ENCLOSURE 1 TO TXX-09066

2008 Radioactive Effluent Release Report

Luminant CPNPP Comanche Peak Nuclear Power Plant

2008 RADIOACTIVE EFFLUENT RELEASE REPORT

January 1, 2008 - December 31, 2008

Prepared By: David Valentine Date: 4/09/08

Reviewed By: Randy Walsh Date: 4/15/08

Approved By: Terry Marsh Date: 4/20/08

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ACRONYMS AND ABBREVIATIONS

CFR	Code of Federal Regulations
CPNPP	Comanche Peak Nuclear Power Plant
ECL	Effluent Concentration Limit
LHMT	Laundry Holdup and Monitor Tanks
LVW	Low Volume Waste
ODCM	Offsite Dose Calculation Manual
PET	Primary Effluent Tanks
pCi	Picocurie
REC	Radiological Effluent Control
SORC	Station Operations Review Committee
uCi	Microcurie
WMT	Waste Monitor Tanks
WWHT	Waste Water Holdup Tanks

1.0 Introduction

This Radioactive Effluent Release Report, for Comanche Peak Nuclear Power Plant Unit 1 and Unit 2, is submitted as required by Technical Specification 5.6.3 and Offsite Dose Calculation Manual (ODCM) Administrative Control 6.9.1.4 for the period January 1, 2008, through December 31, 2008.

1.1 Executive Summary

The radioactive effluent monitoring program for the year 2008 was conducted as described in the following report. The results of the monitoring program indicate the continued effort to maintain the release of radioactive effluents to the environment as low as reasonably achievable (ALARA).

Gaseous Effluents:

A summary of all the radioactive gaseous releases to the environment during 2008

Gaseous Waste	2008	2007	Comments
Tritium Activity	61.27 Ci	55.9	1
Total Fission And Activation Activity	996.9 Ci	13.9	2
Total Particulate Activity	8.44E-05 Ci	1.91E-06	2
Gross Alpha Activity	0 Ci	0 Ci	3
Iodine Activity	1.41E-04 Ci	0 Ci	2
Calculated Gamma Air Dose	3.93E-02 mRad	1.53E-3 mRad	2
Calculated Beta Air Dose	0.112 mRad	2.068E-3 mRad	2
Total Whole body dose	0.0868 mRem	0.0785 mRem	4

Comments:

1 The major contributor to gaseous tritium activity is evaporation from the spent fuel pools. Factors contributing to the tritium activity in the pools is related to the type of fuel used (i.e., 18-month fuel) the core life and power output and number of core cycles.

2 The majority of the gaseous activity and 100% of the Iodine activity was released in the first 2 quarters of the year as a result of 2RF10 with fuel defects.

3 No alpha activity was released.

4 Whole body dose was still very low (0.29% of Technical Specification).

Overall the gaseous radioactivity releases from CPNPP are well controlled and maintained ALARA. CPNPP is well below all applicable limits for gaseous releases.

Liquid Effluents:

A summary of all the radioactive liquid releases to the environment during 2008:

Liquid Waste	2008	2007	Comments
Total Activity (excluding tritium)	15.2 mCi	7.6 mCi	1
Tritium Activity	2426 Ci	532 Ci	2, 3
Total Whole Body Dose	0.127 mRem	0.137 mRem	n/a

Comments

1 CPNPP had 2 refueling outages during 2008. Despite the fuel defects on Unit 2 at 2RF10, the site managed to limit the total activity (excluding tritium) to 15 mCi.

2 A combination of factors resulted in the large increase of tritium released during 2008 as described in Note 3. During 2007, an unusually low amount of tritium was released. Averaging the tritium from 2007 and 2008 results in a more "normal" value of 1479 Ci.

3 In preparation for 2RF10, 22 PET tanks were processed during the first quarter of 2008. Much of this waste water was due to U2 end of cycle dilutions and contained higher concentrations of tritium. Unit 1 tritium concentrations were at the highest level for the cycle. Lastly, with the use of IFBA (Integral Fuel Burnable Absorber) fuel, additional tritiated waste water was produced from initial borations and subsequent dilutions. The combination of all of these factors resulted in a much larger than usual total tritium release for 2008.

Meteorological Data

The CPNPP meteorological system achieved a 98.0% recoverable data rate for the joint frequency parameters required by Regulatory Guide 1.23 for wind speed, wind direction and delta temperature.

Monitors OOS > 30 Days

During 2008 there were no Technical Specification/ODCM effluent radiation monitors out of service for >30 days.

ODCM Changes

There was one revision to the ODCM in 2008.Revision 28 (9/11/08): LDCR-OD-2007-1 (EVAL-2006-003080-05) (JDS) – Revised the definition of rated thermal power to reflect a 4.5% increase on Units 1 and 2 as issued by the NRC in Amendment 146 to the Operating Licenses and Technical Specifications.

Solid Waste

Summary of the solid waste production

Total Waste	2008	2007	% Error	Comments
Shipped (m3)	362	1410	25%	1
Shipped (Ci)	383	652	25%	2
Buried (m3)	40.6	180	25%	1
Buried (Ci)	559	475	25%	2

Comments

1 The majority of the volume was from dry active waste. The large volume in 2007 was from the steam generator replacement outage.

2 The majority of the activity came from resins and filters.

Overall, the radioactive effluent monitoring program has been conducted in an appropriate manner to ensure the activity released and associated dose to the public has been maintained as low as reasonably achievable (ALARA).

