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COMANCHE PEAK STEAM ELECTRIC STATION

UNIT 1

SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

July 1, 1991 - December 31, 1991

P.O. Box 1002 Glen Rose, Texas 76043-1002

Comanche Peak Steam Electric Station

Unit 1

Semiannual Radioactive Effluent Release Report

July 1, 1991 - December 31, 1991

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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
REC	Radiological Effluent Control
TGPWCS	Turbine Generator Primary Water Cooling System
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, 1991 through December 31, 1991.

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.

- The total amount of tritium discharged due to Turbine Generator Primary Water Cooling System (TGPWCS) leakage as required by ODCM Supplemental Guidance Number 3.

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

- A description of resin releases to the Evaporation and 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 1991.
- 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:

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 Evaporation Pond Resin Inventory

The quantity of radioactive material contained in the Evaporation pond shall be limited by the following expression:

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

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/cc),

V = design volume of liquid and slurry in the pond (gallons), and

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

2.1.5 LVW Pond Resin Inventory

ODCM, Revision 7, effective December 4, 1991, changed the methodology for calculating the resin inventory due to a design modification which changed the powdex resin discharge flow path from the Evaporation pond to the LVW pond. The term "V" was changed as shown below:

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)

2.1.6 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 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 releases of tritium due to drainage from the TGPWCS, samples were analyzed for tritium, using liquid scintillation counting techniques, prior to system drainage. The concentration of tritium in the effluent and the volume of coolant drained were used to determine the amount of tritium released. Leakage of tritium from the system was also tracked by comparing system tritium inventory at the beginning of the month to the end of the month.

For batch releases of powdex resin to the Evaporation 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).

A total of 2.33E-05 curies of alpha emitting radioactive material was reported released in liquid effluents. This material is assumed to be radon daughter products since gamma spectroscopy analyses of liquid radioactive waste streams indicated the presence of radon daughter products but not the presence of isotopes of uranium or other transuranics.

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 no abnormal effluent releases made during the period covered by 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 were two revisions to the ODCM. In accordance with ODCM Administrative Control 6.14.c, these charges are submitted in the form of a complete copy of the entire ODCM. The ODCM, current as of December 31, 1991, is contained in Attachment 8.1. The major changes included in these revisions are summarized below:

a. Revision 6, effective July 3, 1991 -

- Liquid ingestion dose commitment factors for Bromine-82 were added to Table 1.1 of Part II.

- The environmental monitoring location for the food product control location was changed, as shown on Table 3.1 and Figure 3.1 of Part II. The old location was deleted and a new location added because food products are no longer grown at the old location.

- The locations of the existing broadleaf sampling locations were added to Figure 3.1, as they had been previously omitted from this figure.

b. Revision 7, effective December 4, 1991 -

- The Radioactive Liquid Waste Sampling and Analysis Program contained in Part I, Table 4.11-1 was revised to add sampling and analysis requirements for normally non-radioactive secondary plant waste discharges from the LVW pond. To support this revision, changes were also made to the Table 4.11-1 sampling and analysis requirements for inputs to the LVW pond and to the calculational methodologies contained in Part II, Section 1.0.

- Supplemental Guidance Statement No. 3 was deleted. This guidance required independent sampling and accountability of tritium discharge due to leakage and drainage from the TGPWCS. Due to the addition of the LVW pond sampling requirements described above, radioactivity from all sources to the LVW pond, including the TGPWCS, will be measured in LVW pond discharges. Additionally, subsequent to the initiation of this revision, a plant design modification deleted tritium for use as a tracer in the TGPWCS.

- Part I, Table 3.3-7, "Liquid Effluent Monitoring Instrumentation," was revised to clarify the sampling requirements when the Station Service Water Monitors are inoperable.

- Part I, Section 3/4.0 was revised to make requirements in this section consistent with CPSES Technical Specification 3/4.0.

- The limit on radioactive materials in discharges of secondary resins contained in Part I, Radiological Effluent Control 3/4.11.1.4 was revised to support a plant design modification which changed the flow path of secondary resin discharges.

- The receptor locations for gaseous effluent dose calculations given in Part II, Table 2.4, were revised based on the current receptor locations identified in the 1991 Land Use Census.

- Site specific liquid ingestion dose conversion factors for Antimony-125 were added to Table 1.1 of Part II.

Detailed documentation of ODCM changes, including justifications, applicable safety evaluations, radiological environmental evaluations and documentation of required reviews and approvals, is maintained onsite.

6.4 <u>New Locations for Dose Calculations or Environmental Monitoring</u>

ODCM Administrative Control 6.9.1.4 requires any new locations for dose calculations or environmental monitoring, identified by the Land Use Census, to be included in the Semiannual Radioactive Effluent Release Report. The 1991 Land Use Census, which will be included in the 1991 Annual Radiological Environmental Operating Report, identified new receptor locations for dose calculations. These locations were added to Part II, Table 2.4 in Revision 7 of the ODCM. See Section 6.3 and Attachment 8.1.

