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Ref. # Tech. Spec. 5.6.3
10CFR50.36a

April 28, 2016

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT
DOCKET NOS. 50-445 AND 50-446
TRANSMITTAL OF YEAR 2015 RADIOACTIVE EFFLUENT RELEASE REPORT

Dear Sir or Madam:

In accordance with Comanche Peak Nuclear Power Plant Units 1 and 2 Technical Specifications (TS) 5.6.3 and Section 6.9.1.4 of the Comanche Peak Offsite Dose Calculation Manual (ODCM), enclosed is the Radioactive Effluent Release Report which covers the reporting period from January 1, 2015 through December 31, 2015.

The tabular summaries of radioactive liquid and gaseous releases are provided in the format defined in Appendix B of Regulatory Guide 1.21, Rev. 1, dated June, 1974.

During this reporting period there were no revisions to the ODCM.

If there are any questions regarding this report, please contact Steve Dixon at (254) 897-5482 or Kerry Cooper at (254) 897-0462.

Sincerely,

Luminant Generation Company LLC

Kenneth J. Peters

By: _____
Thomas P. McCool
Site Vice President

IE48
NRR

Enclosures - 1. Comanche Peak 2015 Radioactive Effluent Release Report

c - M. L. Dapas, Region IV
K. M. Kennedy, Region IV
M. Watford, NRR
Resident Inspectors, Comanche Peak

Enclosure 1

Comanche Peak 2015 Radioactive Effluent Release Report

CPNPP

Comanche Peak Nuclear Power Plant

2015 RADIOACTIVE EFFLUENT RELEASE REPORT

January 1, 2015 - December 31, 2015

Prepared By: Don Rebstock Date 4/20/16

Reviewed By: Dave Valentine Date 4/20/16

Approved By (Print/Signature): Kerry Cooper / Kerry E. Cooper Date 4/20/16
Chemistry Manager

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ACRONYMS AND ABBREVIATIONS

CFR	Code of Federal Regulations
CPNPP	Comanche Peak Nuclear Power Plant
ECL	Effluent Concentration Limit
IFSFI	Independent Spent Fuel Storage Installation
LDCR	Licensing Document Change Request
LHMT	Laundry Holdup and Monitor Tanks
LVW	Low Volume Waste
ODCM	Offsite Dose Calculation Manual
PET	Primary Effluent Tanks
pCi	Pico-Curie
REC	Radiological Effluent Control
SORC	Station Operations Review Committee
uCi	Micro-Curie
WMT	Waste Monitor Tanks
WWHT	Waste Water Holdup Tanks

1.0 Introduction

This Radioactive Effluent Release Report, for Comanche Peak Nuclear Power Plant (CPNPP) 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, 2015, through December 31, 2015. The data in this report was calculated in accordance with the CPNPP ODCM using the Canberra OpenEMS software.

1.1 Executive Summary

The radioactive effluent monitoring program for the calendar year 2015 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).

In June 2009, the NRC provided revised guidance in Regulatory Guide 1.21, *Measuring, Evaluating and Reporting Radioactive Material in Liquid and Gaseous Effluents and Solid Waste, Revision 2*, establishing an updated approach for identifying principal radionuclides. Because the overall quantity of radioactive releases has steadily decreased due to improvements in power plant operations, carbon 14 (C-14) now qualifies as a "principal radionuclide" (anything greater than one percent of overall radioactivity in effluents) under federal regulations at many plants. In other words, C-14 has not increased and C-14 is not a new nuclear plant emission. Rather, the improvements in the mitigation of other isotopes have made C-14 more prominent. Attachment 10.3 on page 50 provides more detail about C-14.

Gaseous Effluents:

A summary of all the radioactive gaseous releases to the environment during 2015:

Gaseous Waste	2014	2015	Comments
Tritium	30.1 Ci	38.2 Ci	1
C-14 Activity	23.45 Ci	25.31 Ci	
Total Fission and Activation Activity	0.49 Ci	0.55 Ci	
Total Particulate Activity	3.72 E-06 Ci	0 Ci	2
Gross Alpha Activity	0 Ci	0 Ci	2
Iodine Activity	0 Ci	0 Ci	2
Calculated Gamma Air Dose	4.05E-04 mRad	3.71E-04 mRad	
Calculated Beta Air Dose	1.53 E-04 mRad	1.62E-04 mRad	
Total Whole body dose	0.09 mRem	0.10 mRem	

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 are related to the type of fuel used (i.e., 18-month fuel) the core life, power output, and number of core cycles. The small increase from 2014 to 2015 is within the historical statistical variation.
2. No particulate, Iodine, or alpha activity was released.

Overall the gaseous radioactivity releases from CPNPP are well controlled and maintained ALARA. CPNPP is well below all applicable limits for gaseous releases. Neither unit had fuel defects during 2015.

Liquid Effluents:

A summary of all the radioactive liquid releases to the environment during 2015:

Liquid Waste	2014	2015	Comments
Total Activity (excluding tritium)	8.61E-4 Ci	1.83E-3 Ci	2
Tritium Activity	2080 Ci	1950 Ci	1
Total Whole Body Dose	0.182 mRem	0.189 mRem	2
Total Volume Released	929,987 gal	665,178 gal	1

Comments

1. There was 1 refueling outage in 2015.
2. Although the total curies released are slightly higher in 2015, the specific isotopes released in 2014 have higher dose factors. Therefore, the dose for 2015 is approximately the same as the 2014 dose.

Meteorological Data

The CPNPP meteorological system achieved a greater than 97% mean recoverable data rate for the joint frequency parameters required by Regulatory Guide 1.23 for wind speed, wind direction and delta temperature. See section 7.1 for the actual recovery percentages.

Monitors OOS > 30 Days

During 2015 there were no Technical Specification/ODCM effluent radiation monitors out of service for >30 days.

ODCM Changes

There were no changes made to the ODCM during 2015.

Solid Waste

Summary of the solid waste production

Total Waste	2014	2015	% Error
Shipped (m^3)	343	316	25%
Shipped (Ci)	608	52.1	25%
Buried (m^3)	38.7	44.5	25%
Buried (Ci)	608	52.1	25%

Comments

In 2015 CPNPP continued to ship and bury stored Class B and Class C wastes at the compact disposal facility in Andrews, Texas. Buried volume during 2015 is lower reflecting Class A waste associated with a single outage and these wastes represent an order of magnitude more volume than Class B and Class C wastes packaged in about 3 cubic meter containers.

Groundwater Tritium

Sentinel Well location CP-A near the Water Plant and Monitor Well 11 (which is directly down gradient from CP-A) continued showing intermittent positive results for tritium. In 2013, the source of the tritium was from a leaking pipe that goes from the Water Treatment Plant and Microfiltration Building sumps to the Low Volume Waste (LVW) Pond. The leaking pipe has been repaired. However, in 2015, the water treatment plant's Filter Water Storage Tank's (FWST) lining began leaking treated Squaw Creek Reservoir (SCR) water. Because SCR water contains a low background tritium concentration, SCR water that leaks from the plant will contain a similar concentration of tritium. All of these samples were well below the state drinking water reportable criterion of 20,000 pCi/L and the environmental reportable criterion of 30,000 pCi/L.

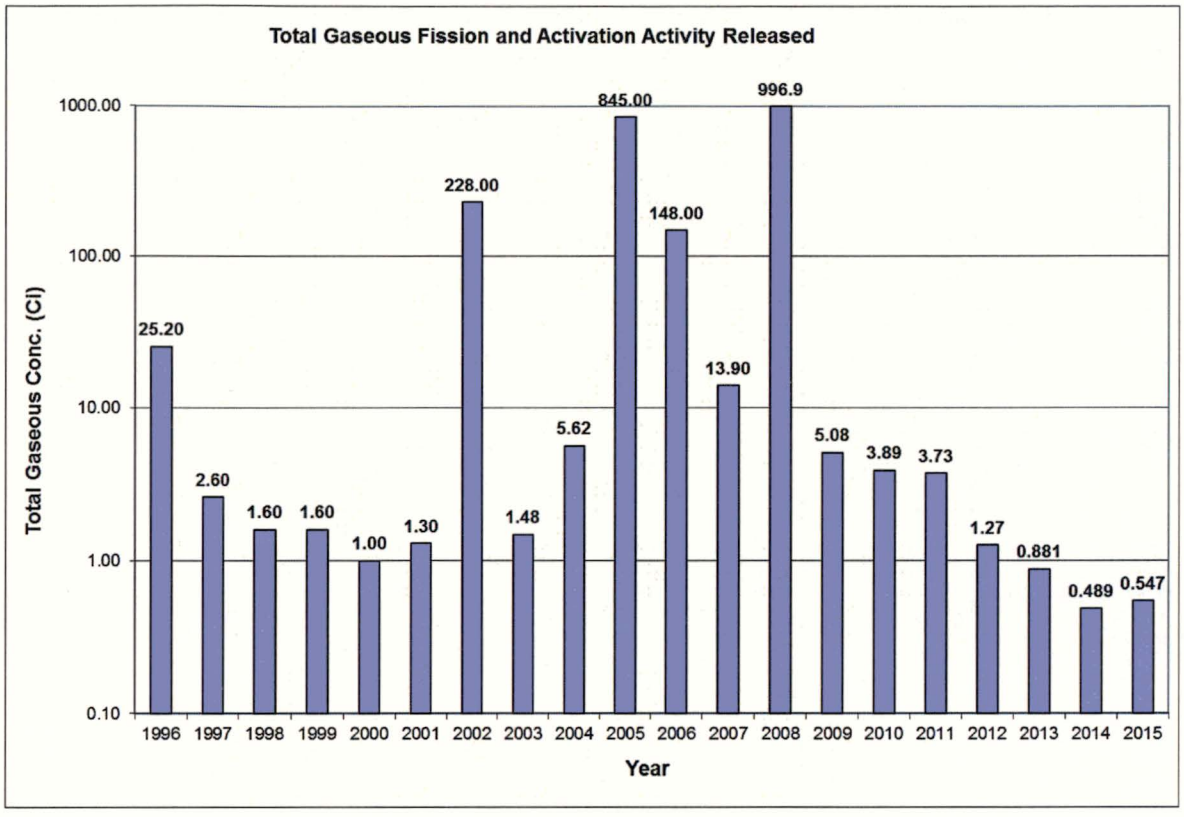
All other monitoring well samples during 2015 were < Minimum Detectable Activity (MDA) for tritium.

