EFFLUENT AND WASTE DISPOSAL

SEMIANNUAL REPORT

FOR

THIRD AND FOURTH QUARTERS 1996

Yankee Atomic Electric Company
Rowe, Massachusetts

NOTES:

1. Yankee Nuclear Power Station's last day at any power level was October 1, 1991. The facility is permanently shut down for future decommissioning. Due to ceased operations, short-lived nuclides have been deleted from the gaseous and liquid effluent tables. Their activity concentrations in the fuel inventory have decayed to zero values.

LIST OF TABLES AND APPENDICES

TABLE 1A

Yankee Atomic Electric Company, Rowe, Massachusetts
Effluent and Waste Disposal Semiannual Report
Third and Fourth Quarters 1996
Gaseous Effluents - Summation of All Releases

	Unit	Quarter 3	Quarter 4	Est. Total Error, %
A. Fission and Activation Gases				
1. Total Release	Ci	0.00e+00	0.00e+00	±2.50e+01
2. Average Release Rate for Period	µCi/sec	0.00e+00	0.00e+00	
3. Percent of Control Limit[a]	%	0.00e+00	0.00e+00	
B. Iodines[b]				
C. Particulates				
1. Particulates with half-lives > 8 days	Ci	<1.11e-05	<9.01e-06	±3.00e+01
2. Average release rate for period	µCi/sec	<1.41e-06	<1.15e-06	
3. Percent of Control Limit[c]	%	9.30e-02	8.00e-02	
4. Gross Alpha Radioactivity	Ci	<3.24e-08	<3.73e-08	
D. Tritium				
1. Total Release	Ci	9.34e-02	7.38e-02	±3.00e+01
2. Average Release Rate for Period	µCi/sec	1.18e-02	9.39e-03	
3. Percent of Control Limit[d]	%	NA	NA	

(a) ODCM Control 3.4.a for gamma-air dose. Percent values for ODCM Control 3.4.b for beta-air dose would be approximately the same.
(b) Iodine data have been deleted. These nuclides are no longer available for discharge.
(c) Per ODCM Control 3.5, the percentage of the limit is based on the combined dose contribution from iodines, tritium, and particulates with half lives greater than 8 days. Percentage of limits are calculated using ODCM Method I dose equations.
(d) Per ODCM Control 3.5, percentage dose contribution from tritium is included in Part C.3.

TABLE 1B

Yankee Atomic Electric Company, Rowe, Massachusetts
Effluent and Waste Disposal Semiannual Report
Third and Fourth Quarters 1996
Gaseous Effluents - Elevated Releases

		Continuous Mode		Batch Mode[a]	
Nuclides Released	Unit	Quarter 3	Quarter 4	Quarter 3	Quarter 4
1. Fission Gases					
Krypton-85	Ci	0.00e+00	0.00e+00	-	-
Total for Period	Ci	0.00e+00	0.00e+00	-	-
2. Iodines[b]					
3. Particulates					
Strontium-89	Ci	<2.65e-06	<7.16e-07	-	-
Strontium-90	Ci	<8.65e-07	<4.70e-07	-	-
Cesium-134	Ci	<4.52e-07	<4.92e-07	-	-
Cesium-137	Ci	<5.96e-07	<6.15e-07	-	-
Zinc-65	Ci	<1.28e-06	<1.21e-06	-	-
Cobalt-58	Ci	<4.98e-07	<5.09e-07	-	-
Cobalt-60	Ci	<6.92e-07	<6.98e-07	-	-
Zirconium-Niobium-95	Ci	<8.65e-07	<9.07e-07	-	-
Cerium-144	Ci	<1.76e-06	<1.86e-06	-	-
Antimony-124	Ci	<4.48e-07	<4.86e-07	-	-
Manganese-54	Ci	<5.30e-07	<5.46e-07	-	-
Silver-110m	Ci	<4.55e-07	<5.02e-07	-	-
Total for Period	Ci	<1.11e-05	<9.01e-06	-	-

(a) There are no longer any batch mode gaseous releases.
(b) Iodine-131, Iodine-133, and Iodine-135 activities have been deleted. These nuclides are no longer available for discharge.

