COMANCHE PEAK STEAM ELECTRIC STATION

UNIT 1

SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

July 1, 1992 - December 31, 1992

Comanche Peak Steam Electric Station

Unit 1

Semiannual Radioactive Effluent Release Report

July 1, 1992 - December 31, 1992

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ACRONYMS AND ABBREVIATIONS

CFR	Code of Federal Regulations
CPSES	Comanche Peak Steam Electric Station
LHMT	Laundry Holdup and Monitor Tanks
LVW	Low Volume Waste
MPC	Maximum Permissible Concentration
ODCM	Offsite Dose Calculation Manual
PET	Primary Effluent Tanks
REC	Radiological Effluent Control
SORC	Station Operations Review Committee
WHUT	Wastewater Holdup Tanks
WMT	Waste Monitor Tanks

1.0 INTRODUCTION

This Semiannual Radioactive Effluent Release Report, for Comanche Peak Steam Electric Station Unit 1, is submitted as required by Technical Specification 6.9.1.4 and Offsite Dose Calculation Manual (ODCM) Administrative Control 6.9.1.4 for the period July 1, 1992 through December 31, 1992.

Information pertaining to the following areas is included in this report:

- A summary of the quantities of radioactive liquid and gaseous effluents released from Unit 1 during the reporting period in the format outlined in Appendix B of Regulatory Guide 1.21, Revision 1, June 1974.

- A summary of solid waste shipped from Unit 1 in the format shown in Appendix B of Regulatory Guide 1.21, Revision 1, June 1974, supplemented with three additional categories: class of waste (per 10CFR61), type of container (Strong Tight, Type A, Type B) and solidification agent or absorbent.

- An explanation of why inoperable liquid or gaseous effluent monitoring instrumentation was not corrected within 30 days.

- Changes to the Process Control Program.

- Changes to the ODCM in the form of a complete, legible copy of the entire ODCM.

- A listing of new locations for dose calculations and/or environmental monitoring identified by the Land Use Census.

- A description of the events leading to liquid holdup tanks or gas storage tanks exceeding Technical Specification limits.

- A list and description of abnormal releases of radioactive material from the site to unrestricted areas.

- A description of resin releases to the LVW Ponds.

- A description of major changes to radioactive waste treatment systems (liquid, gaseous and solid).

- An assessment of radiation doses due to the radioactive liquid and gaseous effluents released from CPSES Unit 1 in 1992.

- An assessment of the radiation doses from radioactive liquid and gaseous effluents to MEMBERS OF THE PUBLIC due to their activities inside the Site Boundary.

- An assessment of radiation doses to the likely most exposed MEMBER OF THE PUBLIC from CPSES Unit 1 releases and other nearby uranium fuel cycle sources, including doses from primary effluent pathways and direct radiation, for the reporting period, to show conformance with 40 CFR 190, "Environmental Radiation Protection Standards for Nuclear Power Operation."

2.0 SUPPLEMENTAL INFORMATION

2.1 Regulatory Limits

The ODCM Radiological Effluent Control limits applicable to the release of radioactive material in liquid and gaseous effluents are described in the following sections:

2.1.1 Fission and Activation Gases (Noble Gases)

The dose rate due to radioactive materials released in gaseous effluents from the site to areas at and beyond the site boundary shall be limited to less than or equal to 500 mrems/yr to the whole body and less than or equal to 3000 mrems/yr to the skin.

The air dose due to noble gases released in gaseous effluents, from each unit, to areas at and beyond the site boundary shall be limited to the following:

a. During any calendar quarter: Less than or equal to 5 mrads for gamma radiation and less than or equal to 10 mrads for beta radiation, and

b. During any calendar year: Less than or equal to 10 mrads for gamma radiation and less than or equal to 20 mrads for beta radiation.

2.1.2 Iodine-131, Iodine-133, Tritium and Radioactive Material in Particulate Form

The dose rate due to Iodine-131, Iodine-133, tritium and all radionuclides in particulate form with half lives greater than 8 days, released in gaseous effluents from the site to areas at and beyond the site boundary, shall be limited to less than or equal to 1500 mrem/yr to any organ.

The dose to a MEMBER OF THE PUBLIC from Iodine-131, Iodine-133, tritium and all radionuclides in particulate form with half lives greater than 8 days, in gaseous effluents released, from each unit, to areas at and beyond the site boundary, shall be limited to the following:

a. During any calendar quarter: Less than or equal to 7.5 mrems to any organ, and

b. During any calendar year: Less than or equal to 15 mrems to any organ.

2.1.3 Liquid Effluents

The concentration of radioactive material released in liquid effluents to unrestricted areas shall be limited to the concentrations specified in 10 CFR Part 20, Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to 2.0E-04 μCi/ml total activity.

The dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released, from each unit, to unrestricted areas shall be limited to the following:

a. During any calendar quarter to less than or equal to 1.5 mrems to the whole body and to less than or equal to 5 mrems to any organ, and

b. During any calendar year to less than or equal to 3 mrems to the whole body and to less than or equal to 10 mrems to any organ.

2.1.4 LVW Pond Resin Inventory

The quantity of radioactive material contained in resins transferred to the LVW pond shall be limited by the following expression:

$$264/V \cdot \Sigma_j A_j/C_j < 1.0$$

excluding tritium, dissolved or entrained noble gases and radionuclides with less than an 8 day half life, where:

A_j = pond inventory limit for a single radionuclide j (Curies),

C_j = 10CFR20, Appendix B, Table II Column 2, concentration for a single radionuclide j (μCi/ml),

V = volume of resins in the pond (gallons), and

264 = conversion unit (μCi/Ci per ml/gal)

2.1.5 Total Dose

The annual (calendar year) dose or dose commitment to any MEMBER OF THE PUBLIC due to releases of radioactivity and to radiation from uranium fuel cycle sources shall be limited to less than or equal to 25 mrems to the whole body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mrems.

2.2 Maximum Permissible Concentrations

2.2.1 Gaseous Effluents

For gaseous effluents, maximum permissible concentration (MPC) values are not directly used in release rate calculations since the applicable limits are expressed in terms of dose rate at the site boundary.