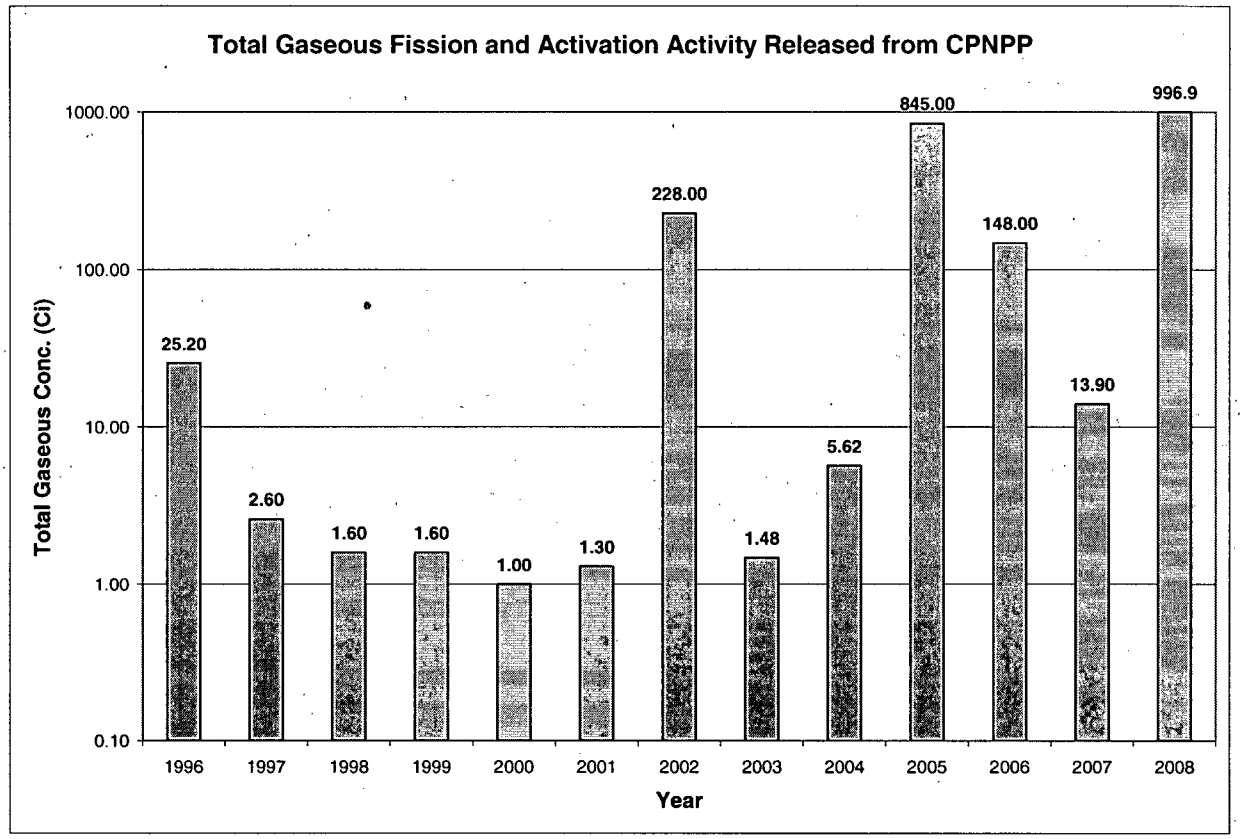
Groundwater Tritium

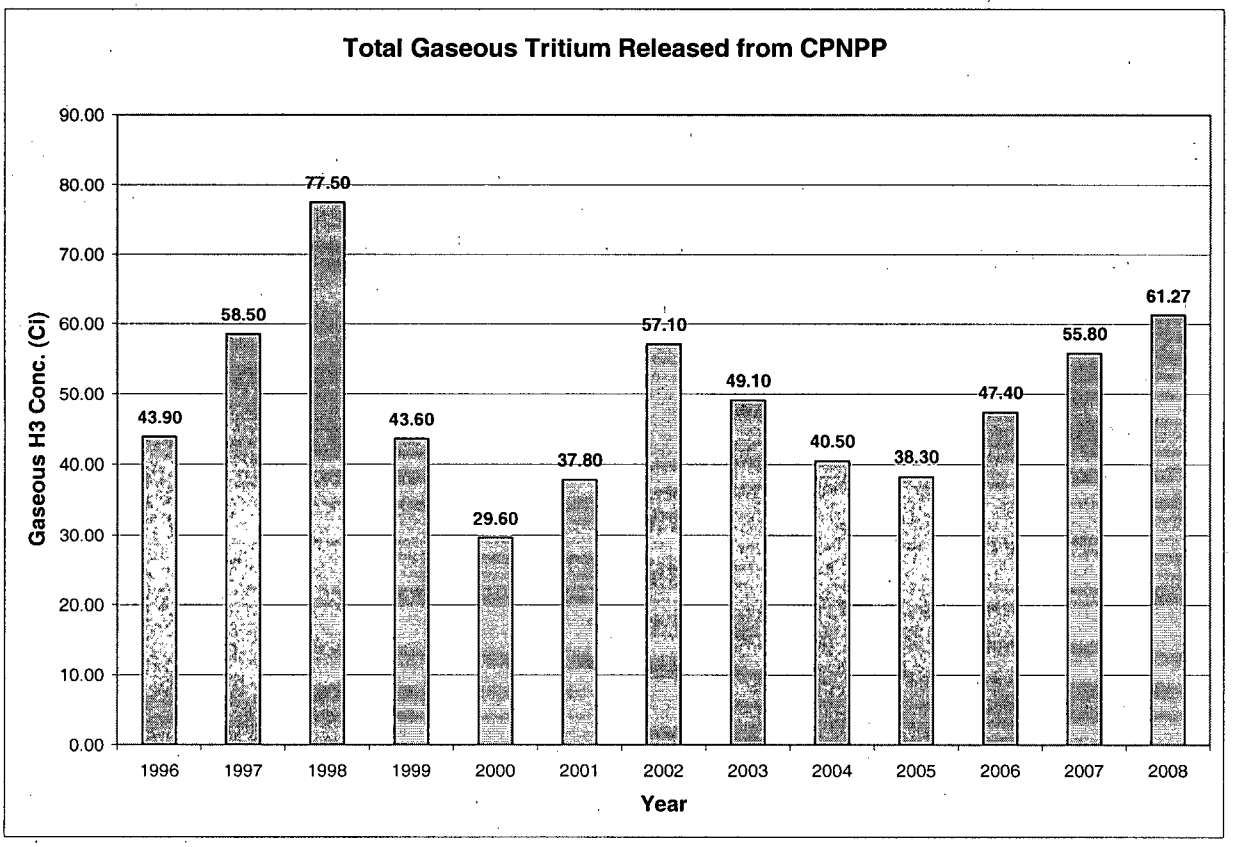
A positive indication (2186 pCi/L) for tritium was found in the artesian basin near the water plant. The source of the tritium was determined to be from the Squaw Creek Lake (approximate tritium concentration of 11,000 pCi/L). The basin discharges back to the lake. This concentration was well below the state reportable criteria of 20,000 pCi/L. This issue is tracked in our corrective action program.

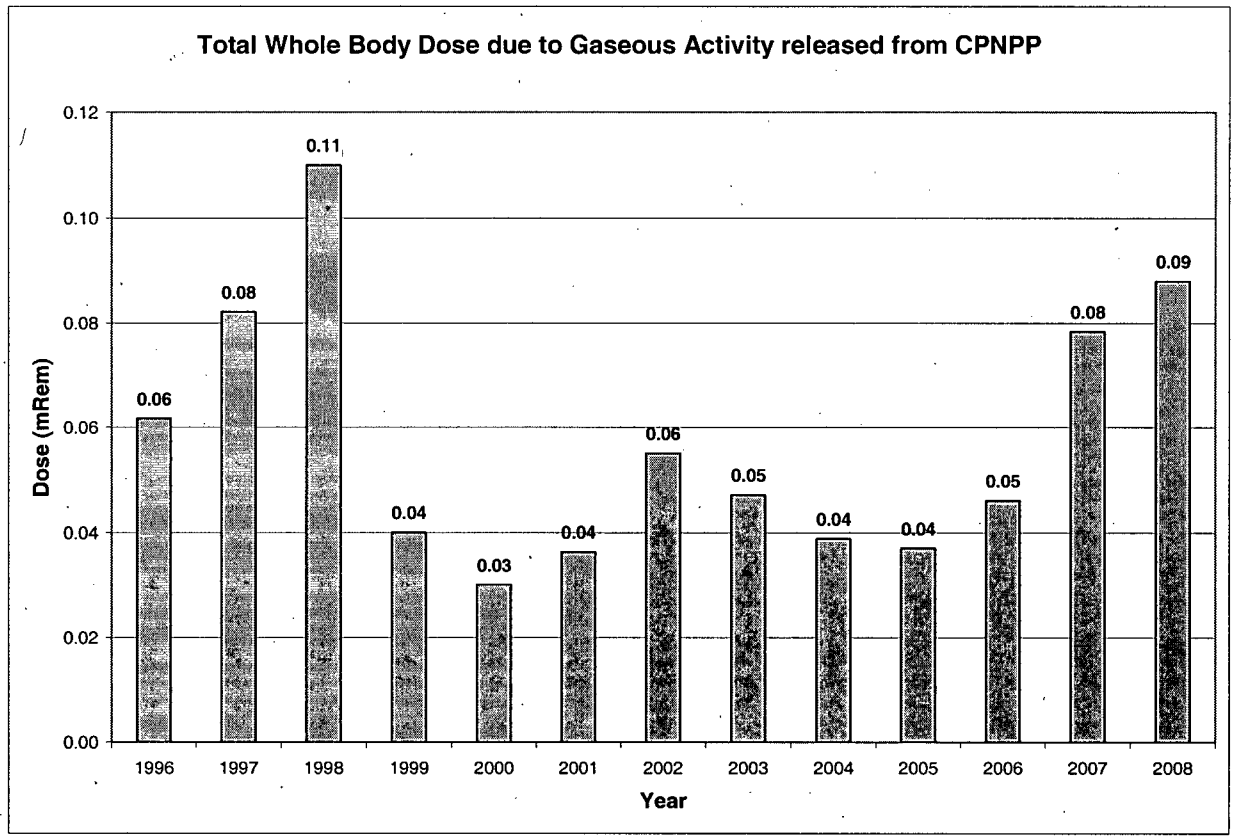
A positive indication (8380 pCi/L) for tritium was also found in Waste Monitoring Basin C liner leachate. This water is contained within the double liner system of basin C; therefore, this incident does not confirm a leak from Basin C, but does suggest a leak in the primary liner of Basin C. Plans have been made to inspect and repair all basin liners. This issue is also tracked in our corrective action program.

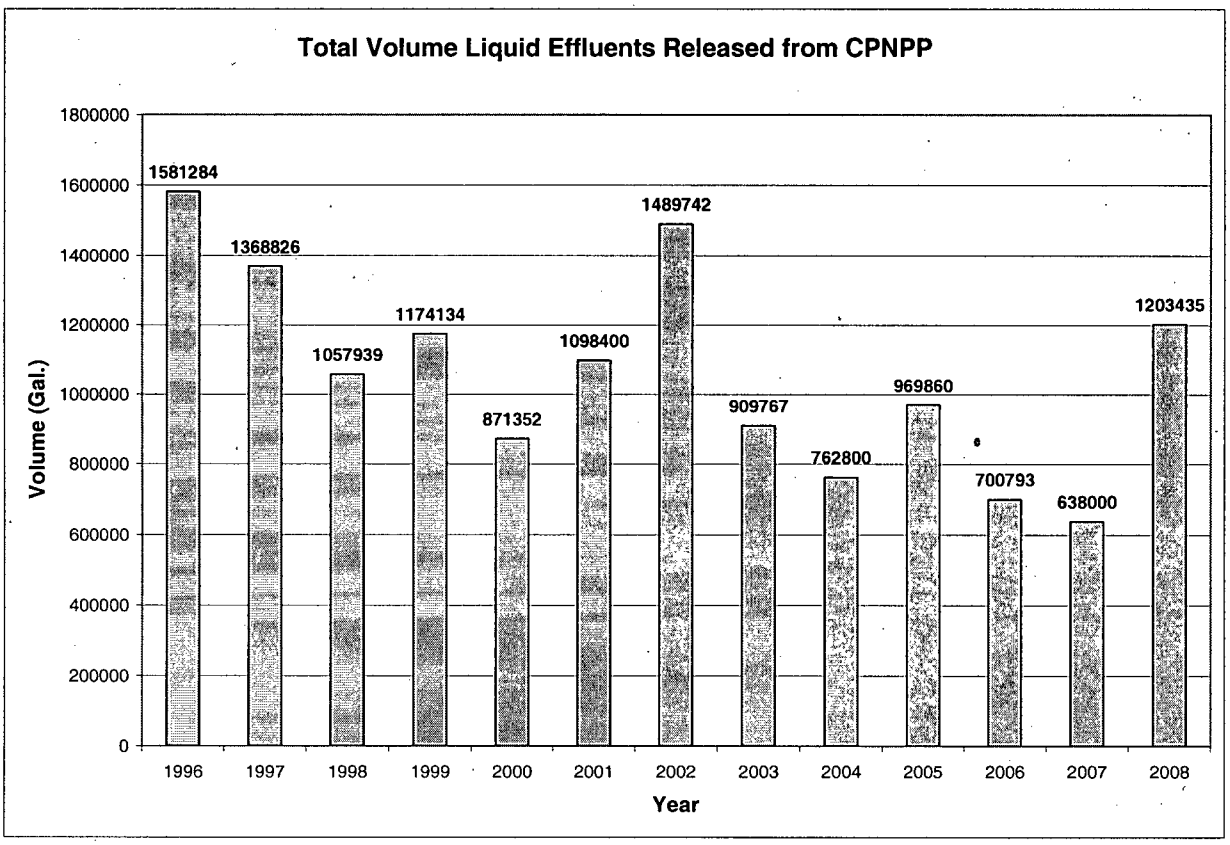
See section 6.10 for the details.