TABLE 1C

Yankee Atomic Electric Company, Rowe, Massachusetts
Effluent and Waste Disposal Semiannual Report
Third and Fourth Quarters 1996
Gaseous Effluents - Ground Level Releases

There were no routine measured ground level continuous or batch mode gaseous releases during the third or fourth quarters of 1996.

TABLE 2A

Yankee Atomic Electric Company, Rowe, Massachusetts
Effluent and Waste Disposal Semiannual Report
Third and Fourth Quarters 1996
Liquid Effluents - Summation of All Releases

	Unit	Quarter 3[c]	Quarter 4	Est. Total Error, %
A. Fission and Activation Products				
1. Total Release (not including tritium, gases, alpha)	Ci	0.00e+00	2.63e-06	±2.00e+01
2. Average Diluted Concentration During Period	µCi/ml	0.00e+00	2.21e-11	
3. Percent of Applicable Limit[a]	%	0.00e+00	7.59e-05	
B. Tritium				
1. Total Release	Ci	0.00e+00	2.76e-03	±1.00e+01
2. Average Diluted Concentration During Period	µCi/ml	0.00e+00	2.32e-08	
3. Percent of Applicable Limit[a]	%	0.00e+00	7.73e-04	
C. Dissolved and Entrained Gases				
1. Total Release	Ci	0.00e+00	<4.78e-04	±2.00e+01
2. Average Diluted Concentration During Period	µCi/ml	0.00e+00	<4.02e-09	
3. Percent of Applicable Limit[b]	%	0.00e+00	<2.01e-03	
D. Gross Alpha Radioactivity				
1. Total Release	Ci	0.00e+00	<1.43e-07	±3.50e+01
E. Volume of Waste Release (prior to dilution)	liters	0.00e+00	3.49e+05	±3.00e+01
F. Volume of Dilution Water Used During Period	liters	7.99e+07	1.19e+08	±1.00e+01

(a) Concentration limits specified in 10CFR20, Appendix B, Table II, Column 2 (ODCM Control 2.1). The percent of applicable limit reported is based on the average diluted concentration during the period. At no time did any release exceed the concentration limit.

(b) Concentration limits for dissolved and entrained noble gases is 2.00E-04 µCi/ml (ODCM Control 2.1). The percent of applicable limit reported is based on the average diluted concentration during the period. At no time did any release exceed the concentration limit.

(c) There were no liquid discharges during the Third Quarter of 1996.

TABLE 2B

Yankee Atomic Electric Company, Rowe, Massachusetts
Effluent and Waste Disposal Semiannual Report
Third and Fourth Quarters 1996
Liquid Effluents - Routine Releases

Nuclides Released	Unit	Continuous Mode		Batch Mode	
		Quarter 3	Quarter 4	Quarter 3	Quarter 4
Strontium-89	Ci	0.00e+00	<6.00e-06	0.00e+00	<8.14e-06
Strontium-90	Ci	0.00e+00	<3.10e-06	0.00e+00	<3.19e-06
Cesium-134	Ci	0.00e+00	<7.51e-07	0.00e+00	<7.64e-07
Cesium-137	Ci	0.00e+00	9.40e-09	0.00e+00	1.39e-07
Cobalt-58	Ci	0.00e+00	<8.33e-07	0.00e+00	<7.83e-07
Cobalt-60	Ci	0.00e+00	2.32e-06	0.00e+00	1.65e-07
Iron-59	Ci	0.00e+00	<1.72e-06	0.00e+00	<1.62e-06
Zinc-65	Ci	0.00e+00	<1.87e-06	0.00e+00	<1.86e-06
Manganese-54	Ci	0.00e+00	<9.55e-07	0.00e+00	<8.50e-07
Zirconium-Niobium-95	Ci	0.00e+00	<1.41e-06	0.00e+00	<1.46e-06
Molybdenum-99	Ci	0.00e+00	<6.07e-06	0.00e+00	<5.48e-06
Cerium-144	Ci	0.00e+00	<4.82e-06	0.00e+00	<4.66e-06
Silver-110m	Ci	0.00e+00	<7.68e-07	0.00e+00	<8.25e-07
Antimony-124	Ci	0.00e+00	<7.33e-07	0.00e+00	<7.77e-07
Carbon-14	Ci	0.00e+00	-	0.00e+00	<4.54e-06
Iron-55	Ci	0.00e+00	<4.64e-05	0.00e+00	<7.26e-05
Antimony-125	Ci	0.00e+00	<2.07e-06	0.00e+00	<2.20e-06
Unidentified	Ci	0.00e+00	-	0.00e+00	-
Total for Period (above)	Ci	0.00e+00	2.33e-06	0.00e+00	3.04e-07
Krypton-85	Ci	0.00e+00	<2.38e-04	0.00e+00	<2.39e-04