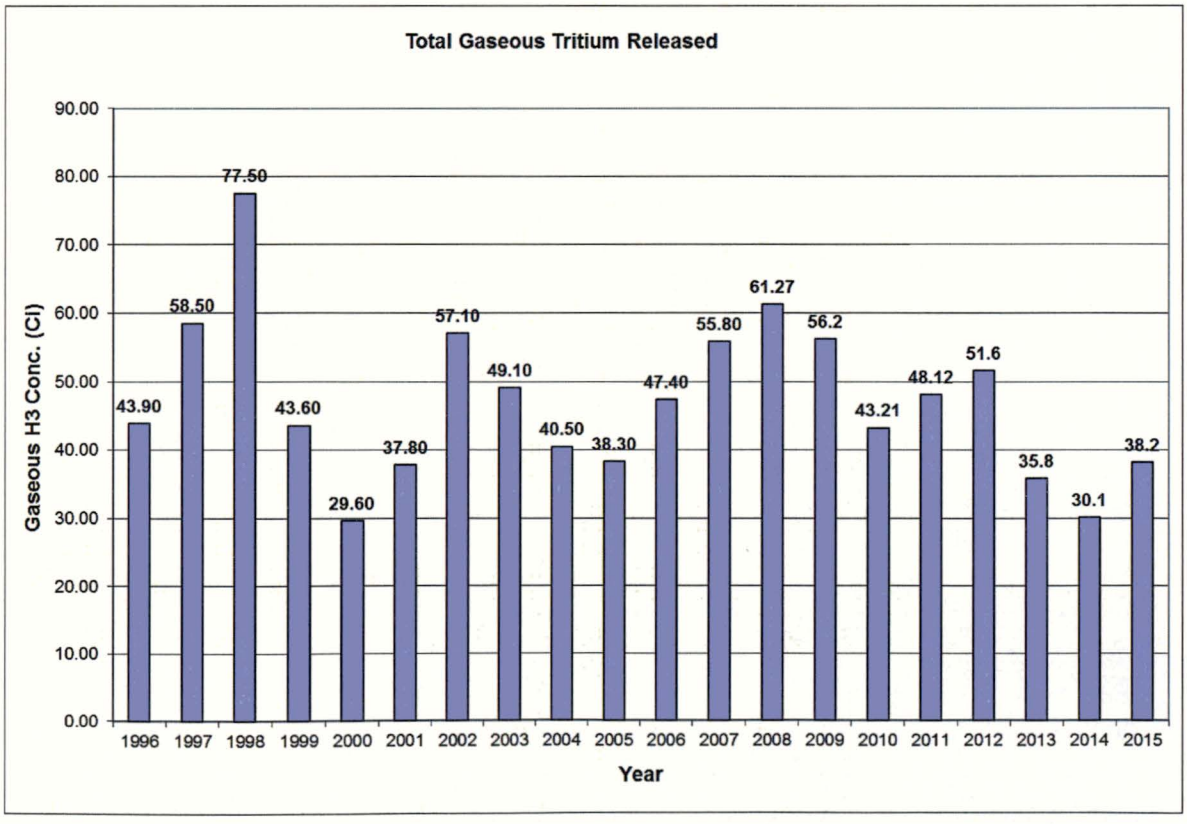
See section 8.8 for details.

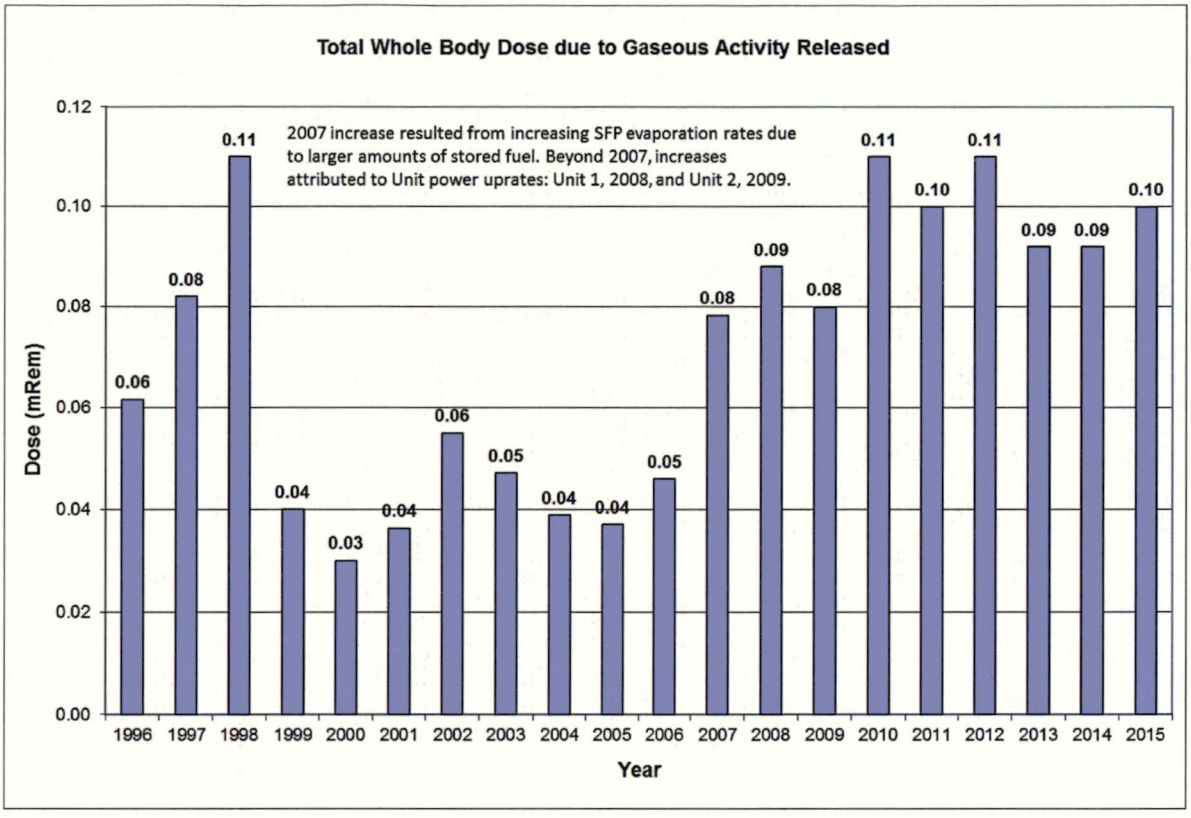
Conclusion

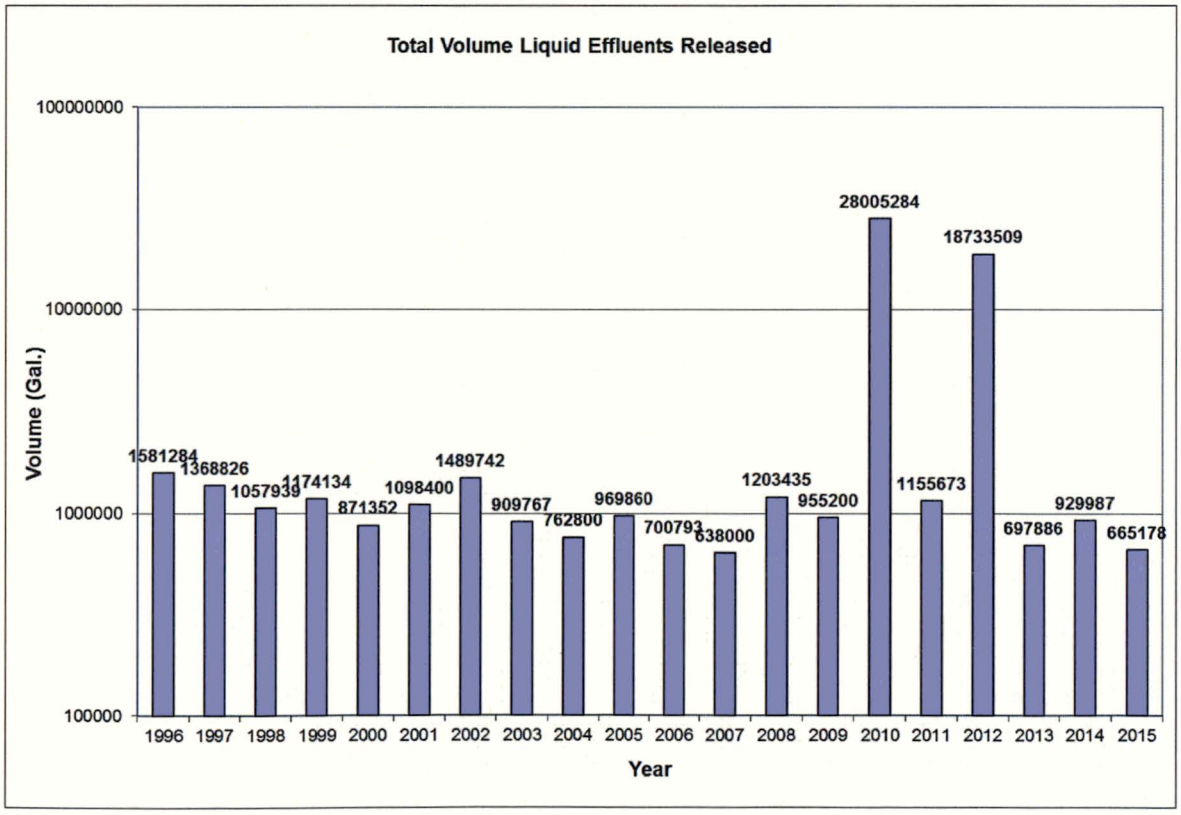
Overall, the radioactive effluent monitoring program has been conducted in an appropriate manner to ensure the activity released and associated dose to the public has been maintained as low as reasonably achievable (ALARA).

