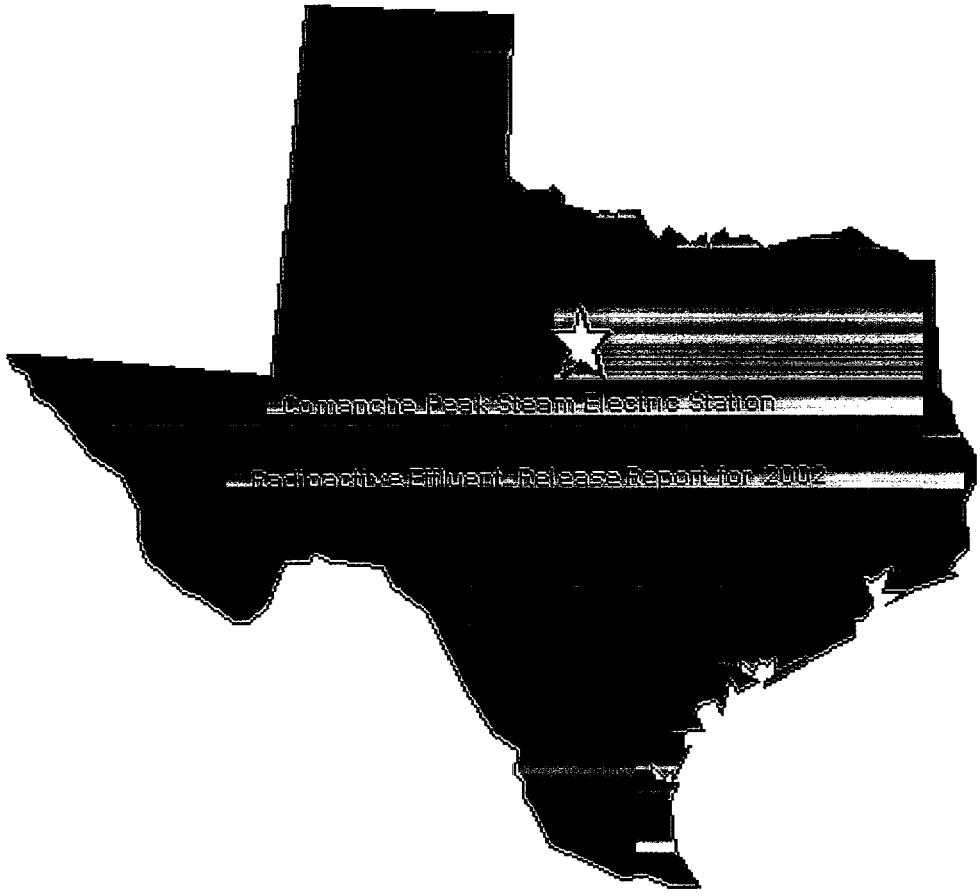

Comanche Peak Steam Electric Station
Radioactive Effluent Release Report for 2002

COMANCHE PEAK STEAM ELECTRIC STATION

UNITS 1 AND 2

RADIOACTIVE EFFLUENT RELEASE REPORT

January 1, 2002 - December 31, 2002

Prepared By: E. T. Floyd — Date: 4-15-03
Radiation Protection Technician

Reviewed By: S. E. Bradley — Date: 4/24/03
Health Physics Supervisor

Approved By: J. R. Curtis — Date: 4/24/03
Radiation Protection Manager

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS

1.0 INTRODUCTION

1.1 Executive Summary

1.2 General Trend Graphs

2.0 SUPPLEMENTAL INFORMATION

2.1 Regulatory Limits

2.2 Effluent Concentration Limits

2.3 Measurements and Approximations of Total Radioactivity

2.4 Batch Releases

2.5 Abnormal Releases

3.0 GASEOUS EFFLUENTS

4.0 LIQUID EFFLUENTS

5.0 SOLID WASTES

6.0 RELATED INFORMATION

6.1 Operability of Liquid and Gaseous Monitoring Instrumentation

6.2 Changes to the Offsite Dose Calculation Manual

6.3 New Locations for Dose Calculations or Environmental Monitoring

6.4 Liquid Holdup and Gas Storage Tanks

6.5 Noncompliance with Radiological Effluent Control Requirements

6.6 Resin Releases to the LVW Pond

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

6.8 Meteorological Monitoring Program

6.9 Assessment of Doses

TABLE OF CONTENTS

7.0 TABLES

7.1 Batch Liquid and Gaseous Release Summary -2002

7.2 Abnormal Batch Liquid and Gaseous Release Summary -2002

7.3 Gaseous Effluents--Summation of All Releases -2002

7.4 Gaseous Effluents--Ground Level Releases -2002

7.5 Liquid Effluents--Summation of All Releases -2002

7.6 Liquid Effluents -2002

7.7 Doses From Liquid Effluents -2002

7.8 Doses From Gaseous Effluents -2002; Noble Gas Air Dose

7.9 Doses From Gaseous Effluents -2002; Site Iodines, Particulates and Tritium Dose, Adult Age Group

7.10 Doses From Gaseous Effluents -2002; Site Iodines, Particulates and Tritium Dose, Teen Age Group

7.11 Doses From Gaseous Effluents -2002; Site Iodines, Particulates and Tritium Dose, Child Age Group

7.12 Doses From Gaseous Effluents -2002; Site Iodines, Particulates and Tritium Dose, Infant Age Group

7.13 Solid Waste and Irradiated Fuel Shipments -2002

8.0 ATTACHMENTS

8.1 Joint Frequency Tables for 2002

8.2 Offsite Dose Calculation Manual for TXU Electric Comanche Peak Steam Electric Station Units 1 and 2, Revision 20.

ACRONYMS AND ABBREVIATIONS

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

1.0 INTRODUCTION

This Radioactive Effluent Release Report, for Comanche Peak Steam Electric Station 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, 2002, through December 31, 2002.

1.1 Executive Summary

The radioactive effluent monitoring program for the year 2002 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).

A summation of all the radioactive gaseous releases to the environment during 2002 produced the following results:

- The total gaseous tritium activity released from the site for 2002 was 57.1 Curies which is an increase from the 37.8 Curies in 2001 and 29.6 Curies released in 2000. 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 (ie, 18 month fuel) the core life and power output and number of core cycles.

- The total gaseous fission and activation activity (Noble gas) released from the site in 2002 was 228 Curies. This was a major increase from past years due to the fuel defects of the Unit 1 core and relief valve testing that took place in conjunction with the unplanned shutdown of Unit 1 due to the primary to secondary leak from the steam generator.

- The total gaseous particulate activity released for 2002 was 1.14E-05 Curies. This value has historically been 0.0 Curies for the last six years. This increase was due to a single Chemistry stack sample that detected the presence of Co-58. There was no way to discount the sample completely so it is being reported in order to be conservative.

- The gross alpha released has continued at 0.0 Curies for 2002 matching the performance of the previous six years. The iodine released was 1.59E-04 Curies for 2002.

- The calculated gamma air dose from the site due to noble gases released during 2002 is 9.04E-03 mrad which is an increase from 2001 which calculated out as 7.54E-04 mrad; this represents only 0.047% of the annual limit for each unit. This increase is attributable to the reporting of the increased nuclide abundance due to the fuel element defects and the primary to secondary leakage from Unit 1.

- The calculated beta air dose from the site due to noble gases released during 2002 is 2.63E-02 mrad which is an increase from 2001 which calculated out as 3.44 E-04 mrad; however, this represents only 0.0655% of the annual limit. This increase is attributable to the reporting of the increased nuclide abundance due to the fuel element defects and the primary to secondary leakage from Unit 1.

- The total whole body dose from the site due to gaseous radioactivity released based on I-131, I-133, H-3(tritium), and particulate nuclides for 2002 calculated out to be 0.055 mrem. This value is a slight increase from the 2001 whole body dose of 0.036 mrem.

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

A summation of all the radioactive liquid releases to the environment during 2002 produced the following results:

- The total number of Curies of radioactive nuclides released from the site in liquid effluents in 2002 was 1390.52 Curies, up from 931.18 Curies in 2001.

- Of the total Curies released from the site, tritium accounted for 1390.0 Curies while all other nuclides released accounted for only 0.52 Curies. The total curies of tritium released is up from the 2001 total of 931.0 Curies.

- The total whole body dose from the site due to liquid effluents calculated out at 1.01 E-01 mrem which is only 1.69% of the annual limit for each unit. Tritium accounts for >99% of the calculated total whole body dose with the Squaw Creek Reservoir (SCR) tritium concentration being the controlling factor. The SCR tritium concentration for 2002 averaged 11,400 pCi/l which is slightly down from 2001.

- The 2002 average SCR tritium concentration of 11,400 pCi/l is 38.0% of the reporting limit of 30,000 pCi/l.

The CPSES meteorological system achieved a 96.7% recoverable data rate for the joint frequency parameters required by Regulatory Guide 1.23 for wind speed, wind direction and delta temperature. All other parameters also achieved a >90% recoverable data rate.

There are two ODCM noncompliance related issues discussed in this annual report. The first issue is a failure to create a 'planned non-routine radioactive release permit' during a vent

of the Volume Control Tank as required by the ODCM and Chemistry procedures. The second issue involved a loss of a liquid composite sample for the Primary Effluent Tanks that was part of the 3rd quarter composite sample analysis to be shipped offsite for vendor analysis of Fe-55, Sr-89, and Sr-90. Additional details of these issues are discussed in section 6.5 of this report.

During 2002 there were no Technical Specification/ODCM effluent radiation monitors out of service for >30 days.

There was one revision (Rev 20) to the ODCM approved and implemented in 2002.

For 2002, the total volume of solid radwaste buried was 27.9 cubic meters and the total radioactivity buried was 135 curies. The majority of the buried solid waste volume comes from dry active waste at 26.2 cubic meters. Also, spent resins and filters were responsible for >99% of all the total radioactivity buried.

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).

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

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

- A summary of solid waste shipped from CPSES in the format shown in Appendix B of Regulatory Guide 1.21, Revision 1, June 1974, supplemented with three additional categories: class of waste (per 10CFR61), type of container (Strong Tight, HIC) and shipped and buried volumes and curies.

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

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

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

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

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

- A description of secondary resin releases to the LVW Pond.

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

- An assessment of radiation doses due to the radioactive liquid and gaseous effluents released from CPSES Unit 1 and Unit 2 in 2002.

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

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

1.2 General Trend Graphs

- Total Whole Body Dose due to Gaseous Activity Released from CPSES

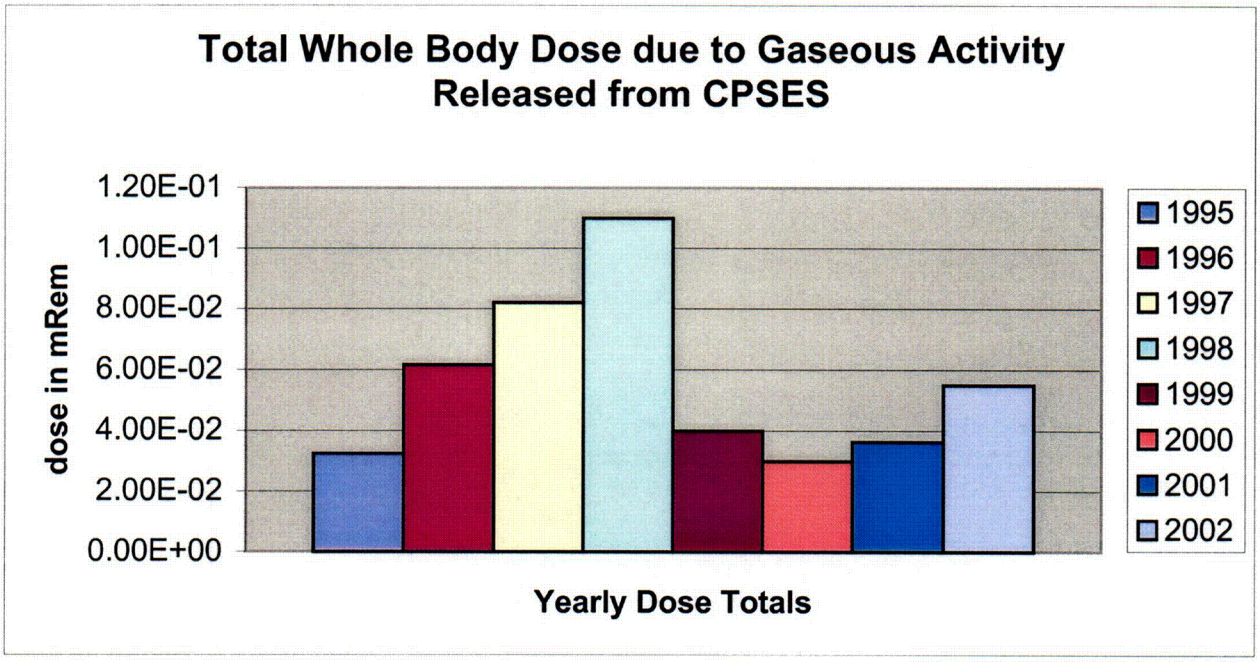
- Total Gaseous Fission and Activation Activity Released from CPSES