TABLE 3
(Sheet 1 of 2)

Yankee Atomic Electric Company, Rowe, Massachusetts
Effluent and Waste Disposal Semiannual Report
Third and Fourth Quarters 1996
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. Dry Active Waste: Class A Containers: steel box (101 ft^3), steel liner (177.5 ft^3)	m^3 Ci (Est.)	3.93e+01 1.08e+00	2.50e+01
b. Dry Active Waste: Class A Containers: (a)	m^3 Ci (Est.)	5.37e+01 2.55e-04	2.50e+01
c. Evap. Bottoms: Class A Containers: steel drum (7.5 ft^3) (b)	m^3 Ci (Est.)	5.95e+00 5.27e+02	2.50e+01
d. Filters: Class C Containers: steel liner (126 ft^3) (b)	m^3 Ci (Est.)	3.57e+00 9.47e+01	2.50e+01

2. Estimate of Major Nuclide Composition (by type of waste) >1%

a.	Iron-55	%	6.44e+01
	Cobalt-60	%	2.24e+01
	Nickel-63	%	1.05e+01

b.	Iron-55	%	6.50e+01
	Cobalt-60	%	2.26e+01
	Nickel-63	%	1.06e+01

c.	Cobalt-60	%	3.82e+01
	Nickel-63	%	3.13e+01
	Iron-55	%	1.61e+01
	Cesium-137	%	1.20e+01
	Cerium-144	%	1.60e+00

d.	Iron-55	%	7.26e+01
	Cobalt-60	%	1.69e+01
	Nickel-63	%	9.50e+00

TABLE 3
(Sheet 2 of 2)

Yankee Atomic Electric Company, Rowe, Massachusetts
Effluent and Waste Disposal Semiannual Report
Third and Fourth Quarters 1996
Solid Waste and Irradiated Fuel Shipments

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
4	truck	Barnwell, SC
17 (c)	truck	Oak Ridge, TN
51 (a)	truck	Barnwell, SC

B. IRRADIATED FUEL SHIPMENTS (Disposition): None

(a) Partial shipments by the processor to disposal.
(b) Solidification agent is cement.
(c) Waste shipments to processors.

APPENDIX A

Radioactive Liquid Effluent Monitoring Instrumentation

Requirement: Radioactive liquid effluent monitoring instrumentation channels are required to be operable in accordance with ODCM Control 5.1. With less than the minimum number of channels operable and reasonable efforts to return the instrument(s) to operable status within 30 days being unsuccessful, ODCM Control 5.1 requires an explanation for the delay in correcting the inoperability in the next Effluent and Waste Disposal Semiannual Report.

Response: As part of plant decommissioning, systems reconfiguration to support the permanent shutdown has included the installation of a new Auxiliary Service Water (ASW) System which was installed in 1995 to support Spent Fuel Pool (SFP) cooling. This engineering design change also added a new ASW composite sampler on the down stream side of the SFP heat exchanger to provide an additional method of determining if any contamination was leaking into this normally clean system. This same ASW effluent line is also equipped with an on-line radiation monitor which monitors the cooling water for any potential contamination ingress.