2.2.2 Liquid Effluents

The values specified in 10 CFR Part 20, Appendix B, Table II, Column 2 are used as the MPC for liquid radioactive effluents released to unrestricted areas. A value of 2.0E-04 μCi/ml is used as the MPC for dissolved and entrained noble gases in liquid effluents.

2.3 Average Energy

This section is not applicable to the Radiological Effluent Controls contained in Part I of the ODCM for Comanche Peak, Unit 1.

2.4 Measurements and Approximations of Total Radioactivity

Measurements of total radioactivity in liquid and gaseous radioactive effluents were accomplished in accordance with the sampling and analysis requirements of Tables 4.11-1 and 4.11-2, respectively, of the CPSES ODCM.

2.4.1 Liquid Radioactive Effluents

Each batch release was sampled and analyzed for gamma emitting radionuclides using gamma spectroscopy, prior to release. Composite samples were analyzed monthly and quarterly for the Primary Effluent Tanks (PET), Waste Monitor Tanks (WMT), Laundry Holdup and Monitor Tanks (LHMT) and Wastewater Holdup Tanks (WHUT). Composite samples were analyzed monthly for tritium and gross alpha radioactivity in the onsite laboratory using liquid scintillation and gas flow proportional counting techniques, respectively. Composite samples were analyzed quarterly for Sr-89, Sr-90 and Fe-55 by a contract laboratory (Teledyne Isotopes). The results of the composite analyses from the previous month or quarter were used to estimate the quantities of these radionuclides in liquid effluents during the current month or quarter. The total radioactivity in liquid effluent releases was determined from the measured and estimated concentrations of each radionuclide present and the total volume of the effluent released during periods of discharge.

For batch releases of powdex resin to the LVW pond, samples were analyzed for gamma emitting radionuclides, using gamma spectroscopy techniques, prior to release. Composite samples were analyzed quarterly, for Sr-89 and Sr-90, by an offsite laboratory (Teledyne Isotopes).

For continuous releases to the circulation water discharge from the LVW pond, daily grab samples were obtained over the period of pond discharge. These samples were composited and analyzed for gamma emitting radionuclides, using gamma spectroscopy techniques. Composite samples were also analyzed for tritium and gross alpha radioactivity using liquid scintillation and gas flow proportional counting techniques, respectively. Composite samples were analyzed quarterly for Sr-89, Sr-90 and Fe-55 by a contract laboratory (Teledyne Isotopes).

2.4.2 Gaseous Radioactive Effluents

Each gaseous batch release was sampled and analyzed for radioactivity prior to release. For releases from Waste Gas Decay Tanks, noble gas grab samples were analyzed for gamma emitting radionuclides using gamma spectroscopy. For releases from the Containment Building, samples were taken using charcoal and particulate filters, in addition to noble gas and tritium grab samples, and analyzed for gamma emitting radionuclides prior to each release with the exception of Containment vents made as a precursor to a Containment purge. In these cases, samples collected and analyzed as a prerequisite to the vent were used to estimate total radioactivity released during the subsequent purge. The results of the analyses and the total volume of effluent released were used to determine the total amount of radioactivity released in the batch mode.

For continuous effluent release pathways, noble gas and tritium grab samples were collected and analyzed weekly for gamma emitting radionuclides by gamma spectroscopy and liquid scintillation counting techniques, respectively. Continuous release pathways were continuously sampled using radioiodine adsorbers and particulate filters. The filters were analyzed weekly for I-131 and gamma emitting radionuclides using gamma spectroscopy. Results of the noble gas and tritium grab samples, radioiodine adsorber and particulate filter analyses from the current week and the average effluent flow rate for the previous week were used to determine the total amount of radioactivity released in the continuous mode. Monthly composites of particulate filters were analyzed for gross alpha activity, in the onsite laboratory using the gas flow proportional counting technique. Quarterly composites of particulate filters were analyzed for Sr-89 and Sr-90 by an offsite laboratory (Teledyne Isotopes).

2.5 Batch Releases

A summary of information for gaseous and liquid batch releases is included in Table 7.1.

2.6 Abnormal Releases

Abnormal releases are defined as unplanned or uncontrolled releases of radioactive material from the site boundary.

There were three abnormal gaseous effluent releases made during the period covered by this report. These events are described in section 6.6.1 of this report.

A summary of information for gaseous and liquid abnormal releases is included in Table 7.2.

3.0 GASEOUS EFFLUENTS

The quantities of radioactive material released in gaseous effluents are summarized in Tables 7.3 and 7.4. All releases of radioactive material in gaseous form are considered to be ground level releases.

4.0 LIQUID EFFLUENTS

The quantities of radioactive material released in liquid effluents are summarized in Tables 7.5 and 7.6.

5.0 SOLID WASTES

The quantities of radioactive material released as solid effluents are summarized in Table 7.13.

6.0 RELATED INFORMATION

6.1 Operability of Liquid and Gaseous Monitoring Instrumentation

ODCM Radiological Effluent Controls 3.3.3.4 and 3.3.3.5 require an explanation of why designated inoperable liquid and gaseous monitoring instrumentation was not restored to operable status within thirty days. During the period covered by this report, there were no instances where this instrumentation was inoperable for more than thirty days.

6.2 Changes to the Process Control Program

There were no changes to the Process Control Program for the period covered by this report.

6.3 Changes to the Offsite Dose Calculation Manual

During the period covered by this report, there was one revision to the ODCM. In accordance with ODCM Administrative Control 6.14.c, this change is submitted in the form of a complete copy of the entire ODCM. The ODCM, current as of December 31, 1992, is contained in Attachment 8.2. The major changes included in this revision are summarized below:

a. Revision 7a, effective August 7, 1992 -

- Two new 30,000 gallon Primary Effluent Tanks (PET) were added to the liquid waste processing system to increase the holdup capacity of processed liquid waste prior to discharge.

- Sampling requirements for the PET's were added to the Radioactive Liquid Waste Sampling and Analysis Program Table 4.11-1.

6.4 New Locations for Dose Calculations or Environmental Monitoring

ODCM Administrative Control 6.9.1.4 requires any new locations for dose calculations and/or environmental monitoring, identified by the Land Use Census, to be included in the Semiannual Radioactive Effluent Release Report. The 1992 Land Use Census, which will be included in the 1992 Annual Radiological Environmental Operating Report, identified new receptor locations for dose calculations and eliminated one existing dairy monitoring station. These changes were submitted as a revision to the ODCM Part II, Table 2.4 and Table 3.1 respectively. This revision to the ODCM has been submitted as Revision 8 but has not become effective during this reporting period.