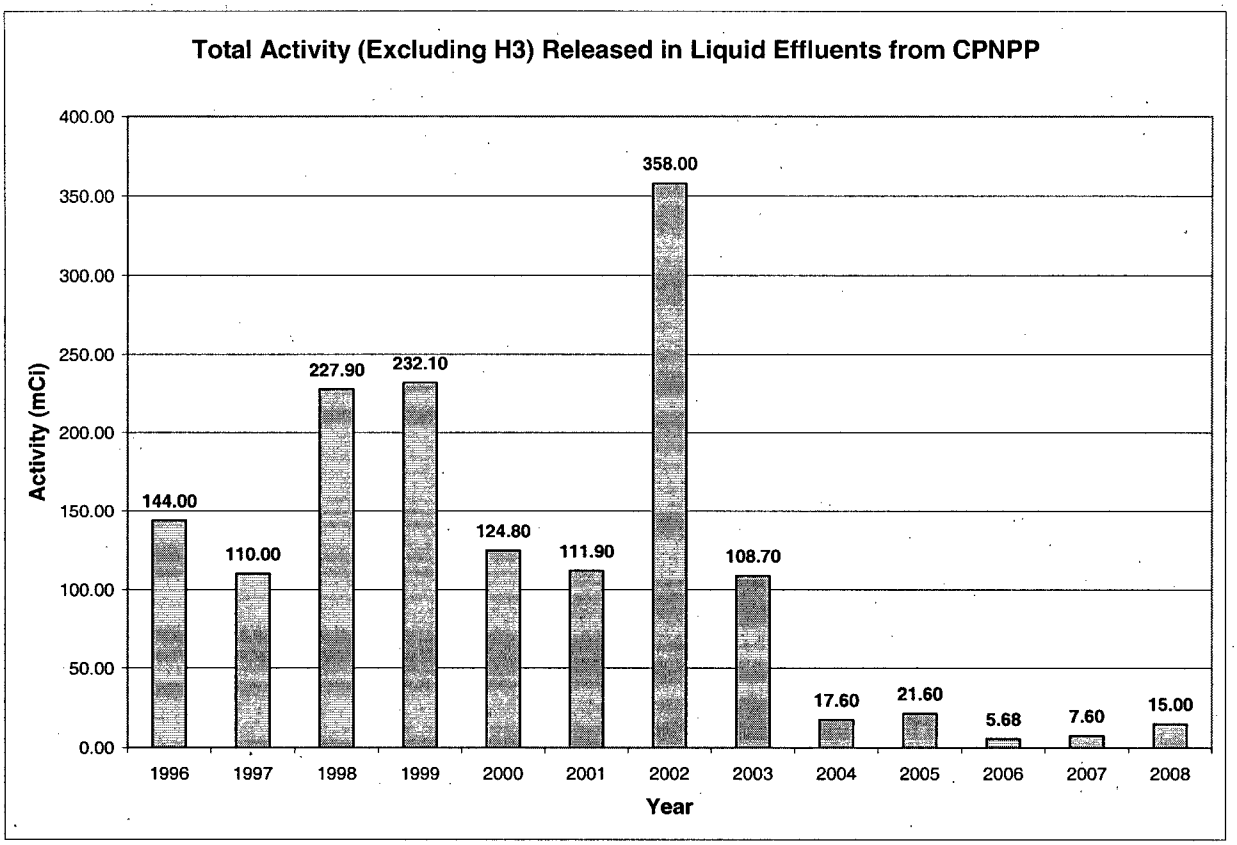
1.2 Historical Trend Graphs

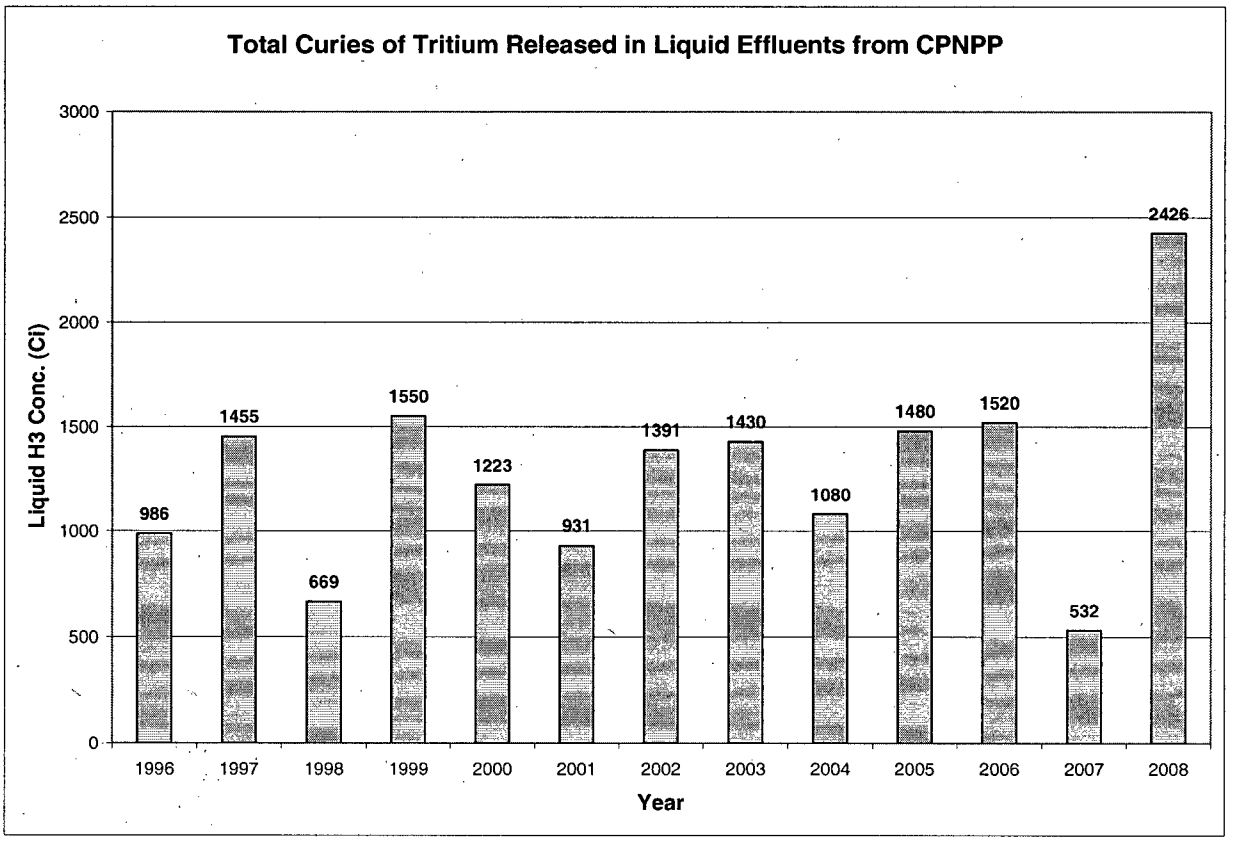


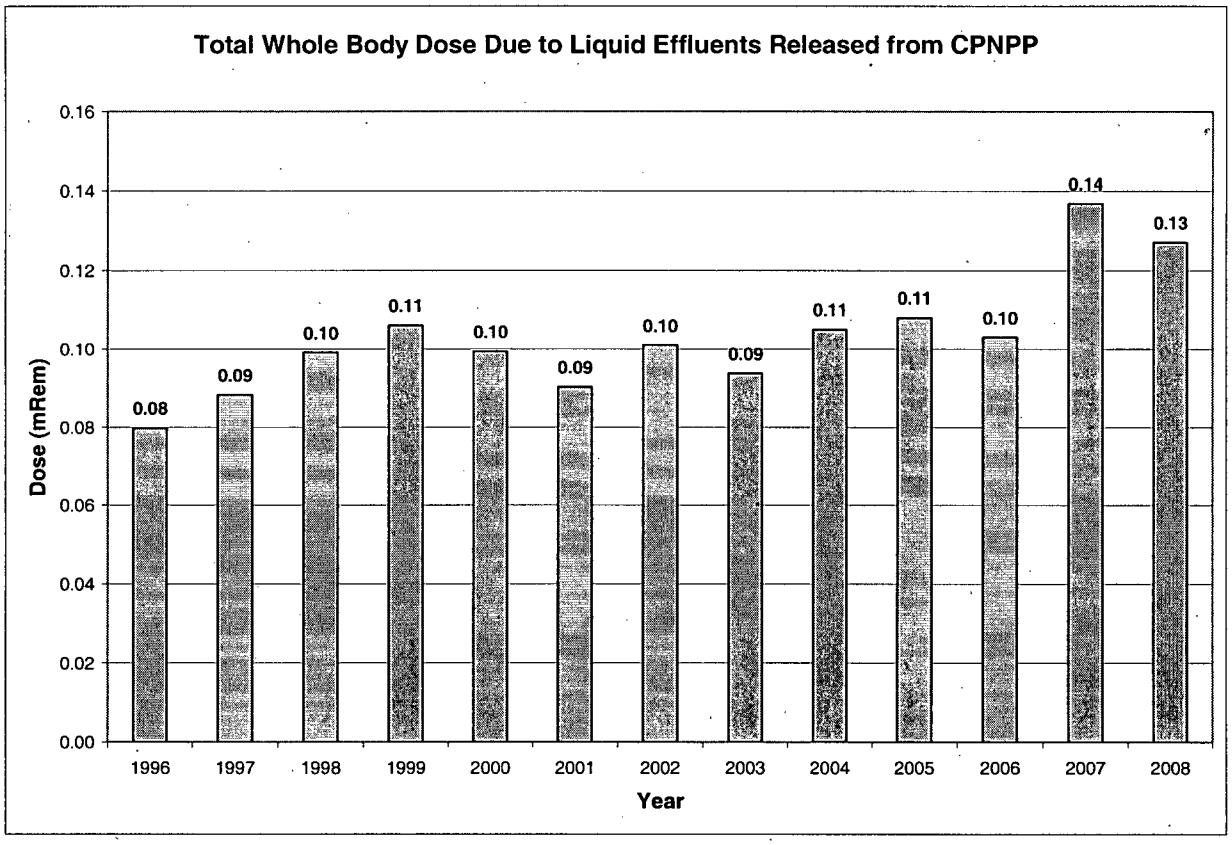


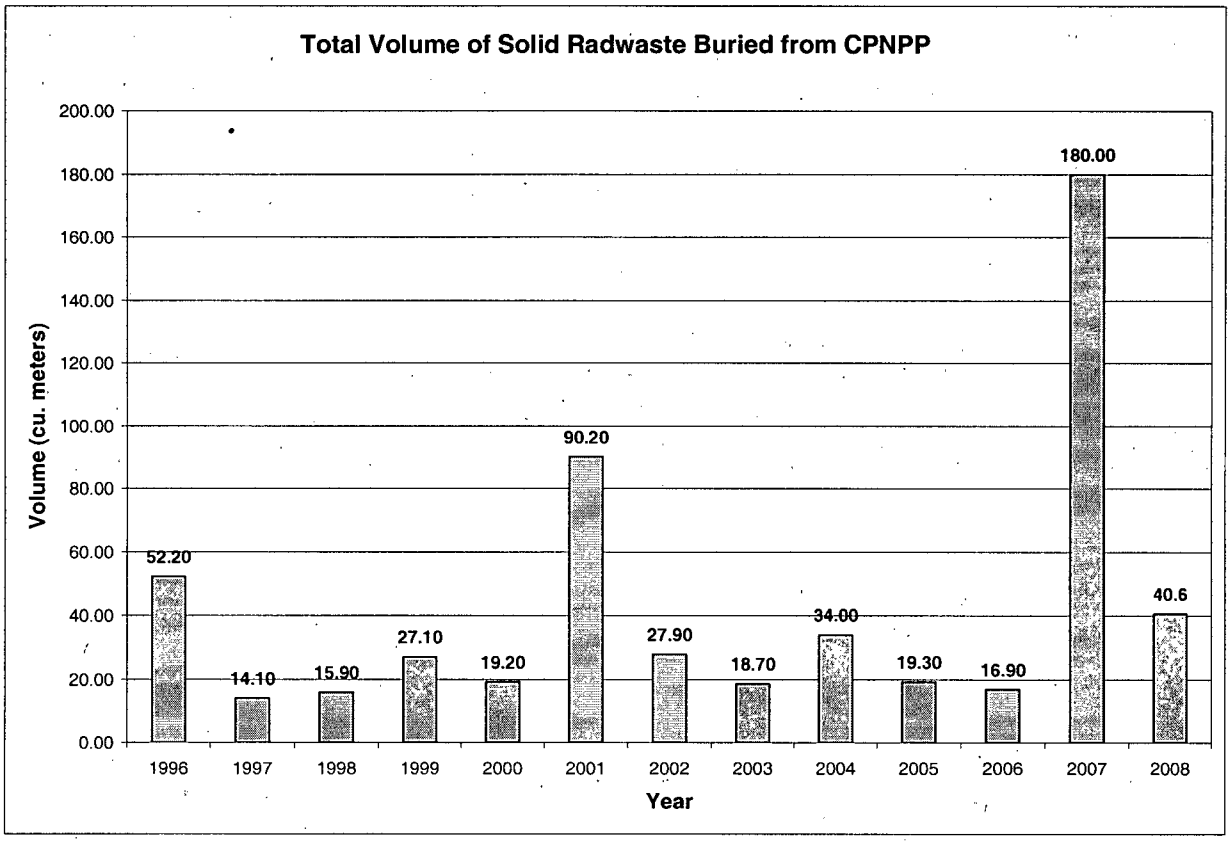

Total Whole Body Dose due to Gaseous Activity released from CPNPP
Dose (mRem)
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.06
0.08
0.11
0.04
0.03
0.04
0.06
0.05
0.04
0.04
0.05
0.08
0.09
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
Year

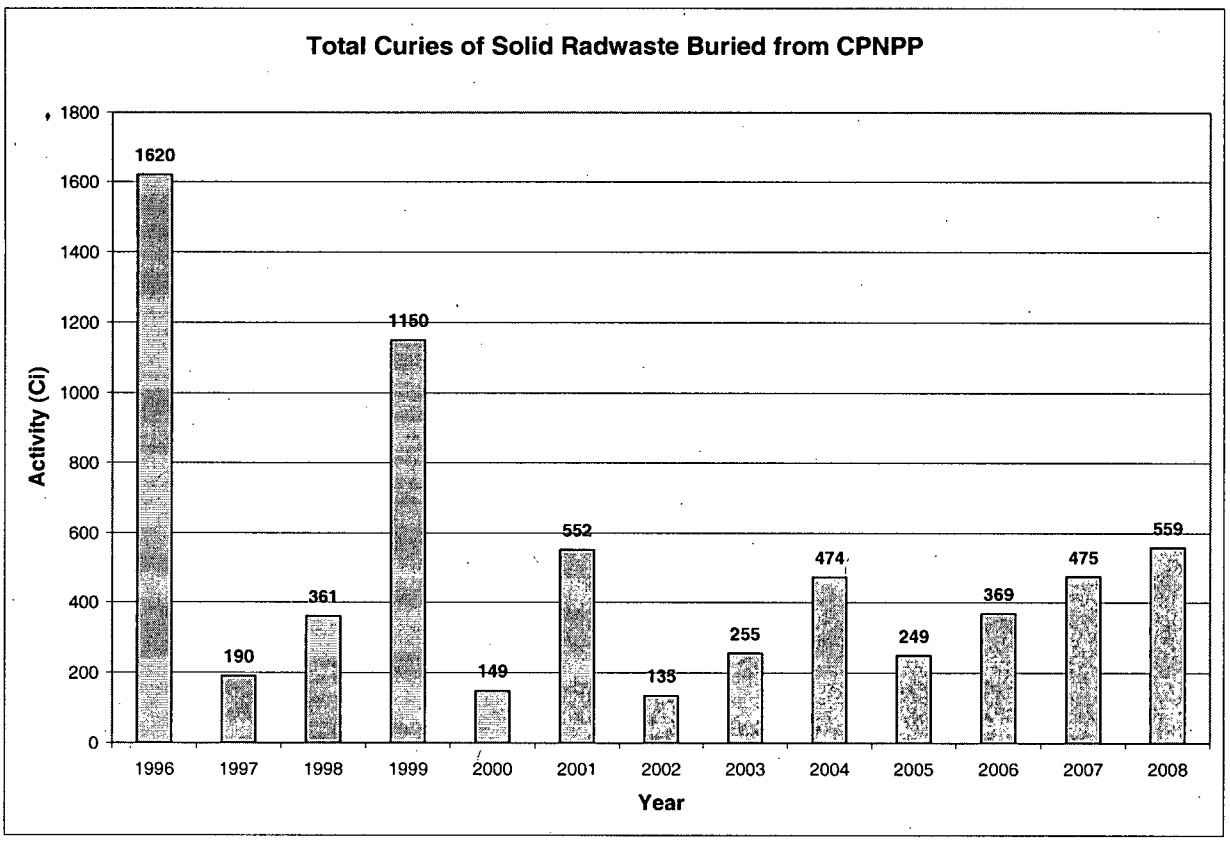

Total Volume Liquid Effluents Released from CPNPP
Volume (Gal.)
1800000
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
1581284
1368826
1057939
1174134
871352
1098400
1489742
909767
762800
969860
700793
638000
1203435
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
Year


Total Activity (Excluding H3) Released in Liquid Effluents from CPNPP
Activity (mCi)
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
144.00
110.00
227.90
232.10
124.80
111.90
358.00
108.70
17.60
21.60
5.68
7.60
15.00
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
Year


Total Curies of Tritium Released in Liquid Effluents from CPNPP
Liquid H3 Conc. (Ci)
3000
2500
2000
1500
1000
500
0
986
1455
669
1550
1223
931
1391
1430
1080
1480
1520
532
2426
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
Year


Total Whole Body Dose Due to Liquid Effluents Released from CPNPP
Dose (mRem)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.08
0.09
0.10
0.11
0.10
0.09
0.10
0.09
0.11
0.11
0.10
0.14
0.13
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
Year


Total Volume of Solid Radwaste Buried from CPNPP
Volume (cu. meters)
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
52.20
14.10
15.90
27.10
19.20
90.20
27.90
18.70
34.00
19.30
16.90
180.00
40.6
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
Year


Total Curies of Solid Radwaste Buried from CPNPP
Activity (Ci)
1800
1600
1400
1200
1000
800
600
400
200
0
1620
190
361
1150
149
552
135
255
474
249
369
475
559
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
Year

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 10 times the concentrations specified in 10 CFR Part 20, Appendix B, Table 2, 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-4 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 LVW Pond Resin Inventory

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

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

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 2 Column 2, concentration for a single radionuclide j (μCi/ml),

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

264 = conversion factor (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 Effluent Concentration Limits

2.2.1 Gaseous Effluents

For gaseous effluents, effluent concentration limits (ECL) 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 2, Column 2 are used as the ECL for liquid radioactive effluents released to unrestricted areas. A value of 2.0E-04 μCi/ml is used as the ECL for dissolved and entrained noble gases in liquid effluents.

2.3 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 CPNPP ODCM.

2.3.1 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 Waste Water Holdup Tanks (WWHT). 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. 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 a contract laboratory.

For continuous releases to the Circulating 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.

2.3.2 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. 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 radioiodine adsorbers and particulate 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 a contract laboratory.

2.4 Batch Releases

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

2.5 Abnormal or Unplanned Releases

Abnormal releases are defined as the unintended discharge of a volume of liquid or airborne radioactivity to the environment. No abnormal or unplanned liquid or gaseous effluent releases occurred during 2008. Table 7.2 summarizes the abnormal and unplanned releases.

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 7.10.

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 these instruments were inoperable for more than thirty days.