Soon after installation, the ASW composite sampler had to be declared inoperable (August 18, 1995) due to blockage in the sample line. At that time, a program of daily grab samples was implemented with laboratory analysis as a remedial action to the out of service sampler. The original design of the sample system contained a series of valves with a microtubing sample outlet. This was to reduce the sample volume collected over a period of time to a volume that matched laboratory analysis requirements. The low sample volume flow rate contributed to plugging from suspended sediments typically found in the pond and cooling water. Higher flow rates could not be used because of the lack of a local drain for excess sample volume where the equipment was located. The on-line monitor remained in operation during the entire grab sampling period.

Due to the above conditions, a change to the original EDCR was prepared. This change incorporated both a new sample system arrangement and location. The new sampling system methodology is similar to the Turbine Building sump composite sampling system that has proven to have a high degree of reliability with cooling water that has suspended sediment. The new location for the sample system is in the Screenwell House which has an adequate drain system to accommodate higher flow rates thereby eliminating the microtubing.

On October 31, 1996, Revision 11 to the ODCM was approved. This revision formally included the requirement for a composite sampler on the ASW, but the design change and installation had not been completed. As a result, Action Statement 5 of Table 5.1 of the ODCM required that the commitment to take at least daily grab samples from the auxiliary service water be continued until the new system could be put into service.

Installation of the new ASW composite sample system was completed on February 26, .997, and declared operational on February 27, 1997, completing the design change and allowing the plant to exit Action Statement 5.

APPENDIX B

Radioactive Gaseous Effluent Monitoring Instrumentation

Requirement: Radioactive gaseous effluent monitoring instrumentation channels are required to be operable in accordance with ODCM Control 5.2. With less than the minimum number of channels operable and reasonable efforts to return the instrument(s) to operable status within 30 days being unsuccessful, ODCM Control 5.2 requires an explanation for the delay in correcting the inoperability in the next Effluent and Waste Disposal Semiannual Report.

Response: The requirements of ODCM Control 5.2 governing the operability of radioactive gaseous effluent monitoring instrumentation were met for this reporting period.

APPENDIX C

Liquid Holdup Tanks

Requirement: Defueled Technical Specification 3.4 limits the quantity of radioactive material contained in any outside temporary tank. With the quantity of radioactive material in any outside temporary tank exceeding the limits of Technical Specification 3.4, a description of the events leading to this condition is required in the next Effluent and Waste Disposal Semiannual Report.

Response: The limits of Technical Specification 3.4 were not exceeded during this reporting period.

APPENDIX D

Radiological Environmental Monitoring Program

Requirement: The Radiological Environmental Monitoring Program is conducted in accordance with ODCM Control 4.1. With milk or fresh leafy vegetation samples no longer available from one or more of the required sample locations, ODCM Control 4.1 requires the identification of the new location(s) for obtaining replacement sample(s) in the next Effluent and Waste Disposal Semiannual Report and inclusion of revised Off-Site Dose Calculation Manual figure(s) and table(s) reflecting the new location(s).

Response: Milk sampling location TM-14 was dropped from the REMP program due to unavailability of milk samples. This location has shown to be unreliable in its supply of milk due to the limited number of cows (1 to 2) which are not always producing milk. This farm is not considered to be a dairy farm, but periodically has milk animals for home use only. The last several land use censuses have shown that the site vicinity is not a significant milk producing area. Only a few locations have milk animals, and these tend to be of the single animal for home use type. Since the significance of the milk pathway as an indicator of the buildup of iodine released from the plant has been eliminated due to the removal of the iodine source term in the plant, and the lack of a reliable replacement supply of milk from the site area, the number of indicator milk stations has been reduced from 2 to 1 in the ODCM.