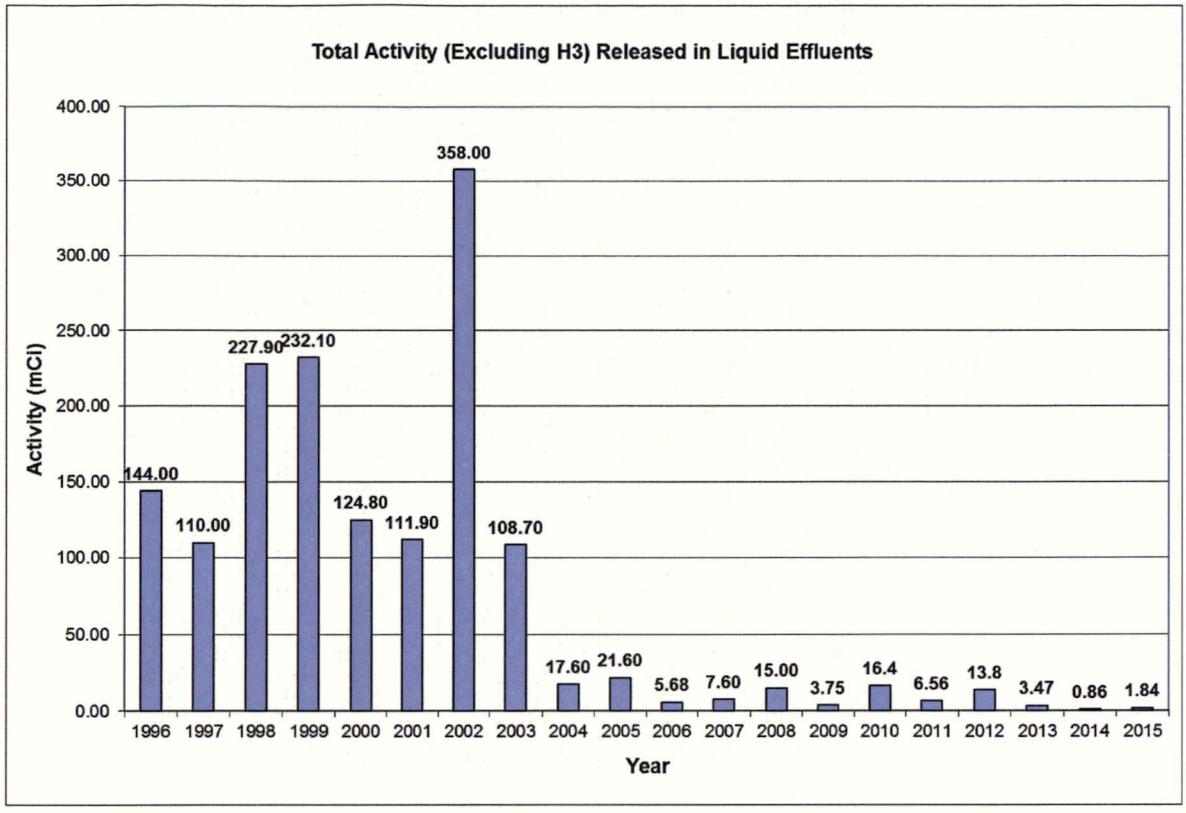
1.2 Historical Trend Graphs

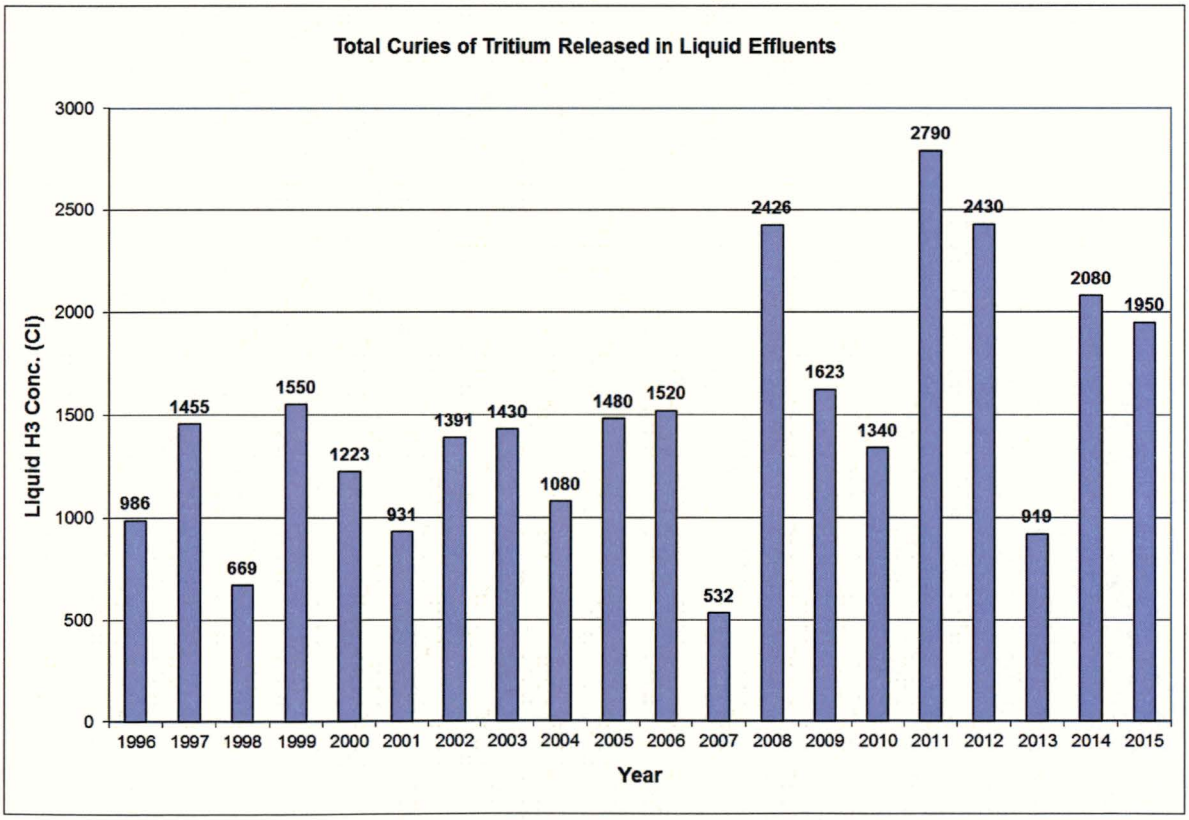


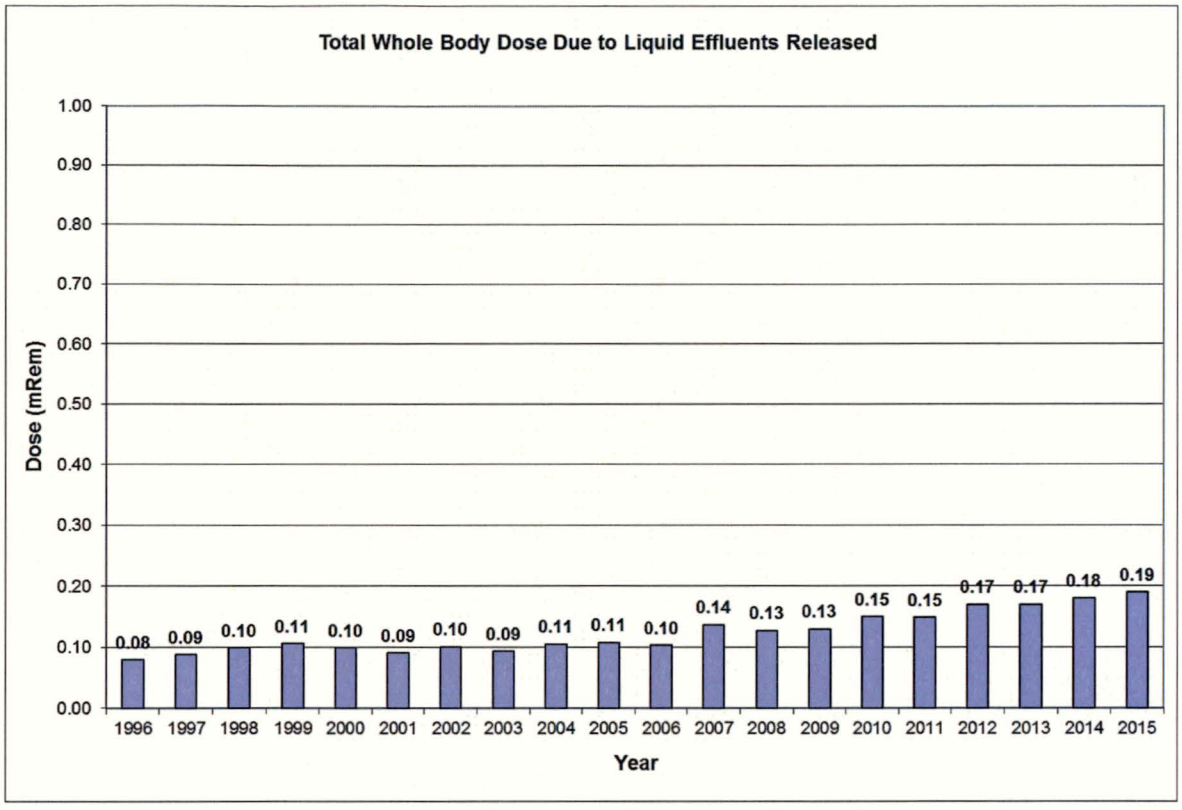


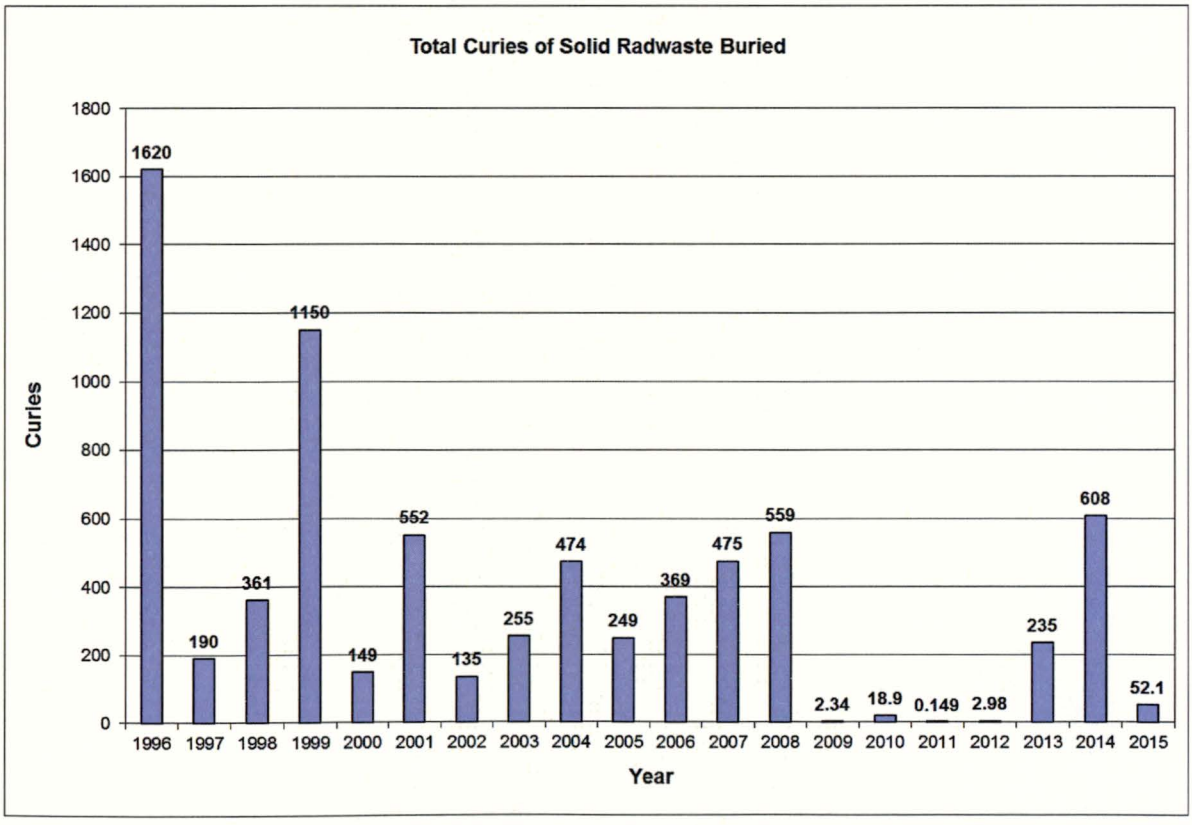

Total Whole Body Dose due to Gaseous Activity Released
2007 increase resulted from increasing SFP evaporation rates due to larger amounts of stored fuel. Beyond 2007, increases attributed to Unit power uprates: Unit 1, 2008, and Unit 2, 2009.
Dose (mRem)
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0.06
0.08
0.11
0.04
0.03
0.04
0.06
0.05
0.04
0.04
0.05
0.08
0.09
0.08
0.11
0.10
0.11
0.09
0.09
0.10
1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Year

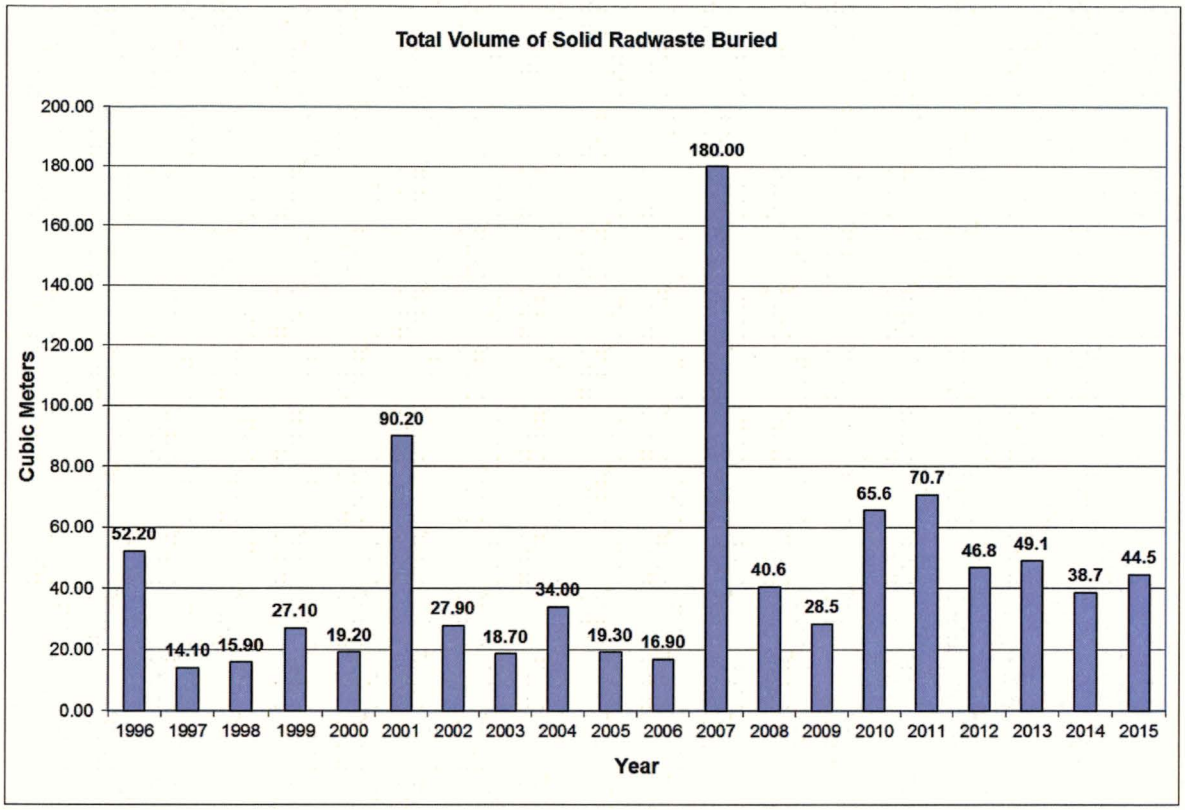

Total Volume Liquid Effluents Released
Volume (Gal.)
100000000
10000000
1000000
100000
1581284
1368826
1057939
1174134
871352
1098400
1489742
909767
762800
969860
700793
638000
1203435
955200
28005284
1155673
18733509
697886
929987
665178
1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Year


Total Activity (Excluding H3) Released in Liquid Effluents
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
3.75
16.4
6.56
13.8
3.47
0.86
1.84
1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Year


Total Curies of Tritium Released in Liquid Effluents
Liquid H3 Conc. (Ci)
3000
2500
2000
1500
1000
500
0
986
1455
669
1550
1223
931
1391
1430
1080
1480
1520
532
2426
1623
1340
2790
2430
919
2080
1950
1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Year


Total Whole Body Dose Due to Liquid Effluents Released
Dose (mRem)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
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 0.13 0.15 0.15 0.17 0.17 0.18 0.19
1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Year


Total Curies of Solid Radwaste Buried
Curies
1800
1600
1400
1200
1000
800
600
400
200
0
1620 190 361 1150 149 552 135 255 474 249 369 475 559 2.34 18.9 0.149 2.98 235 608 52.1
1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Year


Total Volume of Solid Radwaste Buried
Cubic 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
28.5
65.6
70.7
46.8
49.1
38.7
44.5
1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
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 mRem/yr to the whole body and less than or equal to 3000 mRem/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 mRad for gamma radiation and less than or equal to 10 mRad for beta radiation, and

b. During any calendar year: Less than or equal to 10 mRad for gamma radiation and less than or equal to 20 mRad 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 mRem to any organ, and

b. During any calendar year: Less than or equal to 15 mRem 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 mRem to the whole body and to less than or equal to 5 mRem to any organ, and

2.1.3 **b**. During any calendar year to less than or equal to 3 mRem to the whole body and to less than or equal to 10 mRem 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:

$$(264/V) \bullet \Sigma_j A_j/C_j < 1.0$$

