi/sec	1.68E+02	1.33E+01	
3. % of Technical specification limit	%	1.33E-01	5.62E-02	
B. Iodines				
1. Total iodine-131	Ci	8.82E-03	3.17E-05	1.10E+02
2. Average release rate for period	uCi/sec	1.12E-03	4.03E-06	
3. % of Technical specification limit	%	4.41E-01	1.58E-03	
C. Particulates				
1. Particulates with half-lives>8 days	Ci	6.44E-05	5.03E-05	1.00E+02
2. Average release rate for period	uCi/sec	8.19E-06	6.40E-06	
3. % of Technical specification limit	%	1.10E-02	1.22E-02	
4. Gross alpha radioactivity	Ci	8.16E-07	2.03E-07	
D. Tritium				
1. Total release	Ci	3.71E+00	1.16E-01	9.00E+01
2. Average release rate for period	uCi/sec	4.72E-01	1.47E-02	
3. % of Technical specification limit	%	4.86E+00	2.49E-01	

TABLE 2-1c

Site

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1984

GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES

E. I. Hatch Nuclear Power Plant SITE	Unit	Quarter 1	Quarter 2	Est Total Error %
A. Fission & activation gases				
1. Total release	Ci	4.93E+03	1.71E+03	8.00E+01
2. Average release rate for period	uCi/sec	6.27E+02	2.17E+02	
3. % of Technical specification limit	%	2.95E-01	2.82E-01	
B. Iodines				
1. Total iodine-131	Ci	1.75E-02	6.13E-03	1.10E+02
2. Average release rate for period	uCi/sec	2.23E-03	7.80E-04	
3. % of Technical specification limit	%	4.38E-01	1.53E-01	
C. Particulates				
1. Particulates with half-lives>8 days	Ci	9.46E-04	2.98E-03	1.00E+02
2. Average release rate for period	uCi/sec	1.20E-04	3.79E-04	
3. % of Technical specification limit	%	2.09E-01	6.65E-01	
4. Gross alpha radioactivity	Ci	2.98E-06	2.28E-06	
D. Tritium				
1. Total release	Ci	1.46E+01	1.27E+01	9.00E+01
2. Average release rate for period	uCi/sec	1.85E+00	1.62E+00	
3. % of Technical specification limit	%	1.71E+01	2.25E+01	