6.5 <u>Liquid Holdup and Gas Storage Tanks</u>

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 <u>Tritium Discharged Due to Turbine Generator Primary Water Cooling System Leakage</u>

ODCM Supplemental Guidance Number 3 required the total amount of tritium discharged due to TGPWCS leakage to be reported in the Semiannual Radioactive Effluent Release Report. This activity is determined as described in section 2.4.1. The total amount of tritium discharged due to TGPWCS leakage was 7.92E-01 Ci. This is in addition to the values reported in Tables 7.3 through 7.6. ODCM Supplemental Guidance Number 3 was deleted in Revision 7 of the ODCM due to the addition of sampling and analysis requirements for LVW pond discharges, and permanent removal of the tritium tracer from the Turbine Generator leak detection system.

6.7 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.

6.7.1 Sample frequency exceeded on Turbine Building Sump

On September 18, 1991, at 0500 the Turbine Building Sump Radiation Monitor 1RE-5100 was declared inoperable. As required in the CPSES ODCM Liquid Effluent Monitoring Instrumentation ACTION statements, Chemistry initiated collection of grab samples to be analyzed for radioactivity at a lower limit of detection of no more than 1.0E-7 μCi/ml at least once per 24 hours when the specific activity of the secondary coolant is less than or equal to 0.01 μCi/gram DOSE EQUIVALENT I-131. On September 30, 1991, at 0615 the Chemistry Lead Technician was notified that the Turbine Building Sump sample was required to be analyzed before 0830 to comply with the 24 hour time limit for the ACTION statement. At 0800, the Lead Technician remembered that the sample had not been collected. Immediately, the Lead Technician collected the sample from the sump and analyzed it in accordance with the ACTION statement. The analysis was performed as required, however the time interval of 24 hours was exceeded by eight (8) minutes. At 0838, the sample results verified that all gamma activities were less than the lower limits of detection.

A Root Cause Analysis was performed for this event and it concluded that the Lead Technician, filling in for the regular Lead Technician, did not assign the responsibility of sampling to any of the normal on-shift technicians. He assumed the responsibility for ensuring that the requirement was fulfilled. He became preoccupied and failed to obtain the sample early enough for the analysis to be completed within the required time limit.

As a result of this event, the following corrective actions have been taken. First, a status board is maintained in the Secondary Chemistry laboratory with the current sampling/analysis deadlines to remind technicians when sampling is due to be performed. Second, the time intervals for ACTION statements have been administratively reduced in the Chemistry Department to preclude any difficulties encountered during the sampling and/or analysis.

6.7.2 Interruption of the South Vent Stack Wide Range Gas Monitor (WRGM) Continuous Sampling

Three separate events occurred, each of which involved the loss of sample flow through the South Vent Stack WRGM (XRE-5570A), resulting from a loss of the monitor sample pump. The loss of sample flow causes an interruption in the continuous particulate and iodine sampling requirements for the plant ventilation stacks. Under this condition there is no sample flow through the South WRGM and continuous samples for particulates and iodines are not collected. The ODCM Gaseous Effluent Monitoring Instrumentation requirements specify that auxiliary continuous sampling of particulates and iodines be established if the normal continuous samplers are not operable. In each of these events, the required auxiliary sampling was not promptly initiated.

- The first event began on October 13, 1991, when a problem was observed with the South WRGM radiation monitor. Operations declared the radiation monitor inoperable and initiated appropriate corrective actions for this condition. As part of this corrective action the sample flow pump was required to be running to allow for the continuing collection of the particulates and iodines. On October 16, 1991, at 1022, I&C technicians commenced work on the South WRGM radiation monitor under an approved work order. The technicians de-energized the sample pump as part of the work order but in non-compliance with the corrective action requiring the sample pump to remain operable. An alarm was received in the Control Room and was acknowledged at 1052. Operations failed to recognize this as a new problem and took no action to initiate auxiliary sampling by the Chemistry Department. On October 17, 1991, at 0730 a Unit Supervisor discovered that the sample flow pump was secured and the plant was no longer in compliance with the corrective actions. At this time, Chemistry was notified and auxiliary sampling was initiated in accordance with the ODCM requirements. The South WRGM was returned to service at 1630.

Root causes were evaluated for this event. It was determined that there was a lack of communication, between Control Room Operators and personnel performing the maintenance, in describing the extent of work in the troubleshooting of the South WRGM radiation monitor. Conditions to be maintained (sample pump running), as required by the corrective actions, were confusing and complicated to follow. The work order gave general instructions to troubleshoot the radiation monitor and did not specify that the sample pump should remain energized to perform the troubleshooting.

Based on this event, the following actions have been taken or are in the process of being implemented. Appropriate Operations, I&C, Chemistry and Radiation Protection personnel will review this event and re-emphasize proper work control. As of January 18, 1992, the standard form used for documenting corrective actions for WRGM operability has been revised to clarify corrective actions required by Operations. The alarm response procedure (ALM-3200) which specifies actions Operators take when receiving Digital Radiation Monitoring System alarms is being reviewed by System Engineering for possible enhancement.