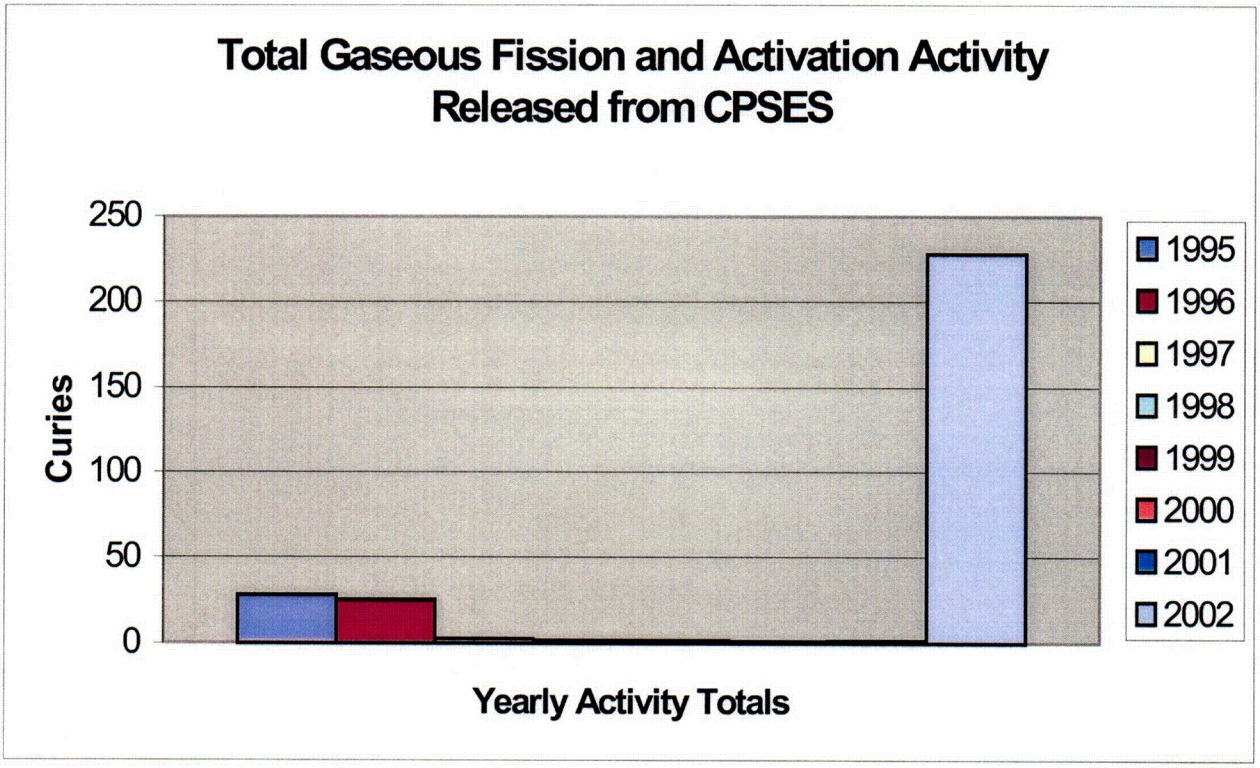
- Total Gaseous Tritium Activity Released from CPSES

- Total Whole Body Dose due to Liquid Effluents Released from CPSES

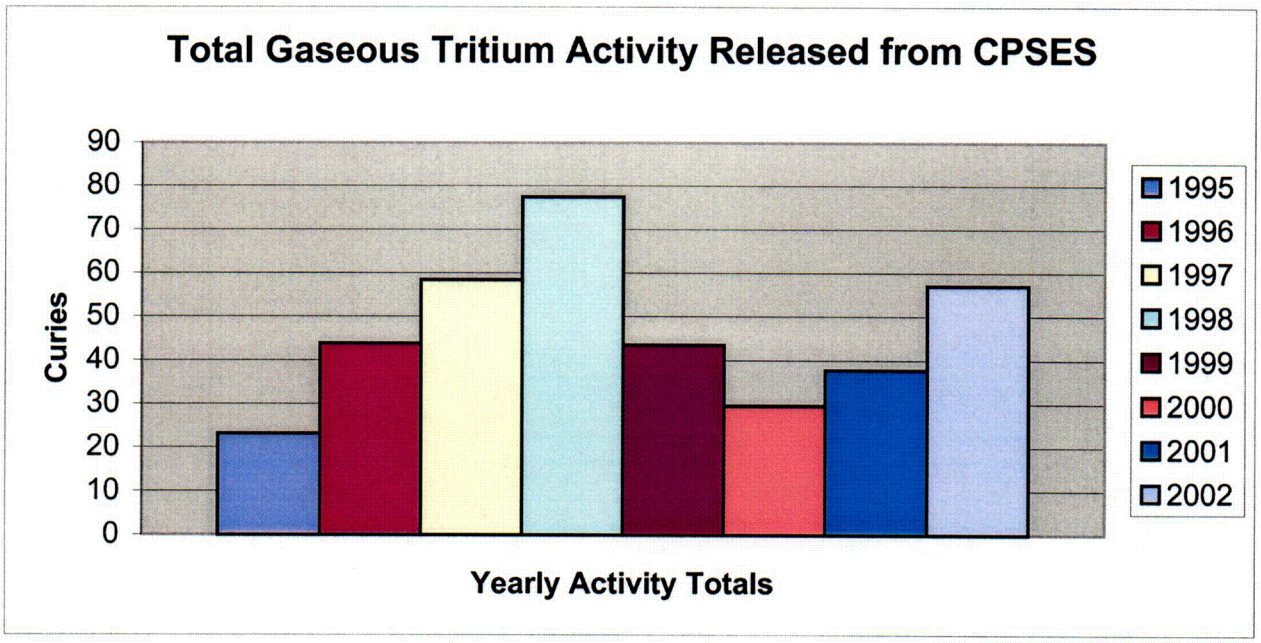
- Total Curies of Tritium Released in Liquid Effluents from CPSES

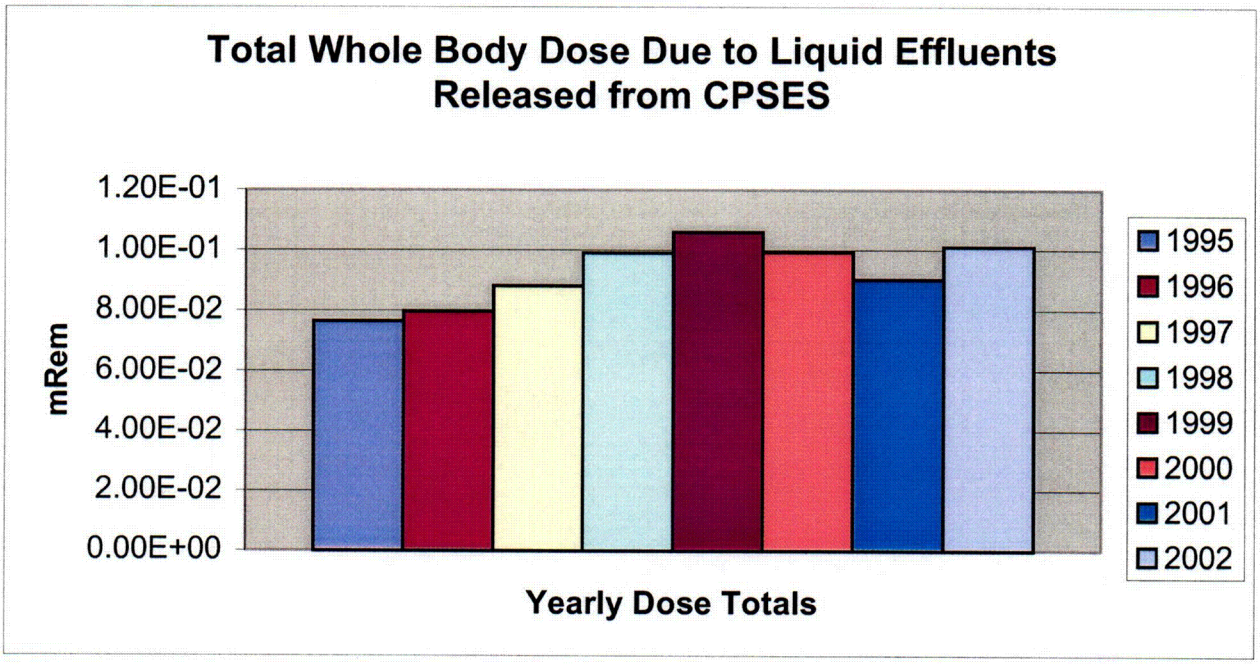
- Squaw Creek Reservoir Average Tritium Concentration


Total Whole Body Dose due to Gaseous Activity Released from CPSES
dose in mRem
1.20E-01
1.00E-01
8.00E-02
6.00E-02
4.00E-02
2.00E-02
0.00E+00
1995
1996
1997
1998
1999
2000
2001
2002
Yearly Dose Totals

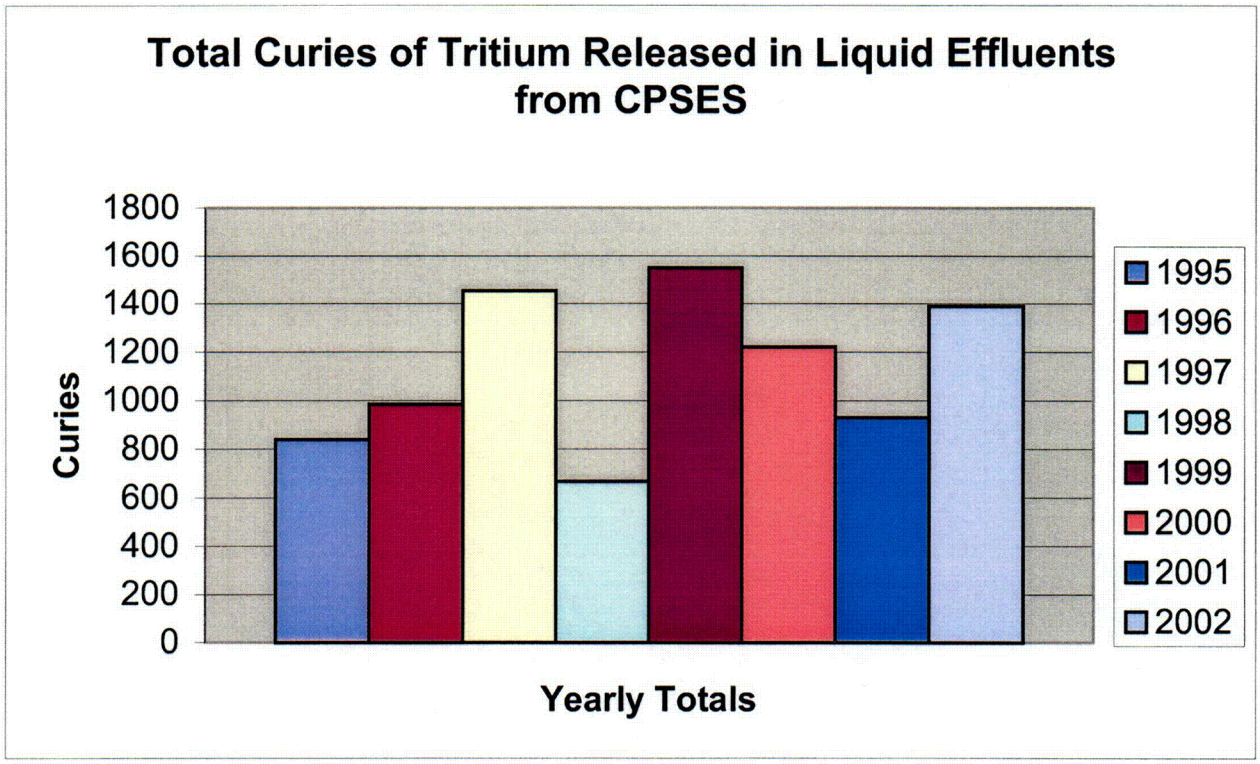

Total Gaseous Fission and Activation Activity Released from CPSES
Curies
250
200
150
100
50
0
1995
1996
1997
1998
1999
2000
2001
2002
Yearly Activity Totals

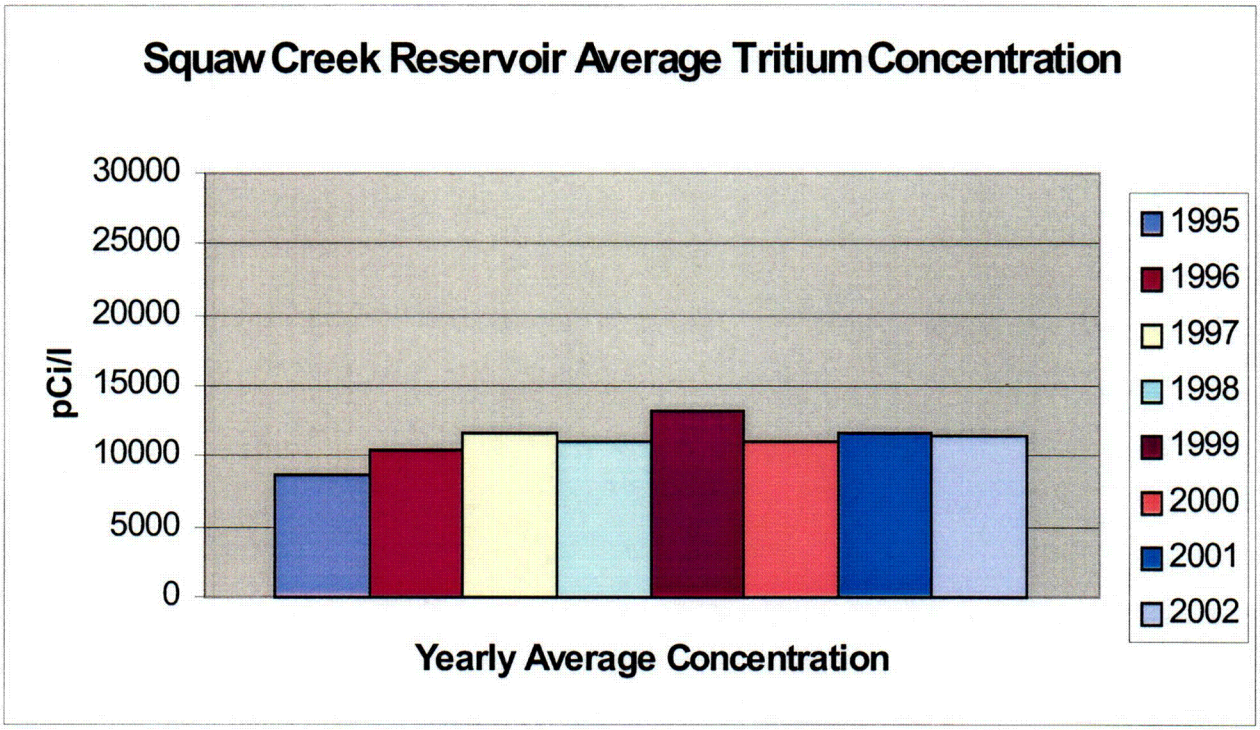
C01


Total Gaseous Tritium Activity Released from CPSES
Curies
90
80
70
60
50
40
30
20
10
0
1995
1996
1997
1998
1999
2000
2001
2002
Yearly Activity Totals


Total Whole Body Dose Due to Liquid Effluents Released from CPSES
mRem
1.20E-01
1.00E-01
8.00E-02
6.00E-02
4.00E-02
2.00E-02
0.00E+00
1995
1996
1997
1998
1999
2000
2001
2002
Yearly Dose Totals

C02


Total Curies of Tritium Released in Liquid Effluents from CPSES
Curies
1800
1600
1400
1200
1000
800
600
400
200
0
1995
1996
1997
1998
1999
2000
2001
2002
Yearly Totals


Squaw Creek Reservoir Average Tritium Concentration
pCi/l
30000
25000
20000
15000
10000
5000
0
1995
1996
1997
1998
1999
2000
2001
2002
Yearly Average Concentration

C03

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:

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

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 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 CPSES 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 (Teledyne Brown). The results of the composite analyses from the previous month or quarter were used to estimate the quantities of these radionuclides in liquid effluents during the current month or quarter. The total radioactivity in liquid effluent releases was

determined from the measured and estimated concentrations of each radionuclide present and the total volume of the effluent released during periods of discharge.