TABLE 2-2a

E. I. Hatch Nuclear Power Plant UNIT 1

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1984

GASEOUS EFFLUENTS-ELEVATED RELEASE

Nuclides Released	Unit	CONTINUOUS MODE Quarter 1	CONTINUOUS MODE Quarter 2	BATCH MODE Quarter 1	BATCH MODE Quarter 2
1. Fission gases					
Xe-133	Ci	2.58E+03	5.82E+02	0.00E+00	0.00E+00
Xe-131m	Ci	8.80E+00	4.97E+00	0.00E+00	0.00E+00
Kr-88	Ci	1.45E+02	4.73E+02	0.00E+00	0.00E+00
Xe-133M	Ci	1.33E+02	1.06E+01	0.00E+00	0.00E+00
Xe-135	Ci	4.99E+02	9.88E+00	0.00E+00	0.00E+00
Kr-85M	Ci	9.24E+01	3.39E+02	0.00E+00	0.00E+00
I-131	Ci	9.45E-01	0.00E+00	0.00E+00	0.00E+00
Kr-87	Ci	2.48E+01	6.05E+01	0.00E+00	0.00E+00
Xe-138	Ci	3.98E+00	1.30E+01	0.00E+00	0.00E+00
Xe-137	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-13	Ci	1.20E+01	4.18E+01	0.00E+00	0.00E+00
Kr-85	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-135M	Ci	5.62E+00	6.62E+00	0.00E+00	0.00E+00
I-133	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-89	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-135	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ar-41	Ci	3.62E+00	8.21E+00	0.00E+00	0.00E+00
Total for period	Ci	3.51E+03	1.55E+03	0.00E+00	0.00E+00
2. Iodines					
I-131	Ci	6.76E-03	2.24E-03	0.00E+00	0.00E+00
I-133	Ci	4.98E-04	6.75E-04	0.00E+00	0.00E+00
I-135	Ci	2.07E-04	4.96E-04	0.00E+00	0.00E+00
Total for period	Ci	7.47E-03	3.41E-03	0.00E+00	0.00E+00
3. Particulates					
Sr-89	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sr-90	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ce-141	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cr-51	Ci	0.00E+00	1.48E-06	0.00E+00	0.00E+00
I-131	Ci	1.15E-05	7.06E-06	0.00E+00	0.00E+00
Sn-113	Ci	0.00E+00	3.63E-08	0.00E+00	0.00E+00
Ba-140	Ci	2.01E-05	6.80E-05	0.00E+00	0.00E+00
Cs-134	Ci	7.15E-07	6.45E-07	0.00E+00	0.00E+00
Cs-137	Ci	2.68E-06	2.30E-06	0.00E+00	0.00E+00
Ce-144	Ci	0.00E+00	9.24E-06	0.00E+00	0.00E+00
Zr-95	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	Ci	0.00E+00	2.04E-07	0.00E+00	0.00E+00
Co-58	Ci	0.00E+00	4.09E-08	0.00E+00	0.00E+00
Mn-54	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	Ci	0.00E+00	2.08E-07	0.00E+00	0.00E+00
Co-60	Ci	1.62E-06	1.63E-06	0.00E+00	0.00E+00
La-140	Ci	2.89E-05	1.56E-04	0.00E+00	0.00E+00
Total for period	Ci	6.55E-05	2.47E-04	0.00E+00	0.00E+00

TABLE 2-2b

E. I. Hatch Nuclear Power Plant UNIT 2

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1984

- GASEOUS EFFLUENTS-ELEVATED RELEASE

Nuclides Released	Unit	CONTINUOUS MODE Quarter 1	CONTINUOUS MODE Quarter 2	BATCH MODE Quarter 1	BATCH MODE Quarter 2
1. Fission gases					
Xe-133	Ci	7.94E+02	0.00E+00	0.00E+00	0.00E+00
Xe-131m	Ci	2.71E+00	0.00E+00	0.00E+00	0.00E+00
Kr-88	Ci	4.48E+01	0.00E+00	0.00E+00	0.00E+00
Xe-133M	Ci	4.10E+01	0.00E+00	0.00E+00	0.00E+00
Xe-135	Ci	1.54E+02	0.00E+00	0.00E+00	0.00E+00
Kr-85M	Ci	2.85E+01	0.00E+00	0.00E+00	0.00E+00
I-131	Ci	2.91E-01	0.00E+00	0.00E+00	0.00E+00
Kr-87	Ci	7.66E+00	0.00E+00	0.00E+00	0.00E+00
Xe-138	Ci	1.23E+00	0.00E+00	0.00E+00	0.00E+00
Xe-137	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-13	Ci	3.70E+00	0.00E+00	0.00E+00	0.00E+00
Kr-85	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-135M	Ci	1.73E+00	0.00E+00	0.00E+00	0.00E+00
I-133	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-89	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-135	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ar-41	Ci	1.12E+00	0.00E+00	0.00E+00	0.00E+00
Total for period	Ci	1.08E+03	0.00E+00	0.00E+00	0.00E+00
2. Iodines					
I-131	Ci	2.09E-03	0.00E+00	0.00E+00	0.00E+00
I-133	Ci	1.54E-04	0.00E+00	0.00E+00	0.00E+00
I-135	Ci	6.38E-05	0.00E+00	0.00E+00	0.00E+00
Total for period	Ci	2.30E-03	0.00E+00	0.00E+00	0.00E+00
3. Particulates					
Sr-89	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sr-90	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ce-141	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cr-51	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	Ci	3.56E-06	0.00E+00	0.00E+00	0.00E+00
Sn-113	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ba-140	Ci	6.21E-06	0.00E+00	0.00E+00	0.00E+00
Cs-134	Ci	2.21E-07	0.00E+00	0.00E+00	0.00E+00
Cs-137	Ci	8.25E-07	0.00E+00	0.00E+00	0.00E+00
Ce-144	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mn-54	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	Ci	5.00E-07	0.00E+00	0.00E+00	0.00E+00
La-140	Ci	8.90E-06	0.00E+00	0.00E+00	0.00E+00
Total for period	Ci	2.02E-05	0.00E+00	0.00E+00	0.00E+00