APPENDIX E

Land Use Census

Requirement: A land use census is conducted in accordance with ODCM Control 4.2. With a land use census identifying a location(s) which yields at least a 20 percent greater dose or dose commitment than the values currently being calculated in ODCM Control 3.5, ODCM Control 4.2 requires the identification of the new location(s) in the next Effluent and Waste Disposal Semiannual Report.

Response: The land use census for this reporting period did not identify any locations yielding at least 20 percent greater dose or dose commitment than the values currently being calculated in ODCM Control 3.5.

Requirement: With a land use census identifying a location(s) which yields a calculated dose or dose commitment (via the same exposure pathway) at least 20 percent greater than at a location from which samples are currently being obtained in accordance with ODCM Control 4.1, ODCM Control 4.2 requires that the new location(s) be added to the Radiological Environmental Monitoring Program if permission from the owner to collect samples can be obtained and sufficient sample volume is available. The identification of the new location(s) is required in the next Effluent and Waste Disposal Semiannual Report.

Response: No new locations were added to the Radiological Environmental Monitoring Program as a result of the 1996 land use census.

APPENDIX F

Process Control Program (PCP)

Requirement: PCP Control 2.0 requires that licensee-initiated changes to the PCP be submitted to the Commission in the Effluent and Waste Disposal Semiannual Report for the period in which the change(s) was made.

Response: There were no licensee-initiated changes to the PCP during the reporting period.

APPENDIX G

Off-Site Dose Calculation Manual (ODCM)

Requirement: ODCM Control 7.2 requires that licensee-initiated changes to the ODCM be submitted to the Commission in the Effluent and Waste Disposal Semiannual Report for the period in which the change(s) was made effective.

Response: Due to the permanent shutdown and decommissioning of the Yankee plant, the Off Site Dose Calculation Manual (ODCM) had become outdated in reference to descriptions of plant systems and surveillance requirements that related to the old operating power plant configuration. A revised ODCM that reflected the current status of the plant, including its reduced source terms, modified effluent and dose pathways, elimination of plant components and systems, as well as the addition of temporary systems installed to support the decommissioning effort was needed. Revision 11 of the Yankee ODCM was approved by PORC in meeting No. 96-63, October 31, 1996, and is attached in its entirety.

A summary of changes made to the ODCM follows:

- The removal of Fe-59 (half life = 44.5 days) and Mo-99 (half life = 2.7 days) from dose assessment and lower limit of detection (LLD) analysis requirements on effluent samples, and the removal of Fe-59 and Ba/La-140 (half life = 12.8 days) from the LLD requirements for REMP sample analyses.

- Inclusion of the new temporary liquid waste evaporator and discharge pathway in place of the originally installed waste evaporator system. This includes updates on monitoring and surveillance requirements for evaporator effluents and the auxiliary service water system.

- The inclusion of gross alpha determination of weekly continuous particulate plant vent samples in place of only doing monthly composite analysis on weekly particulate samples.

- Extension of PVS system and sampler flow rate determination from 8 to 12 hours when the required equipment channels are inoperable.

- Establishment of ACTION requirements for the detection limits and analysis frequency for the ASW grab samples if the composite sampler is down.

- Redefine the analysis frequency for the turbine building sump grab samples when the composite sampler is not operable.

- Removal of the SW radioactivity monitor and flow rate measuring instrumentation and surveillance requirements as a result of the elimination of possible contamination of this flow path (shutdown of old waste evaporator).

- Update of the liquid and gaseous effluent flow pathways on Figures 6-1 and

6-2 to reflect changes in plant configurations.

- Deletion of reference to nearest resident within the site property due to its vacancy and planned removal (Figure 1-1).

- Additional editorial changes to improve the consistency of terms used as well as the removal of outdated references and operational data, and the correction of typographical errors.

- Administrative corrections to various references made in the ODCM to the Defueled Tech Specs.