- The second event occurred on October 29, 1991, at 0034, due to a loss of electrical power to the control circuitry of the South WRGM. Electrical power was interrupted due to transferring electrical buses as part of a design modification test requirement. After the power was restored, Operations personnel were unable to restart the sample flow pump and were unable to resolve the problem or obtain flow. The Operators initiated corrective actions paperwork but failed to recognize the extent of the problem and chose the wrong corrective actions and failed to notify Chemistry of the problem as well. At 0839 I&C technicians were able to restart the sample pump and the monitor was returned to service.

Root causes were evaluated for this event. It was determined that the data from the South WRGM provided ample information to indicate a loss of sample flow. Operators concentrated on changes in the South WRGM effluent channel only and therefore were unable to properly troubleshoot this problem. The response to the failed attempt to start the sample flow pump was not adequate. I&C was able to restart the pump the following morning by disabling the software condition, however Chemistry was not notified by Operations to begin auxiliary sampling. Operations response to determine the appropriate corrective actions was insufficient.

Based on this event the following actions are being proposed for implementation. Consideration is being given to supply users of the Digital Radiation Monitoring System with more detailed information relating to the utilization of WRGM information and its significance. In addition, it is recommended that Engineering perform a review, with the users of this system, of the alarm response procedure (ALM-3200) and revise it as necessary.

- The third event occurred on November 7, 1991, at 1305 due to the sample pump being discovered out of service. At this time, the cause of the pump loss has not been determined. The operator that discovered the situation was able to restart the sample pump from the Control Room. The South WRGM was returned to service at 2030.

The responsibility for the evaluation of this event has been assigned and is in progress at the writing of this report.

Due to the similarities of these three events and the apparent ineffectiveness of immediate corrective actions to prevent recurrence of the problem, further investigation is ongoing to resolve any open issues or generic implications pertaining to the operation of the WRGM.

6.7.3 Lost Composite Sample for Monthly Composite Sample

The ODCM Radioactive Liquid Waste Sampling and Analysis Program requires that a sample from each batch release be kept for inclusion in a monthly composite sample. For November, there were 44 batch samples to be composited. On December 3, 1991, while preparing the monthly composite sample for the Laundry Holdup and Monitor Tanks (LHMT) and Waste Monitor Tanks (WMT), the Chemistry technician discovered the sample for a specific batch release of the LHMT-02 on November 28, 1991, at 1045 could not be found. Since this particular sample could not be found, a substitute sample was obtained from LHMT-01 on November 28, 1991, at 0220. This substitute sample was used due to the fact that both tanks had been processed through the Filter Demineralizer System from the Waste Holdup Tank (WHT) and had similar gamma activities.

As a response to this loss of sample, Chemistry has established an interim storage area for composite samples in the laboratory in which the analysis is being performed and revised the procedure to direct the use of this storage area. This change allows the samples to be transferred to the permanent storage area at a more convenient time and in a more controlled and orderly fashion.

6.8 Resin Releases to the Evaporation and LVW Pond

A total of 879 ft^3 of resin was split between the Evaporation pond and LVW pond, during the period covered by this report. The results of the sample analyses indicate no radioactive material was transferred to either pond.

6.9 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, a major modification to the Spent Resin Transfer System was approved and implemented. Attachment 8.2 contains a summary of this modification and summaries of applicable evaluations and justifications supporting the modification.

6.10 Meteorological Monitoring Program

In accordance with ODCM Administrative Control 6.9.1.4, a summary of hourly meteorological data, collected during 1991, is retained onsite. This data is available for review by the NRC upon request.

6.11 Assessment of Doses

6.11.1 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.

6.11.2 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.

6.11.3 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.

6.11.4 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 1991 were any of these limits exceeded, therefore no evaluations are required.

6.11.5 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 3.69E-2 mrem/yr. The dose to a 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 discharge into the lake, within the Site Boundary.

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	2.36E+02	1.87E+02
Total Time Period For Batch Releases (min)	1.38E+04	1.14E+04
Maximum Time Period For a Batch Release (min)	1.04E+02	3.87E+02
Average Time Period For a Batch Release (min)	5.90E+01	6.20E+01
Minimum Time Period For A Batch Release (min)	2.80E+01	3.00E+00
Average Stream Flow During Periods of Release (ft^3/s)	N/A	N/A
B. Gaseous Releases All Sources		
Number of Batch Releases	1.50E+01	8.00E+00
Total Time Period For Batch Releases (min)	4.22E+03	4.18E+03
Maximum Time Period For A Batch Release (min)	3.43E+02	1.44E+03
Average Time Period For A Batch Release (min)	2.81E+02	5.23E+02
Minimum Time Period For A Batch Release (min)	1.86E+02	3.13E+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	0.00E+00
Total Activity Released, Ci	0.00E+00	0.00E+00