TABLE 2-2c

E. I& Hatch Nuclear Power Plant SITE

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1984

GASEOUS EFFLUENTS-ELEVATED RELEASE

Nuclides Released	Unit	CONTINUOUS MODE Quarter 1	CONTINUOUS MODE Quarter 2	BATCH MODE Quarter 1	BATCH MODE Quarter 2
1. Fission gases					
Xe-133	Ci	3.37E+03	5.82E+02	0.00E+00	0.00E+00
Xe-131m	Ci	1.15E+01	4.97E+00	0.00E+00	0.00E+00
Kr-88	Ci	1.90E+02	4.73E+02	0.00E+00	0.00E+00
Xe-133M	Ci	1.74E+02	1.06E+01	0.00E+00	0.00E+00
Xe-135	Ci	6.53E+02	9.88E+00	0.00E+00	0.00E+00
Kr-85M	Ci	1.21E+02	3.39E+02	0.00E+00	0.00E+00
I-131	Ci	1.24E+00	0.00E+00	0.00E+00	0.00E+00
Kr-87	Ci	3.25E+01	6.05E+01	0.00E+00	0.00E+00
Xe-138	Ci	5.21E+00	1.30E+01	0.00E+00	0.00E+00
Xe-137	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-13	Ci	1.57E+01	4.18E+01	0.00E+00	0.00E+00
Kr-85	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-135M	Ci	7.36E+00	6.62E+00	0.00E+00	0.00E+00
I-133	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-89	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-135	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ar-41	Ci	4.74E+00	8.21E+00	0.00E+00	0.00E+00
Total for period	Ci	4.59E+03	1.55E+03	0.00E+00	0.00E+00
2. Iodines					
I-131	Ci	8.85E-03	2.24E-03	0.00E+00	0.00E+00
I-133	Ci	6.51E-04	6.75E-04	0.00E+00	0.00E+00
I-135	Ci	2.70E-04	4.96E-04	0.00E+00	0.00E+00
Total for period	Ci	9.77E-03	3.41E-03	0.00E+00	0.00E+00
3. Particulates					
Sr-89	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sr-90	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ce-141	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cr-51	Ci	0.00E+00	1.48E-06	0.00E+00	0.00E+00
I-131	Ci	1.51E-05	7.06E-06	0.00E+00	0.00E+00
Sn-113	Ci	0.00E+00	3.63E-08	0.00E+00	0.00E+00
Ba-140	Ci	2.63E-05	6.80E-05	0.00E+00	0.00E+00
Cs-134	Ci	9.36E-07	6.45E-07	0.00E+00	0.00E+00
Cs-137	Ci	3.50E-06	2.30E-06	0.00E+00	0.00E+00
Ce-144	Ci	0.00E+00	9.24E-06	0.00E+00	0.00E+00
Zr-95	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	Ci	0.00E+00	2.04E-07	0.00E+00	0.00E+00
Co-58	Ci	0.00E+00	4.09E-08	0.00E+00	0.00E+00
Mn-54	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	Ci	0.00E+00	2.08E-07	0.00E+00	0.00E+00
Co-60	Ci	2.12E-06	1.63E-06	0.00E+00	0.00E+00
La-140	Ci	3.78E-05	1.56E-04	0.00E+00	0.00E+00
Total for period	Ci	8.57E-05	2.47E-04	0.00E+00	0.00E+00