6.2 Changes to the Offsite Dose Calculation Manual

During the period covered by this report, there was one revision to the ODCM approved and/or implemented. The revision number is 28. A complete copy of the ODCM, with change bars, will be provided as a separate Enclosure to the letter transmitting this report. The change revised the definition of rated thermal power to reflect a 4.5% increase on Units 1 and 2 as issued by the NRC in Amendment 146 to the Operating Licenses and Technical Specifications.

6.3 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 Radioactive

Effluent Release Report. Based on the 2008 Land Use Census, no new receptor locations were identified which resulted in changes requiring a revision in current environmental sample locations. Values for the current nearest resident, milk animal, garden, X/Q and D/Q values in all sectors surrounding CPNPP were included in the 2008 Land Use Census.

6.4 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 limits required to be established by Technical Specification 5.5.12. Technical Requirements Manual 13.10.33 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 Requirements Manual 13.10.32 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.

6.5 Noncompliance with Radiological Effluent Control Requirements

This section provides a listing and description of Abnormal Releases, issues that did not comply with the applicable requirements of the Radiological Effluents Controls given in Part I of the CPNPP ODCM and/or issues that did not comply with associated Administrative Controls and that failed to meet CPNPP expectations regarding Station Radioactive Effluent Controls. Detailed documentation concerning evaluations of these events and corrective actions is maintained onsite.

6.5.1 Normal, Unplanned Gaseous Release

No normal, unplanned gaseous effluent releases occurred during 2008.

6.5.2 Abnormal, Unplanned Gaseous Effluent Release

No abnormal, unplanned gaseous effluent releases occurred during 2008.

6.5.3 Abnormal, Unplanned Liquid Effluent Releases

No abnormal, unplanned liquid effluent releases occurred during 2008.

6.6 Resin Releases to the LVW Pond

A total of 277 ft^3 of powdex resin was transferred to the LVW pond during the period covered by this report. The cumulative activity deposited in the LVW pond since operations began through the end of 2008 is 1.16E-03 Curies, consisting of Co-58, Co-60, Cs-134, Cs-137, I-131 and Sb-125.

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

In accordance with the CPNPP Process Control Program, Section 6.2.6.2, changes to the Radwaste Treatment Systems (liquid, gaseous and solid) should be summarized and reported to the Commission in the Radioactive Effluent Release Report if the changes implemented required a

10CFR50.59 safety evaluation.

For the reporting period of this report, no changes to the Radwaste Treatment Systems occurred that meet the reporting criteria of the Process Control Program.

6.8 Meteorological Monitoring Program

In accordance with ODCM Administrative Control 6.9.1.4, a summary of hourly meteorological data, collected during 2008, is retained onsite. This data is available for review by the NRC upon request. Joint Frequency Tables are included in Attachment 8.1. During 2008, the goal of >90% joint data recovery was met.

6.9 Assessment of Doses

6.9.1 Doses Due to Liquid Effluents

The doses to an adult from the fish and cow-meat 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.

6.9.2 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.

6.9.3 Dose Due to Radioiodines, Tritium and Particulates

The doses to an adult, teen, child, and infant from radioiodines and particulates, for the pathways listed in Part II, Table 2.4 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 Table 7.9.

6.9.4 40CFR190 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. At no time during 2008 were any of these limits exceeded, therefore no evaluations are required.

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

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

The highest dose occurred in the evaluation for fishing, resulting in a dose of 1.27E-4 mrem/yr. The dose to a MEMBER OF THE PUBLIC (fisherman) on Squaw Creek Reservoir 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 CPNPP 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 CPNPP Visitors Center was calculated based on two visits per year, thirty minutes each visit. Pathways included in the calculation were gaseous inhalation and submersion.

Due to increased security, routine fishing on Squaw Creek Reservoir and visitation by the public on-site has been significantly restricted. The calculations are still valid and included in the event security access restrictions are ever returned to previous conditions and controls.

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

6.10 Groundwater Tritium monitoring Program

Samples of perched groundwater are taken quarterly in accordance with the site groundwater tritium monitoring program. During the first quarter of 2008, a sample from the Water Production Plant artesian basin (storm drain) had a positive value for tritium of 2.18E-6 uCi/cc (2186 pCi/L). This value was well below state reportable limit of 20,000 pCi/L. The source of the tritium was from Squaw Creek Lake water (tritium concentration approximately 11,000 pCi/L) from a small leak in the water treatment system. Subsequent samples were taken to monitor for degrading conditions. Since this basin is part of the groundwater tritium monitoring program, the event was put into the corrective action program for tracking. The basin discharges back to Squaw Creek Lake.

Analysis of the fourth quarter ground monitoring conducted on 11/06/08 also indicated the presence of tritium in Waste Monitoring Basin C liner leachate at a concentration of 8380 pCi/L. This water is contained within the double liner system of basin C; therefore, this incident does not confirm a leak from Basin C, but does suggest a leak in the primary liner of Basin C. A sample was collected on 11/17/08 from downgradient well #19 (located east of switchyard) and no tritium was detected, suggesting no release from secondary liner of Basin C. A vendor inspected the WMS liners, including Basin C, on 12/17/08 and indicated the integrity of liners appear to be in good condition. A scope of work for liner leak detection has been received from the contractor and a PIF is in preparation for funding both the leak detection work, as well as anticipated repairs. Man. Act. 08-3781-03 and 04 have been issued to process and leak detect/repair, respectively.

6.11 Nonroutine planned release

There was one nonroutine planned release. During the U2 refueling outage, fuel defects along with a minor steam generator manufacturing imperfection resulted in positive activity in the steam generators. Prior to opening the steam relief valves, the quantity of steam was estimated and a permit was generated to account for the steam release.

SECTION 7.0
TABLES

Table 7.1
Site Liquid and Gaseous Batch Release Summary (2008)

A. Liquid Releases	Units		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals
1. Number of batch releases		:	22	13	14	12	61
2. Total time period for Batch releases	(Minutes)	:	7.616E+03	4.504E+03	4.708E+03	3.837E+03	2.067E+04
3. Maximum time period for a batch release	(Minutes)	:	4.100E+02	4.020E+02	4.000E+02	3.620E+02	4.100E+02
4. Average time period for a batch release	(Minutes)	:	3.462E+02	3.465E+02	3.363E+02	3.198E+02	3.388E+02
5. Minimum time period for a batch release	(Minutes)	:	2.150E+02	3.080E+02	3.000E+02	2.390E+02	2.150E+02
6. Average stream flow during periods of release of liquid Effluent into a flowing stream	(GPM)	:	8.937E+04	6.304E+04	6.376E+04	5.212E+04	2.683E+05

B. Gaseous Releases	Units		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals
1. Number of batch releases		:	39	35	44	31	149
2. Total time period for batch releases	(Minutes)	:	1.380E+04	1.480E+04	1.532E+04	1.264E+04	5.657E+04
3. Maximum time period for a batch release	(Minutes)	:	5.890E+02	2.071E+03	4.560E+02	1.510E+03	2.071E+03
4. Average time period for a batch release	(Minutes)	:	3.538E+02	4.230E+02	3.482E+02	4.078E+02	3.796E+02
5. Minimum time period for a batch release	(Minutes)	:	1.350E+02	3.030E+02	1.890E+02	2.570E+02	1.350E+02

Table 7.2
Site Abnormal Liquid and Gaseous Batch Release Summary (2008)

A. Liquid Releases	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals
1. Number of batch releases	:	0	0	0	0	0
2. Total time period for Batch releases	(Minutes) :	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3. Maximum time period for a batch release	(Minutes) :	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4. Average time period for a batch release	(Minutes) :	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5. Minimum time period for a batch release	(Minutes) :	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6. Total Activity for all releases	(Curies) :	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

B. Gaseous Releases	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals
1. Number of batch releases	:	0	0	0	0	0
2. Total time period for batch releases	(Minutes) :	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3. Maximum time period for a batch release	(Minutes) :	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4. Average time period for a batch release	(Minutes) :	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5. Minimum time period for a batch release	(Minutes) :	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6. Total Activity for all releases	(Curies) :	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Table 7.3
Site Gaseous Effluents - Summation of All Releases (2008)

Type of Effluent	Units		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year
A. Fission and Activation Gases							
1. Total Release	Curies	:	5.050E+02	4.916E+02	2.092E-01	9.600E-02	9.969E+02
2. Average Release rate for period	uCi/sec	:	6.405E+01	6.236E+01	2.653E-02	1.218E-02	1.264E+02
3. Percent of Applicable Limit	%		*	*	*	*	
B. Radioiodines							
1. Total Iodine-131	Curies	:	8.186E-05	5.861E-05	0.000E+00	0.000E+00	1.405E-04
2. Average Release rate for period	uCi/sec	:	1.038E-05	7.434E-06	0.000E+00	0.000E+00	1.782E-05
3. Percent of Applicable Limit	%		*	*	*	*	
C. Particulates							
1. Particulates (Half-Lives > 8 Days)	Curies	:	1.231E-05	0.000E+00	4.396E-06	6.776E-05	8.446E-05
2. Average Release rate for period	uCi/sec	:	1.561E-06	0.000E+00	5.575E-07	8.594E-06	1.071E-05
3. Percent of Applicable Limit	%		*	*	*	*	
D. Tritium							
1. Total Release	Curies	:	9.549E+00	2.049E+01	1.715E+01	1.409E+01	6.127E+01
2. Average Release rate for period	uCi/sec	:	1.211E+00	2.598E+00	2.175E+00	1.787E+00	7.772E+00
3. Percent of Applicable Limit	%		*	*	*	*	
E. Gross Alpha							
1. Total Release		:	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
2. Average Release rate for period		:	0.000E+00	0.000E+00	0.000E+00	0.000E+00	

* Applicable limits are expressed in terms of dose. Estimated total error for all values is <1.0%