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	6.42E+02	7.37E+01	2.35E+01
2. Average release rate for period	μCi/sec	8.07E+01	9.27E+00	
3. Percent of ODCM REC limit (Total Body)	%	1.91E-02	2.17E-03	
4. Percent of ODCM REC limit (Skin)	%	9.34E-03	1.08E-03	
B. Iodines				
1. Total Iodine-131	Ci	6.98E-08	1.84E-05	1.43E+01
2. Average release rate for period	μCi/sec	8.78E-09	2.31E-06	
3. Percent of ODCM REC limit (Organ)	%	4.50E-06	2.71E-03	
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)	%	0.00E+00	0.00E+00	
4. Gross alpha radioactivity	Ci	0.00E+00	0.00E+00	
D. Tritium				
1. Total release	Ci	1.09E-01	5.48E-01	2.38E+01
2. Average release rate for period	μCi/sec	1.37E-02	6.89E-02	
3. Percent of ODCM REC limit (Organ)	%	9.97E-05	3.91E-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	8.67E-02	1.42E-02
Kr-85M	Ci	1.36E-01	0.00E+00	0.00E+00	0.00E+00
Kr-85	Ci	0.00E+00	0.00E+00	0.00E+00	3.03E-01
Kr-88	Ci	1.23E-01	0.00E+00	0.00E+00	0.00E+00
Xe-131M	Ci	0.00E+00	0.00E+00	2.43E-02	2.97E-01
Xe-133M	Ci	2.69E-01	0.00E+00	0.00E+00	6.82E-01
Xe-133	Ci	6.35E+02	0.00E+00	5.85E+00	3E+01
Xe-135	Ci	8.11E-01	0.00E+00	1.82E-03	1.14E-01
Total for period	Ci	6.36E+02	0.00E+00	5.97E+00	7.37E+01
2. Iodines					
I-131	Ci	0.00E+00	0.00E+00	6.98E-08	1.84E-05
I-133	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
Total for period	Ci	0.00E+00	0.00E+00	6.98E-08	1.84E-05
3. Particulates					
H-3	Ci	1.06E-01	5.44E-01	2.93E-03	3.30E-03
Na-24 (Note 1)	Ci	0.00E+00	0.00E+00	4.32E-06	0.00E+00
Br-82 (Note 1)	Ci	0.00E+00	0.00E+00	9.39E-08	0.00E+00
F-18 (Note 1)	Ci	0.00E+00	0.00E+00	1.18E-06	3.35E-06
Total for period	Ci	1.06E-01	5.44E-01	2.93E-03	3.31E-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	8.91E-03	1.09E-01	3.03E+01
2. Average diluted concentration during period	μCi/ml	1.71E-10	1.90E-09	
3. Percent of ODCM REC limit	%	2.31E-03	5.93E-02	
B. Tritium				
1. Total release	Ci	1.12E+02	6.32E+01	1.34E+01
2. Average diluted concentration during period	μCi/ml	2.14E-06	1.11E-06	
3. Percent of ODCM REC limit	%	7.12E-02	3.68E-02	
C. Dissolved and Entrained Gases				
1. Total release	Ci	1.40E+00	4.20E-02	1.16E+01
2. Average diluted concentration during period	μCi/ml	2.69E-08	7.36E-10	
3. Percent of ODCM REC limit	%	1.34E-02	3.67E-04	
D. Gross Alpha Radioactivity				
1. Total release (Note 1)	Ci	0.00E+00	2.33E-05	2.47E+01
E. Volume of waste released (prior to dilution) (Note 2)	Liters	3.70E+06	6.03E+07	2.20E+00
F. Volume dilution of water used during period (Note 3)	Liters	5.22E+10	5.72E+10	1 [illegible]E+01

Note 1: The gross alpha radioactivity reported is assumed to be radon daughters, as discussed in section 2.4.1.

Note 2: The large increase in waste volume in quarter 4, relative to quarter 3, is due to the inclusion of discharges of secondary waste from the LVW Pond. This release pathway was added to the Radioactive Liquid Waste Sampling and Analysis Program in Revision 7 to the ODCM, as discussed in Section 6.3 of this report.