- Inclusion of a new Appendix B that lists the MPC limits of the original 10CFR20.1-20.602, Appendix B which is no longer in publication, but required by Tech Specs.

- Editorial changes in bases to Control Requirements to substitute fundamental dose requirements in place of references to old 10CFR20 sections that were replaced when Part 20 was revised.

- Elimination of the service water composite sampler requirement that provided sample collection of water used to cool the old waste evaporator condenser.

- Elimination of dissolved gas sample and analysis requirements in secondary liquids (service water).

- The reduction from 2 to 1 of indicator milk sampling locations required in the REMP.

- Eliminating the time restriction (24 hours) to complete a radiological analysis of grab samples taken from the turbine building sump if the composite sample were inoperable.

- Elimination of iodine sampling and analysis for plant vent releases.

- Removal of reference to sampling and analysis requirements for waste gas system and containment purges.

- Elimination of reference to Steam Generators and secondary coolant leakage, including surveillance requirements.

- Elimination of LLD requirements for radionuclides no longer present due to short half lives.

- Referencing all noble gas dose calculations and setpoint determinations to Kr-85 as the only remaining potential source.

- Elimination of requirement for use of concurrent meteorology with releases in assessing dose (use historical data only).

- Elimination of iodine sampling and analysis for REMP air monitors.

- Extending air particulate change out frequency from weekly to once every two weeks (REMP).
- Elimination of iodine analysis in milk samples (REMP).
- Reduction of milk sample collection during grazing season from every 2 weeks to monthly (REMP).
- Elimination of broad leaf vegetation sampling (REMP).
- Elimination of upstream river water automatic composite sampler (REMP).
- Reduction in the number of outer ring incident response TLD locations (REMP).

The changes to the RETS and REMP programs as contained in Revision 11 to the ODCM reflect the shutdown status of the plant and the ongoing decommissioning of the facility. None of the changes reduce the affective level of radioactive effluent control and monitoring of release pathways that still represent a potential effluent source term. Decommissioning activities have removed various potential sources, along with the natural radioactive decay of relatively short lived radionuclides due to the cessation of the fission process in October, 1991, (5 years ago). It is therefore concluded that these changes to the ODCM will continue to maintain the level of radioactive effluent control required by 10CFR 20.106 (new 20.1301), 40 CFR 190, 10 CFR 50.36a, and Appendix I to 10 CFR 50 and not adversely impact the accuracy or reliability of effluent measurements, or dose and setpoint calculations.

APPENDIX H

Radioactive Liquid, Gaseous, and Solid Waste Treatment Systems

Requirement: ODCM Control 7.3 requires that licensee-initiated major changes to the radioactive waste systems (liquid, gaseous, and solid) be reported to the Commission in the Effluent and Waste Disposal Semiannual Report for the period in which the evaluation was reviewed by the Plant Operation Review Committee.

Response:

The original plant design included a liquid radwaste evaporator as an installed treatment system to volume reduce and process radioactive liquid waste. As part of the plant decommissioning process, this installed system has been taken out of service and replaced with a temporary, skid mounted, liquid radwaste evaporator (i.e. Temporary Waste Water Processing Island) that operates on the same principle as the original equipment. The same functional design requirements to produce liquid waste acceptable for release to the environment has been included to ensure that the same or better process capability still exists until final termination of the license. ODCM Revision 11 (attached) reflects this change in waste processing equipment configuration.

The summary of the safety evaluation for the Temporary Waste Water Processing Island (TWWPI) system demonstrated the following:

a) All TWWPI systems, structures and components are classified NNS with the only exception being the existing radiation monitor which is classified as RQA.

b) The probability of occurrence and consequences of an accident previously evaluated in the SAR is not increased.

c) The probability of occurrence and consequences of a malfunction of equipment important to safety previously evaluated in the SAR is not increased.

d) The possibility of an accident of a different type than previously evaluated in the SAR is not created.

e) The possibility of a different type of malfunction of equipment important to safety than any previously evaluated in the SAR is not created.

f) The margin of safety as defined in the basis for any technical specification is not reduced.