6.5 Liquid Holdup and Gas Storage Tanks

ODCM Administrative Control 6.9.1.4 requires a description of the events leading to liquid holdup or gas storage tanks exceeding the Technical Specification limits. Technical Specification 3.11.1 limits the quantity of radioactive material contained in each unprotected outdoor tank to less than or equal to ten curies, excluding tritium and dissolved or entrained noble gases. Technical Specification 3.11.2.2 limits the quantity of radioactive material contained in each gas storage tank to less than or equal to 200,000 curies of noble gases (considered as Xe-133 equivalent). These limits were not exceeded during the period covered by this report.

6.6 Noncompliance with Radiological Effluent Control Requirements

This section provides a listing of events that did not comply with the applicable requirements of the Radiological Effluent Controls given in Part I of the CPSES ODCM. Detailed documentation concerning evaluations of these events and corrective actions is maintained onsite.

6.6.1 Abnormal Liquid and Gaseous Releases

- There were no abnormal liquid effluent releases resulting in release of radioactive material from the site boundary.

- Three separate gaseous abnormal permits were processed to document three separate unplanned releases of noble gases to the plant ventilation system. All three releases involved valve lineup operations to vent the pressurizer steam space to the volume control tank using the process sample system. The valve lineups were being performed in preparation for the degassing of the Reactor Coolant System. The events were all of short duration and were determined to be caused by a faulty pressure gauge indication and subsequent lifting of a pressure relief valve to relieve excess system pressure. The relief valve lifting caused the release of noble gases from the Reactor Coolant System to the plant ventilation system. Therefore, all three releases were monitored by the plant vent stack radiation monitors. The events were of short duration because the releases were terminated automatically when they had returned to normal pressure and the relief valve closed. The radioactivity released did not exceed any instantaneous dose rate limits or any cumulative dose limits. It should be noted that stack monitor high radiation alarms were received in all three events based on exceeding instantaneous default alarm setpoint values. The default alarm setpoints were based on the most conservative noble gas dose conversion factor given in the ODCM. Calculations performed based on the distribution of noble gas isotopes actually present showed that ODCM release rate and dose rate limits were not exceeded. The consequences of the releases are detailed below:

  a. On October 20, 1992, at approximately 09:40 the South Vent Stack monitors went into high alarm and recorded a 9.50E+3 μCi/sec release rate with a concentration of 1.67E-4 μCi/ml noble gas. The noted spike on the radiation monitors started trending downward only minutes after the initial alarm. Release calculations that were performed after the latest noble gas spectral data was obtained verified that

no limits were exceeded. The gamma air dose was determined to be 3.87E-03 mrad and the beta air dose was determined to be 3.22E-03 mrad. The relief valve lifting was not noted during this event.

b. On October 23, 1992, at approximately 07:05 the South Vent stack monitors went into high alarm and recorded a 2.79E+4 μCi/sec release rate with a concentration of 3.72E-4 μCi/ml noble gas. The noted spike on the radiation monitors started trending downward only minutes after the initial alarm. Release calculations that were performed after the latest noble gas spectral data was obtained verified that no limits were exceeded. The gamma air dose was determined to be 8.75E-03 mrad and the beta air dose was determined to be 7.29E-03 mrad. The relief valve lifting was noticed at this time and the lineup was secured. Excessive gauge fluctuation was noted by the technician as well.

c. On October 24, 1992, at approximately 16:02 the South Vent stack monitors went into high alarm and recorded a 1.87E+3 μCi/sec release rate with a concentration of 5.73E-5 μCi/ml noble gas. As soon as the relief valve lifted the valve lineup was secured and the release was terminated. Release calculations verified that no limits were exceeded. The gamma air dose was determined to be 5.14E-03 mrad and the beta air dose was determined to be 4.28E-03 mrad.

The necessity to degas the Reactor Coolant System caused the following changes to be implemented in order to resolve the relief valve problem. A technical evaluation was performed and the method used was changed to lineup the pressurizer steam space to the Volume Control Tank without going through the process sampling system. A request for a Design Modification was submitted to connect the pressurizer steam space directly to the waste gas system. Procedure reviews were performed and were determined to be adequate.

No personnel errors were involved. Work requests were submitted on the pressure regulating valve, the pressure gauge and relief valve to repair, replace or calibrate as required.

6.6.2 Failure to Meet Specified Sampling Requirements

- On July 27, 1992, at 07:00 it was determined that the requirement to sample the plant vent stacks at least once per 24 hours for at least 7 days following a reactor trip had not been accomplished on July 26, 1992, as required. The reactor trip occurred on July 20, 1992, at 16:01 and daily samples were being obtained. The sample due on July 26, 1992, was not collected as required. The samples were immediately obtained and no abnormal conditions existed when analysis was performed. The event was classified as a Plant Incident and an evaluation was performed to determine the reasons, causes and failures contributing to the event. The root cause of the event was determined to be personnel error. Additionally, scheduling of Chemistry personnel caused insufficient personnel on this crew. The sample requirement had not been discussed in turnover meetings and there was a lack of attention to detail. Corrective actions included rescheduling of personnel to staff crews, increased turnover discussions between lead technicians and supervisors and increased attention to the Shift Orders at turnover.

- On October 2, 1992, at 12:30 it was determined that an unmonitored potentially radioactive release pathway was created due to problems with water in the condenser off gas monitor and the sample vent line to the primary plant ventilation. This condition required venting of the monitor sample line directly into the Turbine Building instead of out the monitored vent stacks pathway. Immediate corrective actions were taken to expedite the repairs and noble gas grab samples at the monitor vent point were initiated. At no time did the grab samples indicate any radioactivity. A release was not anticipated since secondary sampling has not indicated any primary-to-secondary leakage. The grab samples continued until the

monitor and vent line were repaired and declared operable. Long term corrective actions included increasing the frequency of draining of the discharge header and submittal of a design modification request to increase the drain line size and install a constantly draining loop seal drain.