Note 3: 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

Nuclides Released	Units	Continuous Mode Quarter 3	Continuous Mode Quarter 4	Batch Mode Quarter 3	Batch Mode Quarter 4
H-3	Ci	0.00E+00	0.00E+00	1.12E+02	6.32E+01
Be-7	Ci	0.00E+00	0.00E+00	0.00E+00	3.25E-05
Na-24	Ci	0.00E+00	0.00E+00	2.13E-05	3.61E-05
Cr-51	Ci	0.00E+00	0.00E+00	4.59E-05	1.48E-02
Mn-54	Ci	0.00E+00	0.00E+00	8.10E-05	4.00E-03
Mn-56	Ci	0.00E+00	0.00E+00	0.00E+00	3.38E-06
Fe-55	Ci	0.00E+00	0.00E+00	7.05E-03	5.94E-03
Co-57	Ci	0.00E+00	0.00E+00	0.00E+00	2.02E-05
Co-58	Ci	0.00E+00	0.00E+00	4.74E-04	4.30E-02
Fe-59	Ci	0.00E+00	0.00E+00	0.00E+00	7.15E-03
Co-60	Ci	0.00E+00	0.00E+00	6.77E-05	8.21E-03
Zn-65	Ci	0.00E+00	0.00E+00	0.00E+00	1.38E-05
Se-75	Ci	0.00E+00	0.00E+00	0.00E+00	5.33E-04
Rb-88	Ci	0.00E+00	0.00E+00	7.51E-04	0.00E+00
Zr-95	Ci	0.00E+00	0.00E+00	9.27E-06	2.09E-04
Nb-95	Ci	0.00E+00	0.00E+00	4.41E-05	6.22E-04
Nb-97	Ci	0.00E+00	0.00E+00	0.00E+00	4.43E-05
Mo-99	Ci	0.00E+00	0.00E+00	1.23E-06	1.15E-04
Tc-99M	Ci	0.00E+00	0.00E+00	1.27E-06	1.19E-04
Ag-110M	Ci	0.00E+00	0.00E+00	0.00E+00	2.22E-05
Sn-113	Ci	0.00E+00	0.00E+00	0.00E+00	1.58E-04
In-113M	Ci	0.00E+00	0.00E+00	0.00E+00	1.13E-04
Sb-122	Ci	0.00E+00	0.00E+00	0.00E+00	3.18E-05
Sb-124	Ci	0.00E+00	0.00E+00	0.00E+00	6.22E-03
Sb-125	Ci	0.00E+00	0.00E+00	0.00E+00	6.82E-03
I-131	Ci	0.00E+00	0.00E+00	3.57E-04	9.74E-03
I-133	Ci	0.00E+00	0.00E+00	0.00E+00	8.15E-05
Cs-134	Ci	0.00E+00	0.00E+00	0.00E+00	1.78E-04
Cs-137	Ci	0.00E+00	0.00E+00	0.00E+00	3.98E-04
La-140	Ci	0.00E+00	0.00E+00	2.92E-06	2.44E-05
G. Alpha	Ci	0.00E+00	0.00E+00	0.00E+00	2.33E-05
Total for period	Ci	0.00E+00	0.00E+00	1.12E+02	6.33E+01

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
Ar-41	Ci	0.00E+00	0.00E+00	2.72E-05	0.00E+00
Kr-85M	Ci	0.00E+00	0.00E+00	3.17E-04	0.00E+00
Kr-88	Ci	0.00E+00	0.00E+00	2.10E-04	0.00E+00
Xe-131M	Ci	0.00E+00	0.00E+00	1.47E-02	5.59E-04
Xe-133M	Ci	0.00E+00	0.00E+00	9.56E-03	3.61E-05
Xe-133	Ci	0.00E+00	0.00E+00	1.37E+00	4.14E-02
Xe-135	Ci	0.00E+00	0.00E+00	3.91E-03	8.23E-05
Total for period	Ci	0.00E+00	0.00E+00	1.40E+00	4.20E-02

TABLE 7.7

DOSES FROM LIQUID EFFLUENTS (mrem)

Organ	Bone	Liver	Whole Body	Thyroid	Kidney	Lung	GI-LLI
Quarter 1	3.00E-05	7.67E-03	7.67E-03	7.85E-03	7.64E-03	7.63E-03	1.28E-02
% Limit	6.00E-04	1.53E-01	5.11E-01	1.57E-01	1.53E-01	1.53E-01	2.56E-01
Quarter 2	6.76E-03	2.77E-02	2.46E-02	1.89E-02	2.11E-02	1.89E-02	2.74E-02
% Limit	1.35E-01	5.54E-01	1.64E+00	3.78E-01	4.22E-01	5.31E-01	5.48E-01
Quarter 3	2.89E-05	5.08E-02	5.08E-02	5.11E-02	5.08E-02	5.08E-02	5.11E-02
% Limit	5.78E-04	1.01E+00	3.39E+00	1.02E+00	1.02E+00	1.02E+00	1.02E+00
Quarter 4	2.06E-03	5.91E-02	5.80E-02	7.56E-02	5.67E-02	5.71E-02	6.75E-02
% Limit	4.12E-02	1.18E+00	3.87E+00	1.51E+00	1.13E+00	1.14E+00	1.35E+00
Total 1991	8.88E-03	1.45E-01	1.41E-01	1.53E-01	1.36E-01	1.34E-01	1.59E-01
% Limit	8.88E-02	1.45E+00	4.70E+00	1.53E+00	1.36E+00	1.34E+00	1.59E+00

TABLE 7.8

DOSES FROM GASEOUS EFFLUENTS

Noble Gas Air Dose (mRad)

Air Dose (mRad)	Gamma Air	Beta Air
Quarter 1	1.38E-01	4.17E-01
Percent Limit	2.76E+00	4.17E+00
Quarter 2	5.15E-02	1.53E-01
Percent Limit	1.03E+00	1.53E+00
Quarter 3	2.41E-02	7.07E-02
Percent Limit	4.82E-01	7.07E-01
Quarter 4	2.73E-03	8.17E-03
Percent Limit	5.46E-02	8.17E-02
Total 1991	2.16E-01	6.49E-01
Percent Limit	2.16E+00	3.25E+00