2008 Table 7.4
Site Gaseous Effluents - Ground Level Releases (2008)

Reactor Unit: Site

Continuous Mode **Nuclides Released**	**Unit**	**Quarter 1**	**Quarter 2**	**Quarter 3**	**Quarter 4**	**Total**
Fission Gases						
Xe-133m	Curies	6.313E+00	7.193E+00	0.000E+00	0.000E+00	1.351E+01
Xe-133	Curies	4.759E+02	4.805E+02	0.000E+00	0.000E+00	9.564E+02
Xe-135	Curies	7.770E+00	3.783E+00	0.000E+00	0.000E+00	1.155E+01
Total For Period	Curies	4.900E+02	4.915E+02	0.000E+00	0.000E+00	9.815E+02
Iodines						
I-131	Curies	1.468E-05	5.769E-05	0.000E+00	0.000E+00	7.238E-05
Total For Period	Curies	1.468E-05	5.769E-05	0.000E+00	0.000E+00	7.238E-05
Particulates						
Co-58	Curies	0.000E+00	0.000E+00	4.396E-06	6.776E-05	7.215E-05
Total For Period	Curies	0.000E+00	0.000E+00	4.396E-06	6.776E-05	7.215E-05
Tritium						
H-3	Curies	9.476E+00	2.047E+01	1.714E+01	1.407E+01	6.115E+01
Gross Alpha						
No Nuclides Found		N/A	N/A	N/A	N/A	

2008 Table 7.4 (cont.)
Site Gaseous Effluents - Ground Level Releases (2008)

Batch Mode Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
Fission Gases						
Ar-41	Curies	1.953E-01	1.247E-01	1.858E-01	9.533E-02	6.012E-01
Kr-85m	Curies	6.613E-03	0.000E+00	2.563E-05	0.000E+00	6.639E-03
Kr-85	Curies	8.753E-01	2.041E-02	1.080E-02	4.447E-04	9.069E-01
Kr-88	Curies	0.000E+00	0.000E+00	4.353E-06	0.000E+00	4.353E-06
Xe-131m	Curies	1.649E-01	2.143E-04	0.000E+00	0.000E+00	1.651E-01
Xe-133m	Curies	2.043E-01	2.998E-06	2.996E-04	2.501E-06	2.046E-01
Xe-133	Curies	1.305E+01	5.850E-03	8.986E-03	2.255E-04	1.306E+01
Xe-135m	Curies	0.000E+00	0.000E+00	1.068E-04	0.000E+00	1.068E-04
Xe-135	Curies	4.445E-01	0.000E+00	3.191E-03	0.000E+00	4.477E-01
Total For Period	Curies	1.494E+01	1.512E-01	2.092E-01	9.600E-02	1.539E+01
Iodines						
I-131	Curies	6.718E-05	9.125E-07	0.000E+00	0.000E+00	6.809E-05
I-133	Curies	4.268E-05	0.000E+00	0.000E+00	0.000E+00	4.268E-05
Total For Period	Curies	1.099E-04	9.125E-07	0.000E+00	0.000E+00	1.108E-04
Particulates						
Cs-134	Curies	1.231E-05	0.000E+00	0.000E+00	0.000E+00	1.231E-05
Total For Period	Curies	1.231E-05	0.000E+00	0.000E+00	0.000E+00	1.231E-05
Tritium						
H-3	Curies	7.285E-02	1.564E-02	1.339E-02	1.979E-02	9.270E-02
Gross Alpha						
No Nuclides Found	Curies	N/A	N/A	N/A	N/A	

* Zeroes in this table indicate that no radioactivity was present at detectable levels.

Table 7.5
Site Liquid Effluents - Summation Of All Releases (2008)

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year
A. Fission And Activation Products						
1. Total Release (not including tritium, gases, alpha)	Curies	1.753E-03	8.541E-03	3.947E-03	9.165E-04	1.516E-02
2. Average diluted concentration during period	uCi/ml	7.271E-11	5.074E-10	2.316E-10	6.542E-11	8.771E-10
3. Percent of Applicable Limit	%	0.000022	0.000399	0.000020	0.000026	
B. Tritium						
1. Total Release	Curies	1.735E+03	2.435E+02	2.867E+02	1.608E+02	2.426E+03
2. Average diluted Concentration during period	uCi/ml	7.197E-05	1.446E-05	1.682E-05	1.148E-05	1.147E-04
3. Percent of Applicable Limit	%	0.7197	0.1446	0.1682	0.1148	
C. Dissolved and Entrained Gases						
1. Total Release	Curies	1.723E+00	6.527E-01	2.678E-02	2.092E-02	2.423E+00
2. Average diluted Concentration during period	uCi/ml	7.149E-08	3.877E-08	1.571E-09	1.493E-09	1.133E-07
3. Percent of Applicable Limit	%	0.036	0.019	0.001	0.001	
D: Gross Alpha Radioactivity						
1. Total Release		0.000E+00	0.000E+00	0.000E+00	0.000E+00	
E: Waste Vol Release (Pre-Dilution)						
	Liters	1.619E+06	9.699E+05	1.070E+06	8.957E+05	4.555E+06
F. Volume of Dilution Water Used						
	Liters	2.410E+10	1.683E+10	1.704E+10	1.401E+10	7.199E+10

Estimated total error for all values is <1.0%

Table 7.6
Site Liquid Effluents (2008)

Continuous Mode

Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year
Fission & Activation Products						
No Nuclides Found		N/A	N/A	N/A	N/A	
Tritium						
H-3	Curies	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Dissolved And Entrained Gases						
No Nuclides Found		N/A	N/A	N/A	N/A	
Gross Alpha Radioactivity		0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Batch Mode

Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year
Fission & Activation Products						
Cr-51	Curies	0.000E+00	1.561E-04	0.000E+00	0.000E+00	1.561E-04
Mn-54	Curies	4.725E-05	1.075E-05	0.000E+00	0.000E+00	5.801E-05
Fe-55	Curies	9.657E-04	7.116E-04	0.000E+00	0.000E+00	1.677E-03
Fe-59	Curies	0.000E+00	5.341E-06	0.000E+00	0.000E+00	5.341E-06
Co-57	Curies	1.564E-06	1.562E-05	1.929E-05	2.053E-06	3.852E-05
Co-58	Curies	1.790E-04	7.276E-03	3.691E-03	8.027E-04	1.195E-02
Co-60	Curies	3.676E-04	3.132E-04	2.367E-04	8.378E-05	1.001E-03
Zr-95	Curies	0.000E+00	2.116E-05	0.000E+00	1.164E-05	3.281E-05
Nb-95	Curies	0.000E+00	3.135E-05	0.000E+00	1.635E-05	4.770E-05
Sb-125	Curies	1.896E-04	0.000E+00	0.000E+00	0.000E+00	1.896E-04
I-133	Curies	1.124E-06	0.000E+00	0.000E+00	0.000E+00	1.124E-06
Sn-117m	Curies	7.549E-07	0.000E+00	0.000E+00	0.000E+00	7.549E-07
Total For Period	Curies	1.753E-03	8.541E-03	3.947E-03	9.165E-04	1.516E-02
Tritium						
H-3	Curies	1.735E+03	2.435E+02	2.867E+02	1.608E+02	2.426E+03

Table 7.6 (cont.)
Site Liquid Effluents (2008)

Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year
Dissolved And Entrained Gases						
Kr-85m	Curies	6.028E-04	0.000E+00	0.000E+00	0.000E+00	6.028E-04
Kr-85	Curies	7.966E-02	5.111E-02	2.660E-02	2.084E-02	1.782E-01
Kr-88	Curies	3.450E-04	0.000E+00	0.000E+00	0.000E+00	3.450E-04
Xe-131m	Curies	4.432E-02	1.964E-02	0.000E+00	0.000E+00	6.396E-02
Xe-133m	Curies	1.742E-02	6.805E-03	0.000E+00	0.000E+00	2.422E-02
Xe-133	Curies	1.576E+00	5.740E-01	1.845E-04	7.325E-05	2.150E+00
Xe-135	Curies	4.788E-03	1.119E-03	0.000E+00	0.000E+00	5.908E-03
Total For Period	Curies	1.723E+00	6.527E-01	2.678E-02	2.092E-02	2.423E+00
Gross Alpha Radioactivity		0	0	0	0	0

* Zeroes in this table indicate that no radioactivity was present at detectable levels

Table 7.7
Doses to a member of the public due to Liquid Releases (2008)

Cumulative Doses Per Quarter

Organ	Tech Spec Limit	Units	Quarter 1	% of Tech Spec Limit	Quarter 2	% of Tech Spec Limit	Quarter 3	% of Tech Spec Limit	Quarter 4	% of Tech Spec Limit
Total Body	1.500E+00	mRem	2.388E-02	1.592E+00	3.049E-02	2.033E+00	3.666E-02	2.444E+00	3.603E-02	6.489E-07
Bone	5.000E+00	mRem	3.249E-06	6.498E-05	2.169E-06	4.338E-05	0.000E+00	0.000E+00	3.244E-08	6.489E-07
Thyroid	5.000E+00	mRem	2.388E-02	4.776E-01	3.048E-02	6.096E-01	3.666E-02	7.332E-01	3.603E-02	7.205E-01
Kidney	5.000E+00	mRem	2.388E-02	4.776E-01	3.048E-02	6.096E-01	3.666E-02	7.332E-01	3.603E-02	7.205E-01
Liver	5.000E+00	mRem	2.388E-02	4.777E-01	3.049E-02	6.097E-01	3.666E-02	7.332E-01	3.603E-02	7.205E-01
Lung	5.000E+00	mRem	2.389E-02	4.777E-01	3.048E-02	6.096E-01	3.666E-02	7.332E-01	3.603E-02	7.205E-01
GI-Lli	5.000E+00	mRem	2.390E-02	4.779E-01	3.076E-02	6.152E-01	3.669E-02	7.338E-01	3.614E-02	7.229E-01

