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Robinson Nuclear Plant
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United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23

REVISION TO 1998 ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

Ladies and Gentlemen:

The purpose of this letter is to transmit a revision to the 1998 Annual Radioactive Effluent Release Report for the H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2, previously transmitted on April 29, 1999. That report was submitted in accordance with 10 CFR 50.36a(a)(2), and the HBRSEP, Unit No. 2 Technical Specifications, Section 5.6.3. The revision addresses administrative errors identified during internal reviews by HBRSEP personnel.

A description of the report changes is provided in Attachment I. Attachment II contains replacement pages of the report.

If you have any questions concerning this report, please contact Mr. H. K. Chernoff.

Sincerely,



R. L. Warden

Manager - Regulatory Affairs

PMY/py

Attachments:

- I. Description of Report Changes
- II. Revised Report Pages

c: L. A. Reyes, NRC, Region II
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NRC Resident Inspector, HBRSEP

H. B. Robinson Steam Electric Plant, Unit No. 2
Description of Report Changes

Page Number	Change
8 of 76	Correction to annual Liquid Dose Commitment
20 of 76	Correction to third and fourth quarter values
21 of 76	Corrections to table values
22 of 76	Corrections to table values
34 of 76	Corrected Total Infant Bone Dose
37 of 76	Corrections to table values
39 of 76	Corrections to table values
47,48 & 49 of 76	Corrections to Adult, Teenager, and Child Dose tables
50 of 76	Corrected Fish and Shoreline values
51 of 76	Corrections to table values

1998 ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
REVISED REPORT PAGES

GASEOUS

	<u>UNITS</u>	<u>EMS(ODCM)</u>	<u>LADTAP/GASPAR</u>
Annual Beta Air Dose	mrad	6.86E-03	2.32E-03
Annual Gamma Air Dose	mrad	1.40E-02	4.14E-03
I-131, I-133, Tritium & Part. >8 Day Half-Lives Dose	mrem	1.75E-01	1.24E-02

LIQUID

	<u>mrem</u>	<u>3.73E-04</u>	<u>1.49E-03</u>
Total Body Dose	mrem	3.73E-04	1.49E-03
Critical Organ Dose	mrem	9.10E-04	3.26E-03

The annual gaseous dose commitment was calculated with GASPAR using batch mixed mode, continuous mixed mode, batch ground level mode, and continuous ground level concurrent meteorology. The ODCM (EMS¹ Software) provides day-by-day dose estimates that are higher because all releases are assigned to the limiting receptor, using the continuous ground level dispersion factors calculated from 1978 meteorology.

The annual liquid dose commitment is usually lower with LADTAP because total annual dilution flow is used. Day-by-day dose estimates provided by the ODCM using EMS software utilizes dilution flow during actual release periods from HBRSEP, Unit No. 2 or Unit No. 1 only²; not both. During the refueling outage, that conservatism is lost due to the Unit No. 2 circulating water pumps being shut down and the Unit No. 1 pumps only being used for dilution.

2. HBRSEP Unit No. 2 ran mostly at steady-state power operations for the entire year of 1998 with the exception of a refueling shutdown from March 6, 1998 until April 13, 1998. The higher release values in the first quarter are due to containment vessel purges in preparation for outage work. Otherwise, good fuel and reactor coolant system integrity kept gaseous and liquid effluent totals relatively low in 1998. Some of the gaseous and liquid release parameters for this reporting period are summarized below:

GASEOUS EFFLUENTS

	<u>Units</u>	<u>1st Qtr</u>	<u>2nd Qtr</u>	<u>3rd Qtr</u>	<u>4th Qtr</u>
Fission & Act. Gas	Ci	1.07E+00	5.33E-02	1.10E-01	6.44E-02
I-131	Ci	1.90E-06	<LLD	<LLD	<LLD
Part. >8 Day Half-Lives	Ci	2.34E-05	<LLD	<LLD	<LLD
Tritium	Ci	4.17E+00	3.03E+00	3.18E+00	2.34E+00

3. Virtually all parameters associated with liquid effluents remained constant throughout the year. The first and fourth quarter tritium release curies are noticeably higher due to the unit shutdown in March and CVCS processing in the fourth quarter. Some of the liquid release parameters for this reporting period are shown below:

¹ EMS, Effluent Management Software, A product of Canberra Nuclear Industries used for determining curies and dose released from routine radioactive effluent releases.