TABLE 7.9

DOSES FROM GASEOUS EFFLUENTS

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

Organ	Bone	Liver	Whole Body	Thyroid	GI-LLI	Kidney	Lung	Skin
Qtr-1	0.00E+00	3.21E-04	3.21E-04	3.21E-04	3.21E-04	3.21E-04	3.21E-04	0.00E+00
% Limit	0.00E+00	4.28E-03	4.28E-03	4.28E-03	4.28E-03	4.28E-03	4.28E-03	0.00E+00
Qtr-2	0.00E+00	2.67E-04	2.67E-04	2.67E-04	2.67E-04	2.67E-04	2.67E-04	0.00E+00
% Limit	0.00E+00	3.56E-03	3.56E-03	3.56E-03	3.56E-03	3.56E-03	3.56E-03	0.00E+00
Qtr-3	1.27E-08	3.82E-05	4.40E-05	3.82E-05	3.82E-05	3.82E-05	3.82E-05	3.47E-10
% Limit	1.69E-07	5.09E-04	5.87E-04	5.09E-04	5.09E-04	5.09E-04	5.09E-04	4.63E-09
Qtr-4	3.35E-06	1.97E-04	1.95E-04	1.72E-03	2.01E-04	1.93E-04	1.94E-04	9.12E-08
% Limit	4.47E-05	2.63E-03	2.60E-03	2.29E-02	2.68E-03	2.57E-03	2.59E-03	1.22E-05
Total 1991	3.36E-06	8.23E-04	8.27E-04	2.35E-03	8.27E-04	8.19E-04	8.20E-04	9.15E-08
% Limit	2.24E-05	5.49E-03	5.51E-03	1.57E-02	5.51E-03	5.46E-03	5.47E-03	6.10E-07

TABLE 7.10

DOSES FROM GASEOUS EFFLUENTS

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

Organ	Bone	Liver	Whole Body	Thyroid	GI-LLI	Kidney	Lung	Skin
Qtr-1	0.00E+00	3.69E-04	3.69E-04	3.69E-04	3.69E-04	3.69E-04	3.69E-04	0.00E+00
% Limit	0.00E+00	4.92E-03	4.92E-03	4.92E-03	4.92E-03	4.92E-03	4.92E-03	0.00E+00
Qtr-2	0.00E+00	3.07E-04	3.07E-04	3.07E-04	3.07E-04	3.07E-04	3.07E-04	0.00E+00
% Limit	0.00E+00	4.09E-03	4.09E-03	4.09E-03	4.09E-03	4.09E-03	4.09E-03	0.00E+00
Qtr-3	2.15E-08	4.39E-05	4.39E-05	5.26E-05	4.40E-05	4.39E-05	4.39E-05	3.47E-10
% Limit	2.87E-07	5.85E-04	5.85E-04	7.01E-04	5.87E-04	5.85E-04	5.85E-04	4.63E-09
Qtr-4	5.65E-06	2.29E-04	2.26E-04	2.50E-03	2.35E-04	2.21E-04	2.73E-04	9.12E-08
% Limit	7.53E-05	3.05E-03	3.01E-03	3.33E-02	3.13E-03	2.94E-03	2.97E-03	1.22E-06
Total 1991	5.67E-06	9.49E-04	9.46E-04	3.23E-03	9.55E-04	9.41E-04	9.43E-04	9.15E-08
% Limit	3.78E-05	6.33E-03	6.31E-03	2.15E-02	6.37E-03	6.27E-03	6.29E-03	6.10E-07

TABLE 7.11

DOSES FROM GASEOUS EFFLUENTS

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

Organ	Bone	Liver	Whole Body	Thyroid	GI-LLI	Kidney	Lung	Skin
Qtr-1	0.00E+00	5.29E-04	5.29E-04	5.29E-04	5.29E-04	5.29E-04	5.29E-04	0.00E+00
% Limit	0.00E+00	7.05E-03	7.05E-03	7.05E-03	7.05E-03	7.05E-03	7.05E-03	0.00E+00
Qtr-2	0.00E+00	4.40E-04	4.40E-04	4.40E-04	4.40E-04	4.40E-04	4.40E-04	0.00E+00
% Limit	0.00E+00	5.87E-03	5.87E-03	5.87E-03	5.87E-03	5.87E-03	5.87E-03	0.00E+00
Qtr-3	5.09E-08	6.30E-05	6.29E-05	7.97E-05	6.30E-05	6.29E-05	6.29E-05	3.47E-10
% Limit	6.79E-07	8.40E-04	8.39E-04	1.06E-03	8.40E-04	8.39E-04	8.39E-04	4.63E-09
Qtr-4	1.34E-05	3.31E-04	3.25E-04	4.73E-03	3.39E-04	3.17E-04	3.18E-04	9.12E-08
% Limit	1.79E-04	4.41E-03	4.33E-03	6.31E-02	4.52E-03	4.23E-03	4.24E-03	1.21E-06
Total 1991	1.35E-05	1.36E-03	1.36E-03	5.78E-03	1.37E-03	1.35E-03	1.35E-03	9.15E-08
% Limit	9.00E-05	9.07E-03	9.07E-03	3.85E-02	9.13E-03	9.00E-03	9.00E-03	6.10E-07