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

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 (Teledyne Brown).

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 with the exception of Containment vents made as a precursor to a Containment purge. In these cases, samples collected and analyzed as a prerequisite to the vent were used to estimate total radioactivity released during the subsequent purge. The results of the analyses and the total volume of effluent released were used to determine the total amount of radioactivity released in the batch mode.

For continuous effluent release pathways, noble gas and tritium grab samples were collected and analyzed weekly for gamma emitting radionuclides by gamma spectroscopy and liquid scintillation counting techniques, respectively. Continuous release pathways were continuously sampled using radioiodine adsorbers and particulate filters. The 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 an offsite laboratory (Teledyne Brown).

2.4 Batch Releases

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

2.5 Abnormal Releases

Abnormal releases are defined as the unintended discharge of a volume of liquid or airborne radioactivity to the environment.

No abnormal effluent releases occurred during the period covered by this report.

3.0 GASEOUS EFFLUENTS

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

4.0 LIQUID EFFLUENTS

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

5.0 SOLID WASTES

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

6.0 RELATED INFORMATION

6.1 Operability of Liquid and Gaseous Monitoring Instrumentation

ODCM Radiological Effluent Controls 3.3.3.4 and 3.3.3.5 require an explanation of why designated inoperable liquid and gaseous monitoring instrumentation was not restored to operable status within thirty days.

During the period covered by this report, there were no instances where these instruments were inoperable for more than thirty days.

6.2 Changes to the Offsite Dose Calculation Manual

Revision 20 was issued to the Offsite Dose Calculation Manual during 2002. This revision included six areas as described below:

(1) Plant vent stack radiation monitors, particulate and iodine channels (XRE5568A&B and XRE5575A&B) were deleted from the ODCM due to a design modification that removed them from the plant. The plant vent stack Wide Range Gas Monitors meet the design requirements for the stack effluents.

(2) Revised the sampling and analysis requirements of Part I, Table 4.11-1 'Radioactive Liquid Waste Sampling and Analysis Program'. The change concerned deleting the unrealistically limiting lower level of detection (LLD) for dissolved and entrained gases in the monthly composite sample of the Low Volume Waste Pond.

(3) Footnotes of Part I, Table 4.11-2 'Radioactive Gaseous Waste Sampling and Analysis Program' were revised to clarify the sampling criteria during changes in 'Rated Thermal Power' to add '*greater than or equal to*' criteria for clarification and consistency with Technical Specification 3.4.16.

(4) ODCM Part II, Section 1.5 'Definitions of Common Liquid Effluent Parameters was revised to remove reference to ODCM Table 3.1 and Figure 3.1 which were previously removed from the ODCM and placed in the current CPSES Land Use Census.

(5) Deleted references to the effluent pathway Outfall numbers. These numbers were not necessary to describe the program and changes in the numbers produced inconsistencies in the ODCM and current plant designation.

(6) Revised the company name to be consistent with CPSES License Amendment No.90.

A complete copy of the current ODCM Rev. 20 can be found in attachment 8.2 of this report.

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 2002 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 CPSES were included in the 2002 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 of issues that did not comply with the applicable requirements of the Radiological Effluent Controls given in Part I of the CPSES ODCM. Detailed documentation concerning evaluations of these events and corrective actions is maintained onsite.

6.5.1 Abnormal Gaseous and Liquid Releases

There were no abnormal gaseous or liquid releases during this reporting period.

6.5.2 Failure to perform a Radioactive Release Permit for the Volume Control Tank (VCT) prior to the release

As part of the activities of the Spring 2002 refueling outage, the Unit 2 VCT was being prepared to be returned to service following the maintenance activities associated with the system. Operations filled the system with demineralized water, which pressurized the gas space to 28 psig as the air and nitrogen compressed. The normal allowable pressure during shutdown conditions is 5 psig. Plans were made by Operations and Chemistry to vent the excess pressure through the sample system fume hood and therefore through the monitored pathway of the primary vent stacks.

The ODCM treats all releases from the VCT as batch releases. All batch releases should be permitted so that dose calculations and monitor setpoints may be verified and approved prior to release of the contents of the VCT. Chemistry procedures require the initiation of a planned non-routine release permit prior to using this release pathway.

Based on the plant conditions, late in the outage and with the system refilled with demineralized water, personnel made the determination that it was not necessary to obtain the planned non-routine release permit. The VCT vent was started without a permit based on the determination that this was a maintenance activity and not a described VCT vent and the belief that there was no radiological significance to the vent.

The oncoming shift crew received turnover of the VCT vent in progress and determined there was no permit in place. The vent was immediately secured and an unplanned non-routine release permit was initiated. The permit verified that there was no impact on dose or monitor setpoints. The stack radiation monitors showed no indication of any release via the chosen VCT release pathway. There was no radiological consequence of this release onsite or to members of the public. All dose and activity data is included in this annual report.

While there was a procedural violation, there was no radiological significance associated with this failure to perform a radiological release permit prior to the VCT vent. (Smart Form 2002-1534)

6.5.3 Loss of a liquid composite sample

Once a month a liquid composite sample is compiled from each Plant Effluent Tank release during the month. Part of the monthly sample is analyzed for tritium and alpha while the remainder of the sample is saved for a quarterly composite. This quarterly composite is shipped offsite for Fe-55, Sr-89, and Sr-90 analysis.

The third quarter composite was being compiled for shipment when it was discovered that the August monthly sample could not be found. The third quarter composite would not be available based on the normal method of compiling equal volumes of the three monthly samples.

In order to provide data, two different composites were made and shipped for analysis. The ratios used

were 50/50 July and September for one composite and 33.3/66.6 July and September for the second composite. The returned Fe-55 results were similar, 6.20E-05 uCi/cc for the first composite and 7.45E-05 uCi/cc for the second. The higher value of 7.45E-05 uCi/cc was used for release calculations as soon as it was available. This data was the best and most conservative data available for the third quarter.

Corrective actions were taken by Chemistry. These actions created locked 'composite sample storage area' cabinets in the Hot Lab and the Secondary Lab. Procedures were changed to control access to the composite samples through the Chemistry Supervisors. Unique labels were created for composite samples and approval of a supervisor is required to discard any composite sample. These actions should ensure samples are not lost in the future. (Smart Form 2002-3448)

6.6 Resin Releases to the LVW Pond

A total of 460 ft^3 of resin was transferred to the LVW pond during the period covered by this report. The results of the sample analyses indicate no radioactive material was transferred to the pond.

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

In accordance with the CPSES 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 2002, is retained onsite. This data is available for review by the NRC upon request. Joint Frequency Tables are included in Attachment 8.1.

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 Tables 7.9 through 7.12.

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 2002 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 CPSES employee recreational area and site tours through the CPSES Visitors Center.

The highest dose occurred in the evaluation for fishing, resulting in a dose of 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 CPSES employee recreational park was calculated based on one visit a week, five hours each day, six months per year. Pathways included in the calculation were gaseous inhalation, submersion and ground plane.

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

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

SECTION 7.0

TABLES

Table 7.1

BATCH LIQUID AND GASEOUS RELEASE SUMMARY - 2002

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
A. Liquid Releases All Sources				
Number of Batch Releases	1.90+01	1.70E+01	2.00E+01	2.40E+01
Total Time Period for Batch Releases (min)	5.92E+03	5.45E+03	6.10E+03	7.38E+03
Maximum Time Period for a Batch Release (min)	4.32E+02	3.82E+02	3.62E+02	4.09E+02
Average Time Period for a Batch Release (min)	3.12E+02	3.21E+02	3.05E+02	3.08E+02
Minimum Time Period for a Batch Release (min)	1.80E+02	6.00E+01	1.88E+02	1.00E+00
Average Stream Flow During Periods of Release (ft^3/s)	N/A	N/A	N/A	N/A
B. Gaseous Releases All Sources				
Number of Batch Releases	3.80E+01	4.50E+01	4.70E+01	3.90E+01
Total Time Period for Batch Releases (min)	1.48E+04	1.75E+04	1.85E+04	1.81E+04
Maximum Time Period for a Batch Release (min)	5.11E+02	8.80E+02	2.94E+03	3.14E+03
Average Time Period for a Batch Release (min)	3.90E+02	3.90E+02	3.93E+02	4.63E+02
Minimum Time Period for a Batch Release (min)	2.53E+02	2.37E+02	1.00E+00	1.42E+02

TABLE 7.2

ABNORMAL BATCH LIQUID AND GASEOUS RELEASE SUMMARY - 2002

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
A. Liquids				
Number of Releases	0	0	0	0
Total Activity Released, Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B. Gases				
Number of Releases	0	0	0	0
Total Activity Released, Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TABLE 7.3

GASEOUS EFFLUENTS--SUMMATION OF ALL RELEASES - 2002

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Est.Total Error, %
A. Fission and Activation Gases						
1. Total release (site)	Ci	2.10E-01	5.39E-01	5.28E+01	1.75E+02	2.35E+01
2. Average release rate for period (site)	µCi/sec	2.70E-02	6.85E-02	6.64E+00	2.20E+01	
3. Percent of ODCM REC limit (Dose Rate 500 mrem/yr/site)	%	4.64E-05	5.46E-05	1.91E-03	4.94E-03	
4. Percent of ODCM REC limit (Skin Dose Rate 3000 mrem/yr/site)	%	3.70E-05	3.54E-05	6.47E-04	1.81E-03	
B. Iodines						
1. Total Iodine-131 (site)	Ci	0.00E+00	0.00E+00	0.00E+00	1.59E-04	1.43E+01
2. Average release rate for period (site)	µCi/sec	0.00E+00	0.00E+00	0.00E+00	2.00E-05	
3. Percent of ODCM REC limit (Organ Dose Rate 1500 mrem/yr/site)	%	0.00E+00	0.00E+00	0.00E+00	1.18E-02	
C. Particulates						
1. Particulates with half lives > 8 days (site)	Ci	1.13E-05	1.35E-07	0.00E+00	0.00E+00	3.13E+01
2. Average release rate for period (site)	µCi/sec	1.46E-06	1.72E-08	0.00E+00	0.00E+00	
3. Percent of ODCM REC limit (Organ Dose Rate 1500 mrem/yr/site)	%	4.35E-05	5.18E-07	0.00E+00	0.00E+00	
4. Gross alpha radioactivity (site)	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
D. Tritium						
1. Total release (site)	Ci	1.28E+01	1.65E+01	1.30E+01	1.48E+01	2.38E+01
2. Average release rate for period (site)	µCi/sec	1.65E+00	2.10E+00	1.63E+00	1.86E+00	
3. Percent of ODCM REC limit (Organ Dose 7.5 mrem/qtr/unit)	%	1.64E-01	2.11E-01	1.65E-01	8.25E-02	

TABLE 7.4

GASEOUS EFFLUENTS--GROUND LEVEL RELEASES--2002

Continuous Mode

Nuclides Released from the site	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
A. Fission and Activation Gases					
Xe-131M	Ci	0.00E+00	0.00E+00	0.00E+00	4.07E+00
Xe-133	Ci	0.00E+00	0.00E+00	1.17E+01	1.37E+02
Xe-135	Ci	0.00E+00	0.00E+00	9.37E-01	1.12E+00
Total for period	Ci	0.00E+00	0.00E+00	1.26E+01	1.42E+02
B. Iodines					
I-131	Ci	0.00E+00	0.00E+00	0.00E+00	1.59E-04
Total for period	Ci	0.00E+00	0.00E+00	0.00E+00	1.59E-04
C. Particulates-Halflife >= 8 Days					
CO-58	Ci	1.13E-05	1.37E-07	0.00E+00	0.00E+00
Total for period	Ci	1.13E-05	1.37E-07	0.00E+00	0.00E+00
D. Tritium					
H-3	Ci	1.28E+01	1.65E+01	1.30E+01	1.48E+01
Total for period	Ci	1.28E+01	1.65E+01	1.30E+01	1.48E+01

TABLE 7.4 (con't.)