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 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 mRem to the whole body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mRem.

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. 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, Fe-55, and Ni-63 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. 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, Fe-55, and Ni-63 by a contract laboratory.

2.3.2 Gaseous Radioactive Effluents

Each gaseous batch release was sampled and analyzed for radioactivity prior to release. Waste Gas Decay Tank samples were analyzed for gamma emitting radionuclides. Containment Building charcoal (iodine), particulate, noble gas, and tritium grab samples were also analyzed for radioactivity 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. Samples were analyzed for gamma emitting radionuclides by gamma spectroscopy and liquid scintillation counting techniques. 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.

C-14 was estimated in accordance with the methodology in the EPRI report *Estimation of Carbon-14 in Nuclear Power Plant Gaseous Effluents.* EPRI, Palo Alto, CA: 2010, 1021106. See attachment 10.3 on page 50 for more information on C-14.

2.4 Batch Releases

A summary of information for liquid and gaseous batch releases is included in Table 9.1.

2.5 Abnormal or Unplanned Releases

Abnormal or unplanned releases are defined as the unintended discharge of a volume of liquid or airborne radioactivity to the environment. There was one normal, unplanned gaseous effluent monitored release and no abnormal or unplanned liquid effluent releases during 2015. Refer to CR-2015-001594 and gas release permit G2015-031. A brief description of the normal, unplanned gas release is in section 8.5.1 of this report.

3.0 GASEOUS EFFLUENTS

The quantities of radioactive material released in gaseous effluents are summarized in Tables 9.3 and 9.4. 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 9.5 and 9.6.

5.0 SOLID WASTES

The quantities of radioactive material released as solid effluents are summarized in Table 9.10.

6.0 RADIOLOGICAL IMPACT ON MAN

6.1 Dose Due to Liquid Effluents

The dose 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 9.7.

6.2 Dose 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 9.8.

6.3 Dose Due to Radioiodines, Tritium and Particulates

The dose to an adult, teen, child, and infant from radio-iodines 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 9.9. Because of pathway similarity, C-14 dose is included in this table.

6.4 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 dose exceed two times the applicable quarterly or annual dose limits. At no time during 2015 were any of these limits exceeded, therefore no evaluations are required.

6.5 Dose 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 3.28E-03 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 circulation water discharge into the reservoir.

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.