TABLE 7.12

DOSES FROM GASEOUS EFFLUENTS

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

Organ	Bone	Liver	Whole Body	Thyroid	GI-LLI	Kidney	Lung	Skin
Qtr-1	0.00E+00	4.11E-04	4.11E-04	4.11E-04	4.11E-04	4.11E-04	4.11E-04	0.00E+00
% Limit	0.00E+00	5.48E-03	5.48E-03	5.48E-03	5.48E-03	5.48E-03	5.48E-03	0.00E+00
Qtr-2	0.00E+00	3.42E-04	3.42E-04	3.[illegible]2E-04	3.42E-04	3.42E-04	3.42E-04	0.00E+00
% Limit	0.00E+00	4.56E-03	4.56E-03	4.56E-03	4.56E-03	4.56E-03	4.56E-03	0.00E+00
Qtr-3	9.99E-08	4.90E-05	4.89E-05	8.75E-05	4.90E-05	4.89E-05	4.89E-05	3.47E-10
% Limit	1.33E-06	6.53E-04	6.52E-04	1.17E-03	6.53E-04	6.52E-04	6.52E-04	4.63E-09
Qtr-4	2.63E-05	2.77E-04	2.60E-04	1.04E-02	2.83E-04	2.47E-04	2.48E-04	9.12E-08
% Limit	3.51E-04	3.69E-03	3.47E-03	1.39E-01	3.77E-03	3.30E-03	3.31E-03	1.22E-06
Total 1991	2.64E-05	1.08E-03	1.06E-03	1.12E-02	1.09E-03	1.05E-03	1.05E-03	9.15E-08
% Limit	1.76E-04	7.20E-03	7.07E-03	7.47E-02	7.27E-03	7.00E-03	7.00E-03	6.10E-07

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	m^3 Ci	None N/A	N/A
b. Dry compressible waste, contaminated equip. etc. [1,2,3]	m^3 Ci	7.86E+01 7.44E-01	1.00E+01
c. Irradiated components, control rods, etc.	m^3 Ci	None N/A	N/A
d. Other	m^3 Ci	None N/A	N/A

1. There were no solidification agents or absorbents applied to the solid waste.
2. Volume shipped to burial site via waste processors.
3. Volume includes waste buried in prior 6 month period but not reported in last Semiannual Effluent Report.

2. **Estimate of Major Nuclide Composition (by type of waste)**	Nuclide	% Abund.	Activity (Ci)
b. Dry compressible waste, contaminated equipment, etc.	Co-58	56.1%	4.17E-01
	Cr-51	19.7%	1.47E-01
	Zr-95	4.4%	3.27E-02
	Nb-95	4.4%	3.27E-02
	Co-60	2.4%	1.79E-02
	Mn-54	2.3%	1.71E-02
	I-131	1.4%	1.04E-02
	Ni-63	1.2%	8.93E-03
	Fe-59	1.1%	8.18E-03
	Others	7.0%	5.21E-02

3. **Solid Waste Disposition**

Waste Class	Number of Shipments	DOT Type	Type of Container	Transportation Mode	Shipped To	Burial Site
AU	5.00E+00	LSA	Strong-tight	Truck	ALARON	Barnwell
AU	5.00E+00	LSA	Strong-tight	Truck	SEG	Beatty

B. **Irradiated Fuel Shipments (Disposition)**

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

ATTACHMENT 8.1

Offsite Dose Calculation Manual

for CPSES Unit 1

ATTACHMENT 8.2

Summary of Spent Resin Transfer System Modifications

SUMMARY OF SPENT RESIN TRANSFER SYSTEM MODIFICATIONS
(CPSES Design Modification No. DM-90-482)

1. MODIFICATION SUMMARY

The Spent Resin Transfer System modification involved the following changes:

a. Modification of the Steam Generator Blowdown System (SGBS) spent resin transfer pump suction strainer to a lateral assembly;

b. Modification of the SGBS Demineralizer to be less susceptible to clogging;

c. Separation of SGBS and Nuclear Steam Supply System (NSSS) resin blowdown lines to reduce radwaste and unnecessary piping and valves;

d. Installation of a bypass line across the resin transfer inlet and outlet piping at the SGBS demineralizer header to allow a more complete flush without going through a demineralizer first;

e. Installation of reach rods to permit valve operations without entry into potential high radiation areas during resin transfer and flushing operations; and

f. Removal of several lengths of piping to minimize the formation of resin traps

2. MODIFICATION JUSTIFICATION

Various problems were discovered with the Spent Resin Transfer System during pre-operational testing of the system. Modification of the system to correct these problems was necessary in order for the system to meet its intended design function, operate correctly and minimize radwaste generation and operational exposures. The reasoning and/or justification for each change are summarized below:

a. Modify the SGBS resin transfer pump suction strainer to a lateral assembly to enhance resin transfer capability and prevent clogging. This modification has already been performed in the NSSS Blowdown system and has proved successful.