Cumulative Doses per Year

Organ	Tech Spec Limit	Units	Year to Ending Date	% of Tech Spec Limit	Receptor	Limit
Bone	1.000E+01	mRem	5.450E-06	5.450E-05	Liquid Receptor - Adult	Liq Annual Organ Dose
Liver	1.000E+01	mRem	1.271E-01	1.271E+00	Liquid Receptor - Adult	Liq Annual Organ Dose
Thyroid	1.000E+01	mRem	1.270E-01	1.270E+00	Liquid Receptor - Adult	Liq Annual Organ Dose
Kidney	1.000E+01	mRem	1.270E-01	1.270E+00	Liquid Receptor - Adult	Liq Annual Organ Dose
Lung	1.000E+01	mRem	1.271E-01	1.271E+00	Liquid Receptor - Adult	Liq Annual Organ Dose
GI-Lli	1.000E+01	mRem	1.275E-01	1.275E+00	Liquid Receptor - Adult	Liq Annual Organ Dose
Total Body	3.000E+00	mRem	1.271E-01	4.235E+00	Liquid Receptor - Adult	Liq Annual TB Dose

Total Dilution Volume for Quarter 1 : 2.410E+10
Total Dilution Volume for Quarter 2 : 1.683E+10
Total Dilution Volume for Quarter 3 : 1.704E+10
Total Dilution Volume for Quarter 4 : 1.401E+10

Table 7.8
Air Doses Due To Gaseous Releases – Site (2008)

Cumulative Doses Per Quarter

Type of Radiation	Tech Spec Limit	Units	Quarter 1	% of Tech Spec Limit	Quarter 2	% of Tech Spec Limit	Quarter 3	% of Tech Spec Limit	Quarter 4	% of Tech Spec Limit
Gamma	5.000E+00	mRad	2.013E-02	4.026E-01	1.888E-02	3.775E-01	1.818E-04	3.637E-03	9.278E-05	1.856E-03
Beta	1.000E+01	mRad	5.712E-02	5.712E-01	5.493E-02	5.493E-01	6.784E-05	6.784E-04	3.283E-05	3.283E-04

Cumulative Doses Per Year

Type of Radiation	Tech Spec Limit	Units	Year to End Date	% of Tech Spec Limit	Receptor	Limit
Gamma	1.000E+01	mRad	3.928E-02	3.928E-01	Gas Receptor SB - Adult	NG Annual Gamma Air Dose
Gamma	1.000E+01	mRad	3.928E-02	3.928E-01	Gas Receptor SB - Teen	NG Annual Gamma Air Dose
Gamma	1.000E+01	mRad	3.928E-02	3.928E-01	Gas Receptor SB - Child	NG Annual Gamma Air Dose
Gamma	1.000E+01	mRad	3.928E-02	3.928E-01	Gas Receptor SB - Infant	NG Annual Gamma Air Dose
Gamma	1.000E+01	mRad	3.928E-02	3.928E-01	Gas Receptor MI - Adult	NG Annual Gamma Air Dose
Gamma	1.000E+01	mRad	3.928E-02	3.928E-01	Gas Receptor MI - Teen	NG Annual Gamma Air Dose
Gamma	1.000E+01	mRad	3.928E-02	3.928E-01	Gas Receptor MI - Child	NG Annual Gamma Air Dose
Gamma	1.000E+01	mRad	3.928E-02	3.928E-01	Gas Receptor MI - Infant	NG Annual Gamma Air Dose
Beta	2.000E+01	mRad	1.121E-01	5.607E-01	Gas Receptor SB - Adult	NG Annual Beta Air Dose
Beta	2.000E+01	mRad	1.121E-01	5.607E-01	Gas Receptor SB - Teen	NG Annual Beta Air Dose
Beta	2.000E+01	mRad	1.121E-01	5.607E-01	Gas Receptor SB - Child	NG Annual Beta Air Dose
Beta	2.000E+01	mRad	1.121E-01	5.607E-01	Gas Receptor SB - Infant	NG Annual Beta Air Dose
Beta	2.000E+01	mRad	1.121E-01	5.607E-01	Gas Receptor MI - Adult	NG Annual Beta Air Dose
Beta	2.000E+01	mRad	1.121E-01	5.607E-01	Gas Receptor MI - Teen	NG Annual Beta Air Dose
Beta	2.000E+01	mRad	1.121E-01	5.607E-01	Gas Receptor MI - Child	NG Annual Beta Air Dose
Beta	2.000E+01	mRad	1.121E-01	5.607E-01	Gas Receptor MI - Infant	NG Annual Beta Air Dose

Table 7.9
Doses to A Member Of The Public Due To Radioiodines, Tritium, and Particulates in Gaseous Releases (2008)

Cumulative Doses Per Quarter

Organ	Tech Spec Limit	Units	Quarter 1	% of Tech Spec Limit	Quarter 2	% of Tech Spec Limit	Quarter 3	% of Tech Spec Limit	Quarter 4	% of Tech Spec Limit
Skin	7.500E+00	mRem	1.062E-04	1.416E-03	1.297E-06	1.730E-05	2.067E-06	2.756E-05	3.186E-05	4.248E-04
Bone	7.500E+00	mRem	2.420E-03	3.227E-02	3.720E-04	4.961E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GI-Lli	7.500E+00	mRem	1.343E-02	1.790E-01	2.875E-02	3.833E-01	2.406E-02	3.207E-01	1.980E-02	2.640E-01
Lung	7.500E+00	mRem	1.365E-02	1.820E-01	2.873E-02	3.831E-01	2.405E-02	3.207E-01	1.976E-02	2.635E-01
Kidney	7.500E+00	mRem	1.454E-02	1.939E-01	2.904E-02	3.872E-01	2.405E-02	3.207E-01	1.976E-02	2.634E-01
Liver	7.500E+00	mRem	1.597E-02	2.129E-01	2.892E-02	3.856E-01	2.405E-02	3.207E-01	1.976E-02	2.635E-01
Thyroid	7.500E+00	mRem	2.127E-01	2.835E+00	1.664E-01	2.219E+00	1.870E-02	2.494E-01	1.536E-02	2.048E-01
Total Body	7.500E+00	mRem	1.412E-02	1.883E-01	2.884E-02	3.845E-01	2.406E-02	3.208E-01	1.980E-02	2.641E-01

Cumulative Doses per Year

Organ	Tech Spec Limit	Units	Year to Ending Date	% of Tech Spec Limit	Receptor	Limit
Skin	1.500E+01	mRem	1.414E-04	9.429E-04	Gas Receptor SB - Adult	Gas Annual Organ Dose
Skin	1.500E+01	mRem	1.414E-04	9.429E-04	Gas Receptor SB - Teen	Gas Annual Organ Dose
Liver	1.500E+01	mRem	8.870E-02	5.914E-01	Gas Receptor SB - Child	Gas Annual Organ Dose
Total Body	1.500E+01	mRem	8.682E-02	5.788E-01	Gas Receptor SB - Child	Gas Annual Organ Dose
Kidney	1.500E+01	mRem	8.740E-02	5.826E-01	Gas Receptor SB - Child	Gas Annual Organ Dose
Lung	1.500E+01	mRem	8.620E-02	5.746E-01	Gas Receptor SB - Child	Gas Annual Organ Dose
GI-Lli	1.500E+01	mRem	8.603E-02	5.735E-01	Gas Receptor SB - Child	Gas Annual Organ Dose
Skin	1.500E+01	mRem	1.414E-04	9.429E-04	Gas Receptor SB - Child	Gas Annual Organ Dose
Bone	1.500E+01	mRem	2.792E-03	1.861E-02	Gas Receptor SB - Infant	Gas Annual Organ Dose
Thyroid	1.500E+01	mRem	4.132E-01	2.754E+00	Gas Receptor SB - Infant	Gas Annual Organ Dose
Skin	1.500E+01	mRem	1.414E-04	9.429E-04	Gas Receptor SB - Infant	Gas Annual Organ Dose
Skin	1.500E+01	mRem	1.414E-04	9.429E-04	Gas Receptor MI - Adult	Gas Annual Organ Dose
Skin	1.500E+01	mRem	1.414E-04	9.429E-04	Gas Receptor MI - Teen	Gas Annual Organ Dose

Table 7.9 (cont)
Doses to A Member Of The Public Due To Radioiodines, Tritium, and Particulates in Gaseous Releases (2008)

Cumulative Doses per Year (cont.)

Organ	Tech Spec Limit	Units	Year to Ending Date	% of Tech Spec Limit	Receptor	Limit
Liver	1.500E+01	mRem	8.870E-02	5.914E-01	Gas Receptor MI - Child	Gas Annual Organ Dose
Total Body	1.500E+01	mRem	8.682E-02	5.788E-01	Gas Receptor MI - Child	Gas Annual Organ Dose
Kidney	1.500E+01	mRem	8.740E-02	5.826E-01	Gas Receptor MI - Child	Gas Annual Organ Dose
Lung	1.500E+01	mRem	8.620E-02	5.746E-01	Gas Receptor MI - Child	Gas Annual Organ Dose
GI-Lli	1.500E+01	mRem	8.603E-02	5.735E-01	Gas Receptor MI - Child	Gas Annual Organ Dose
Skin	1.500E+01	mRem	1.414E-04	9.429E-04	Gas Receptor MI - Child	Gas Annual Organ Dose
Bone	1.500E+01	mRem	2.792E-03	1.861E-02	Gas Receptor MI - Infant	Gas Annual Organ Dose
Thyroid	1.500E+01	mRem	4.132E-01	2.754E+00	Gas Receptor MI - Infant	Gas Annual Organ Dose
Skin	1.500E+01	mRem	1.414E-04	9.429E-04	Gas Receptor MI - Infant	Gas Annual Organ Dose

TABLE 7.10
SOLID RADWASTE AND IRRADIATED FUEL SHIPMENTS -2008

A. Solid Waste Shipped Offsite for Burial or Disposal (Not Irradiated Fuel)

1. **Type of Waste**	Shipped M^3	Shipped Ci	Buried m^3	Buried Ci	Percent Error
a. Spent resins/filters	1.95E+01	3.83E+02	3.52E+00	5.43E+02	25%
b. Dry active waste	3.42E+02	3.16E-01	3.71E+01	1.52E+01	25%
c. Irradiated components	-0-	-0-	-0-	-0-	N/A
d. Other (oil/miscellaneous liquids sent to processor for volume reduction)	-0-	-0-	-0-	-0-	N/A
TOTAL	3.62E+02	3.83E+02	4.06E+01	5.59E+02	25%

Note: Shipped volumes and curies are not always equal to the buried volumes and curies since some disposal occurs outside the twelve month time period in which shipments occurred.