GASEOUS EFFLUENTS--GROUND LEVEL RELEASES--2002

Batch Mode

Nuclides Released from the site	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
A. Fission and Activation Gases					
Ar-41	Ci	2.02E-01	1.63E-01	2.15E-01	1.52E-01
Kr-85	Ci	0.00E-00	2.46E-02	3.34E+00	1.54E+00
Kr-85M	Ci	0.00E+00	0.00E+00	4.98E-05	4.63E-05
Kr-87	Ci	0.00E+00	2.44E-04	1.01E-04	0.00E+00
Kr-88	Ci	0.00E+00	0.00E+00	8.74E-05	0.00E+00
Xe-131M	Ci	0.00E+00	0.00E+00	8.21E-01	5.77E-01
Xe-133	Ci	7.63E-03	3.07E-01	3.47E+01	2.91E+01
Xe-133M	Ci	0.00E+00	0.00E+00	4.63E-01	4.63E-01
Xe-135	Ci	3.54E-04	4.46E-02	5.90E-01	7.59E-01
Xe-135M	Ci	0.00E+00	0.00E+00	1.23e-04	0.00E+00
Xe-138	Ci	0.00E+00	0.00E+00	1.61E-04	0.00E+00
Total for period	Ci	2.10E-01	5.39E-01	4.01E+01	3.26E+01
B. Iodines					
None	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for period	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C. Particulates-Halflife >= 8 Days					
None	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for period	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
D. Tritium					
H-3	Ci	3.11E-03	1.24E-02	1.03E-02	2.10E-02
Total for period	Ci	3.11E-03	1.24E-03	1.03E-02	2.10E-02

TABLE 7.5

LIQUID EFFLUENTS--SUMMATION OF ALL RELEASES - 2002

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Est.Total Error, %
A. Fission and Activation Products						
1. Total release (not including tritium, gases, alpha) (site)	Ci	2.18E-01	2.59E-02	1.44E-02	1.44E-01	3.03E+01
2. Average diluted concentration during period (site)	µCi/ml	1.28E-08	1.38E-09	6.30E-10	5.82E-09	
3. Percent of ODCM REC limit (Σ diluted conc/10*ECL)	%	1.66E-03	7.23E-04	4.44E-04	4.05E-04	
B. Tritium						
1. Total release (site)	Ci	4.61E+02	2.70E+02	3.55E+02	2.99E+02	1.34E+01
2. Average diluted concentration during period (site)	µCi/ml	2.63E-05	1.45E-05	1.55E-05	1.21E-05	
3. Percent of ODCM REC limit (diluted conc/1E-02 µCi/ml)	%	2.62E-01	1.44E-01	1.56E-01	1.21E-01	
C. Dissolved and Entrained Gases						
1. Total release (site)	Ci	8.69E-04	3.44E-04	4.64E-02	6.70E-02	1.16E+01
2. Average diluted concentration during period (site)	µCi/ml	4.95E-11	1.84E-11	2.03E-09	2.71E-09	
3. Percent of ODCM REC limit (diluted conc/2.0E-04 µCi/ml	%	2.47E-05	9.20E-06	1.02E-03	1.90E-03	
D. Gross Alpha Radioactivity						
1. Total release (site)	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
E. Volume of waste released (prior to dilution) (site)	Liters	1.33E+06	1.24E+06	1.37E+06	1.67E+06	2.20E+00
F. Volume dilution of water used during period (Note 1)(site)	Liters	1.76E+10	1.87E+10	2.28E+10	2.47E+10	1.00E+01

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

TABLE 7.6

LIQUID EFFLUENTS--2002

Continuous Mode

Nuclides Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
A. Fission and Activation Products					
None	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for period	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B. Tritium					
None	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for period	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C. Dissolved and Entrained Gases					
None	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for period	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
D. Gross Alpha Radioactivity					
None	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for period	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TABLE 7.6 (continued)
LIQUID EFFLUENTS--2002
Batch Mode

Nuclides Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
A. Fission and Activation Products					
Ba-139	Ci	0.00E+00	0.00E+00	0.00E+00	1.35E-05
Br-82	Ci	2.21E-06	0.00E+00	0.00E+00	0.00E+00
Co-57	Ci	0.00E+00	3.46E-05	0.00E+00	2.75E-04
Co-58	Ci	1.22E-04	1.32E-02	3.15E-03	4.03E-02
Co-60	Ci	1.86E-03	8.06E-04	1.60E-03	1.87E-02
Cr-51	Ci	6.77E-05	1.11E-03	4.00E-04	9.10E-03
Cs-134	Ci	0.00E+00	0.00E+00	0.00E+00	4.78E-06
Cs-137	Ci	0.00E+00	0.00E+00	1.47E-05	0.00E+00
Fe-55	Ci	2.10E-01	1.21E-03	1.38E-03	4.90E-02
Fe-59	Ci	0.00E+00	1.18E-04	0.00E+00	7.81E-04
Hf-181	Ci	0.00E+00	0.00E+00	0.00E+00	2.27E-05
I-131	Ci	0.00E+00	0.00E+00	0.00E+00	1.45E-05
I-134	Ci	0.00E+00	0.00E+00	0.00E+00	8.55E-06
In-113M	Ci	0.00E+00	0.00E+00	0.00E+00	3.05E-04
Mn-54	Ci	2.33E-04	2.23E-04	2.53E-04	2.79E-03
Mn-56	Ci	0.00E+00	0.00E+00	0.00E+00	5.47E-06
Na-24	Ci	0.00E+00	8.66E-06	0.00E+00	5.47E-06
Nb-95	Ci	9.11E-06	1.01E-04	1.31E-04	5.11E-03
Pr-144	Ci	0.00E+00	0.00E+00	0.00E+00	3.51E-03
Sb-122	Ci	0.00E+00	1.58E-05	7.74E-06	0.00E+00
Sb-124	Ci	0.00E+00	5.53E-04	1.90E-04	1.18e-03
Sb-125	Ci	5.81E-03	8.38E-03	7.17E-03	9.23E-03
Sb-126	Ci	0.00E+00	3.15E-05	0.00E+00	0.00E+00
Sn-113	Ci	0.00E+00	0.00E+00	0.00E+00	2.03E-04
Sr-85	Ci	0.00E+00	0.00E+00	0.00E+00	2.00E-05
Sr-89	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	Ci	0.00E+00	1.96E-05	0.00E+00	1.87E-04
Zr-95	Ci	0.00E+00	6.41E-05	1.00E-04	3.08E-03
Total for Period	Ci	2.18E-01	2.59E-02	1.44E-02	1.44E-01
B. Tritium					
H-3	Ci	4.61E+02	2.70E+02	3.55E+02	2.99E+02
Total for period	Ci	4.61E+02	2.70E+02	3.55E+02	2.99E+02
C. Dissolved and Entrained Gases					
Kr-85	Ci	0.00E+00	0.00E+00	5.13E-03	4.61E-03
Xe-131M	Ci	0.00E+00	0.00E+00	1.84E-03	1.55E-03
Xe-133	Ci	8.69E-04	3.44E-04	3.93E-02	6.04E-02
Xe-133M	Ci	0.00E+00	0.00E+00	1.91E-04	4.48E-04
Xe-135	Ci	0.00E+00	0.00E+00	0.00E+00	6.14E-05
Total for period	Ci	8.69E-04	3.44E-04	4.65E-02	6.71E-02
D. Gross Alpha Activity					
None	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for period	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TABLE 7.7

DOSES FROM LIQUID EFFLUENTS -2002 (mrem) **(site)**

Any Organ 5 mrem/qtr/unit -- 10 mrem/yr/unit.
Whole Body 1.5 mrem/qtr/unit -- 3 mrem/yr/unit.

Organ	Bone	Liver	Whole Body	Thyroid	Kidney	Lung	GI-LLI
Quarter 1	7.77E-04	2.51E-02	2.47E-02	2.45E-02	2.45E-02	2.50E-02	2.50E-02
% Limit per unit	7.77E-03	2.51E-01	8.23E-01	2.45E-01	2.45E-01	2.50E-02	2.50E-01
Quarter 2	8.80E-06	2.52E-02	2.52E-02	2.51E-02	2.51E-02	2.53E-02	2.61E-02
% Limit per unit	8.80E-05	2.52E-01	8.40E-01	2.51E-01	2.51E-01	2.53E-01	2.61E-01
Quarter 3	3.06E-05	2.64E-02	2.64E-02	2.64E-02	2.64E-02	2.65E-02	2.73E-02
% Limit per unit	3.06E-04	2.64E-01	8.80E-01	2.64E-01	2.64E-01	2.65E-01	2.73E-01
Quarter 4	2.07E-04	2.54E-02	2.53E-02	2.51E-02	2.52e-02	2.54E-02	6.47E-02
% Limit per unit	2.07E-03	2.54E-01	8.43E-01	2.51E-01	2.52E-01	2.54E-01	6.47E-01
Total 2002	9.32E-04	1.02E-01	1.01E-01	1.01E-01	1.01e-01	1.02E-01	1.43E-01
% Limit per unit	4.66E-03	5.10E-01	1.68E+00	5.05E-01	5.05E-01	5.10E-01	7.15E-01

Theoretical Maximum Age Group - Adult
Theoretical Highest Organ Dose - GI-LLI

TABLE 7.8

DOSES FROM GASEOUS EFFLUENTS -2002

Site Noble Gas Air Dose (mRad)

5 mrad gamma/qtr/unit -- 10 mrad beta/qtr/unit
10 mrad gamma/yr/unit -- 20 mrad beta/yr/unit

Air Dose (mRad)	Gamma Air	Beta Air
Quarter 1	1.96E-04	7.01E-05
% Limit per unit	1.96E-03	3.51E-04
Quarter 2	1.79E-04	1.06E-04
% Limit per unit	1.79E-03	5.30E-04
Quarter 3	2.26E-03	6.41E-03
% Limit per unit	2.26E-02	3.21E-02
Quarter 4	6.76E-03	1.97E-02
% Limit per unit	6.76E-02	9.85E-02
Total 2002	9.40E-03	2.63E-02
% Limit per unit	4.70E-02	6.58E-02

TABLE 7.9
DOSES FROM GASEOUS EFFLUENTS -2002

Site Iodines, Particulates and Tritium Dose
Adult Age Group, (mrem)
Any Organ Dose Limit - 7.5 mrem/qtr/unit -- 15 mrem/yr/unit

Organ	Bone	Liver	Whole Body	Thyroid	Kidney	Lung	GI-LLI	Skin
Qtr-1	0.00E+00	8.18E-03	8.18E-03	8.18E-03	8.18E-03	8.18E-03	8.19E-03	5.32E-06
% Limit per Unit	0.00E+00	5.45E-02	5.45E-02	5.45E-02	5.45E-02	5.45E-02	5.46E-02	3.55E-05
Qtr-2	0.00E+00	1.05E-02	1.05E-02	1.05E-02	1.05E-02	1.05E-02	1.05E-02	6.34E-08
% Limit per Unit	0.00E+00	7.00E-02	7.00E-02	7.00E-02	7.00E-02	7.00E-02	7.00E-02	4.22E-07
Qtr-3	0.00E+00	8.26E-03	8.26E-03	8.26E-03	8.26E-03	8.26E-03	8.26E-03	0.00E+00
% Limit per Unit	0.00E+00	5.51E-02	5.51E-02	5.51E-02	5.51E-02	5.51E-02	5.51E-02	0.00E+00
Qtr-4	6.58E-05	9.52E-03	9.48E-03	4.03E-02	9.59E-03	9.42E-03	9.45E-03	3.52E-06
% Limit per Unit	4.39E-04	6.35E-02	6.32E-02	2.69E-01	6.39E-02	6.28E-02	6.30E-02	2.35E-05
Total 2002	6.58E-05	3.65E-02	3.64E-02	6.72E-02	3.65E-02	3.64E-02	3.64E-02	8.90E-06
% Limit per Unit	2.19E-04	1.22E-01	1.21E-01	2.24E-01	1.22E-01	1.21E-01	1.21E-01	2.97E-05

TABLE 7.10

DOSES FROM GASEOUS EFFLUENTS -2002

Site Iodines, Particulates and Tritium Dose
Teen Age Group, (mrem)
Any Organ Dose Limit - 7.5 mrem/qtr/unit -- 15 mrem/yr/unit

Organ	Bone	Liver	Whole Body	Thyroid	Kidney	Lung	GI-LLI	Skin
Qtr-1	0.00E+00	8.96E-03	8.96E-03	8.96E-03	8.96E-03	8.96E-03	8.97E-03	5.32E-06
% Limit per Unit	0.00E+00	5.97E-02	5.97E-02	5.97E-02	5.97E-02	5.97E-02	5.98E-02	3.55E-05
Qtr-2	0.00E+00	1.15E-02	1.15E-02	1.15E-02	1.15E-02	1.15E-02	1.15E-02	6.34E-08
% Limit per Unit	0.00E+00	7.67E-02	7.67E-02	7.67E-02	7.67E-02	7.67E-02	7.67E-02	4.23E-07
Qtr-3	0.00E+00	9.04E-03	9.04E-03	9.04E-03	9.04E-03	9.04E-03	9.04E-03	0.00E+00
% Limit per Unit	0.00E+00	6.03E-02	6.03E-02	6.03E-02	6.03E-02	6.03E-02	6.03E-02	0.00E+00
Qtr-4	1.06E-04	1.05E-02	1.04E-02	5.36E-02	1.06E-02	1.03E-02	1.04E-02	3.52E-06
% Limit per Unit	7.07E-04	7.00E-02	6.93E-02	3.57E-01	7.07E-02	6.87E-02	6.93E-02	2.35E-05
Total 2002	1.06E-04	4.00E-02	3.99E-02	8.31E-02	4.01E-02	3.98E-02	3.99E-02	8.90E-06
% Limit per Unit	3.53E-04	1.33E-01	1.33E-01	2.77E-01	1.34E-01	1.33E-01	1.33E-01	2.97E-05

TABLE 7.11

DOSES FROM GASEOUS EFFLUENTS -2002

Site Iodines, Particulates and Tritium Dose
Child Age Group, (mrem)
Any Organ Dose Limit - 7.5 mrem/qtr/unit -- 15 mrem/yr/unit