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

7.0 METEROLOGICAL DATA

7.1 Meteorological Monitoring Program

In accordance with ODCM Administrative Control 6.9.1.4, a summary of hourly meteorological data, collected during 2015 is retained onsite. This data is available for review by the NRC upon request. Joint Frequency Tables are included in Attachment 10. During 2015, the goal of >90% joint data recovery was met. The individual percent recoveries are listed below:

Meteorological Data Recovery	
Channel	**% Recovery**
10 m Wind Speed	99.2
10 m Wind Direction	99.5
Delta Temperature A	97.8
Delta Temperature B	97.7

8.0 RELATED INFORMATION

8.1 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.

8.2 Changes to the Offsite Dose Calculation Manual (ODCM)

During the period covered by this report, there were no changes to the ODCM.

8.3 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 2015 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 2015 Land Use Census.

8.4 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.

8.5 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.

8.5.1 Normal, Unplanned Gaseous Effluent Release

There was one normal, unplanned gaseous effluent release in 2015. This release occurred while performing maintenance on the Waste Gas Decay Tank (WGDT) X-07 inlet valve. During this maintenance, gas escaped from GDT X-02 as a result of the bank isolation valve leaking by on the clearance. The GDT X-07 inlet valve was reinstalled prior to the end of the shift which terminated the gas release. The release was vented to the environment through an effluent radiation monitored flowpath via the plant ventilation system. An unplanned, non-routine release permit was generated for the release. More information regarding this release can be found in CR-2015-001594 and gas release permit G2015-031. No gas effluent radiation monitor alarms occurred as a result of this release.

8.5.2 Abnormal, Unplanned Gaseous Effluent Release

No abnormal, unplanned gaseous effluent releases occurred during 2015.

8.5.3 Abnormal, Unplanned Liquid Effluent Releases

No abnormal, unplanned liquid effluent releases occurred during 2015.

8.6 Resin Releases to the LVW Pond

A total of 1960 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 2015 is 2.01e-3 Curies, consisting of Co-58, Co-60, Cs-134, Cs-137, I-131, Sr-90 and Sb-125.

8.7 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.

8.8 Groundwater Tritium monitoring Program

The wells used to monitor CPNPP for tritium leaks into the ground water all had results that were less than detectable with the exception of sentinel well CP-A and MW-11 near the Water Treatment Plant. CR-2016-001459 documents this issue.

The primary source of tritium intrusion to these wells is likely from the percolation of treated Squaw Creek Reservoir (SCR) water leaking at a rate of 13 to 20 gpm from the Water Treatment Plant's Filter Water Storage Tank (FWST). Because SCR water always contains low background concentrations of tritium, SCR water used in the plant will contain similar concentrations. All of these sample results were well below the state drinking water reportable criteria of 20,000 pCi/L and the environmental reportable criteria of 30,000 pCi/L.

Other areas also monitored, but not considered part of the ground monitoring program include the seepage sump, and Leachate Basins A,B, and C. These sample points are actually of perched (surface) water and not indicative of ground water tritium.

Previous hydrogeology studies performed by Pastor, Behling and Wheeler LLC, showed that this perched water sits above an impermeable layer of bedrock. This prevents the migration of the tritiated perched water into the Twin Mountain Aquifer and a potential new pathway to drinking water sources but is re-routed back to Squaw Creek Reservoir.

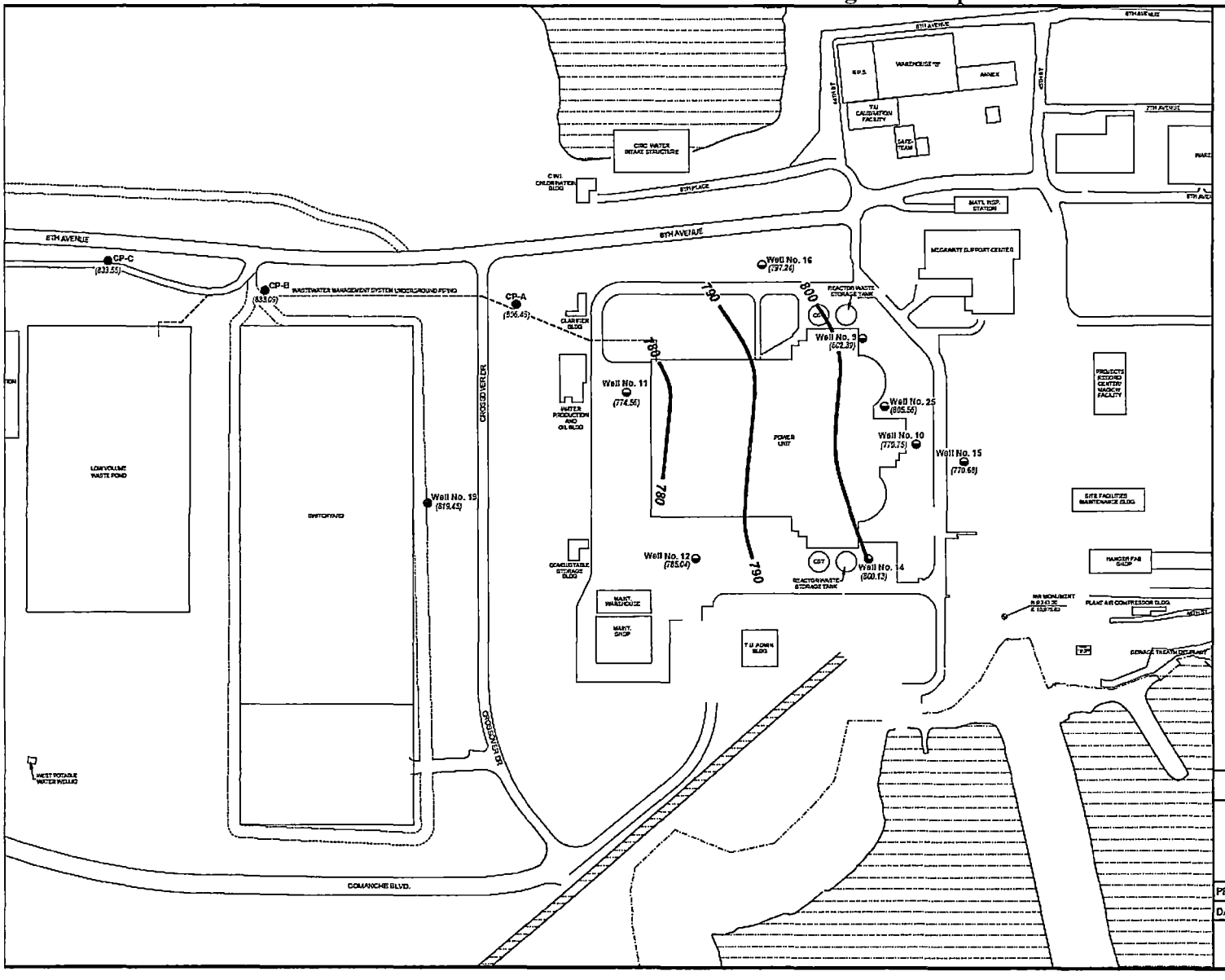
Groundwater monitoring wells below the perched layer have not identified any tritium above the MDA and confirm the claims of the hydrogeology study. Based on this information and the guidance in NEI 07-07, there is no requirement for notification to the NRC or local officials and no requirement for remediation as it is not considered licensed material. Continued monitoring of these perched water sample points will occur as part of the Groundwater Monitoring Program (STA-654) and any new sources of tritium or increase in the activity will be evaluated and remediated as necessary.

Ground Water Tritium Results (pCi/L)

MW Location	02/19/14	05/14/14	07/15/14	12/10/14	03/25/15	06/24/15	9/22/15	11/18/15
9	<778	<688	<709	<603	<665	<661	<638	<630
10	<778	<688	<709	<603	<665	<661	<638	<630
11	908[2]	2470[2]	2870[2]	1500[2]	<665	3410[3]	2270[3]	2270[3]
12	<788	<688	<709	<603	<665	<661	<638	<630
14	<788	<688	<709	<603	<665	<661	<638	<630
15	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
16	<778	<688	<709	<603	<665	<661	<638	<630
19	<778	<688	<709	<603	<665	<661	<638	<630
25	<788	<688	<709	<603	<665	<661	<638	<630
CP-A	12900[1]	9290[1]	1640[1]	<603	<665	<661	1300[3]	3250[3]
CP-B	<788	<688	<709	<603	<665	<661	<638	<630
CP-C	<788	<688	<709	<603	<665	<661	<638	<630
OSGSF	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY

(1) CR-2013-012215; Result was attributed to a leak in a water treatment plant line (lake water)
(2) CR-2014-007981; MW-11 is directly down gradient from CP-A
(3) CR-2016-001459; SCR lake water leakage via Water Treatment Plant's Filter Water Storage Tank (FWST).

Ground Water Tritium Monitoring Well Map



Note:
1. Wells Nos. 10, 15, 19, CP-A, CP-B, and CP-C were not used to construct potentiometric surface contours for this figure because these wells are not considered to be in hydraulic connection with the other wells.
2. Groundwater elevation contours were constructed based on predominant water level elevations in order to evaluate the overall hydraulic gradient at the Site, and thus contours may not be entirely consistent with the individual elevations at all wells.

Source: Created from TXU Electric CPSES Site Map SGM-01.