TABLE 2-3a

E. I. Hatch Nuclear Power Plant UNIT 1

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1984

GASEOUS EFFLUENTS-GROUND-LEVEL RELEASE

Nuclides Released	Unit	CONTINUOUS MODE Quarter 1	CONTINUOUS MODE Quarter 2	BATCH MODE Quarter 1	BATCH MODE Quarter 2
1. Fission gases					
Xe-133	Ci	6.31E+01	3.75E+00	0.00E+00	0.00E+00
Xe-131m	Ci	0.30E+00	0.00E+00	0.00E+00	0.00E+00
Kr-88	Ci	3.29E-02	1.74E-01	0.00E+00	0.00E+00
Xe-133M	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-135	Ci	2.51E+01	1.85E+01	0.00E+00	0.00E+00
Kr-85M	Ci	1.08E-02	3.44E-02	0.00E+00	0.00E+00
I-131	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-87	Ci	1.89E-02	1.80E-01	0.00E+00	0.00E+00
Xe-138	Ci	9.82E-02	8.86E-01	0.00E+00	0.00E+00
Xe-137	Ci	9.35E-02	7.37E-01	0.00E+00	0.00E+00
N-13	Ci	1.92E-01	1.84E+00	0.00E+00	0.00E+00
Kr-85	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-135M	Ci	1.81E+01	2.44E+01	0.00E+00	0.00E+00
I-133	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-89	Ci	2.72E-02	1.37E-01	0.00E+00	0.00E+00
I-135	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ar-41	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for period	Ci	1.07E+02	5.07E+01	0.00E+00	0.00E+00
2. Iodines					
I-131	Ci	1.81E-03	3.71E-03	0.00E+00	0.00E+00
I-133	Ci	3.98E-04	1.87E-03	0.00E+00	0.00E+00
I-135	Ci	9.05E-04	1.12E-03	0.00E+00	0.00E+00
Total for period	Ci	3.11E-03	6.70E-03	0.00E+00	0.00E+00
3. Particulates					
Sr-89	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sr-90	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ce-141	Ci	0.00E+00	3.91E-07	0.00E+00	0.00E+00
Cr-51	Ci	1.79E-04	7.51E-04	0.00E+00	0.00E+00
I-131	Ci	1.13E-04	1.45E-04	0.00E+00	0.00E+00
Sn-113	Ci	0.00E+00	5.00E-06	0.00E+00	0.00E+00
Ba-140	Ci	1.58E-05	3.46E-05	0.00E+00	0.00E+00
Cs-134	Ci	1.33E-04	4.20E-04	0.00E+00	0.00E+00
Cs-137	Ci	2.08E-04	6.16E-04	0.00E+00	0.00E+00
Ce-144	Ci	0.00E+00	8.54E-05	0.00E+00	0.00E+00
Zr-95	Ci	0.00E+00	1.36E-05	0.00E+00	0.00E+00
Nb-95	Ci	0.00E+00	5.74E-06	0.00E+00	0.00E+00
Co-58	Ci	3.43E-05	1.59E-04	0.00E+00	0.00E+00
Mn-54	Ci	0.00E+00	2.01E-05	0.00E+00	0.00E+00
Fe-59	Ci	0.00E+00	4.52E-07	0.00E+00	0.00E+00
Co-60	Ci	1.26E-04	3.43E-04	0.00E+00	0.00E+00
La-140	Ci	7.09E-06	8.67E-05	0.00E+00	0.00E+00
Total for period	Ci	8.16E-04	2.69E-03	0.00E+00	0.00E+00