Organ	Bone	Liver	Whole Body	Thyroid	Kidney	Lung	GI-LLI	Skin
Qtr-1	0.00E+00	1.23E-02	1.23E-02	1.23E-02	1.23E-02	1.23E-02	1.23E-02	5.32E-06
% Limit per Unit	0.00E+00	8.20E-02	8.20E-02	8.20E-02	8.20E-02	8.20E-02	8.20E-02	3.55E-05
Qtr-2	0.00E+00	1.58E-02	1.58E-02	1.58E-02	1.58E-02	1.58E-02	1.58E-02	6.34E-08
% Limit per Unit	0.00E+00	1.05E-01	1.05E-01	1.05E-01	1.05E-01	1.05E-01	1.05E-01	4.23E-07
Qtr-3	0.00E+00	1.24E-02	1.24E-02	1.24E-02	1.24E-02	1.24E-02	1.24E-02	0.00E+00
% Limit per Unit	0.00E+00	8.27E-02	8.27E-02	8.27E-02	8.27E-02	8.27E-02	8.27E-02	0.00E+00
Qtr-4	2.49E-04	1.45E-02	1.44E-02	9.66E-02	1.46E-02	1.42E-02	1.42E-02	3.52E-06
% Limit per Unit	1.66E-03	9.67E-02	9.60E-02	6.44E-01	9.73E-02	9.47E-02	9.47E-02	2.35E-05
Total 2002	2.49E-04	5.51E-02	5.50E-02	1.37E-01	5.52E-02	5.48E-02	5.48E-02	8.90E-06
% Limit per Unit	8.30E-04	1.84E-01	1.83E-01	4.57E-01	1.84E-01	1.83E-01	1.83E-01	2.97E-05

TABLE 7.12

DOSES FROM GASEOUS EFFLUENTS -2002

Site Iodines, Particulates and Tritium Dose
Infant Age Group, (mrem)
Any Organ Dose Limit - 7.5 mre/qtr/unit -- 15 mrem/yr/unit

Organ	Bone	Liver	Whole Body	Thyroid	Kidney	Lung	GI-LLI	Skin
Qtr-1	0.00E+00	5.37E-03	5.38E-03	5.37E-03	5.37E-03	5.37E-03	5.37E-03	5.32E-06
% Limit per Unit	0.00E+00	3.58E-02	3.59E-02	3.58E-02	3.58E-02	3.58E-02	3.58E-02	3.55E-05
Qtr-2	0.00E+00	6.90E-03	6.90E-03	6.90E-03	6.90E-03	6.90E-03	6.90E-03	6.34E-08
% Limit per Unit	0.00E+00	4.60E-02	4.60E-02	4.60E-02	4.60E-02	4.60E-02	4.60E-02	4.23E-07
Qtr-3	0.00E+00	5.43E-03	5.43E-03	5.43E-03	5.43E-03	5.43E-03	5.43E-03	0.00E+00
% Limit per Unit	0.00E+00	3.62E-02	3.62E-02	3.62E-02	3.62E-02	3.62E-02	3.62E-02	0.00E+00
Qtr-4	4.59E-04	6.74E-03	6.43E-03	1.83E-01	6.83E-03	6.19E-03	6.21E-03	3.52E-06
% Limit per Unit	3.06E-03	4.49E-02	4.29E-02	1.22E+00	4.55E-02	4.13E-02	4.14E-02	2.35E-05
Total 2002	4.59E-04	2.44E-02	2.41E-02	2.01E-01	2.45E-02	2.39E-02	2.39E-02	8.90E-06
% Limit per Unit	1.53E-03	8.13E-02	8.03E-02	6.70E-01	8.17E-02	7.97E-02	7.97E-02	2.97E-05

TABLE 7.13

SOLID RADWASTE AND IRRADIATED FUEL SHIPMENTS -2002

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	1.26E+01	1.37E+02	1.67E+00	1.34E+02	±25%
b. Dry active waste	3.64E+02	6.43E-01	2.62E+01	1.26E+00	±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	3.77E+02	1.38E+02	2.79E+01	1.35E+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 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	Co-60	39.39	5.41E+01
	Ni-63	35.17	4.83E+01
	Mn-54	11.25	1.55E+01
	Co-58	5.98	8.22E+00
	Fe-55	4.17	5.73E+00
	Sb-125	1.91	2.62E+00
	H-3	0.48	6.57E-01
	C-14	0.05	6.69E-02
	Tc-99	LLD	-0-
	I-129	LLD	-0-
	Other*	1.60	2.20E+00
	Total	100.00	100.00

* Nuclides representing <1% of total shipped activity: Sc-46, Co-57, Sr-90, Nb-94, Cs-134, Cs-137, Ce-144, Pu-238, Pu-239/40, Pu-241, Am-241, Cm-242, Cm-243/244.

TABLE 7.13 (Continued)

SOLID RADWASTE AND IRRADIATED FUEL SHIPMENTS -2002

2. Estimate of Major Nuclide Composition (by type of waste)	Nuclide	% Abund.	Activity (Ci)
b. Dry active waste	Fe-55	44.00	2.83E-01
	Co-58	30.07	1.93E-01
	Ni-63	15.31	9.85E-02
	Co-60	6.80	4.37E-02
	H-3	0.63	4.08E-03
	C-14	1.04	6.72E-03
	Tc-99	LLD	-0-
	I-129	LLD	-0-
	Other*	2.15	1.38E-02
	Total	100.00	6.43E-01

* Nuclides representing <1% of total shipped activity: Mn-54, Co-57, Se-75, Nb-95, Zr-95, Sb-125, Cs-134, Cs-137, Ce-144, Pu-238, Pu-239/40, Pu-241, Am-241, Cm-243/44.

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	2	Studsvik Erwin, TN.
b. Dry active waste	A	Strong-tight	6	GTS Duratek 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

Joint Frequency Tables for

2002

R. G. 1.21 JOINT FREQUENCY TABLE

TXU ELECTRIC COMPANY

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 01-JAN-02 00:00 TO 31-DEC-02 23:59

STABILITY CLASS:A

ELEVATION: 10 m.

	Wind Speed (mph) at 10 m. level						
Wind Direction	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	1	9	8	5	1	24
NNE	6	6	17	9	0	0	38
NE	2	15	9	4	0	0	30
ENE	2	17	16	3	0	0	38
E	3	23	11	1	0	0	38
ESE	0	72	23	6	0	0	101
SE	0	42	42	14	3	0	101
SSE	2	17	48	29	0	0	96
S	2	22	74	41	8	0	147
SSW	1	12	33	16	3	0	65
SW	0	13	6	4	0	0	23
WSW	0	3	5	1	1	0	10
W	1	0	1	0	0	0	2
WNW	0	1	1	0	0	0	2
NW	0	0	1	1	0	0	2
NNW	1	0	9	12	10	16	48
VARIABLE	12	2	0	0	0	0	14
TOTAL	32	246	305	149	30	17	779
Periods of calm (hours): 2							
Hours of missing data: 5							

R. G. 1.21 JOINT FREQUENCY TABLE

TXU ELECTRIC COMPANY

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 01-JAN-02 00:00 TO 31-DEC-02 23:59

STABILITY CLASS:B

ELEVATION: 10 m.

	Wind Speed (mph) at 10 m. level						
Wind Direction	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	7	14	14	5	2	42
NNE	6	8	9	12	4	1	40
NE	3	13	8	1	1	0	26
ENE	3	13	8	2	0	0	26
E	3	14	8	0	0	0	25
ESE	3	18	4	0	0	0	25
SE	2	16	8	7	0	0	33
SSE	5	12	29	28	5	0	79
S	2	12	34	55	10	1	114
SSW	4	1	14	15	0	0	34
SW	5	6	10	6	4	0	31
WSW	0	3	4	3	1	0	11
W	1	2	0	0	0	0	3
WNW	0	0	0	0	0	0	0
NW	1	0	5	9	3	0	18
NNW	1	8	14	17	7	6	53
VARIABLE	10	6	0	0	0	0	16
TOTAL	49	139	169	169	40	10	576
Periods of calm (hours):			0				
Hours of missing data:			1				

R. G. 1.21 JOINT FREQUENCY TABLE

TXU ELECTRIC COMPANY

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 01-JAN-02 00:00 TO 31-DEC-02 23:59

STABILITY CLASS:C

ELEVATION: 10 m.

	Wind Speed (mph) at 10 m. level						
Wind Direction	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	2	6	21	14	9	0	52
NNE	3	7	14	9	5	1	39
NE	9	7	5	3	1	0	25
ENE	4	12	4	2	0	0	22
E	5	9	3	2	0	0	19
ESE	7	15	4	1	0	0	27
SE	2	10	18	7	0	0	37
SSE	3	11	35	24	12	0	85
S	7	8	49	62	20	1	147
SSW	2	7	9	24	6	0	48
SW	1	6	3	6	2	0	18
WSW	1	3	4	5	0	0	13
W	2	1	2	1	0	0	6
WNW	0	1	3	2	2	0	8
NW	0	3	6	12	13	2	36
NNW	5	17	10	20	7	12	71
VARIABLE	17	2	0	0	0	0	19
TOTAL	70	125	190	194	77	16	672

Periods of calm (hours): 0

Hours of missing data: 3

R. G. 1.21 JOINT FREQUENCY TABLE

TXU ELECTRIC COMPANY

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 01-JAN-02 00:00 TO 31-DEC-02 23:59

STABILITY CLASS:D

ELEVATION: 10 m.

	Wind Speed (mph) at 10 m. level						
Wind Direction	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	5	92	218	138	58	6	517
NNE	11	59	163	66	5	5	309
NE	16	67	79	23	0	0	185
ENE	11	58	74	11	0	0	154
E	15	105	49	3	0	0	172
ESE	21	112	47	2	0	0	182
SE	19	137	197	31	0	0	384
SSE	9	76	231	233	46	1	596
S	8	55	217	272	89	10	651
SSW	10	38	34	19	2	0	103
SW	3	13	14	7	3	0	40
WSW	6	18	9	7	2	0	42
W	5	5	5	0	0	0	15
WNW	5	25	20	17	0	0	67
NW	6	28	59	56	12	0	161
NNW	7	26	123	121	53	7	337
VARIABLE	47	18	6	4	1	0	76
TOTAL	204	932	1545	1010	271	29	3991

Periods of calm (hours): 3

Hours of missing data: 44

R. G. 1.21 JOINT FREQUENCY TABLE

TXU ELECTRIC COMPANY

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 01-JAN-02 00:00 TO 31-DEC-02 23:59

STABILITY CLASS:E

ELEVATION: 10 m.

	Wind Speed (mph) at 10 m. level						
Wind Direction	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	9	22	32	4	1	0	68
NNE	5	21	21	2	0	0	49
NE	2	8	4	1	0	0	15
ENE	0	7	0	0	0	0	7
E	19	31	3	0	0	0	53
ESE	22	59	18	0	0	0	99
SE	33	218	142	5	0	0	398
SSE	22	140	247	65	9	0	483
S	10	57	132	48	5	0	252
SSW	22	37	63	23	0	0	145
SW	20	9	8	7	0	0	44
WSW	18	9	11	5	0	0	43
W	10	11	8	1	0	0	30
WNW	9	35	13	9	0	0	66
NW	12	39	40	2	0	0	93
NNW	2	12	35	3	9	0	61
VARIABLE	61	8	2	0	0	0	71
TOTAL	276	723	779	175	24	0	1977

Periods of calm (hours): 10

Hours of missing data: 1

R. G. 1.21 JOINT FREQUENCY TABLE

TXU ELECTRIC COMPANY

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 01-JAN-02 00:00 TO 31-DEC-02 23:59

STABILITY CLASS:F

ELEVATION: 10 m.

	Wind Speed (mph) at 10 m. level						
Wind Direction	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	1	1	0	0	0	2
NNE	0	0	0	0	0	0	0
NE	0	1	0	0	0	0	1
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	2	2	1	0	0	0	5
SE	7	36	9	0	0	0	52
SSE	7	24	20	0	0	0	51
S	11	30	12	0	0	0	53
SSW	23	15	12	0	0	0	50
SW	16	12	15	1	0	0	44
WSW	14	10	3	1	0	0	28
W	12	6	4	0	0	0	22
WNW	10	12	5	0	0	0	27
NW	8	45	15	0	0	0	68
NNW	5	2	1	0	0	0	8
VARIABLE	16	1	0	0	0	0	17
TOTAL	131	197	98	2	0	0	428

Periods of calm (hours): 3

Hours of missing data: 0

R. G. 1.21 JOINT FREQUENCY TABLE

TXU ELECTRIC COMPANY

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 01-JAN-02 00:00 TO 31-DEC-02 23:59

STABILITY CLASS:G

ELEVATION: 10 m.

	Wind Speed (mph) at 10 m. level						
Wind Direction	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	1	0	0	0	0	0	1
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	2	0	0	0	0	0	2
SE	3	5	0	0	0	0	8
SSE	5	0	0	0	0	0	5
S	8	6	2	0	0	0	16
SSW	21	11	7	0	0	0	39
SW	10	8	1	0	0	0	19
WSW	20	27	5	0	0	0	52
W	12	10	0	0	0	0	22
WNW	15	7	0	0	0	0	22
NW	7	28	3	0	0	0	38
NNW	0	0	1	0	0	0	1
VARIABLE	17	1	0	0	0	0	18
TOTAL	121	103	19	0	0	0	243
Periods of calm (hours):		2					
Hours of missing data:		0					

R. G. 1.21 JOINT FREQUENCY TABLE

TXU ELECTRIC COMPANY

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 01-JAN-02 00:00 TO 31-DEC-02 23:59

STABILITY CLASS:ALL

ELEVATION: 10 m.