Therefore, the design change does not constitute an unreviewed safety question as defined in 10CFR 50.59 (a)(2). Furthermore,

g) The plant modifications implemented by this EDCR do not significantly increase the cost of decommissioning.

h) The plant modifications implemented by this EDCR do not foreclose release of the site for unrestricted use.

I) The plant modifications implemented by this EDCR do not cause any significant environmental impact not previously evaluated.

j) The activity does not violate the terms of the existing facility license.

The design change presents a consolidated TWWPI system capable of processing all the expected plant waste water at YNPS until the completion of spent fuel pool decommissioning activities. Operation of the TWWPI system allowed for the removal of the permanent plant waste water evaporator system and the eventual dismantlement of the Waste Disposal Building (WDB).

Waste water, generated as a result of decommissioning activities, is routed to a new 20,000 gallon waste water storage tank. The tank is constructed with a secondary berm so that in the event a leak was to develop, the contents are contained, thereby preventing a spill of contaminated water. The tank accepts water from the Radioactive Lab Service Sump. However, the piping is installed in a way to accommodate future connections from the plant as needed. The tank is instrumented to provide level and temperature indication. Additionally, the tank is serviced by a hot water heating system to prevent freezing in the winter.

The contents of the waste water storage tank are processed through an evaporator consisting of a propane-fired burner, a condensate cooler, and the necessary equipment to route the liquids. Steam generated as a result of the boiling process is routed over a cooler resulting in collected distillate. Due to their higher density, the contaminants are concentrated and settle out on the bottom of the evaporator.

The resultant two liquids from the evaporative process consist of distillate and bottoms. The distillate is transferred and stored in two 5,000 gallon storage tanks. Prior to transferring the distillate to the tanks, the clean water is further purified by a filter and two ion exchange polishers. Similar to the 20,000 gallon storage tank, both tanks have heating capability and instrumentation for temperature. At a predetermined level, the tank(s) are recirculated, sampled, and then discharged to Sherman Pond via the Auxiliary Service Water system. The resultant bottoms is pumped into a locally staged waste container (HIC) for eventual transfer to an offsite disposal facility.

The cargo enclosure is ventilated with 1,000 cfm of fresh outside air. The exhaust is routed to the plant vent stack.

The TWWPI system was selected to duplicate the original treatment process and match, or improve upon, the cleanup capability that was associated with the old installed radwaste evaporator system that it replaced. Therefore, the amount of radioactive materials expected to be released in liquid effluents after processing in the new system is anticipated to be equivalent, or lower, than that which would have been predicted for the original evaporator operations. As a result, the maximum exposures to members of the public at the site boundary and to the general population will not differ significantly from those that would have occurred during the decommissioning process if the original evaporator system was assumed to be used. A comparison of liquid effluent water quality from the new evaporator system to the water quality from the old evaporator

system prior to the change shows that the total particulate radioactivity during the first few months of operation of the new system ranged on the order of E-8 to E-9 uCi/ml compared to typical values for the original system that were on the order of E-8 uCi/ml.

Occupational exposure is minimized, monitored, and controlled in strict compliance with existing plant procedures. The ALARA program continues to be implemented. The program ensures that ALARA is considered in all aspects of plant operation, maintenance, inspection, and modifications.

Additionally, the HIC which contains the concentrated bottoms liquid is shielded from the rest of the equipment in the cargo enclosure. Also, the estimated dose to personnel is minimal because the radioactive content of the waste water currently is significantly less than during when the plant was operating. Finally, the TWWPI system operates more efficiently than the old liquid radwaste system. A net benefit is realized in dose savings from no longer having to perform maintenance on the old system.

The design change, TWWPI system, was reviewed and found acceptable by PORC on July 11, 1996 as documented in PORC meeting number 96-41.