TABLE 2-3b

E. I. Hatch Nuclear Power Plant UNIT 2

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1984

GASEOUS EFFLUENTS-GROUND-LEVEL RELEASE

Nuclides Released	Unit	CONTINUOUS MODE Quarter 1	CONTINUOUS MODE Quarter 2	BATCH MODE Quarter 1	BATCH MODE Quarter 2
1. Fission gases					
Xe-133	Ci	1.99E+02	7.16E+01	0.00E+00	0.00E+00
Xe-131m	Ci	0.00E+00	4.78E+00	0.00E+00	0.00E+00
Kr-88	Ci	3.22E+00	6.88E+00	0.00E+00	0.00E+00
Xe-133M	Ci	0.00E+00	6.69E-01	0.00E+00	0.00E+00
Xe-135	Ci	2.07E+01	1.64E+01	0.00E+00	0.00E+00
Kr-85M	Ci	9.27E-01	2.97E+00	0.00E+00	0.00E+00
I-131	Ci	8.13E-01	8.66E-03	0.00E+00	0.00E+00
Kr-87	Ci	1.62E+00	1.46E+00	0.00E+00	0.00E+00
Xe-138	Ci	4.43E+00	0.00E+00	0.00E+00	0.00E+00
Xe-137	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-13	Ci	7.18E-01	1.27E-02	0.00E+00	0.00E+00
Kr-85	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-135M	Ci	5.02E+00	0.00E+00	0.00E+00	0.00E+00
I-133	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-89	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-135	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ar-41	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for period	Ci	2.36E+02	1.05E+02	0.00E+00	0.00E+00
2. Iodines					
I-131	Ci	6.72E-03	2.83E-05	0.00E+00	0.00E+00
I-133	Ci	2.49E-04	1.98E-05	0.00E+00	0.00E+00
I-135	Ci	8.67E-05	1.30E-05	0.00E+00	0.00E+00
Total for period	Ci	7.06E-03	6.11E-05	0.00E+00	0.00E+00
3. Particulates					
Sr-89	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sr-90	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ce-141	Ci	0.00E+00	3.52E-08	0.00E+00	0.00E+00
Cr-51	Ci	0.00E+00	6.33E-06	0.00E+00	0.00E+00
I-131	Ci	7.12E-06	3.37E-06	0.00E+00	0.00E+00
Sn-113	Ci	0.00E+00	1.98E-07	0.00E+00	0.00E+00
Ba-140	Ci	2.47E-06	2.18E-06	0.00E+00	0.00E+00
Cs-134	Ci	7.89E-07	3.14E-06	0.00E+00	0.00E+00
Cs-137	Ci	1.29E-05	1.10E-05	0.00E+00	0.00E+00
Ce-144	Ci	0.00E+00	9.62E-06	0.00E+00	0.00E+00
Zr-95	Ci	0.00E+00	1.26E-06	0.00E+00	0.00E+00
Nb-95	Ci	0.00E+00	2.00E-07	0.00E+00	0.00E+00
Co-58	Ci	0.00E+00	8.88E-08	0.00E+00	0.00E+00
Mn-54	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	Ci	1.90E-05	9.04E-06	0.00E+00	0.00E+00
La-140	Ci	1.95E-06	3.85E-06	0.00E+00	0.00E+00
Total for period	Ci	4.42E-05	5.03E-05	0.00E+00	0.00E+00