	Wind Speed (mph) at 10 m. level						
Wind Direction	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	17	130	295	178	78	9	707
NNE	33	101	224	98	14	7	477
NE	32	111	105	32	2	0	282
ENE	20	107	102	18	0	0	247
E	45	182	74	6	0	0	307
ESE	57	278	97	9	0	0	441
SE	66	465	418	64	3	0	1016
SSE	53	280	611	379	72	1	1396
S	49	190	520	478	132	12	1381
SSW	83	121	172	97	11	0	484
SW	55	67	57	31	9	0	219
WSW	59	73	41	22	4	0	199
W	43	35	20	2	0	0	100
WNW	39	81	42	28	2	0	192
NW	34	143	129	80	28	2	416
NNW	21	65	193	173	86	41	579
VARIABLE	181	38	8	4	1	0	232
TOTAL	887	2467	3108	1699	442	72	8675
Periods of calm (hours):			20				
Hours of missing data:			65				

ATTACHMENT 8.2

Offsite Dose Calculation Manual for TXU Electric Comanche Peak Steam Electric Station Units 1 and 2, Revision 20.

OFFSITE DOSE CALCULATION MANUAL

FOR

TXU GENERATION COMPANY LP (TXU ENERGY)

COMANCHE PEAK STEAM ELECTRIC STATION

UNITS 1 AND 2

20

TABLE OF CONTENTS

Number/Title			Page
List of Tables			v
List of Figures			vii
Cross-Reference to Technical Specifications and REC			viii
References			xi
Introduction			xii
PART I - RADIOLOGICAL EFFLUENT CONTROLS			
SECTION 1.0 - USE AND APPLICATIONS			I 1-0
SECTION 1.1 - DEFINITIONS			I 1-1
SECTION 2.0 - NOT USED			I 2-0
SECTIONS 3.0 AND 4.0 - CONTROLS AND SURVEILLANCE REQUIREMENTS			I 3/4-0
3/4.0	-	Applicability	I 3/4-1
3/4.3.3.4	-	Radioactive Liquid Effluent Monitoring Instrumentation	I 3/4-3
3/4.3.3.5	-	Radioactive Gaseous Effluent Monitoring Instrumentation	I 3/4-8
3/4.3.3.6	-	Meteorological Monitoring Instrumentation	I 3/4-13
3/4.7.15	-	Sealed Source Contamination	I 3/4-15
3/4.11.1	-	Liquid Effluents	I 3/4-17
3/4.11.1.1	-	Concentration Controls	I 3/4-17
3/4.11.1.2	-	Dose	I 3/4-21
3/4.11.1.3	-	Liquid Radwaste Treatment System	I 3/4-22
3/4.11.1.4	-	LVW Pond Resin Inventory	I 3/4-22a
3/4.11.2	-	Gaseous Effluents	I 3/4-23
3/4.11.2.1	-	Dose Rate	I 3/4-23
3/4.11.2.2	-	Dose - Noble Gases	I 3/4-27
3/4.11.2.3	-	Dose - Iodine-131, Iodine-133, Tritium, and Radioactive Material in Particulate Form	I 3/4-28

TABLE OF CONTENTS
(continued)

Number/Title			Page
3/4.11.2.4	-	Gaseous Radwaste Treatment System	I 3/4-29
3/4.11.4	-	Total Dose	I 3/4-30
3/4.12.1	-	Radiological Environmental Monitoring Program	I 3/4-32
3/4.12.2	-	Land Use Census	I 3/4-44
3/4.12.3	-	Interlaboratory Comparison Program	I 3/4-45
BASES			I B 3/4-0
SECTION 5.0 - DESIGN FEATURES			I 5-0
5.1.3	-	Map Defining Controlled Areas, Unrestricted Areas and Site Boundary for Radioactive Gaseous and Liquid Effluents	I 5-1
SECTION 6.0 - ADMINISTRATIVE CONTROLS			I 6-0
6.9.1.3	-	Radiological Environmental Operating Report	I 6-1
6.9.1.4	-	Radioactive Effluent Release Report	I 6-2
6.14	-	Offsite Dose Calculation Manual (ODCM)	I 6-3

PART II - CALCULATIONAL METHODOLOGIES

1.0 LIQUID EFFLUENTS		II 1-1
1.1 10CFR20 and Radiological Effluent Control 3/4.11.1.1 Compliance		II 1-2
1.1.1	Isotopic Concentration of the Waste Tank	II 1-3
1.1.2	Effluent Flow Rate (f)	II 1-3
1.1.3	Dilution of Liquid Effluents	II 1-ii4
1.1.4	Actual Dilution Factor (ADF)	II 1-5
1.1.5	Required Dilution Factor (RDF)	II 1-6
1.1.6	10CFR20 Compliance	II 1-6

TABLE OF CONTENTS
(continued)

Number/Title	Page
1.2 Radiation Monitor Alarm Setpoints	II 1-7
1.2.1 Primary Liquid Effluent Monitor (XRE-5253)	II 1-7
1.2.2 Turbine Building Sump Effluent Radiation Monitors (1RE-5100 and 2RE-5100)	II 1-8
1.2.3 Service Water Effluent Radiation Monitors (1RE-4269/4270 and 2RE-4269/4270)	II 1-9
1.2.4 Auxiliary Building to LVW Pond Radiation Monitor (XRE-5251A)	II 1-9a
1.3 Dose Calculations for Liquid Effluents	II 1-10
1.3.1 Calculation of Dose Due to Liquid Releases	II 1-11
1.3.2 Calculation of Dose Due to Radionuclide Buildup in the Lake	II 1-12
1.4 Dose Projections for Liquid Effluents	II 1-15
1.5 Definitions of Common Liquid Effluent Parameters	II 1-16
2.0 GASEOUS EFFLUENTS	II 2-1
2.1 Radiological Effluent Control 3/4.11.2.1 Compliance	II 2-3
2.1.1 Dose Rates Due to Noble Gases	II 2-3
2.1.2 Dose Rates Due to Radioiodines, Tritium, and Particulates	II 2-5
2.2 Gaseous Effluent Monitor Setpoints	II 2-6
2.2.1 Plant Vent Effluent Release Rate Monitors (XRE-5570A/XRE-5570B)	II 2-7
2.2.2 Plant Vent Stack Noble Gas Activity Monitors (XRE-5570A/XRE-5570B and XRE-5567A/XRE-5567B)	II 2-8
2.2.3 Sampler Flow Rate Monitors (X-RFT-5570A-1/X-RFT-5570B-1)	II 2-9
2.2.4 Auxiliary Building Ventilation Exhaust Monitor (XRE-5701)	II 2-9

TABLE OF CONTENTS
(continued)

Number/Title		Page
2.2.5	Containment Atmosphere Gaseous Monitors (1RE-5503/2RE-5503)	II 2-10
2.3	Dose Calculations for Gaseous Effluents	II 2-12
2.3.1	Dose Due to Noble Gases	II 2-12
2.3.2	Dose Due to Radioiodines, Tritium, and Particulates	II 2-13
2.4	Dose Projections for Gaseous Effluents	II 2-15
2.5	Dose Calculations to Support Other Requirements	II 2-16
2.6	Meteorological Model	II 2-18
2.6.1	Dispersion Calculations	II 2-18
2.6.2	Deposition Calculations	II 2-20
2.7	Definitions of Gaseous Effluents Parameters	II 2-21
3.0	RADIOLOGICAL ENVIRONMENTAL MONITORING	II 3-1
3.1	Sampling Locations	II 3-1
3.2	Interlaboratory Comparison Program	II 3-1

APPENDICES

A.	Pathway Dose Rate Parameter	A-1
B.	Inhalation Pathway Dose Factor	B-1
C.	Ground Plane Pathway Dose Factor	C-1
D.	Grass-Cow-Milk Pathway Dose Factor	D-1
E.	Cow-Meat Pathway Dose Factor	E-1
F.	Vegetation Pathway Dose Factor	F-1
G.	Supplemental Guidance Statements - Deleted	G-1

TABLE OF CONTENTS

List of Tables

Table No.	Title	Page
PART I - RADIOLOGICAL EFFLUENT CONTROLS		
1.1	ODCM Frequency Notation	I 1-5
3.3-7	Radioactive Liquid Effluent Monitoring Instrumentation	I 3/4-4
4.3-3	Radioactive Liquid Effluent Monitoring Instrumentation Surveillance Requirements	I 3/4-6
3.3-8	Radioactive Gaseous Effluent Monitoring Instrumentation	I 3/4-9
4.3-4	Radioactive Gaseous Effluent Monitoring Instrumentation Surveillance Requirements	I 3/4-11
3.3-9	Meteorological Monitoring Instrumentation	I 3/4-14
4.11-1	Radioactive Liquid Waste Sampling and Analysis Program	I 3/4-18
4.11-2	Radioactive Gaseous Waste Sampling and Analysis Program	I 3/4-24
3.12-1	Radiological Environmental Monitoring Program	I 3/4-34
3.12-2	Reporting Levels for Radioactivity Concentrations in Environmental Samples	I 3/4-40
4.12-1	Detection Capabilities for Environmental Sample Analysis (LLDs)	I 3/4-41
PART II - CALCULATIONAL METHODOLOGIES		
1.1	Summary of Liquid Release Pathways	II 1-19
1.2	Site Related Ingestion Dose Commitment Factor (A_{iT})	II 1-20
2.1	Summary of Gaseous Release Pathways	II 2-26
2.2	Dose Factors for Exposure to a Semi-Infinite Cloud of Noble Gases	II 2-27
2.3	Pathway Dose Rate Parameter (P_i)	II 2-28

List of Tables

Table No.	Title	Page
2.4	Pathway Dose Factors	II 2-29
2.5	Controlling Receptor Pathways and Locations, and Atmospheric Dispersion Parameters (For Dose Calculations Required by Radiological Effluent Control 3/4.11.2.3)	II 2-50
3.1	Environmental Sampling Locations	II 3-3

TABLE OF CONTENTS

List of Figures

Figure	Title	Page
	PART I - RADIOLOGICAL EFFLUENT CONTROLS	
5.1-3	Controlled Area, Unrestricted Area and Site Boundary for Radioactive Gaseous and Liquid Effluents	I 5-2
	PART II - CALCULATIONAL METHODOLOGIES	
1.1	Liquid Effluent Discharge Pathways	II 1-24
1.2	Circulating Water Pump Curves	II 1-26
1.3	Energy Response to Gamma Radiations for RD-33 Type Detector	II 1-27
2.1	Gaseous Waste Processing System	II 2-52
2.2	Plume Depletion Effect for Ground-Level Releases	II 2-53
2.3	Vertical Standard Deviation of Material in a Plume	II 2-54
2.4	Relative Deposition for Ground-Level Releases	II 2-55
2.5	Open Terrain Correction Factor	II 2-56
3.1	Radiological Environmental Monitoring Locations	II 3-4

CROSS-REFERENCE TO TECHNICAL SPECIFICATIONS AND REC

Document	Number or Section	Requirement	ODCM Section
		PART I-RADIOLOGICAL EFFLUENT CONTROLS (REC)	
Tech Spec	4.1	Site Location/Map	5.1.3 and Fig. 5.1-3
Tech Spec	5.5.1	Offsite Dose Calculation Manual (ODCM)	6.14
Tech Spec	5.5.4.a	Effluent monitoring instrumentation operability, surveillance, and setpoint requirements	3/4.3.3.4 and 3/4.3.3.5
Tech Spec	5.5.4.b	Limit liquid effluent concentration	3/4.11.1.1
Tech Spec	5.5.4.c	Effluent monitoring, sampling, and analysis requirements	3/4.11.1.1 and 3/4.11.2.1
Tech Spec	5.5.4.d	Limit doses due to liquid effluents	3/4.11.1.2
Tech Spec	5.5.4.e	Determine cumulative and projected doses due to radioactive effluents	3/4.11.1.2, 3/4.11.2.2, 3/4.11.2.3 3/4.11.1.3 and 3/4.11.2.4
Tech Spec	5.5.4.f	Effluent treatment systems operability requirements	3/4.11.1.3 and 3/4.11.2.4
Tech Spec	5.5.4.g	Limit gaseous effluent dose rate	3/4.11.2.1
Tech Spec	5.5.4.h	Limit noble gas air dose	3/4.11.2.2
Tech Spec	5.5.4.i	Limit gaseous effluent iodine and particulate dose	3/4.11.2.3
Tech Spec	5.5.4.j	Limit total dose	3/4.11.4
Tech Spec	5.6.2	Annual Radiological Environmental Operating Report	6.9.1.3
Tech Spec	5.6.3	Radioactive Effluent Release Report	6.9.1.4
		PART II - CALCULATIONAL METHODOLOGIES	
REC	3/4.11.1.1	Liquid effluent concentration	1.1
REC	3/4.11.1.2	Dose due to liquid effluents	1.3

CROSS-REFERENCE TO TECHNICAL SPECIFICATIONS AND REC
(continued)

Document	Number or Section	Requirement	ODCM Section
REC	3/4.11.1.3	Dose projections for liquid releases	1.4
REC	3/4.11.2.1.a	Dose rate due to noble gases	2.1.1
REC	3/4.11.2.1.b	Dose rate due to iodine, tritium, and particulates with half-lives greater than eight days	2.1.2
REC	3/4.11.2.2	Air dose due to noble gases	2.3.1
REC	3/4.11.2.3	Doses due to iodine, tritium, and particulates with half-lives greater than eight days	2.3.2
REC	3/4.11.2.4	Dose projections for gaseous releases	2.4
REC	3/4.11.4	Total dose due to releases of radioactivity and direct radiation	2.5
REC	3/4.12.1	Description of radiological environmental sampling locations	3.1
REC	3/4.12.2	Dose calculations for identifying changes to environmental sampling locations	2.5
REC	3/4.12.3	Description of the Interlaboratory Comparison Program	3.2
REC	3.3.3.4	Radioactive liquid effluent monitoring channels alarm/trip setpoints	
		• liquid waste monitor (XRE-5253)	1.2.1
		• turbine building sump monitors (1RE-5100 and 2RE-5100)	1.2.2
		• service water monitors (1RE-4269/4270 and 2RE-4269/4270)	1.2.3
		• auxiliary building to LVW Pond radiation monitor (XRE-5251A)	1.2.4

CROSS-REFERENCE TO TECHNICAL SPECIFICATIONS AND REC
(continued)

Document	Number or Section	Requirement	ODCM Section
REC	3.3.3.5	Radioactive gaseous effluent monitoring channels alarm/trip setpoints	
		• noble gas release rate monitors XRE-5570A and XRE-5570B (WGRM release rate channels)	2.2.1
		• noble gas activity monitors XRE-5570A and XRE-5570B (WRGM low range activity channel) XRE-5567A and XRE-5567B (noble gas channel)	2.2.2
		• waste gas holdup system monitor (auxiliary building vent monitor) XRE-5701	2.2.4
		• sampler flow rate monitor XFT-5570A2/B2	2.2.3
Tech Spec	3.3.6	Radiation monitoring channels alarm/trip setpoint	
		• Containment atmosphere gaseous monitors (containment vent monitors) 1RE-5503 and 2RE-5503	2.2.5
Tech Spec REC	5.6.3 6.9.1.4	Assessment of radiation doses due to liquid and gaseous effluents released during the previous year	2.5
Tech Spec REC	5.6.3 6.9.1.4	Assessment of doses to members of the public inside the site boundary	2.5
Tech Spec REC	5.6.3 6.9.1.4	Assessment of doses to the most likely exposed member of the public from reactor releases and direct radiation	2.5

20

REFERENCES

1. Boegli, J.S., R. R. Bellamy, W. L. Britz, and R. L. Waterfield, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants," NUREG-0133 (October 1978).

2. Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR Part 50, Appendix I, U. S. NRC Regulatory Guide 1.109, Rev. 1 (October 1977).

3. "Environmental Report," TU Electric, Comanche Peak Steam Electric Station.

4. "Final Safety Analysis Report," TU Electric, Comanche Peak Steam Electric Station.

5. Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors, U.S. NRC Regulatory Guide 1.111 (March 1976).

6. Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Release from Light - Water - Cooled Reactors, U.S. NRC Regulatory Guide 1.111, Rev. 1 (July 1977).

7. Meteorology and Atomic Energy; Edited by Slade, D. H.; U. S. Department of Commerce (July 1968).

8. "Technical Specifications," TU Electric, Comanche Peak Steam Electric Station.

9. Implementation of Programmatic Controls for Radiological Effluent Technical Specifications in the Administrative Controls Section of the Technical Specifications and the Relocation of Procedural Details of RETS to the Offsite Dose Calculation Manual or to the Process Control Program (Generic Letter 89-01), USNRC, January 31, 1989.

10. CPSES Technical Evaluation No. RP-90-3077, "Calculation of Site Related Ingestion Dose Commitment Factors For Sb-122."

11. "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," USNRC Regulatory Guide 1.109 (March 1976).

12. Code of Federal Regulation, Title 10, Parts 20 and 50.

INTRODUCTION

The OFFSITE DOSE CALCULATION MANUAL (ODCM) is a supporting document of the CPSES Technical Specifications. Part I of the ODCM contains (1) the Radioactive Effluent Controls required by Technical Specification 5.5.4, (2) descriptions of the information that should be included in the Annual Radiological Environmental Operating and Radioactive Effluent Release Reports required by Technical Specifications 5.6.2 and 5.6.3, (3) Controls for Meteorological Monitoring Instrumentation and Sealed Source Leakage, and (4) Radiological Environmental Monitoring Controls. Part II of the ODCM describes the methodology and parameters to be used in the calculation of offsite doses due to radioactive liquid and gaseous effluents and in the calculation of liquid and gaseous effluent monitoring instrumentation alarm/trip setpoints. Liquid and Gaseous Radwaste Treatment System configurations are shown in Part II, Figures 1.1 and 2.1. | 16 | 12

The ODCM is maintained for use as a reference guide and training document on accepted methodologies and calculations. Changes in the calculation methods or parameters will be incorporated into the ODCM in order to assure that the ODCM represents the present methodology in all applicable areas. TXU Energy initiated changes to the ODCM will be implemented in accordance with Section 5.5.1 of the Technical Specifications. | 12 | 20

The ODCM follows the methodology and models suggested by NUREG-0133 (Ref. 1) and Regulatory Guide 1.109, Revision 1 (Ref. 2). Simplifying assumptions have been applied in this manual where applicable to provide a more workable document for implementing the Radiological Effluent Control requirements. This simplified approach will result in a more conservative dose evaluation, but requires the least amount of time for establishing compliance with regulatory requirements.

This manual is designed to provide necessary information in order to simplify the dose calculations. The dose calculations can be optionally expanded to several levels of effort. The complexity of the dose calculations can be expanded by several levels of effort, aiming toward a full calculation in accordance with Regulatory Guide 1.109. Future changes to the ODCM may be initiated to implement more complex calculations as systems become available and are validated that can reliably, economically and properly perform these more complex calculations. A beneficial approach to implementing the Radiological Effluent Control Program and Regulatory Guide 1.21 (Radioactive Effluent Release Report) requirements is to use a computerized system to determine the effluent releases and update cumulative doses. | 16

PART I

RADIOLOGICAL EFFLUENT CONTROLS

SECTION 1.0

USE AND APPLICATIONS

1.0 USE AND APPLICATIONS

16

1.1 DEFINITIONS

16

The defined terms of this section appear in capitalized type and are applicable throughout these Controls.

ACTION

ACTION shall be that part of a Control that prescribes required actions to be taken under designated conditions within specified completion times.

16

ANALOG CHANNEL OPERATIONAL TEST

An ANALOG CHANNEL OPERATIONAL TEST shall be the injection of a simulated signal into the channel as close to the sensor as practicable to verify OPERABILITY of alarm, interlock and/or trip functions. The ANALOG CHANNEL OPERATIONAL TEST shall include adjustments, as necessary, of the alarm, interlock and/or Trip Setpoints such that the setpoints are within the required range and accuracy.

CHANNEL CALIBRATION

A CHANNEL CALIBRATION shall be the adjustment, as necessary, of the channel output such that it responds within the necessary range and accuracy to known values of the parameter that the channel monitors. The CHANNEL CALIBRATION shall encompass all devices in the channel required for channel OPERABILITY. Calibration of instrument channels with resistance temperature detector (RTD) or thermocouple sensors may consist of an inplace qualitative assessment of sensor behavior and normal calibration of the remaining adjustable devices in the channel. The CHANNEL CALIBRATION may be performed by means of any series of sequential, overlapping or total channel steps.

16

CHANNEL CHECK

A CHANNEL CHECK shall be the qualitative assessment of channel behavior during operation by observation. This determination shall include, where possible, comparison of the channel indication and/or status with other indications and/or status derived from independent instrument channels measuring the same parameter.

DIGITAL CHANNEL OPERATIONAL TEST

A DIGITAL CHANNEL OPERATIONAL TEST shall consist of exercising the digital computer hardware using data base manipulation and injecting simulated process data to verify OPERABILITY of alarm and/or trip functions.

DOSE EQUIVALENT I-131

DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microCurie/gram) which alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Table III of TID-14844, "Calculation of Distance Factors for Power and Test Reactor Sites" or Table E-7 of NRC Regulatory Guide 1.109, Revision 1, October 1977.

FREQUENCY NOTATION

The FREQUENCY NOTATION specified for the performance of Surveillance Requirements shall correspond to the intervals defined in Table 1.1.

MEMBER(S) OF THE PUBLIC

MEMBER(S) OF THE PUBLIC means an individual in a CONTROLLED or UNRESTRICTED AREA. However, an individual is not a MEMBER OF THE PUBLIC during any period in which the individual receives an occupational dose. 12

OFFSITE DOSE CALCULATION MANUAL

The OFFSITE DOSE CALCULATION MANUAL (ODCM) shall contain the methodology and parameters used in the calculation of offsite doses resulting from radioactive gaseous and liquid effluents, calculation of gaseous and liquid effluent monitoring Alarm/Trip Setpoints, and conduct of the Environmental Radiological Monitoring Program. The ODCM shall also contain (1) the Radioactive Effluent Controls and Radiological Environmental Monitoring Programs required by Technical Specification Section 5.5.4 and (2) descriptions of the information that should be included in the Annual Radiological Environmental Operating and Radioactive Effluent Release Reports required by Technical Specifications 5.6.2 and 5.6.3, respectively. 16

OPERABLE - OPERABILITY

A system, subsystem, train, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified safety function(s) and when all necessary attendant instrumentation, controls, normal or emergency electrical power, cooling and seal water, lubrication, and other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its specified safety function(s) are also capable of performing their related support function(s). 16

16

PRIMARY PLANT VENTILATION SYSTEM

A PRIMARY PLANT VENTILATION SYSTEM shall be any system designed and installed to reduce gaseous radioiodine or radioactive material in particulate form in effluents by passing ventilation or vent exhaust gases through charcoal adsorbers and/or HEPA filters for the purpose of removing iodines or particulates from the gaseous exhaust stream prior to the release to the environment. Such a system is not considered to have any effect on noble gas effluents.

PURGE - PURGING

PURGE or PURGING shall be the controlled process of discharging air or gas from a confinement to maintain temperature, pressure, humidity, concentration or other operating conditions, in such a manner that replacement air or gas is required to purify the confinement.

RATED THERMAL POWER

RATED THERMAL POWER shall be a total reactor core heat transfer rate to the reactor coolant of 3458 Mwt.* 17 19

REPORTABLE EVENT

A REPORTABLE EVENT shall be any of those conditions specified in 10CFR50.73.

SITE BOUNDARY

The SITE BOUNDARY shall be that line as shown in Figure 5.1-3.

SOURCE CHECK

A SOURCE CHECK shall be the qualitative assessment of channel response when the channel sensor is exposed to a source of increased radioactivity.

THERMAL POWER

THERMAL POWER shall be the total reactor core heat transfer rate to the reactor coolant.

* The Unit 1 Rated Thermal Power will remain at 3411 Mwt until implementation of the 1.4% uprate for Unit 1 during 1RFO9. 19

UNRESTRICTED AREA

An UNRESTRICTED AREA means any area beyond the SITE BOUNDARY. | 8

VENTING

VENTING shall be the controlled process of discharging air or gas from a confinement to maintain temperature, pressure, humidity, concentration, or other operating condition, in such a manner that replacement air or gas is not provided or required during VENTING. Vent, used in system names, does not imply a VENTING process.

WASTE GAS HOLDUP SYSTEM

A WASTE GAS HOLDUP SYSTEM shall be any system designed and installed to reduce radioactive gaseous effluents by collecting Reactor Coolant System offgases from the Reactor Coolant System and providing for delay or holdup for the purpose of reducing the total radioactivity prior to release to the environment.

CONTROLLED AREA | 8

A CONTROLLED AREA means an area outside of a restricted area, as defined in 10 CFR 20.1003, but inside the SITE BOUNDARY, access to which can be limited by the licensee for any reason.

TABLE 1.1

ODCM FREQUENCY NOTATION

16

NOTATION	FREQUENCY
S	At least once per 12 hours.
D	At least once per 24 hours.
W	At least once per 7 days.
M	At least once per 31 days
Q	At least once per 92 days.
SA	At least once per 184 days.
SR	At least once per 9 months.
R	At least once per 18 months.
S/U	Prior to each reactor startup.
N.A.	Not applicable.
P	Completed prior to each release.

TABLE 1.2

This Table is Deleted. | 16

SECTION 2.0

NOT USED

SECTIONS 3.0 AND 4.0

CONTROLS

AND

SURVEILLANCE REQUIREMENTS

3/4.0 APPLICABILITY

16

The guidance provided for the use and application of LIMITING CONDITION FOR OPERATION (LCO) APPLICABILITY in Section 3.0 "LIMITING CONDITION FOR OPERATION (LCO) APPLICABILITY" of the Technical Specifications is applicable to the Controls contained in this manual, except as noted below.

The guidance provided for the use and application of SURVEILLANCE REQUIREMENT (SR) APPLICABILITY in Section 3.0, "SURVEILLANCE REQUIREMENT (SR) APPLICABILITY" of the Technical Specifications is applicable to the Surveillance Requirements contained in this manual.

For the purpose of the ODCM, the ODCM terms specified below should be considered synonomous with the listed Technical Specification term:

ODCM	Technical Specification
Control	LCO
ACTION	Required Action

A cross reference between Section 3/4.0 of the Offsite Dose Calculation Manual (ODCM) and the applicable Section 3.0 of the Technical Specifications is as follows:

ODCM Control:	Technical Specification Section
3.0.1	LCO 3.0.1
3.0.2	LCO 3.0.2
3.0.3	LCO 3.0.3
3.0.4	LCO 3.0.4
N/A (see Note 1)	LCO 3.0.5
N/A (see Note 1)	LCO 3.0.6
N/A (see Note 1)	LCO 3.0.7

ODCM Surveillance Requirement:	Technical Specification Section
4.0.1	SR 3.0.1
4.0.2	SR 3.0.2
4.0.3	SR 3.0.3
4.0.4	SR 3.0.4

----------NOTE 1----------

The provisions of the cross referenced Technical Specification LCO are not pertinent for use in the ODCM; therefore, the Technical Specification LCO is not applicable (N/A).

16

INSTRUMENTATION

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

CONTROLS

3.3.3.4 In accordance with CPSES TS 5.5.4.a, the radioactive liquid effluent monitoring instrumentation channels shown in Table 3.3-7 shall be OPERABLE with their Alarm/Trip Setpoints set to ensure that the limits of Control 3.11.1.1 are not exceeded. The Alarm/Trip Setpoints of these channels shall be determined and adjusted in accordance with the methodology and parameters in Part II of the OFFSITE DOSE CALCULATION MANUAL (ODCM). 16 8

APPLICABILITY: At all times.