² Unit No. 1 is a fossil fueled unit located next to Unit No. 2

TABLE IV-A
 (Continued)
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - 1998
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	Unit	Quarter 3	Quarter 4	Est. Total Error %
A. Fission and Activation Products				
1. Total release (not including tritium, gases, alpha)	Ci	2.09E-03	6.34E-03	1.07E+01
2. Average diluted concentration during period	µCi/ml	7.23E-12	2.21E-11	
B. Tritium				
1. Total release	Ci	5.10E+01	1.16E+02	9.20E+00
2. Average diluted concentration during period	µCi/ml	1.76E-07	4.03E-07	
C. Dissolved and entrained gases				
1. Total release	Ci	3.95E-05	1.64E-04	9.60E+00
2. Average diluted concentration during period	µCi/ml	1.36E-13	5.72E-13	
3. Percent of applicable limit	%	6.80E-08	2.86E-07	
D. Gross alpha radioactivity				
1. Total release	Ci	<LLD	<LLD	1.83E+01
E. Volume of waste released prior to dilution				
	Liters	2.83E+05	2.12E+06	
F. Volume of dilution water used during period				
	Liters	2.89E+11	2.87E+11	
G. Percent of 10CFR50, Appendix I				
1. Quarterly Limit				
Organ: Liver	%	1.04E-04	2.26E-03	
Total body	%	3.23E-04	6.93E-03	
2. Annual Limit				
Organ: GI-LLI	%	8.07E-03*	9.10E-03*	
Total body	%	8.95E-03*	1.24E-02*	

*Cumulative total for the year-to-date using the methodology in the ODCM.

TABLE IV-B
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - 1998
LIQUID EFFLUENTS - CONTINUOUS MODE AND BATCH MODE RELEASES

Nuclides Released	Unit	Continuous Mode		Batch Mode	
		Quarter 1	Quarter 2	Quarter 1	Quarter 2
H-3	Ci	<LLD	<LLD	3.66E+02	5.01E+01
Cr-51	Ci	<LLD	<LLD	1.20E-04	9.36E-03
Mn-54	Ci	<LLD	<LLD	<LLD	2.85E-05
Fe-55	Ci	<LLD	<LLD	9.30E-04	2.62E-04
Co-57	Ci	<LLD	<LLD	1.65E-05	2.94E-06
Co-58	Ci	<LLD	<LLD	1.01E-02	1.19E-02
Fe-59	Ci	<LLD	<LLD	<LLD	1.53E-03
Co-60	Ci	<LLD	<LLD	3.29E-03	1.68E-03
Nb-95	Ci	<LLD	<LLD	<LLD	5.12E-05
Nb-95m	Ci	<LLD	<LLD	8.63E-06	<LLD
Zr-95	Ci	<LLD	<LLD	<LLD	3.59E-05
Ru-103	Ci	<LLD	<LLD	<LLD	8.36E-06
Ag-110m	Ci	<LLD	<LLD	4.01E-04	1.21E-03
Sn-113	Ci	<LLD	<LLD	<LLD	6.70E-05
Sn-117m	Ci	<LLD	<LLD	<LLD	3.24E-06
Sb-124	Ci	<LLD	<LLD	<LLD	8.81E-04
Sb-125	Ci	<LLD	<LLD	3.63E-03	2.19E-02
Sb-126	Ci	<LLD	<LLD	<LLD	4.87E-05
Te-129m	Ci	<LLD	<LLD	<LLD	2.96E-03
Te-132	Ci	<LLD	<LLD	1.22E-05	2.75E-05
Cs-134	Ci	<LLD	<LLD	6.48E-07	<LLD
Cs-134m	Ci	<LLD	<LLD	6.73E-07	<LLD
Cs-137	Ci	<LLD	<LLD	9.69E-05	4.80E-05
Ce-141	Ci	<LLD	<LLD	<LLD	3.18E-05
Ce-144	Ci	<LLD	<LLD	<LLD	5.45E-05
Total for Period	Ci	<LLD	<LLD	1.86E-02	5.21E-02
Xe-127	Ci	<LLD	<LLD	<LLD	3.68E-05
Xe-131m	Ci	<LLD	<LLD	5.79E-04	<LLD
Xe-133	Ci	<LLD	<LLD	5.61E-02	2.91E-04
Xe-133m	Ci	<LLD	<LLD	5.14E-04	<LLD
Xe-135	Ci	<LLD	<LLD	2.80E-05	<LLD
Total for Period	Ci	<LLD	<LLD	5.72E-02	3.28E-04