LUMINANT - CPNPP

Figure 23

UNWEATHERED GLEN ROSE FORMATION - GROUNDWATER ELEVATIONS - AUG. 29, 2010

PROJECT: 1785	BY: AJD	REVISIONS:
DATE: AUG., 2012	CHECKED: RJM	

PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS

SECTION 9.0
EFFLUENT TABLES

Table 9.1
Site Liquid and Gaseous Batch Release Summary (2015)

A. Liquid Releases	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
1. Number of batch releases		4	6	10	14	34
2. Total time period for Batch releases	(Minutes)	1.42E+03	2.01E+03	3.36E+03	4.66E+03	1.14E+04
3. Maximum time period for a batch release	(Minutes)	3.93E+02	3.95E+02	3.59E+02	4.10E+02	4.10E+02
4. Average time period for a batch release	(Minutes)	3.55E+02	3.34E+02	3.36E+02	3.33E+02	3.36E+02
5. Minimum time period for a batch release	(Minutes)	3.20E+02	2.85E+02	3.15E+02	3.09E+02	2.85E+02

B. Gaseous Releases	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
1. Number of batch releases		31	29	33	28	121
2. Total time period for batch releases	(Minutes)	1.18E+04	1.02E+04	1.12E+04	1.13E+04	4.46E+04
3. Maximum time period for a batch release	(Minutes)	1.74E+03	4.23E+02	4.00E+02	1.72E+03	1.74E+03
4. Average time period for a batch release	(Minutes)	3.80E+02	3.53E+02	3.39E+02	4.05E+02	3.68E+02
5. Minimum time period for a batch release	(Minutes)	2.34E+02	3.02E+02	2.87E+02	3.50E+01	3.50E+01

Table 9.2
Site Abnormal Liquid and Gaseous Batch Release Summary (2015)

A. Liquid Abnormal Release Totals	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals
1. Number of abnormal releases		0	0	0	0	0
2. Total activity of abnormal releases	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

B. Gas Abnormal Release Totals	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Totals
1. Number of abnormal releases		0	0	0	0	0
2. Total activity of abnormal releases	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 9.3
Site Gaseous Effluents - Summation of All Releases (2015)

Type of Effluent	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
A. Fission And Activation Gases						
1. Total Release	Curies	1.64E-01	1.10E-01	1.59E-01	1.15E-01	5.47E-01
2. Average Release rate for period	uCi/sec	2.11E-02	1.40E-02	1.99E-02	1.44E-02	1.74E-02
3. Percent of Applicable Limit	%	*	*	*	*	*
B. Radioiodines						
1. Total Iodine-131		0.00E+00	0.00E+00	8.23E-07	0.00E+00	8.23E-07
2. Average Release rate for period		0.00E+00	0.00E+00	1.04E-07	0.00E+00	2.61E-08
3. Percent of Applicable Limit	%	*	*	*	*	*
C. Particulates						
1. Particulates (Half-Lives > 8 Days)		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2. Average Release rate for period		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3. Percent of Applicable Limit	%	*	*	*	*	*
D. Tritium						
1. H3 Release	Curies	6.27E+00	1.09E+01	1.18E+01	9.28E+00	3.82E+01
2. Average Release rate for period	uCi/sec	8.07E-01	1.38E+00	1.49E+00	1.17E+00	1.21E+00
3. Percent of Applicable Limit	%	*	*	*	*	*
D. C-14						
1. C14 Release	Curies	6.64E+00	6.64E+00	6.79E+00	5.23E+00	2.53E+01
2. Average Release rate for period	uCi/sec	8.55E-01	8.41E-01	8.57E-01	6.59E-01	8.03E-01
3. Percent of Applicable Limit	%	*	*	*	*	*
E. Gross Alpha						
1. Total Release	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

*** Applicable limits are expressed in terms of dose.**

Estimated Total Error For All Values Reported Is < 1.0%

Table 9.4
Site Gaseous Effluents - Ground Level Releases (2015)

Continuous Mode Nuclides Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
Fission Gases						
Ar-41	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Iodines						
No Nuclides Found	Curies	N/A	N/A	N/A	N/A	N/A
Particulates						
No Nuclides Found	Curies	N/A	N/A	N/A	N/A	N/A
Tritium & C-14						
H-3	Curies	6.25E+00	1.08E+01	1.18E+01	9.23E+00	3.81E+01
C14						
C-14	Curies	1.99E+00	1.99E+00	2.04E+00	1.57E+00	7.59E+00
Gross Alpha						
No Nuclides Found	Curies	N/A	N/A	N/A	N/A	N/A

Table 9.4 (cont)
Site Gaseous Effluents - Ground Level Releases (2015)

Batch Mode

Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
Fission Gases						
Ar-41	Curies	8.60E-02	9.26E-02	1.19E-01	8.06E-02	3.78E-01
Kr-85	Curies	7.81E-02	1.74E-02	3.90E-02	5.22E-04	1.35E-01
Xe-131m	Curies	0.00E+00	0.00E+00	0.00E+00	1.36E-05	1.36E-05
Xe-133m	Curies	0.00E+00	0.00E+00	0.00E+00	7.45E-04	7.45E-04
Xe-133	Curies	5.10E-05	0.00E+00	4.02E-04	2.54E-02	2.59E-02
Xe-135m	Curies	0.00E+00	0.00E+00	0.00E+00	6.20E-06	6.20E-06
Xe-135	Curies	0.00E+00	0.00E+00	0.00E+00	7.28E-03	7.28E-03
Total For Period	**Curies**	**1.64E-01**	**1.10E-01**	**1.59E-01**	**1.15E-01**	**5.47E-01**
Iodines						
Br-82	Curies	0.00E+00	0.00E+00	8.23E-07	0.00E+00	8.23E-07
Particulates						
No Nuclides Found	Curies	N/A	N/A	N/A	N/A	N/A
Tritium						
H-3	Curies	2.58E-02	4.48E-02	4.71E-02	4.65E-02	1.64E+01
Carbon 14						
C-14	Curies	4.65E+00	4.65E+00	4.75E+00	3.66E+00	1.77E+01
Gross Alpha	Curies	N/A	N/A	N/A	N/A	N/A
No Nuclides Found						

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

Table 9.5
Site Liquid Effluents - Summation Of All Releases (2015)

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
A. Fission And Activation Products						
1. Total Release (not including tritium, gases, alpha)	Curies	2.03E-04	7.53E-05	8.00E-04	7.65E-04	1.84E-03
2. Average diluted concentration during period	uCi/ml	5.27E-11	1.04E-11	6.47E-11	4.41E-11	4.51E-11
3. Percent of Applicable Limit	%	*	*	*	*	*
B. Tritium						
1. Total Release	Curies	8.09E+01	3.48E+02	9.10E+02	6.11E+02	1.95E+03
2. Average diluted concentration during period	uCi/ml	2.10E-05	4.80E-05	7.36E-05	3.52E-05	4.78E-05
3. Percent of Applicable Limit	%	*	*	*	*	*
C. Dissolved and Entrained Gases						
1. Total Release	Curies	0.00E+00	1.88E-05	5.42E-05	1.87E-04	2.60E-04
2. Average diluted concentration during period	uCi/ml	0.00E+00	2.59E-12	4.38E-12	1.08E-11	6.36E-12
3. Percent of Applicable Limit	%	*	*	*	*	*
D: Gross Alpha Radioactivity						
1. Total Release	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2. Average diluted concentration during period	uCi/ml	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
E: Waste Vol Release (Pre-Dilution)	Liters	3.02E+05	4.36E+05	7.52E+05	1.03E+06	2.52E+06
F. Volume of Dilution Water Used	Liters	3.86E+09	7.26E+09	1.24E+10	1.74E+10	4.08E+10

*** Applicable limits are expressed in terms of dose.**

Estimated Total Error For All Values Reported Is < 1.0%

Table 9.6
Site Liquid Effluents (2015)

Continuous Mode

Nuclides Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
Fission & Activation Products						
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tritium						
H-3	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dissolved And Entrained Gases						
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Gross Alpha Radioactivity	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Batch Mode

Nuclides Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
Fission & Activation Products						
Mn-54	Curies	0.00E+00	0.00E+00	4.32E-05	1.07E-05	5.39E-05
Fe-55	Curies	0.00E+00	0.00E+00	0.00E+00	1.45E-04	1.45E-04
Co-57	Curies	0.00E+00	0.00E+00	3.43E-06	0.00E+00	3.43E-06
Co-58	Curies	1.34E-04	6.14E-05	1.91E-04	1.53E-04	5.39E-04
Co-60	Curies	6.92E-05	1.39E-05	5.62E-04	2.27E-04	8.72E-04
Ni-63	Curies	0.00E+00	0.00E+00	0.00E+00	2.26E-04	2.26E-04
Ce-143	Curies	0.00E+00	0.00E+00	0.00E+00	3.64E-06	3.64E-06
Total For Period	**Curies**	**2.03E-04**	**7.53E-05**	**8.00E-04**	**7.65E-04**	**1.84E-03**
Tritium						
H-3	Curies	8.09E+01	3.48E+02	9.10E+02	6.11E+02	1.95E+03
Dissolved And Entrained Gases						
Xe-133	Curies	0.00E+00	1.88E-05	5.42E-05	1.82E-04	2.55E-04
Xe-135	Curies	0.00E+00	0.00E+00	0.00E+00	5.31E-06	5.31E-06
Total for Period	**Curies**	**0.00E+00**	**1.88E-05**	**5.42E-05**	**1.87E-04**	**2.60E-04**
Gross Alpha Activity						
No Nuclides Found	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

If Not Detected, Nuclide is Not Reported. Zeroes in this table indicates that no radioactivity was present at detectable levels.