- On November 25, 1992, at 14:00 a Chemistry technician discovered that an auxiliary sample pump being used to satisfy continuous sample requirements of the inoperable South Vent Stack particulate, iodine and noble gas monitor had blown a fuse. Since the South Vent Stack monitor was inoperable the auxiliary sample pump had been installed to provide 4 hour grab samples for Noble gases and continuous sampling of particulates and iodines. The pump ad previously been running at 10:00 when the last 4 hour grab sample was collected. Therefore the pump was off for less than 4 hours. The North Vent Stack monitoring was not affected by any of the conditions described above. The North Vent Stack was being continuously monitored. The samples taken before and after restoration of the pump were all "normal" in noble gas activity. There was no particulate or iodine radioactivity measured during this time frame. Dose calculations were performed using both North Vent Stack data and grab sample data to account for the 4 hours of missed sampling. Corrective action was taken to replace the fuse and no further problems were encountered.

6.7 Resin Releases to the LVW Pond

A total of 1037 ft^3 of resin was transferred to the LVW pond during the period covered by this report. The results of the sample analyses indicate no radioactive material was transferred to the pond.

6.8 Changes to the Liquid, Gaseous and Solid Waste Treatment Systems

In accordance with the CPSES Process Control Program, Section 2.2a, major changes to the Radwaste Treatment Systems (liquid, gaseous and solid) shall be reported to the Commission in the Semiannual Radioactive Effluent Release Report for the period in which changes were reviewed by the SORC.

During this reporting period, one design modification was implemented. Attachment 8.1 contains a summary of this modification as well as summaries of applicable evaluations and justifications supporting the modification.

6.9 Meteorological Monitoring Program

In accordance with ODCM Administrative Control 6.9.1.4, a summary of hourly meteorological data, collected during 1992, is retained onsite. This data is available for review by the NRC upon request.

6.10 Assessment of Doses

6.10.1 Doses Due to Liquid Effluents

The doses to an adult from the fish and water consumption pathways from Squaw Creek Reservoir were calculated in accordance with the methodology and parameters in the ODCM. The results of the calculations are summarized on a quarterly and annual basis in Table 7.7.

6.10.2 Doses Due to Gaseous Effluents

The air dose due to gamma emissions and the air dose due to beta emissions were calculated using the highest annual average atmospheric dispersion factor at the Site Boundary location, in accordance with the methodology and parameters in the ODCM. The results of the calculations are summarized on a quarterly and annual basis in Table 7.8.

6.10.3 Dose Due to Radioiodines, Tritium and Particulates

The doses to an infant, child, teen and adult from radioiodines and particulates, for the pathways listed in Part II, Table 2.3 of the ODCM, were calculated using the highest dispersion and deposition factors, as appropriate, in accordance with the methodology and parameters in the ODCM. The results of the calculations are summarized on a quarterly and annual basis in Tables 7.9 through 7.12.

6.10.4 40 CFR 190 Dose Evaluation

ODCM Radiological Effluent Control 3.11.4 requires dose evaluations to demonstrate compliance with 40 CFR Part 190 only if the calculated quarterly or yearly doses exceed two times the applicable quarterly or annual dose limits (see Sections 2.1.1, 2.2.2 and 2.2.3). At no time during 1992 were any of these limits exceeded, therefore no evaluations are required.

6.10.5 Doses to a MEMBER OF THE PUBLIC From Activities Inside the Site Boundary

Three activities are considered in this evaluation: fishing on Squaw Creek Lake, recreation activities at the CPSES employee recreational area and site tours through the CPSES Visitors Center.

The highest dose occurred in the evaluation for fishing, resulting in a dose of 2.28E-2 mrem/yr. The dose to a MEMBER OF THE PUBLIC (fisherman) on Squaw Creek Lake was calculated based on fishing twice a week, five hours each day, six months per year. Pathways included in the calculation were gaseous inhalation and submersion. Liquid pathways are not considered since all doses are calculated at the point of circwater discharge into the lake.

The dose to a MEMBER OF THE PUBLIC engaged in recreational activities at the CPSES employee recreational park was calculated based on one visit a week, five hours each day, six months per year. Pathways included in the calculation were gaseous inhalation, submersion and ground plane.

The dose to a MEMBER OF THE PUBLIC during site tours through the CPSES Visitors Center was calculated based on two visits per year, thirty minutes each visit. Pathways included in the calculation were gaseous inhalation and submersion.

All calculations were performed in accordance with the methodology and parameters in the ODCM.

SECTION 7.0

TABLES

Table 7.1

BATCH LIQUID AND GASEOUS RELEASE SUMMARY

	Quarter 3	Quarter 4
A. Liquid Releases All Sources		
Number of Batch Releases	1.75E+02	1.44E+02
Total Time Period For Batch Releases (min)	1.28E+04	1.50E+04
Maximum Time Period For a Batch Release (min)	8.00E+01	4.59E+02
Average Time Period For a Batch Release (min)	7.30E+01	1.05E+02
Minimum Time Period For A Batch Release (min)	2.90E+01	2.10E+01
Average Stream Flow During Periods of Release (ft^3/s)	N/A	N/A
B. Gaseous Releases All Sources		
Number of Batch Releases	1.90E+01	9.00E+00
Total Time Period For Batch Releases (min)	5.34E+03	4.26E+03
Maximum Time Period For A Batch Release (min)	3.77E+02	1.92E+03
Average Time Period For A Batch Release (min)	2.81E+02	4.73E+02
Minimum Time Period For A Batch Release (min)	1.19E+02	1.77E+02

TABLE 7.2

ABNORMAL BATCH LIQUID AND GASEOUS RELEASE SUMMARY

	Quarter 3	Quarter 4
A. Liquids		
Number of Releases	0.00E+00	0.00E+00
Total Activity Released, Ci	0.00E+00	0.00E+00
B. Gases		
Number of Releases	0.00E+00	3.00E+00
Total Activity Released, Ci	0.00E+00	7.04E+01