TABLE IV-B
(Continued)
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - 1998
LIQUID EFFLUENTS - CONTINUOUS MODE AND BATCH MODE RELEASES

Nuclides Released	Unit	Continuous Mode		Batch Mode	
		Quarter 3	Quarter 4	Quarter 3	Quarter 4
H-3	Ci	<LLD	1.05E-03	5.10E+01	1.16E+02
Cr-51	Ci	<LLD	<LLD	3.10E-05	2.75E-05
Fe-55	Ci	<LLD	<LLD	1.36E-04	5.22E-03
Co-58	Ci	<LLD	<LLD	5.67E-04	8.04E-05
Co-60	Ci	<LLD	<LLD	2.38E-04	2.70E-05
Ag-110m	Ci	<LLD	<LLD	1.53E-04	1.20E-05
Sn-117m	Ci	<LLD	<LLD	<LLD	6.41E-07
Sb-125	Ci	<LLD	<LLD	9.53E-04	9.68E-04
Cs-137	Ci	<LLD	<LLD	1.34E-05	3.78E-06
Total for Period	Ci	<LLD	<LLD	2.09E-03	6.34E-03
Xe-133	Ci	<LLD	<LLD	3.95E-05	1.64E-04
Total for Period	Ci	<LLD	<LLD	3.95E-05	1.64E-04

TABLE VI-A
 (Continued)
GASEOUS PATHWAY
HYPOTHETICAL SITE BOUNDARY MAXIMUM INDIVIDUAL DOSES FOR 1998
 (millirem)

Child	Total body	GI-tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
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Plume	2.81E-03	2.81E-03	2.81E-03	2.81E-03	2.81E-03	2.81E-03	2.82E-03	4.79E-03
Ground plane	1.11E-05	1.11E-05	1.11E-05	1.11E-05	1.11E-05	1.11E-05	1.11E-05	1.30E-05
Inhalation	9.00E-03	9.00E-03	5.46E-08	9.00E-03	9.00E-03	9.02E-03	9.02E-03	9.00E-03
Vegetation	3.24E-02	3.24E-02	3.94E-07	3.24E-02	3.24E-02	3.24E-02	3.24E-02	3.24E-02
Meat & poultry	1.89E-03	1.89E-03	1.90E-08	1.89E-03	1.89E-03	1.89E-03	1.89E-03	1.89E-03
Total	4.61E-02	4.61E-02	2.82E-03	4.61E-02	4.61E-02	4.62E-02	4.61E-02	4.81E-02

Infant	Total body	GI-tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
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Plume	2.81E-03	2.81E-03	2.81E-03	2.81E-03	2.81E-03	2.81E-03	2.82E-03	4.79E-03
Ground plane	1.11E-05	1.11E-05	1.11E-05	1.11E-05	1.11E-05	1.11E-05	1.11E-05	1.30E-05
Inhalation	5.18E-03	5.18E-03	4.25E-08	5.18E-03	5.18E-03	5.19E-03	5.19E-03	5.18E-03
Total	8.00E-03	8.00E-03	2.82E-03	8.00E-03	8.00E-03	8.02E-03	8.02E-03	9.98E-03

TABLE VI-C
GASEOUS PATHWAY
ONSITE HYPOTHETICAL MAXIMUM INDIVIDUAL DOSES FOR 1998
(millirem)