Dry active waste also includes some low-level radioactive resins tank sediments and filters that are handled and processed in a manner that is consistent with this waste stream.

2. **Estimate of Major Nuclide Composition (by type of waste)**	Nuclide	% Abund.	Activity (Ci)
a. Spent resins/filters	Fe-55	34.50	1.32E+02
	NI-63	23.88	9.14E+01
	CS-137	10.49	4.01E+01
	Co-58	9.20	3.52E+01
	Co-60	8.79	3.36E+01
	Cs-134	8.02	3.07E+01
	H-3	2.23	8.52E+00
	MN-54	1.77	6.77E+00
	C-14	0.14	5.27E-01
	Tc-99	LLD	-0-
	I-129	LLD	-0-
	Other*	0.98	3.76E+00
	Total	100.00	3.3.83E+02

Nuclides representing <1% of total shipped activity: Cr-51,Co-57,Fe-59,Zn-65,Sr-90,Zr-95,Nb-95,Ag-110m,Sn-113,Sn-117m,Sb-122,SB-124,Sb-125,I-131,Cs-136,Ba-140,Ce-144,Pu-238,Pu-239/240,Pu-241,Am-241,Cm-242,Cm-243/244.

TABLE 7.10 (Cont)
SOLID RADWASTE AND IRRADIATED FUEL SHIPMENTS -2008

2. **Estimate of Major Nuclide Composition (by type of waste)**	Nuclide	% Abund.	Activity (Ci)
b. Dry active waste	Fe-55	58.25	1.84E-01
	Ni-63	17.30	5.47E-02
	Co-60	17.05	5.39E-02
	Co-58	2.89	9.13E-03
	CR-51	1.57	4.96E-03
	H-3	0.27	8.59E-04
	C-14	LLD	-0-
	Tc-99	LLD	-0-
	I-129	LLD	-0-
	Other*	2.67	8.47E-03
	Total	100.00	3.16E-01

Nuclides representing <1% of total shipped activity: Mn-54,Co-57,Nb-95,ZR-95,Sb-125,Cs-134,Cs-137,Ce-144,Pu-238,Pu-239/240,Am-241,Cm-242,Cm-243/244.

2. **Estimate of Major Nuclide Composition (by type of waste)**	Nuclide	% Abund.	Activity (Ci)
d. Other (oil/miscellaneous liquids sent to processor for volume reduction)	-0-	-0-	-0-

TABLE 7.13 (Cont)
SOLID RADWASTE AND IRRADIATED FUEL SHIPMENTS -2008

3. Solid Waste Disposition (Mode of Transportation: Truck)				
Waste Type	Waste Class	Container Type	Number of Shipments	Destination
a. Resin/filters	A	Poly HIC*	1	Studsvik Erwin, TN
	B	Poly HIC*	3	Studsvik Erwin, TN
	C	Poly HIC*	1	Studsvik Erwin, TN
b. Dry active waste	A	General Design	5	Energy Solutions Oak Ridge, TN

* High Integrity Container

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

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

ATTACHMENT 8.1
2008 Meterological
Joint Frequency Table

REG. Guide 1.21 Joint Frequency Table

LUMINANT

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 1-JAN-2008 00:00 to 31-DEC-2008 23:59

STABILITY CLASS A

ELEVATION: 10m.

WIND DIRECTION	Wind Speed (mph) at 10 m. level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N							
NNE							
NE							
ENE							
E							
ESE							
SE							
SSE				9	3		12
S				1	1		2
SSW		2					2
SW							
WSW		1					1
W							
WNW							
NW							
NNW							
VARIABLE							
TOTAL		3		10	4		
Periods of calm							
Hours of missing data:							

REG. Guide 1.21 Joint Frequency Table

LUMINANT

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 1-JAN-2008 00:00 to 31-DEC-2008 23:59

STABILITY CLASS B

ELEVATION: 10m.

WIND DIRECTION	Wind Speed (mph) at 10 m. level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N							
NNE							
NE							
ENE							
E							
ESE							
SE							
SSE							
S					1		1
SSW							
SW							
WSW							
W							
WNW							
NW							
NNW							
VARIABLE							
TOTAL					1		
Periods of calm							
Hours of missing data:							

REG. Guide 1.21 Joint Frequency Table

LUMINANT

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 1-JAN-2008 00:00 to 31-DEC-2008 23:59

STABILITY CLASS C

ELEVATION: 10m.

WIND DIRECTION	Wind Speed (mph) at 10 m. level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N							
NNE							
NE							
ENE		1					1
E							
ESE							
SE							
SSE							
S							
SSW							
SW							
WSW							
W							
WNW							
NW							
NNW				1			1
VARIABLE							
TOTAL		1		1			
Periods of calm							
Hours of missing data:							

REG. Guide 1.21 Joint Frequency Table

LUMINANT

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 1-JAN-2008 00:00 to 31-DEC-2008 23:59

STABILITY CLASS D

ELEVATION: 10m.

WIND DIRECTION	Wind Speed (mph) at 10 m. level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	3	26	79	68	14		190
NNE		17	20	4	1		42
NE		17	35	9			61
ENE		19	48	4			71
E	1	56	54	1	1		113
ESE	1	71	159	48	1		280
SE	2	46	206	202	21		477
SSE	2	51	231	400	180	35	899
S	2	57	172	174	76	5	486
SSW	4	30	60	46	1		141
SW	2	56	54	18	2		132
WSW	3	38	16	8	1		66
W	3	41	18	9	4	1	76
WNW	3	40	36	51	20	9	159
NW	5	46	77	141	105	18	392
NNW	1	56	147	203	97	12	516
VARIABLE							
TOTAL	32	667	1412	1386	524	80	
Periods of calm							2
Hours of missing data:							

REG. Guide 1.21 Joint Frequency Table

LUMINANT

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 1-JAN-2008 00:00 to 31-DEC-2008 23:59

STABILITY CLASS E

ELEVATION: 10m.

WIND DIRECTION	Wind Speed (mph) at 10 m. level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	3	26	58	23	5		115
NNE	1	10	20	4	1		36
NE		18	26	1			45
ENE		38	33	1			72
E	5	178	37	1			221
ESE	8	255	241	14			518
SE	5	215	470	159	19	2	870
SSE	6	122	319	234	39		720
S	10	120	111	64	10	1	316
SSW	11	80	72	16			179
SW	14	65	44	13	2	1	139
WSW	10	64	33	8	2		117
W	13	56	34	19	4	1	127
WNW	19	70	93	43	9	4	238
NW	8	64	55	54	21	2	204
NNW	6	48	114	50	10	4	232
VARIABLE							
TOTAL	119	1429	1760	704	122	15	
Periods of calm							22
Hours of missing data:							

REG. Guide 1.21 Joint Frequency Table

LUMINANT

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 1-JAN-2008 00:00 to 31-DEC-2008 23:59

STABILITY CLASS F

ELEVATION: 10m.

WIND DIRECTION	Wind Speed (mph) at 10 m. level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N		1					1
NNE							
NE							
ENE							
E		2					2
ESE	1	4	1				6
SE	2	7	5				14
SSE	3	13	3				19
S	8	25	18				51
SSW	7	51	8				66
SW	3	36	14				53
WSW	8	46	4				58
W	8	23	2				33
WNW	3	36	4				43
NW		9	2				11
NNW							
VARIABLE							
TOTAL	43	253	61				
Periods of calm							
Hours of missing data:							

REG. Guide 1.21 Joint Frequency Table

LUMINANT

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 1-JAN-2008 00:00 to 31-DEC-2008 23:59

STABILITY CLASS G

ELEVATION: 10m.

WIND DIRECTION	Wind Speed (mph) at 10 m. level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N							
NNE							
NE							
ENE							
E							
ESE							
SE							
SSE							
S							
SSW		2					2
SW		7					7
WSW		6					6
W		3					3
WNW		1					1
NW							
NNW							
VARIABLE							
TOTAL		19					
Periods of calm							
Hours of missing data:							

REG. Guide 1.21 Joint Frequency Table

LUMINANT

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 1-JAN-2008 00:00 to 31-DEC-2008 23:59

STABILITY CLASS ALL Stability Classes

ELEVATION: 10m.

WIND DIRECTION	Wind Speed (mph) at 10 m. level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	6	53	137	91	19		306
NNE	1	27	40	8	2		78
NE		35	61	10			106
ENE		58	81	5			144
E	6	236	91	2	1		336
ESE	10	330	401	62	1		804
SE	9	268	681	361	40	2	1361
SSE	11	186	553	643	222	35	1650
S	20	202	301	239	88	6	856
SSW	22	165	140	62	1		390
SW	19	164	112	31	4	1	331
WSW	21	155	53	16	3		248
W	24	123	54	28	8	2	239
WNW	25	147	133	94	29	13	441
NW	13	119	134	195	126	20	607
NNW	7	104	261	254	107	16	749
VARIABLE							
TOTAL	194	2372	3233	2101	651	95	
Periods of calm							24
Hours of missing data:		SC 124 hrs		WD 68 hrs		WS 59 hrs	
Total Percent Recovery		SC 98.6%	WD 99.2%	WS 99.3%		**Overall 98.0%**	