TABLE 7.3

GASEOUS EFFLUENTS--SUMMATION OF ALL RELEASES

	Units	Quarter 3	Quarter 4	Est.Total Error, %
A. Fission and Activation Gases				
1. Total release	Ci	6.11E+02	7.12E+02	2.35E+01
2. Average release rate for period	μCi/sec	7.68E+01	8.96E+01	
3. Percent of ODCM REC limit (Total Body Dose Rate)	%	4.38E-02	3.54E-02	
4. Percent of ODCM REC limit (Skin Dose Rate)	%	1.02E-02	1.16E-02	
B. Iodines				
1. Total Iodine-131	Ci	4.02E-04	2.82E-04	1.43E+01
2. Average release rate for period	μCi/sec	5.06E-05	3.55E-05	
3. Percent of ODCM REC limit (Organ Dose Rate)	%	5.94E-02	4.17E-02	
C. Particulates				
1. Particulates with half lives > 8 days	Ci	0.00E+00	0.00E+00	N/A
2. Average release rate for period	μCi/sec	0.00E+00	0.00E+00	
3. Percent of ODCM REC limit (Organ Dose Rate)	%	0.00E+00	0.00E+00	
4. Gross alpha radioactivity	Ci	0.00E+00	0.00E+00	
D. Tritium				
1. Total release	Ci	8.78E-01	2.94E-01	2.38E+01
2. Average release rate for period	μCi/sec	1.10E-01	3.70E-02	
3. Percent of ODCM REC limit (Organ Dose Rate)	%	6.26E-04	2.10E-04	

TABLE 7.4

GASEOUS EFFLUENTS--GROUND LEVEL RELEASES

Nuclides Released	Units	Continuous Mode Quarter 3	Continuous Mode Quarter 4	Batch Mode Quarter 3	Batch Mode Quarter 4
1. Fission and Activation Gases					
Ar-41	Ci	0.00E+00	0.00E+00	5.24E-02	3.98E-01
Kr-85M	Ci	0.00E+00	0.00E+00	0.00E+00	2.65E+00
Kr-87	Ci	0.00E+00	0.00E+00	0.00E+00	2.96E+00
Kr-88	Ci	1.59E+01	0.00E+00	0.00E+00	5.52E+00
Xe-131M	Ci	0.00E+00	0.00E+00	3.27E-03	0.00E+00
Xe-133M	Ci	0.00E+00	0.00E+00	0.00E+00	1.04E+00
Xe-133	Ci	5.44E+02	6.01E+02	1.35E+00	6.19E+01
Xe-135M	Ci	0.00E+00	0.00E+00	0.00E+00	9.72E-01
Xe-135	Ci	4.92E+01	1.92E+01	1.40E-02	1.44E+01
Xe-138	Ci	0.00E+00	0.00E+00	0.00E+00	1.64E+00
Total for period	Ci	6.09E+02	6.20E+02	1.42E+00	9.15E+01
2. Iodines					
I-131	Ci	3.95E-04	2.81E-04	6.95E-06	8.76E-07
I-133	Ci	0.00E+00	0.00E+00	2.80E-07	3.97E-08
Total for period	Ci	3.95E-04	2.81E-04	7.23E-06	9.16E-07
3. Particulates					
H-3	Ci	8.77E-01	2.87E-01	1.09E-03	7.76E-03
Rb-88 (Note 1)	Ci	0.00E+00	0.00E+00	1.35E-06	0.00E+00
Br-82 (Note 1)	Ci	0.00E+00	0.00E+00	3.72E-07	0.00E+00
Total for period	Ci	8.77E-01	2.87E-01	1.09E-03	7.76E-03

Note 1: Since the half life of these nuclides are less than eight days, the amount released in gaseous effluents is not reported in Table 7.3, item C. For the same reason, these nuclides are not considered in dose calculations.

TABLE 7.5
LIQUID EFFLUENTS--SUMMATION OF ALL RELEASES

	Units	Quarter 3	Quarter 4	Est. Total Error, %
A. Fission and Activation Products				
1. Total release (not including tritium, gases, alpha)	Ci	4.00E-02	1.15E-01	3.03E+01
2. Average diluted concentration during period	µCi/ml	6.25E-10	2.68E-09	
3. Percent of ODCM REC limit	%	2.95E-02	3.22E-02	
B. Tritium				
1. Total release	Ci	2.39E+02	2.17E+02	1.34E+01
2. Average diluted concentration during period	µCi/ml	3.74E-06	5.08E-06	
3. Percent of ODCM REC limit	%	1.25E-01	1.69E-01	
C. Dissolved and Entrained Gases				
1. Total release	Ci	9.32E-01	3.30E+00	1.16E+01
2. Average diluted concentration during period	µCi/ml	1.46E-08	7.71E-08	
3. Percent of ODCM REC limit	%	7.28E-03	3.86E-02	
D. Gross Alpha Radioactivity				
1. Total release	Ci	0.00E+00	0.00E+00	0.00E+00
E. Volume of waste released (prior to dilution)	Liters	6.87E+06	3.50E+06	2.20E+00
F. Volume dilution of water used during period (Note 1)	Liters	6.40E+10	4.28E+10	1.00E+01

Note 1: The dilution volume reported is the total dilution volume during periods when effluent releases were occurring. The additional dilution volume available when there are no effluent releases occurring is not included.