Annual Beta Air Dose = 2.10E-04 millirads
 Annual Gamma Air Dose = 3.81E-04 millirads

Sector: North-northwest
 Distance: 1062.0 Meters

Adult	Total body	GI-tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
Plume	2.51E-04	2.51E-04	2.51E-04	2.51E-04	2.51E-04	2.51E-04	2.52E-04	4.30E-04
Ground plane	1.38E-06	1.38E-06	1.38E-06	1.38E-06	1.38E-06	1.38E-06	1.38E-06	1.62E-06
Inhalation	8.32E-04	8.32E-04	2.11E-09	8.32E-04	8.32E-04	8.33E-04	8.32E-04	8.32E-04
Total	1.08E-03	1.08E-03	2.53E-04	1.08E-03	1.08E-03	1.09E-03	1.09E-03	1.26E-03

TABLE VI-E
GASEOUS PATHWAY
ONSITE ANNUAL INTEGRATED AND RECREATIONAL POPULATION DOSES FOR 1998
(person-rem)

Pathway	Total body	GI-tract	Bone	Liver	Kidney	Thyroid	Lung	Skin
Plume	4.73E-05	4.73E-05	4.73E-05	4.73E-05	4.73E-05	4.73E-05	4.76E-05	9.11E-05
Ground plane	3.74E-07	3.74E-07	3.74E-07	3.74E-07	3.74E-07	3.74E-07	3.74E-07	4.39E-07
Inhalation	3.83E-04	3.83E-04	1.31E-09	3.83E-04	3.83E-04	3.84E-04	3.84E-04	3.83E-04
Total	4.31E-04	4.31E-04	4.77E-05	4.31E-04	4.31E-04	4.32E-04	4.32E-04	4.75E-04

TABLE VII-A
LIQUID PATHWAY
HYPOTHETICAL MAXIMUM INDIVIDUAL DOSES FOR 1998
(millirem)

Adult Doses

Pathway	Skin	Bone	Liver	Total body	Thyroid	Kidney	Lung	Gi-Ili
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Fish	0.00E+00	6.88E-04	1.64E-03	1.39E-03	9.82E-04	2.02E-03	9.91E-04	3.16E-03
Shoreline	8.75E-05	7.54E-05	7.54E-05	7.54E-05	7.54E-05	7.54E-05	7.54E-05	7.54E-05
Swimming	0.00E+00	1.45E-05	1.45E-05	1.45E-05	1.45E-05	1.45E-05	1.45E-05	1.45E-05
Boating	0.00E+00	9.69E-06	9.69E-06	9.69E-06	9.69E-06	9.69E-06	9.69E-06	9.69E-06
Total	8.75E-05	7.88E-04	1.74E-03	1.49E-03	1.08E-03	2.12E-03	1.09E-03	3.26E-03

	Usage (kg/yr, hr/yr)	Dilution	Time(hr)	Shore width factor = 0.3
Fish	21.0	1.2	24.0	
Shoreline	12.0	1.2	0.0	
Swimming	180.0	1.2	0.0	
Boating	240.0	1.2	0.0	

TABLE VII-A
 (Continued)
LIQUID PATHWAY
HYPOTHETICAL MAXIMUM INDIVIDUAL DOSES FOR 1998
 (millirem)

Teenager Doses

Pathway	Skin	Bone	Liver	Total body	Thyroid	Kidney	Lung	Gi-lli
Fish	0.00E+00	7.38E-04	1.47E-03	1.02E-03	7.74E-04	1.90E-03	8.00E-04	2.39E-03
Shoreline	4.89E-04	4.21E-04	4.21E-04	4.21E-04	4.21E-04	4.21E-04	4.21E-04	4.21E-04
Swimming	0.00E+00	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05
Boating	0.00E+00	1.45E-05	1.45E-05	1.45E-05	1.45E-05	1.45E-05	1.45E-05	1.45E-05
Total	4.89E-04	1.20E-03	1.93E-03	1.48E-03	1.24E-03	2.36E-03	1.27E-03	2.85E-03