TABLE 2-3c

E. I& Hatch Nuclear Power Plant SITE

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1984

- GASEOUS EFFLUENTS-GROUND-LEVEL RELEASE

Nuclides Released	Unit	CONTINUOUS MODE Quarter 1	CONTINUOUS MODE Quarter 2	BATCH MODE Quarter 1	BATCH MODE Quarter 2
1. Fission gases					
Xe-133	Ci	2.62E+02	7.54E+01	0.00E+00	0.00E+00
Xe-131m	Ci	0.00E+00	4.78E+00	0.00E+00	0.00E+00
Kr-88	Ci	3.26E+00	7.06E+00	0.00E+00	0.00E+00
Xe-133M	Ci	0.00E+00	6.69E-01	0.00E+00	0.00E+00
Xe-135	Ci	4.58E+01	3.50E+01	0.00E+00	0.00E+00
Kr-85M	Ci	9.38E-01	3.00E+00	0.00E+00	0.00E+00
I-131	Ci	8.13E-01	8.66E-03	0.00E+00	0.00E+00
Kr-87	Ci	1.64E+00	1.64E+00	0.00E+00	0.00E+00
Xe-138	Ci	4.53E+00	8.86E-01	0.00E+00	0.00E+00
Xe-137	Ci	9.35E-02	7.37E-01	0.00E+00	0.00E+00
N-13	Ci	9.10E-01	1.85E+00	0.00E+00	0.00E+00
Kr-85	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-135M	Ci	2.32E+01	2.44E+01	0.00E+00	0.00E+00
I-133	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-89	Ci	2.72E-02	1.37E-01	0.00E+00	0.00E+00
I-135	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ar-41	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for period	Ci	3.43E+02	1.56E+02	0.00E+00	0.00E+00
2. Iodines					
I-131	Ci	8.53E-03	3.73E-03	0.00E+00	0.00E+00
I-133	Ci	6.47E-04	1.89E-03	0.00E+00	0.00E+00
I-135	Ci	9.92E-04	1.14E-03	0.00E+00	0.00E+00
Total for period	Ci	1.02E-02	6.76E-03	0.00E+00	0.00E+00
3. Particulates					
Sr-89	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sr-90	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ce-141	Ci	0.00E+00	4.26E-07	0.00E+00	0.00E+00
Cr-51	Ci	1.79E-04	7.57E-04	0.00E+00	0.00E+00
I-131	Ci	1.20E-04	1.48E-04	0.00E+00	0.00E+00
Sn-113	Ci	0.00E+00	5.20E-06	0.00E+00	0.00E+00
Ba-140	Ci	1.83E-05	3.68E-05	0.00E+00	0.00E+00
Cs-134	Ci	1.33E-04	4.24E-04	0.00E+00	0.00E+00
Cs-137	Ci	2.21E-04	6.27E-04	0.00E+00	0.00E+00
Ce-144	Ci	0.00E+00	9.50E-05	0.00E+00	0.00E+00
Zr-95	Ci	0.00E+00	1.48E-05	0.00E+00	0.00E+00
Nb-95	Ci	0.00E+00	5.94E-06	0.00E+00	0.00E+00
Co-58	Ci	3.43E-05	1.59E-04	0.00E+00	0.00E+00
Mn-54	Ci	0.00E+00	2.01E-05	0.00E+00	0.00E+00
Fe-59	Ci	0.00E+00	4.52E-07	0.00E+00	0.00E+00
Co-60	Ci	1.45E-04	3.52E-04	0.00E+00	0.00E+00
La-140	Ci	9.04E-06	9.05E-05	0.00E+00	0.00E+00
Total for period	Ci	8.60E-04	2.74E-03	0.00E+00	0.00E+00

TABLE 3-1

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (YEAR) 1984
January 1, 1984 - June 30, 1984
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS
FOR UNIT 's I and II

A. SOLID WASTE SHIPPED OFFSITE 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	2.85 E+2	
	Ci	1.38 E+3	1.0 E+1
b. Dry compressible waste, contaminated equip, etc.	m^3	5.67 E+2	
	Ci	5.57 E+0	1.0 E+1
c. Irradiated components, control rods, etc.	m^3	9.79 E+1	
	Ci	4.81 E+1	1.0 E+1
d. Other (describe)	m^3	1.05 E+2	
	Ci	1.56 E+0	1.0 E+1

2. Estimate of major nuclide composition (by type of waste)

ISOTOPE	PERCENT	CURIES
a. Zn-65	46.18	635.997
Cs-137	15.79	217.483
Cs-134	13.14	180.914
All others	24.89	342.762
b. Zn-65	51.63	2.876
Co-60	27.90	1.554
Cs-137	7.04	0.392
All others	13.43	0.748
c. Zn-65	51.00	24.513
Co-60	28.00	13.458
Mn-54	10.00	4.806
All others	11.00	5.288
d. Zn-65	53.05	0.826
Co-60	28.51	0.444
Cs-137	7.45	0.116
All others	10.99	0.171

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
53	Cask	Barnwell, S. C.
7	Van	Barnwell, S. C.
25	Van	Hanford, WA

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments	Mode of Transportation	Destination
0	n/a	n/a