Table 9.7
Dose to a member of the public due to Liquid Releases (2015)

Organ Dose	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
Bone	mRem	0.00E+00	0.00E+00	0.00E+00	3.17E-05	3.17E-05
Limit	mRem	5	5	5	5	10
Percent of Limit	%	0.000	0.000	0.000	0.001	0.000
Liver	mRem	4.54E-02	4.34E-02	4.73E-02	5.30E-02	1.89E-01
Limit	mRem	5	5	5	5	10
Percent of Limit	%	0.907	0.869	0.947	1.060	1.891
Total Body	mRem	4.54E-02	4.34E-02	4.73E-02	5.30E-02	1.89E-01
Limit	mRem	1.5	1.5	1.5	1.5	3
Percent of Limit	%	3.025	2.895	3.156	3.532	6.304
Thyroid	mRem	4.54E-02	4.34E-02	4.73E-02	5.30E-02	1.89E-01
Limit	mRem	5	5	5	5	10
Percent of Limit	%	0.907	0.869	0.947	1.060	1.891
Kidney	mRem	4.54E-02	4.34E-02	4.73E-02	5.30E-02	1.89E-01
Limit	mRem	5	5	5	5	10
Percent of Limit	%	0.907	0.869	0.947	1.060	1.891
Lung	mRem	4.54E-02	4.34E-02	4.73E-02	5.30E-02	1.89E-01
Limit	mRem	5	5	5	5	10
Percent of Limit	%	0.907	0.869	0.947	1.060	1.891
GI-Lli	mRem	4.54E-02	4.34E-02	4.73E-02	5.30E-02	1.89E-01
Limit	mRem	5	5	5	5	10
Percent of Limit	%	0.907	0.869	0.947	1.060	1.891

Table 9.8

Air Dose Due To Gaseous Releases – Site (2015)

NG Dose	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
Gamma Air	mRad	8.38E-05	9.02E-05	1.16E-04	8.08E-05	3.71E-04
Limit	mRad	5	5	5	5	10
Percent of Limit	%	0.002	0.002	0.002	0.002	0.004
Beta Air	mRad	4.54E-05	3.53E-05	4.89E-05	3.25E-05	1.62E-04
Limit	mRad	10	10	10	10	20
Percent of Limit	%	0.000	0.000	0.000	0.000	0.001

Table 9.9
Dose to A Member Of The Public Due To Radioiodines, Tritium, and Particulates in Gaseous Releases (2015)

Organ Dose	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
Liver	mRem	2.10E-02	2.74E-02	2.91E-02	2.26E-02	1.00E-01
Limit	mRem	7.5	7.5	7.5	7.5	15
Percent of Limit	%	0.280	0.365	0.388	0.301	0.667
Total Body	mRem	2.10E-02	2.74E-02	2.91E-02	2.26E-02	1.00E-01
Limit	mRem	7.5	7.5	7.5	7.5	15
Percent of Limit	%	0.280	0.365	0.388	0.301	0.667
Thyroid	mRem	2.10E-02	2.74E-02	2.91E-02	2.26E-02	1.00E-01
Limit	mRem	7.5	7.5	7.5	7.5	15
Percent of Limit	%	0.280	0.365	0.388	0.301	0.667
Kidney	mRem	2.10E-02	2.74E-02	2.91E-02	2.26E-02	1.00E-01
Limit	mRem	7.5	7.5	7.5	7.5	15
Percent of Limit	%	0.280	0.365	0.388	0.301	0.667
Lung	mRem	2.10E-02	2.74E-02	2.91E-02	2.26E-02	1.00E-01
Limit	mRem	7.5	7.5	7.5	7.5	15
Percent of Limit	%	0.280	0.365	0.388	0.301	0.667
GI-Lli	mRem	2.10E-02	2.74E-02	2.91E-02	2.26E-02	1.00E-01
Limit	mRem	7.5	7.5	7.5	7.5	15
Percent of Limit	%	0.280	0.365	0.388	0.301	0.667
Bone	mRem	6.30E-02	6.30E-02	6.44E-02	4.96E-02	2.40E-01
Limit	mRem	7.5	7.5	7.5	7.5	15
Percent of Limit	%	0.84	0.84	0.86	0.66	1.60

TABLE 9.10
SOLID RADWASTE AND IRRADIATED FUEL SHIPMENTS 2015

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	3.40E+00	5.20E+01	3.40E+00	5.20E+01	25%
b. Dry active waste	3.13E+02	5.82E-02	4.11E+01	6.12E-02	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	3.16E+02	5.21E+01	4.45E+01	5.21E+01	25%

Note: Shipped volumes and curies are not always equal to the buried volumes and curies as a result of volume reducing processing, and 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	% Abundance	Activity (Ci)
a. Spent resins/filters	Ni-63	81.51	4.24E+01
	Fe-55	6.88	3.58E+00
	Co-60	6.27	3.26E+00
	Sb-125	2.19	1.14E+00
	Cs-137	1.61	8.37E-01
	C-14	0.25	1.32E-01
	Tc-99	<0.01	1.12E-03
	H-3	LLD	-0-
	I-129	LLD	-0-
	Other (1)	1.29	6.68E-01
	Total	100.00	5.20E+01
b. Dry active waste	Fe-55	36.11	2.10E-02
	Co-60	26.25	1.53E-02
	Ni-63	18.29	1.06E-02
	Co-58	9.39	5.46E-03
	Cr-51	2.78	1.61E-03
	Nb-95	1.95	1.13E-03
	Mn-54	1.79	1.04E-03
	Zr-95	1.13	6.54E-04
	C-14	0.71	4.30E-04
	H-3	LLD	-0-
	Tc-99	LLD	-0-
	I-129	LLD	-0-
	Other (2)	1.60	9.38E-04
	Total	100.00	5.82E-02
d. Other (oil/miscellaneous liquids sent to processor for volume reduction)	N/A	N/A	N/A

(1) Nuclides representing <1% of total shipped activity: Mn-54, Co-57, Co-58, Ni-59, Sr-90, Zr-95, Nb-95, Cs-134, Ce-144, Pu-238, Pu-239/40, Am-241, and Cm-243/44.

(2) Nuclides representing <1% of total shipped activity: Co-57, Sr-90d, Nb-94, Sn-113, Sb-125, Cs-134, Cs-137d, Ce-144d, Pu-239/40, and Am-241/243.

TABLE 9.10
SOLID RADWASTE AND IRRADIATED FUEL SHIPMENTS 2015

3. Solid Waste Shipped Offsite for Burial or Disposal (Not Irradiated Fuel)				
Waste Type	**Waste Class**	**Container Type**	**Number of Shipments**	**Destination**
a. Resin/filters	B	Poly HIC*	1	Waste Control Specialists, Andrews, TX
b. Dry active waste	A	General Design	5	Energy Solutions Oak Ridge, TN
d. Other	NA	NA	NA	NA

*High Integrity Container

B. Irradiated Fuel Shipments (Disposition)

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

Attachment 10.1
2015 Meteorological Joint Frequency Table

Reg. Guide 1.21 Joint Frequency Table

CPNPP

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 1-JAN-2015 00:00 to 31-DEC-2015 23:59

STABILITY CLASS **A**

ELEVATION:
10 m

WIND DIRECTION	Wind Speed (mph)						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N		9	10	16	11	4	50
NNE	2	18	24	6			50
NE	9	27	21		1		58
ENE	8	23	3				34
E	6	16	2		1		25
ESE	2	42	21				65
SE	2	28	36	4			70
SSE	1	34	63	18			116
S		22	61	14			97
SSW	1	10	5				16
SW		4	1				5
WSW							
W		1					1
WNW	1	1		1			3
NW		1		3			4
NNW	2	6	4	9	14		35
VARIABLE	11	1					12
TOTAL	45	243	251	71	27	4	641
Periods of calm (hours):		0					
Hours of missing data:		4					

Reg. Guide 1.21 Joint Frequency Table

CPNPP

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 1-JAN-2015 00:00 to 31-DEC-2015 23:59

STABILITY CLASS **B**

ELEVATION:
10 m

WIND DIRECTION	Wind Speed (mph)						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N		6	15	9	6		36
NNE	4	19	18	4			45
NE	10	20	10	1			41
ENE	10	11	4				25
E	4	17	1				22
ESE	1	20	20	2			43
SE	2	19	24	6	1		52
SSE	1	20	55	25	1		102
S		13	49	41	5		108
SSW	1	8	22	13			44
SW	2	6	14	3			25
WSW	1	3	4	1			9
W	3	1					4
WNW				1			1
NW		6	3	9	1		19
NNW	1	6	8	16	7		38
VARIABLE	13	2					15
TOTAL	53	177	247	131	21		629
Periods of calm (hours):		0					
Hours of missing data:		6					

Reg. Guide 1.21 Joint Frequency Table

CPNPP

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 1-JAN-2015 00:00 to 31-DEC-2015 23:59

STABILITY CLASS **C**

ELEVATION:
10 m

WIND DIRECTION	Wind Speed (mph)						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	3	3	12	26	7		51
NNE	1	12	13	11	7		44
NE	3	8		2			13
ENE	9	14	2				25
E	5	15	3				23
ESE	3	29	6				38
SE	3	17	28	3	1		52
SSE	3	20	58	36	4		121
S	2	16	40	48	9		115
SSW	2	14	35	18			69
SW	4	10	22	9			45
WSW	3	9	7	2			21
W	1	4	1	3			9
WNW				2			2
NW		6	10	8	2		26
NNW	1	6	18	35	16	3	79
VARIABLE	16						16
TOTAL	59	183	255	203	46	3	749
Periods of calm (hours):		1					
Hours of missing data:		2					

Reg. Guide 1.21 Joint Frequency Table

CPNPP

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 1-JAN-2015 00:00 to 31-DEC-2015 23:59

STABILITY CLASS **D**

ELEVATION:
10 m

WIND DIRECTION	Wind Speed (mph)						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	21	156	237	117	10		541
NNE	11	88	111	50	2		262
NE	16	63	74	16			169
ENE	15	49	42	3			109
E	21	81	8				110
ESE	36	122	51				209
SE	18	195	317	34	1		565
SSE	12	120	416	197	18	2	765
S	6	69	303	158	11	2	549
SSW	8	65	137	54	3		267
SW	11	33	39	7			90
WSW	15	29	23	5			72
W	4	17	7	7			35
WNW	2	51	30	29	3		115
NW	14	38	51	21	9	1	134
NNW	8	53	126	65	15	2	269
VARIABLE	54	21	11	1			87
TOTAL	272	1250	1983	764	72	7	4348
Periods of calm (hours):		3					
Hours of missing data:		55					

Reg. Guide 1.21 Joint Frequency Table

CPNPP

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 1-JAN-2015 00:00 to 31-DEC-2015 23:59

STABILITY CLASS **E**

ELEVATION:
10 m

WIND DIRECTION	Wind Speed (mph)						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	11	13	12				36
NNE	7	22	12				41
NE	1	11	4				16
ENE	3	6	1				10
E	18	39	4				61
ESE	24	86	5				115
SE	27	280	122	1			430
SSE	18	159	204	8			389
S	17	62	59	2			140
SSW	15	47	71	6			139
SW	13	15	19	2			49
WSW	6	13	8	3			30
W	8	10	7				25
WNW	5	25	13	3			46
NW	16	55	14	1			86
NNW	8	15	9				32
VARIABLE	54	10	3				67
TOTAL	251	868	567	26			1712
Periods of calm (hours):		9					
Hours of missing data:		13					

Reg. Guide 1.21 Joint Frequency Table

CPNPP

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 1-JAN-2015 00:00 to 31-DEC-2015 23:59