TABLE 7.6

LIQUID EFFLUENTS

		Continuous Mode		Batch Mode	
Nuclides Released	Units	Quarter 3	Quarter 4	Quarter 3	Quarter 4
H-3	Ci	0.00E+00	0.00E+00	2.39E+02	2.17E+02
Na-24	Ci	0.00E+00	0.00E+00	0.00E+00	8.34E-05
Cr-51	Ci	0.00E+00	0.00E+00	0.00E+00	1.92E-02
Mn-54	Ci	0.00E+00	0.00E+00	3.40E-04	3.02E-04
Fe-55	Ci	0.00E+00	0.00E+00	1.87E-02	4.11E-03
Co-57	Ci	0.00E+00	0.00E+00	1.12E-06	1.14E-04
Co-58	Ci	0.00E+00	0.00E+00	5.69E-04	4.73E-02
Fe-59	Ci	0.00E+00	0.00E+00	0.00E+00	3.95E-03
Co-60	Ci	0.00E+00	0.00E+00	8.21E-04	4.95E-03
Se-75	Ci	0.00E+00	0.00E+00	0.00E+00	1.20E-04
Rb-88	Ci	0.00E+00	0.00E+00	8.53E-05	3.64E-05
Zr-95	Ci	0.00E+00	0.00E+00	3.60E-05	1.44E-04
Nb-95	Ci	0.00E+00	0.00E+00	1.12E-04	3.70E-04
Mo-99	Ci	0.00E+00	0.00E+00	1.94E-05	5.00E-05
Tc-99M	Ci	0.00E+00	0.00E+00	.23E-05	4.87E-05
Sn-113	Ci	0.00E+00	0.00E+00	1.95E-06	7.78E-06
In-113M	Ci	0.00E+00	0.00E+00	2.17E-06	9.37E-06
Sn-117M	Ci	0.00E+00	0.00E+00	0.00E+00	3.39E-06
Sb-122	Ci	0.00E+00	0.00E+00	0.00E+00	5.20E-04
Sb-124	Ci	0.00E+00	0.00E+00	0.00E+00	7.12E-03
Sb-125	Ci	0.00E+00	0.00E+00	3.56E-05	2.09E-02
Sb-126	Ci	0.00E+00	0.00E+00	0.00E+00	1.50E-04
Sb-127	Ci	0.00E+00	0.00E+00	0.00E+00	1.06E-05
I-131	Ci	0.00E+00	0.00E+00	5.27E-03	3.59E-03
I-133	Ci	0.00E+00	0.00E+00	1.48E-04	4.49E-05
Cs-134	Ci	0.00E+00	0.00E+00	6.36E-03	2.49E-04
Cs-136	Ci	0.00E+00	0.00E+00	1.52E-04	1.76E-06
Cs-137	Ci	0.00E+00	0.00E+00	7.30E-03	4.42E-04
Cs-138	Ci	0.00E+00	0.00E+00	0.00E+00	1.77E-05
La-140	Ci	0.00E+00	0.00E+00	1.33E-05	1.20E-04
La-141	Ci	0.00E+00	0.00E+00	0.00E+00	7.85E-04
Total for period	Ci	0.00E+00	0.00E+00	2.39E+02	2.17E+02

TABLE 7.6 (Continued)

LIQUID EFFLUENTS

Nuclides Released	Units	Continuous Mode Quarter 3	Continuous Mode Quarter 4	Batch Mode Quarter 3	Batch Mode Quarter 4
Kr-85	Ci	0.00E+00	0.00E+00	6.23E-03	5.91E-03
Kr-85M	Ci	0.00E+00	0.00E+00	7.47E-05	3.94E-05
Kr-88	Ci	0.00E+00	0.00E+00	2.41E-05	5.20E-06
Xe-131M	Ci	0.00E+00	0.00E+00	1.98E-02	4.72E-02
Xe-133	Ci	0.00E+00	0.00E+00	9.01E-01	3.23E+00
Xe-133M	Ci	0.00E+00	0.00E+00	4.66E-03	1.83E-02
Xe-135	Ci	0.00E+00	0.00E+00	1.99E-04	1.22E-03
Total for period	Ci	0.00E+00	0.00E+00	9.32E-01	3.30E+00

TABLE 7.7

DOSES FROM LIQUID EFFLUENTS (mrem)

Organ	Bone	Liver	Whole Body	Thyroid	Kidney	Lung	GI-LLI
Quarter 1	1.19E-03	6.59E-02	6.53E-02	6.49E-02	6.49E-02	6.54E-02	7.69E-02
% Limit	2.38E-02	1.32E+00	4.35E+00	1.30E+00	1.30E+00	1.31E+00	1.54E+00
Quarter 2	1.44E-02	8.00E-02	7.33E-02	5.88E-02	6.34E-02	5.83E-02	5.70E-02
% Limit	2.88E-01	1.60E+00	4.89E+00	1.18E+00	1.27E+00	1.17E+00	1.14E+00
Quarter 3	2.13E-02	1.06E-01	9.61E-02	7.35E-02	8.05E-02	7.22E-02	6.96E-02
% Limit	4.26E-03	2.12E+00	6.41E+00	1.47E+00	1.61E+00	1.44E+00	1.39E+00
Quarter 4	2.12E-03	8.40E-02	8.31E-02	8.62E-02	8.15E-02	8.41E-02	8.65E-02
% Limit	4.24E-02	1.68E+00	5.54E+00	1.72E+00	1.63E+00	1.68E+00	1.73E+00
Total 1992	3.90E-02	3.36E-01	3.18E-01	2.83E-01	2.90E-01	2.80E-01	2.90E-01
% Limit	3.90E-01	3.36E+00	1.06E+01	2.83E+00	2.90E+00	2.80E+00	2.90E+00

TABLE 7.8

DOSES FROM GASEOUS EFFLUENTS

Noble Gas Air Dose (mRad)

Air Dose (mRad)	Gamma Air	Beta Air
Quarter 1	3.43E-03	1.83E-02
Percent Limit	6.86E-02	1.83E-01
Quarter 2	4.95E-03	4.73E-02
Percent Limit	9.90E-02	4.73E-01
Quarter 3	5.53E-02	7.75E-02
Percent Limit	1.11E+00	7.75E-01
Quarter 4	4.46E-02	8.81E-02
Percent Limit	8.92E-01	8.81E-01
Total 1992	1.08E-01	2.31E-01
Percent Limit	1.08E+00	1.16E+00

TABLE 7.9

DOSES FROM GASEOUS EFFLUENTS

Iodines, Particulates and Tritium
Adult Age Group, (mrem)

Organ	Bone	Liver	Whole Body	Thyroid	Kidney	Lung	GI-LLI	Skin
Qtr-1	1.80E-07	1.44E-04	1.44E-04	2.26E-04	1.45E-04	1.44E-04	1.44E-04	4.92E-09
% Limit	2.40E-06	1.92E-03	1.92E-03	3.01E-03	1.93E-03	1.92E-03	1.92E-03	6.56E-08
Qtr-2	2.66E-05	5.44E-04	5.28E-04	1.27E-02	5.71E-04	5.07E-04	5.17E-04	7.26E-07
% Limit	3.55E-04	7.25E-03	7.04E-03	1.69E-01	7.61E-03	3.80E-05	6.89E-03	9.68E-06
Qtr-3	7.33E-05	4.13E-04	3.69E-04	3.39E-02	4.86E-04	3.10E-04	3.37E-04	2.00E-06
% Limit	9.77E-04	5.51E-03	4.92E-03	4.52E-01	6.48E-03	4.13E-03	4.49E-03	2.67E-05
Qtr-4	5.14E-05	1.77E-04	1.46E-04	2.37E-02	2.28E-04	1.05E-04	1.24E-04	1.40E-06
% Limit	6.85E-04	2.36E-03	1.95E-03	3.16E-01	3.04E-03	1.40E-03	1.65E-03	1.87E-05
Total 1992	1.51E-04	1.28E-03	1.19E-03	7.05E-02	1.43E-03	1.07E-03	1.12E-03	4.13E-06
% Limit	1.01E-03	8.53E-03	7.93E-03	4.70E-01	9.53E-03	7.13E-03	7.48E-03	2.75E-05