APPENDIX I

Supplemental Information
Third and Fourth Quarters 1996

1. Control Limits - Dose and Dose Rate

Control and Category	Limit
a. Noble Gases	
Control 3.3, Total body dose rate	500 mrem/year
Control 3.3, Skin dose rate	3000 mrem/year
Control 3.4, Gamma air dose	5 mrad/quarter
Control 3.4, Gamma air dose	10 mrad/year
Control 3.4, Beta air dose	10 mrad/quarter
Control 3.4, Beta air dose	20 mrad/year
b. Iodine-131, Tritium, and Radionuclides in Particulate Form With Half-Lives Greater Than 8 Days	
Control 3.3, Organ dose rate	1500 mrem/year
Control 3.5, Organ dose	7.5 mrem/quarter
Control 3.5, Organ dose	15 mrem/year
c. Liquids	
Control 3.1, Total body dose	1.5 mrem/quarter
Control 3.1, Total body dose	3 mrem/year
Control 3.1, Organ dose	5 mrem/quarter
Control 3.1, Organ dose	10 mrem/year

2. Control limits - Concentration

Control and Category	Limit
a. Liquids	
Control 2.1, Total sum of the fraction of MPC (10CFR20, Appendix B, Table II, Column 2), excluding noble gases less than:	1.0
Control 2.1, Total noble gas concentration	2.00E-04 µCi/cc

3. Measurements and Approximations of Total Radioactivity

a. Noble Gases, Krypton-85

Continuous discharges are determined by direct measurements. A primary vent stack gas sample is taken monthly and analyzed for Krypton-85. A review of the weekly primary vent stack noble gas integrator readings for any increase in values above the background level also is used as a reference. There are no longer any batch discharges. Errors associated with the above measurements are estimated to be ±25 percent.

b. Iodines, Particulates

There are no longer any iodine isotopes available for discharge. The sampling system design requires the use of a charcoal cartridge as a support for the particulate filter during particulate collection. The sampling system continuously draws a sample from the primary vent stack through a filter and charcoal cartridge. Both the filter and charcoal cartridge are removed and analyzed weekly. The errors associated with the determination of particulate effluents are estimated to be ±30 percent.

c. Liquid Effluents

A gamma isotopic analysis is performed on a representative sample using a Marinelli Beaker geometry for both a batch or continuous discharge. Composite samples for batch and continuous discharges are analyzed for strontium-89, strontium-90, iron-55, gross alpha activity, and carbon-14.

Tritium analysis is performed on composite samples for continuous discharges and on each batch discharge. The errors associated with these measurements are as follows: fission and activation products, ±20 percent; tritium, ±10 percent; dissolved fission gases, ±20 percent; and alpha activity, ±35 percent.

4. Batch Releases

a. Liquids

The batch release data is presented in two categories to provide accurate average discharge rate values.

Third Quarter	Routine Batches	Outdoor Tank Moats
Number of batch releases:	0	0
Total time period for batch releases (minutes):	-	-
Maximum time period for a batch release (minutes):	-	-
Average time period for batch releases (minutes):	-	-
Minimum time period for a batch release (minutes):	-	-
Average stream flow (Sherman Dam) during period (cfs):	125	125
Average discharge rate (gpm):	-	-

Fourth Quarter	Routine Batches	Outdoor Tank Moats
Number of batch releases:	4	5
Total time period for batch releases (minutes):	3,425	13,299
Maximum time period for a batch release (minutes):	1,420	7,644
Average time period for batch releases (minutes):	856	2,660
Minimum time period for a batch release (minutes):	135	330
Average stream flow (Sherman Dam) during period (cfs):	728	728
Average discharge rate (gpm):	5.7	2.0

b. Gases

There are no longer any gaseous batch discharges.

5. Abnormal Releases

ODCM Control 7.2 requires the reporting of any unplanned releases from the site to the site boundary of radioactive material in gaseous and liquid effluents made during the reporting period.

a. Liquid

There were no nonroutine liquid releases during the reporting period.

b. Gases

There were no nonroutine gaseous releases during the reporting period.