STABILITY CLASS **F**

ELEVATION:
10 m

WIND DIRECTION	Wind Speed (mph)						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	1						1
NNE							
NE							
ENE	1						1
E	2						2
ESE	3	5					8
SE	5	25	11	1			42
SSE	8	15	5				28
S	13	19	5				37
SSW	22	13	10				45
SW	19	15	5				39
WSW	26	19	13				58
W	6	4	2				12
WNW	11	7	1				19
NW	12	32	2				46
NNW	3	2	1				6
VARIABLE	32	4					36
TOTAL	164	160	55	1			380
Periods of calm (hours):		2					
Hours of missing data:							

Reg. Guide 1.21 Joint Frequency Table

CPNPP

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 1-JAN-2015 00:00 to 31-DEC-2015 23:59

STABILITY CLASS **G**

ELEVATION:
10 m

WIND DIRECTION	Wind Speed (mph)						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N							
NNE							
NE							
ENE							
E							
ESE							
SE	3	1					4
SSE	6	1					7
S	5	10					15
SSW	10	5	2				17
SW	20	11	1				32
WSW	11	29	8				48
W	10	4					14
WNW	6	8					14
NW	10	25	1				36
NNW	4	2					6
VARIABLE	12						12
TOTAL	97	96	12				205
Periods of calm (hours):							
Hours of missing data:							

Reg. Guide 1.21 Joint Frequency Table

CPNPP

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 1-JAN-2015 00:00 to 31-DEC-2015 23:59

STABILITY CLASS **ALL**

ELEVATION:
10 m

WIND DIRECTION	Wind Speed (mph)						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	36	187	286	168	34	4	715
NNE	25	159	178	71	9		442
NE	39	129	109	19	1		297
ENE	46	103	52	3			204
E	56	168	18		1		243
ESE	69	304	103	2			478
SE	60	565	538	49	3		1215
SSE	49	369	801	284	23	2	1528
S	43	211	517	263	25	2	1061
SSW	59	162	282	91	3		597
SW	69	94	101	21			285
WSW	62	102	63	11			238
W	32	41	17	10			100
WNW	25	92	44	36	3		200
NW	52	163	81	42	12	1	351
NNW	27	90	166	125	52	5	465
VARIABLE	192	38	14	1			245
TOTAL	941	2977	3370	1196	166	14	8664
Periods of calm (hours):		15					
Hours of missing data:		81					

Attachment 10.2

Atmospheric Dispersion (x/q) and Deposition (d/q) Calculation Methodology Discussion

CR-2013-001059 evaluated the atmospheric dispersion (x/q) and deposition (d/q) calculation methodology and frequency as they relate to the meteorological data to ensure they are up to date. The CPNPP ODCM does not require a re-evaluation on any frequency or specific criteria for comparison. The NRC guidance documents cited in the ODCM also do not provide any requirements for re-evaluation. Revision 2 of Regulatory Guide 1.21, to which we are not committed, recommends that 5 years of meteorological data be used to evaluate the dispersion factors and that variation in the factors be within 10% in the non-conservative direction. The evaluation of our meteorological data included 6 years of data and meets the criteria.

Meteorological data collected for the original FSAR, the NuBuild FSAR and historical Radiological Effluent Reports were reviewed. The data list the predominant wind direction, as a percentage, averaged for all speeds and stability classes within the period. For periods not summarized and when the plant was operable (1990-2000) only 1990, 1995 and 1996 show the predominant wind direction to be from the SSE. This information was not included, however, since the data should include a summary of at least 5 years of data. The original dispersion and deposition factors were calculated based on meteorological data collected and summarized from 1972 through 1976 at Comanche Peak. This data show the predominant wind direction to be from the South but only slightly more than winds originating from the SSE. The historical data from 1957-1976 was included in the original FSAR for comparison and show more bias toward the southerly direction but was collected from the Dallas-Fort Worth Airport location. Wind patterns for the DFW Airport were reviewed on the National Weather Service website for 1981-2010 and show that the prevailing wind direction remains from the South. This accounts for the slight variation in prevailing winds between historical and current data collected on site. During the New Build project for Units 3&4 and from OE 25286 the meteorological data were again summarized from 1997-2006, for Comanche Peak, and showed that the predominant wind direction shifted to the SSE. Using this data, new dispersion and deposition factors were calculated. The new factors were less conservative when compared to the original dispersion and deposition factors at the Exclusion Area Boundary (See Reference 3). The conclusion was to continue reporting offsite exposures based on the original values. The last column of data in Table 1 is summarized for the purposes of this evaluation and includes meteorological data since the New Build evaluation through 2012. This data, like the NuBuild data, show the predominant wind direction to be from the SSE.

Conclusion:

Although the predominant wind direction frequency changes slightly from SSE to S when comparing the NuBuild Data to the original FSAR and Historical Data, the NuBuild calculations show that dispersion and deposition factors do not increase. Following the NuBuild evaluation, the wind direction remains the same and does not impact the calculation of the dispersion and deposition. Using the original factors would be conservative when calculating doses to the public.

CR-2016-002632 was initiated to document the evaluation of prevailing wind directions for all stability classes over the calendar year 2015. This evaluation is performed annually in accordance with Chemistry Guideline 25 to ensure the predominant wind direction has not changed based on the last 5 years of meteorological data including the current year. The 2015 predominant wind direction for the ALL stability class categories did not change when compared with the five year rolling average which includes 2015. No recalculations of X/Q or D/Q values are required at this time.

Attachment 10.3

Carbon 14 Supplemental Information

Carbon-14 Supplemental Information

Carbon-14 (C-14) is a naturally occurring isotope of carbon produced by interactions with cosmic radiation in the atmosphere with a half-life of 5730 years. Nuclear weapons testing in the 1950s and 1960s significantly increased the amount of C-14 in the atmosphere. C-14 is also produced in commercial nuclear reactors, but the amounts are much less than the amounts produced from natural formation or from weapons testing.

In June 2009, the NRC provided revised guidance in Regulatory Guide 1.21, *Measuring, Evaluating and Reporting Radioactive Material in Liquid and Gaseous Effluents and Solid Waste, Revision 2*, establishing an updated approach for identifying principal radionuclides. Because the overall quantity of radioactive releases has steadily decreased due to improvements in power plant operations, C-14 now qualifies as a "principal radionuclide" (anything greater than one percent of overall radioactivity in effluents) under federal regulations at many plants. In other words, C-14 has not increased and C-14 is not a new nuclear plant emission. Rather, the improvements in the mitigation of other isotopes have made C-14 more prominent.

The dose contribution of C-14 from liquid radioactive waste is essentially insignificant compared to that contributed by gaseous radioactive waste. Therefore the evaluation of C-14 in liquid radioactive waste is not required by the new Reg. Guide 1.21, Rev. 2. The Reg. Guide 1.21, Rev. 2 also states that the quantity of gaseous C-14 released to the environment can be estimated by use of a C-14 source term production model.

A recent study produced by EPRI (*Estimation of Carbon-14 in Nuclear Power Plant Gaseous Effluents,* EPRI, Palo Alto, CA: 2010, 1021106) developed a model for estimation of C-14 source production. This model was used by CPNPP for the 2010 Radioactive Effluent Release Report. Also in the CPNPP report, the assumption that 70% of the C-14 gaseous effluent is estimated to be from batch releases (e.g. WGDTs), and 30% of C-14 gaseous effluent is estimated to be from continuous releases through the unit vents (Ref. IAEA Technical Reports Series no. 421, "Management of Waste Containing Tritium and Carbon-14", 2004).

The C-14 released from PWR's is primarily a mix of organic carbon and carbon dioxide released from the waste gas system. The C-14 species initially produced are primarily in the organic form, such as methane. The C-14 in the primary coolant can be converted to an inorganic chemical form of primarily carbon dioxide through a chemical transformation. Studies documented by the EPRI Report *Characterization of Carbon-14 Generated by the Nuclear Power Industry,* EPRI Palo Alto, CA: 1995, TR-105715, measured C-14 releases from PWRs indicating a range of 70% to 95% organic. The average value was indicated to be 80% organic with the remainder being carbon dioxide. As a result, a value of 80% organic C-14 is assumed by the CPNPP Radioactive Effluent Release Report methodology.

The public dose estimates from airborne C-14 in the CPNPP Effluent report are performed using dose models from NUREG-0133 and Regulatory Guide 1.109. The dose models and assumptions used for the dose estimates of C-14 are documented in the 2011 ODCM changes. The estimated C-14 dose impact on the maximum organ dose from airborne effluents released during 2011 is well below the 10CFR50, Appendix I, ALARA design objective of 15 mRem/yr per unit.

Putting Radiation Dose in Context

Humans are exposed to radiation every day. The majority comes from natural sources including the earth, food and water consumption, the air, the sun and outer space. A smaller fraction radiation comes from man-made source such as X-rays, nuclear medical treatments, building materials, nuclear power plants, smoke detectors and televisions.

Radiation is measured in units called millirem (mRem). One mRem is a very small amount of exposure. On average, Americans receive 620 mRem of radiation dose every year. Approximately one-half of the dose comes from natural sources and the other half comes from medical procedures such as CAT scans.

The table below can help to give some perspective to dose from various sources.

Source	Average Annual Dose
Smoke detector in the home	0.008 mRem
Live within 50 miles of a nuclear power plant	0.009 mRem
Live within 50 miles of a coal-fired power plant*	0.03 mRem
NRC guideline for keeping radiation dose from nuclear power plants as low as reasonably achievable (ALARA)	5 mRem
Round trip flight from New York City to Los Angeles	5 mRem
Medical X-ray	10 mRem
EPA limit for dose to the public from the commercial nuclear fuel cycle	25 mRem
Food and water consumed throughout the course of one year	30 mRem
NRC limit for dose to the public from nuclear power plants	100 mRem
Mammogram	100 mRem
Average annual exposure for a nuclear power plant worker	120 mRem
Average annual exposure from background radiation	300 mRem
CT scan	1,000 mRem
NRC's annual limit for occupational exposure	5,000 mRem
Cardiac catheterization or coronary angiogram	5,000 mRem

*Coal is naturally radioactive.

Sources: U.S. Environmental Protection Agency, Health Physics Society.