TABLE 7.10

DOSES FROM GASEOUS EFFLUENTS

Iodines, Particulates and Tritium
Teen Age Group, (mrem)

Organ	Bone	Liver	Whole Body	Thyroid	Kidney	Lung	GI-LLI	Skin
Qtr-1	3.03E-07	1.66E-04	1.66E-04	2.88E-04	1.66E-04	1.66E-04	1.66E-04	4.92E-09
% Limit	4.04E-06	2.21E-03	2.21E-03	3.84E-03	2.21E-03	2.21E-03	2.21E-03	6.56E-08
Qtr-2	4.50E-05	6.44E-04	6.16E-04	1.87E-02	6.89E-04	5.82E-04	5.95E-04	7.26E-07
% Limit	6.00E-04	8.59E-03	8.21E-03	2.49E-01	9.19E-03	7.76E-03	7.93E-03	9.68E-06
Qtr-3	1.24E-04	5.27E-04	4.48E-04	5.02E-02	6.51E-04	3.56E-04	3.90E-04	2.00E-06
% Limit	1.65E-03	7.03E-03	5.97E-03	6.69E-01	8.68E-03	4.75E-03	5.20E-03	2.67E-05
Qtr-4	8.68E-05	2.40E-04	1.85E-04	3.51E-02	3.27E-04	1.20E-04	1.44E-04	1.40E-06
% Limit	1.16E-03	3.20E-03	2.47E-03	4.68E-01	4.36E-03	1.60E-03	1.92E-03	1.87E-05
Total 1992	2.56E-04	1.58E-03	1.42E-03	1.04E-01	1.83E-03	1.22E-03	1.30E-03	4.13E-06
% Limit	1.71E-03	1.05E-02	9.47E-03	6.95E-01	1.22E-02	8.16E-03	8.67E-03	2.75E-05

TABLE 7.11

DOSES FROM GASEOUS EFFLUENTS

Iodines, Particulates and Tritium
Child Age Group, (mrem)

Organ	Bone	Liver	Whole Body	Thyroid	Kidney	Lung	GI-LLI	Skin
Qtr-1	7.19E-07	2.38E-04	2.38E-04	4.74E-04	2.38E-04	2.37E-04	2.37E-04	4.92E-09
% Limit	7.59E-06	3.17E-03	3.17E-03	6.32E-03	3.17E-03	3.16E-03	3.16E-03	6.56E-08
Qtr-2	1.07E-04	9.40E-04	8.95E-04	3.60E-02	1.01E-03	8.34E-04	8.44E-04	7.14E-07
% Limit	1.43E-03	1.25E-02	1.19E-02	4.80E-01	1.35E-02	1.11E-02	1.13E-02	9.68E-06
Qtr-3	2.93E-04	8.02E-04	6.76E-04	9.72E-02	9.90E-04	5.10E-04	5.36E-04	2.00E-06
% Limit	3.91E-03	1.07E-02	9.01E-03	1.30E+00	1.32E-02	6.80E-03	7.15E-03	2.67E-05
Qtr-4	2.06E-04	3.77E-04	2.88E-04	6.80E-02	5.09E-04	1.72E-04	1.90E-04	1.40E-06
% Limit	2.75E-03	5.03E-03	3.84E-03	9.07E-01	6.79E-03	2.29E-03	2.53E-03	1.87E-05
Total 1992	6.07E-04	2.36E-03	2.10E-03	2.02E-01	2.75E-03	1.75E-03	1.81E-03	4.13E-06
% Limit	4.04E-03	1.57E-02	1.40E-02	1.35E+00	1.83E-02	1.17E-02	1.20E-02	2.75E-05

TABLE 7.12

DOSES FROM GASEOUS EFFLUENTS

Iodines, Particulates and Tritium
Infant Age Group, (mrem)

Organ	Bone	Liver	Whole Body	Thyroid	Kidney	Lung	GI-LLI	Skin
Qtr-1	1.41E-06	1.86E-04	1.85E-04	7.29E-04	1.86E-04	1.84E-04	1.84E-04	4.92E-09
% Limit	1.88E-05	2.48E-03	2.47E-03	9.72E-03	2.48E-03	2.45E-03	2.45E-03	6.58E-08
Qtr-2	2.09E-04	8.94E-04	7.56E-04	8.15E-02	9.35E-04	6.48E-04	6.57E-04	7.26E-07
% Limit	2.79E-03	1.19E-02	1.01E-02	1.09E+00	1.25E-02	8.64E-03	8.76E-03	9.68E-06
Qtr-3	5.75E-04	1.07E-03	6.93E-04	2.23E-01	1.19E-03	3.97E-04	4.21E-04	2.00E-06
% Limit	7.67E-03	1.43E-02	9.24E-03	2.97E+00	1.59E-02	5.29E-03	5.61E-03	2.67E-05
Qtr-4	4.03E-04	6.07E-04	3.42E-04	1.56E-01	6.88E-04	1.34E-04	1.51E-04	1.40E-06
% Limit	5.37E-03	8.09E-03	4.56E-03	2.08E+00	9.17E-03	1.79E-03	2.01E-03	1.87E-05
Total 1992	1.19E-03	2.76E-03	1.98E-03	4.61E-01	2.99E-03	1.36E-03	1.41E-03	4.13E-06
% Limit	7.92E-03	1.84E-02	1.32E-02	3.07E+00	1.99E-02	9.09E-03	9.42E-03	2.75E-05

TABLE 7.13

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

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/filters	m^3 Ci	20.19 118.97	10.0
b. Dry compressible waste, contaminated equip., etc.	m^3 Ci	65.63 1.195	10.0
c. Irradiated components, control rods, etc.	m^3 Ci	None N/A	N/A
d. Other (oil which was incinerated by processor)	m^3 Ci	N/A 2.86E-3	10.0

Note: There were no solidification agents or absorbents applied to the solid waste.