	Usage (kg/yr, hr/yr)	Dilution	Time(hr)	Shore width factor = 0.3
Fish	16.0	1.2	24.0	
Shoreline	67.0	1.2	0.0	
Swimming	360.0	1.2	0.0	
Boating	360.0	1.2	0.0	

TABLE VII-A
 (Continued)
LIQUID PATHWAY
HYPOTHETICAL MAXIMUM INDIVIDUAL DOSES FOR 1998
 (millirem)

Child Doses

Pathway	Skin	Bone	Liver	Total body	Thyroid	Kidney	Lung	Gi-lli
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Fish	0.00E+00	9.37E-04	1.27E-03	7.79E-04	6.75E-04	1.65E-03	6.59E-04	1.23E-03
Shoreline	1.02E-04	8.80E-05	8.80E-05	8.80E-05	8.80E-05	8.80E-05	8.80E-05	8.80E-05
Swimming	0.00E+00	2.18E-05	2.18E-05	2.18E-05	2.18E-05	2.18E-05	2.18E-05	2.18E-05
Boating	0.00E+00	7.27E-06	7.27E-06	7.27E-06	7.27E-06	7.27E-06	7.27E-06	7.27E-06
Total	1.02E-04	1.05E-03	1.39E-03	8.96E-04	7.92E-04	1.77E-03	7.77E-04	1.35E-03

	Usage (kg/yr, hr/yr)	Dilution	Time(hr)	Shore width factor = 0.3
Fish	6.9	1.2	24.0	
Shoreline	14.0	1.2	0.0	
Swimming	270.0	1.2	0.0	
Boating	180.0	1.2	0.0	

TABLE VII-B
LIQUID PATHWAY
LAKE ROBINSON (ONSITE) ANNUAL INTEGRATED AND RECREATIONAL POPULATION DOSES FOR 1998
(person-rem)

Pathway	Bone	Liver	Total body	Thyroid	Kidney	Lung	Gi-lli	Skin
Fish	3.15E-04	6.87E-04	5.49E-04	3.98E-04	8.16E-04	4.05E-04	1.13E-03	0.00E+00
Shoreline	4.52E-03	4.52E-03	4.52E-03	4.52E-03	4.52E-03	4.52E-03	4.52E-03	5.25E-03
Swimming	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	0.00E+00
Boating	1.18E-05	1.18E-05	1.18E-05	1.18E-05	1.18E-05	1.18E-05	1.18E-05	0.00E+00
Total	4.88E-03	5.25E-03	5.11E-03	4.96E-03	5.38E-03	4.97E-03	5.69E-03	5.25E-03

TABLE VII-C
LIQUID PATHWAY
ANNUAL INTEGRATED POPULATION DOSE SUMMARY FOR 1998
(person-rem)

Pathway	Bone	Liver	Total body	Thyroid	Kidney	Lung	Gi-lli	Skin
Fish	6.40E-04	1.42E-03	1.14E-03	8.22E-04	1.64E-03	8.41E-04	2.26E-03	0.00E+00
Shoreline	7.96E-03	7.96E-03	7.96E-03	7.96E-03	7.96E-03	7.96E-03	7.96E-03	9.24E-03
Swimming	4.55E-05	4.55E-05	4.55E-05	4.55E-05	4.55E-05	4.55E-05	4.55E-05	0.00E+00
Boating	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05	1.30E-05	0.00E+00
Irr. Veg.	2.80E-06	2.14E-04	2.14E-04	2.12E-04	2.13E-04	2.14E-04	2.32E-04	0.00E+00
Irr. Leafy veg.	1.56E-05	1.05E-03	1.05E-03	1.04E-03	1.05E-03	1.04E-03	1.18E-03	0.00E+00
Irr. Meat	1.54E-05	2.16E-04	2.14E-04	2.08E-04	2.34E-04	2.09E-04	2.96E-04	0.00E+00
Total	8.69E-03	1.09E-02	1.06E-02	1.03E-02	1.12E-02	1.03E-02	1.20E-02	9.24E-03