b. Modify the SGBS demineralizer vent Johnson screen and inlet lateral. This will enlarge the vent screen surface area so it is not susceptible to clogging. The modification to the inlet laterals will reduce the flow area by 90% which will increase the water velocity and improve the resin transfer.

c. Install a bypass line across the resin transfer inlet and outlet piping at the demin header. This will allow the transfer header to be used as a flush header to flush both the transfer piping and vent Johnson screens without going through a demin first. Operational experience has suggested this modification.

d. Install a new tap for discharge of SGBS resins to the vendor processing skid. Currently the NSSS resin transfer system and the SGBS resin transfer system utilize common piping. This is not a concern until after the first NSSS demin is transferred. At that point all future resin transfers must be considered to be radioactively contaminated. This means that SGBS resin that was not originally contaminated must now be disposed of as radwaste. This greatly increases dispos ` volumes and costs.

e. Install reach rods to permit valve operations without entry into potential high radiation areas during resin transfer and flushing procedures. This will aid in maintaining radiation exposures to system operators "as low as is reasonably achievable (ALARA)."

f. Remove several lengths of piping to minimize formation of resin traps. This will eliminate dead legs where spent resin can be trapped, thereby aiding in maintaining exposures to system operators ALARA.

3. DESCRIPTION OF EQUIPMENT, COMPONENTS AND PROCESSES INVOLVED AND INTERFACES WITH OTHER SYSTEMS

The modification required removal of approximately 100 feet of piping and fourteen (14) valves from the Liquid Waste Processing System/Spent Resin Transfer Subsystem and Steam Generator Blowdown System (SGBS) to separate NSSS and SGBS spent resin transfer lines. Approximately 65 feet of piping and two (2) valves were installed for this same purpose. The SGBS spent resin transfer pump, and SGBS cation and mixed bed demineralizers were modified internally to provide more efficient demineralizer back flushing and resin transfer capabilities. A bypass line was added across the resin transfer inlet and outlet piping at the demineralizer header to allow more efficient flushing of the transfer lines and vent screens. This portion of the system supplies spent resins received from the SGBS and NSSS to a vendor skid for dewatering.

4. SAFETY EVALUATION SUMMARY

This modification was evaluated pursuant to the requirements of 10CFR50.59. This safety evaluation (CPSES Safety Evaluation No. SE-91-068) is summarized below:

Fourteen (14) valves and approximately 100 feet of piping are being removed from the LWPS to separate the SGBS and NSSS spent resin transfer lines. Two (2) valves and about 65 feet of piping will be installed to aid in this separation as a bypass line. The implementation of this modification does not change the process only the flow paths to enhance blowdown, back flushing and prevent system cross contamination. As this modification does not create nor modify the possibility of accidents previously identified, nor effect equipment important to safety different than previously evaluated, nor impact on the margin of safety, implementation of this change does not constitute an unreviewed safety question.

5. <u>CHANGES TO PREDICTED LIQUID AND GASEOUS EFFLUENT RELEASES AND QUANTITY OF SOLID WASTES</u>

This modification affects the spent resin transfer system flow paths to enhance blowdown, back flushing and prevent system cross contamination. Therefore, the 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). Projected quantities of solid waste given in CPSES SAR Section 11.4 are based on projected generation rates of normally radioactive waste streams. Because SGBS resins are not normally radioactive, this modification does not impact the projected quantities of solid wastes.

6. <u>EVALUATION OF CHANGES TO PREVIOUSLY ESTIMATED EXPOSURES TO A MEMBER OF THE PUBLIC AND TO THE GENERAL POPULATION</u>

As indicated in Item 4, above, this modification does not impact the predicted releases of radioactive materials in liquid and gaseous effluents. Therefore, expected maximum doses to a member of the public in an unrestricted area and to the general population do not differ from those previously estimated.

7. <u>COMPARISON OF THE PREDICTED RELEASES OF RADIOACTIVE MATERIALS FOR THIS CHANGE TO THE ACTUAL RELEASES FOR THE PERIOD PRIOR TO WHEN THE CHANGE IS MADE</u>

Because there is no impact on predicted changes in releases of radioactive materials in liquid and gaseous effluents and in solid waste, a comparison to the actual releases for the period prior to when the change was made is not applicable.

8. ESTIMATE OF EXPOSURE TO PLANT OPERATING PERSONNEL AS A RESULT OF THE CHANGE

a. Implementation of the modification - The modification to the spent resin transfer system was implemented prior to initial use of the system for transferring radioactively contaminated resins. Therefore, there was no radiation exposure to plant personnel resulting from installation of the modification.

b. Future System Operations - Due to the installation of reach rods, removal of piping that could trap resins, enhancement of flushing capabilities and splitting of the SGBS and NSSS resin discharge lines, it was estimated that a net exposure reduction to operating personnel of at least five person-rem per year would be realized.

9. STATION OPERATIONS REVIEW COMMITTEE

This modification was reviewed and found acceptable by the CPSES Station Operations Review Committee (SORC) at SORC Meeting No. 91-51 held on July 3, 1991.