2. Estimate of Major Nuclide Composition (by type of waste)	Nuclide	% Abund.	Activity (Ci)
a. Spent resins/filters	Co-60	66.46	79.07
	Mn-54	9.03	10.74
	Co-58	7.20	8.56
	H-3	4.87	5.79
	C-14	4.77	5.67
	Cs-137	3.17	3.78
	Cs-134	2.41	2.86
	Others	2.44	2.90
	Totals	100%	118.97
b. Dry compressible waste, contaminated equipment, etc.	Fe-55	54.09	6.46E-01
	Co-58	17.04	2.04E-02
	Co-60	13.97	1.67E-02
	Mn-54	3.62	4.32E-03
	Ni-63	3.55	4.24E-03
	Cr-51	2.38	2.85E-03
	Nb-95	2.04	2.44E-03
	Others	3.25	3.89E-03
	Totals	100%	1.195E+0
d. Other (oil which was incinerated by processor)	H-3	94.55	2.71E-03
	Fe-55	4.30	1.23E-04
	Co-60	1.18	3.37E-05
	Totals	100%	2.86E-03

TABLE 7.13 (Continued)

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

3. Solid Waste Disposition						
Waste Class	Number of Shipments	DOT Type	Type of Container	Transportation Mode	Shipped To	Burial Site
Au	13	LSA	Strong-tight	Truck	ALARON/ SEG [1]	Barnwell /Beatty
Au	1	LSA	Strong-tight	Truck	Quad-rex[2]	Barrwell
As	4	A LSA	Poly-PVC	Truck	Barn-well	Barnwell
C	1	>A LSA	Poly-PVC	Truck	Barn-well	Barnwell

Note: 1. Quantity and activity of DAW was processed and buried by Vendor.

2. Limited quantity - green bag material.

B. **Irradiated Fuel Shipments**

Number of Shipments	Transportation Method	Destination
0	N/A	N/A

ATTACHMENT 8.1

Summary of the "Relocation of the Filter/Demineralizer and Resin Dewatering Skids" Modification

Summary of the Relocation of the Filter/Demineralizer and Resin Dewatering Skids

(CPSES Design Modification No. DM-90-507)

1. Modification Summary

This Filter/Demineralizer (FDS) and Resin Dewatering Skids modification involved the following changes:

a. Provided air, water and electrical services to support the relocation of the FDS and resin dewatering skid into the Fuel Building, 802' elevation, barrel pit.

b. Installed a concrete pad, swing arm and chainfall for two new "Rad vaults" to be installed permanently in the barrel pit along with the hard piped drains to the floor drain system.

c. Removed the FDS from the Hot Machine Shop area of the Fuel Building, 810' elevation, where it was previously installed, to free up needed space in the hot machine shop area.

d. Allows for resin transfers and dewatering of resin HIC's to be performed in the barrel pit instead of the Fuel Building, 810' elevation, train bay. This relocation alleviates work restraints in the train bay during resin dewatering evolutions.

2. Modification Justification

a. The relocation of the FDS system into the barrel pit frees up the area of the Hot Machine Shop so it can be used by Maintenance personnel without interference during resin transfers or FDS media replacement.

b. The installation of the two new Rad vaults allows for resin transfers and dewatering at any time so that other evolutions may continue in the train bay.

c. Replacement of the FDS media can be performed at any time without interfering with the evolutions occurring in the train bay and hot machine shop area.

d. Dewatering of resins prior to shipment can now be done in the barrel pit with hard piped drain lines to the floor drain system instead of hoses.

e. Manpower required to set up and take down resin fill and dewatering equipment will be reduced.

3. Description of Equipment, Components and Processes Involved and Interfaces With Other Systems

The interfaces that are involved with this modification are no different than they were previously. All resin sluice lines and liquid waste processing lines have remained the same as far as interfaces are concerned. All resin handling and liquid processing remains the same but the location for performing these evolutions has changed.

4. Safety Evaluation Summary

This modification was evaluated pursuant to the requirements of 10CFR50.59. This safety evaluation (CPSES Safety Evaluation No. SE-92-122) is summarized below:

The barrel pit is a Safe Zone and the installation of the Rad vaults and skids is therefore acceptable. The effect of the weight of the vaults and skids on the floor was analyzed and found acceptable. All new piping, ducts and conduit is non-safety related and mounted Seismic Category II. The processing of spent resins is enhanced since the train bay will no longer be required for this activity. No new credible failure modes for any of the interfacing plant systems are introduced and there is no potential for any impact on the safety function of any plant structure, system or component, therefore this modification does not constitute an unreviewed safety question.

5. Changes to Predicted Liquid and Gaseous Effluent Releases and Quantity of Solid Wastes

This modification does not impact the predicted releases of radioactive materials in liquid and gaseous effluents given in Sections 11.2 and 11.3, respectively, of the CPSES Safety Analysis Report (SAR) or Section 11.4 for quantities of solid waste.

6. Evaluation of Changes to Previously Estimated Exposures to a Member of the Public and to the General Population

This modification does not impact the predicted release of radioactive materials as noted in item 5 above, therefore calculations were not performed to change predicted values in Section 11A of the CPSES SAR.

7. Comparison of the Predicted Releases of Radioactive Material for this Change to the Actual Releases for the Period Prior to When the Change is Made

This modification does not impact the predicted release of radioactive materials as noted in item 5 above, therefore a comparison to the actual releases for the prior period to when the change will be made is not applicable.

8. Estimate of Exposure to Plant Operating Personnel as a Result of the Change

This modification was designed to provide better utilization of space within the hot shop and train bay areas of the Fuel Building. This will enhance the work scheduling and performance of personnel by not allowing resin operations to influence other jobs. There should not be any significant change in personnel exposure as a result of this modification.

In fact exposures are anticipated to decrease somewhat, since these operations are now conducted in a secluded area and provided with more elaborate shielding which will reduce exposures to personnel working in adjacent areas.

9. Station Operations Review Committee

This modification was reviewed and found acceptable by the CPSES Station Operations Review Committee (SORC) at SORC Meeting No. 92-087 held on 26 August 1992.