ACTION:

a. With a radioactive liquid effluent monitoring instrumentation channel Alarm/Trip Setpoint less conservative than required by the above Control, immediately suspend the release of radioactive liquid effluents monitored by the affected channel, or declare the channel inoperable, or change the setpoint so it is acceptably conservative.

b. With less than the minimum number of radioactive liquid effluent monitoring instrumentation channels OPERABLE, take the ACTION shown in Table 3.3-7. Restore the inoperable instrumentation to OPERABLE status within 30 days and, if unsuccessful, explain in the next Radioactive Effluent Release Report pursuant to Control 6.9.1.4 why this inoperability was not corrected in a timely manner. 16

c. The provisions of Controls 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.3.3.4 Each radioactive liquid effluent monitoring instrumentation channel shall be demonstrated OPERABLE by performance of the CHANNEL CHECK, SOURCE CHECK, CHANNEL CALIBRATION, and DIGITAL CHANNEL OPERATIONAL TEST or ANALOG CHANNEL OPERATIONAL TEST at the frequencies shown in Table 4.3-3.

TABLE 3.3-7

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

	INSTRUMENT	MINIMUM CHANNELS OPERABLE	ACTION
	1. Radioactivity Monitors Providing Alarm and Automatic Termination of Release		
	a. Liquid Radwaste Effluent Line (XRE-5253)	1	30
	b. Turbine Building (Floor Drains) Sumps Effluent Lines (1RE-5100 & 2RE-5100)	1/sump	31
8			
9			
10	c. Auxiliary Building to LVW Pond Liquid Effluent Line (XRE-5251A)	1	31A
	2. Radioactivity Monitors Providing Alarm But Not Providing Automatic Termination of Release		
	a. Service Water System Effluent Lines (1RE-4269, 1RE-4270, 2RE-4269 & 2RE-4270)	1/train	32
8			
	3. Flow Rate Measurement Devices		
	a. Liquid Radwaste Effluent Line (XFT-5288)	1	33

TABLE 3.3-7 (Continued)

ACTION STATEMENTS

ACTION 30- With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided that prior to initiating a release:

a. At least two independent samples are analyzed in accordance with Control 4.11.1.1.1; and

b. At least two technically qualified members of the facility staff independently verify the release rate calculations and discharge line valving.

Otherwise, suspend release of radioactive effluents via this pathway.

ACTION 31- With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided grab samples are analyzed for principal gamma emitters at a lower limit of detection of no more than 5×10^{-7} microCurie/ml: | 8

a. At least once per 12 hours when the specific activity of the secondary coolant is greater than 0.01 microCurie/gram DOSE EQUIVALENT I-131; or

b. At least once per 24 hours when the specific activity of the secondary coolant is less than or equal to 0.01 microCurie/gram DOSE EQUIVALENT I-131. (Refer to Notation 3 of Table 4.11-1 for the applicability of the LLD requirement.) | 8

ACTION 31A- With number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided grab samples are analyzed for principal gamma emitters at a lower-limit of detection of no more than 5×10^{-7} microCurie/ml at least once per 12 hours. | 10

ACTION 32- With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, operations may continue provided that:

a. With the component cooling water monitors (uRE-4509, uRE-4510, & uRE-4511)* OPERABLE and indicating an activity of less than $1X10^{-4}$ microCurie/ml, a grab sample is collected and analyzed for principal gamma emitters at a lower limit of detection of no more than 5×10^{-7} microCurie/ml at least every 31 days; or | 15

b. At least once per 12 hours, grab samples are collected and analyzed for principal gamma emitters at a lower limit of detection of no more than 5×10^{-7} microCurie/ml. (Refer to Notation 3 of Table 4.11-1 for the applicability of the LLD requirement.) | 8

NOTE: Collection of grab samples is not required when there is no process flow at the monitor. | 7

| 11

* "u" designates monitor for the applicable unit, e.g., 1 or 2.

TABLE 3.3-7 (Continued)

ACTION STATEMENTS (Continued)

ACTION 33- With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided the flow rate is estimated at least once per 4 hours during actual releases. Pump performance curves generated in place may be used to estimate flow.

TABLE 4.3-3

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

	INSTRUMENT	CHANNEL CHECK	SOURCE CHECK	CHANNEL CALIBRATION	ANALOG CHANNEL OPERATIONAL TEST	DIGITAL CHANNEL OPERATIONAL TEST
	1. Radioactivity Monitors Providing Alarm and Automatic Termination of Release					
	a. Liquid Radwaste Effluent Line (XRE-5253)	D	P	R(4)	N.A.	Q(1)
8	b. Turbine Building (Floor Drains) Sumps Effluent Lines (1RE-5100 & 2RE-5100)	D	M	R(4)	N.A.	Q(2)
9	c. Auxiliary Building to LVW Pond Liquid Effluent Line (XRE-5251A)	D	M	R(4)	N.A.	Q(2)
	2. Radioactivity Monitors Providing Alarm But Not Providing Automatic Termination of Release					
8	a. Service Water System Effluent Lines (1RE-4269, 1RE-4270, 2RE-4269 & 2RE-4270)	D	M	R(4)	N.A.	Q(3)
	3. Flow Rate Measurement Devices					
	a. Liquid Radwaste Effluent Line (XFT-5288)	D(5)	N.A.	R	Q	N.A.

TABLE 4.3-3 (Continued)

TABLE NOTATIONS

(1) The DIGITAL CHANNEL OPERATIONAL TEST shall also demonstrate that automatic isolation of this pathway and Control Room alarm annunciation occur if any of the following conditions exist:

a. Instrument indicates measured levels above the Alarm/Trip Setpoint; or

b. Circuit failure (Channel Out of Service - Loss of Power, Loss of Counts, Loss of Sample Flow, or Check Source Failure).

(2) The DIGITAL CHANNEL OPERATIONAL TEST shall also demonstrate that automatic flow diversion of this pathway (from the Low Volume Waste Treatment System to the Co-Current Waste Treatment System) and Control Room alarm annunciation occur if any of the following conditions exist:

a. Instrument indicates measured levels above the Alarm/Trip Setpoint; or

b. Circuit failure (Channel Out of Service - Loss of Power, Loss of Counts, or Check Source Failure). | 13

(3) The DIGITAL CHANNEL OPERATIONAL TEST shall also demonstrate that Control Room alarm annunciation occurs if any of the following conditions exist:

a. Instrument indicates measured levels above the Alarm Setpoint; or

b. Circuit failure (Channel Out of Service - Loss of Power, Loss of Counts, Loss of Sample Flow, or Check Source Failure).

(4) The initial CHANNEL CALIBRATION shall be performed using one or more of the reference standards certified by the National Institute of Standards and Technology (NIST) or using standards that have been obtained from suppliers that participate in measurement assurance activities with NIST. These standards shall permit calibrating the system over its intended range of energy and measurement range. For subsequent CHANNEL CALIBRATION, sources that have been related to the initial calibration, reference standards certified by NIST, or standards that have been obtained from suppliers that participate in measurement assurance activities with NIST shall be used. | 8 | 8

(5) CHANNEL CHECK shall consist of verifying indication of flow during periods of release. CHANNEL CHECK shall be made at least once per 24 hours on days on which continuous, periodic, or batch releases are made.

CONTROLS

3.3.3.5 In accordance with CPSES TS 5.5.4.a, the radioactive gaseous effluent monitoring instrumentation channels shown in Table 3.3-8 shall be OPERABLE with their Alarm/Trip Setpoints set to ensure that the limits of Control 3.11.2.1 are not exceeded. The Alarm/Trip Setpoints of these channels shall be determined and adjusted in accordance with the methodology and parameters in Part II of the ODCM. | 16 | 8

APPLICABILITY: As shown in Table 3.3-8.

ACTION:

a. With a radioactive gaseous effluent monitoring instrumentation channel Alarm/Trip Setpoint less conservative than required by the above Control, immediately suspend the release of radioactive gaseous effluents monitored by the affected channel, or declare the channel inoperable, or change the setpoint so it is acceptably conservative.

b. With less than the minimum number of radioactive gaseous effluent monitoring instrumentation channels OPERABLE, take the ACTION shown in Table 3.3-8. Restore the inoperable instrumentation to OPERABLE status within 30 days and, if unsuccessful, explain in the next Radioactive Effluent Release Report pursuant to Control 6.9.1.4 why this inoperability was not corrected in a timely manner. | 16

c. The provisions of Controls 3.0.3 and 3.0.4 are not applicable. | 1

SURVEILLANCE REQUIREMENTS

4.3.3.5 Each radioactive gaseous effluent monitoring instrumentation channel shall be demonstrated OPERABLE by performance of the CHANNEL CHECK, SOURCE CHECK, CHANNEL CALIBRATION, and DIGITAL CHANNEL OPERATIONAL TEST or ANALOG CHANNEL OPERATIONAL TEST at the frequencies shown in Table 4.3-4.

TABLE 3.3-8

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

INSTRUMENT	MINIMUM CHANNELS OPERABLE	APPLICABILITY	ACTION	
1. WASTE GAS HOLDUP SYSTEM				
a. Noble Gas Release Rate Monitor - Providing Alarm and Automatic Termination of Release [redacted]	[redacted]	[redacted]	34	
2. PRIMARY PLANT VENTILATION				
a. Noble Gas Release Rate Monitor [redacted]	[redacted]	[redacted]	36	
b. Iodine Sampler (WRGM sample skid)	1/stack	*	37	
c. Particulate Sampler (WRGM sample skid)	1/stack	*	37	
d. Sampler Flow Rate Monitor SMPL Flow 1 (X-RFT-5570A-1, X-RFT-5570B-1)	1/stack	*	35	4 4

TABLE 3.3-8 (Continued)

TABLE NOTATIONS

* At all times.
** During Batch Radioactive Releases via this pathway.

ACTION 34- With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, the contents of the tank(s) may be released to the environment provided that prior to initiating the release:

a. The auxiliary building vent duct monitor (XRE-5701) is confirmed OPERABLE, or

b. At least two independent samples of the tank's contents are analyzed, and

c. At least two technically qualified members of the facility staff independently verify the release rate calculations and discharge valve lineup.

Otherwise, suspend release of radioactive effluents via this pathway.

ACTION 35- With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided the sample flow rate is estimated at least once per 4 hours. | 4

ACTION 36- With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided that:

(a) A Plant Vent Noble Gas Activity Monitor (XRE-5570A, XRE-5570B (low range activity) or XRE-5567A, XRE-5567B) is OPERABLE, and the plant vent flow rate is estimated at least once per 4 hours; or

(b) The Plant Vent Flow Monitor, PROC FLOW N (X-FT-5570A-1, X-FT-5570B-1), is OPERABLE, and an alternate Plant Vent Noble Gas Activity Monitor is OPERABLE (XRE-5567A, XRE-5567B) or grab samples are taken at least once per 12 hours and these samples are analyzed for radioactivity within 24 hours; or | 4

(c) The plant vent flow rate is estimated at least once per 4 hours, and grab samples are taken at least once per 12 hours and these samples are analyzed for radioactivity within 24 hours.

ACTION 37- With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via the affected pathway may continue provided samples are continuously collected with auxiliary sampling equipment as required in Table 4.11-2.

TABLE 4.3-4

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

INSTRUMENT	CHANNEL CHECK	SOURCE CHECK	CHANNEL CALIBRATION	ANALOG CHANNEL OPERATIONAL TEST	DIGITAL CHANNEL OPERATIONAL TEST	
1. WASTE GAS HOLDUP SYSTEM						
a. Noble Gas Release Rate Monitor - Providing Alarm and Automatic Termination of Release [XRE-5570A, XRE-5570B(effluent release rate channel)]	P	P	R(3)	N.A.	Q(1)	
2. PRIMARY PLANT VENTILATION						
[redacted]	D	[redacted]	R(3)	N.A.	Q(2)	
b. Iodine Sampler (WRGM sample skid)	W(4)	N.A.	N.A.	N.A.	N.A.	
c. Particulate Sampler (WRGM Sample Skid)	W(4)	N.A.	N.A.	N.A.	N.A.	
d. Sampler Flow Rate Monitor SMPL Flow 1 (X-RFT-5570A-1, X-RFT-5570B-1)	D	N.A.	R	Q	N.A.	4 4

TABLE 4.3-4 (Continued)

TABLE NOTATIONS

Prior to any release from the WASTE GAS HOLDUP SYSTEM or containment PURGING or VENTING, not to exceed 31 days.

(1) The DIGITAL CHANNEL OPERATIONAL TEST shall also demonstrate that automatic isolation of this pathway and control room alarm annunciation occurs if any of the following condition exists:

a. Instrument indicates measured levels above the Alarm/Trip Setpoint, or

b. Circuit failure, (Channel Out of Service - Loss of Power, Loss of Counts, Loss of Sample Flow, or Check Source Failure).

(2) The DIGITAL CHANNEL OPERATIONAL TEST shall also demonstrate that control room alarm annunciation occurs if any of the following conditions exists:

a. Instrument indicates measured levels above the Alarm Setpoint, or

b. Circuit failure, (Channel Out of Service - Loss of Power, Loss of Counts, Loss of Sample Flow, or Check Source Failure).

(3) The initial CHANNEL CALIBRATION shall be performed using one or more of the reference standards certified by the National Institute of Standards and Technology (NIST) or using standards that have been obtained from suppliers that participate in measurement assurance activities with NIST. These standards shall permit calibrating the system over its intended range of energy and measurement range. For subsequent CHANNEL CALIBRATION, sources that have been related to the initial calibration, reference standards certified by NIST, or standards that have been obtained from suppliers that participate in measurement assurance activities with NIST shall be used. 8 8

(4) The CHANNEL CHECK shall consist of visually verifying that the collection element (i.e., filter or cartridge, etc.) is in place for sampling.

METEOROLOGICAL MONITORING INSTRUMENTATION

CONTROLS

3.3.3.6 The meteorological monitoring instrumentation channels shown in Table 3.3-9 shall be OPERABLE. | 8

APPLICABILITY: At all times.

ACTION:

a. With less than the minimum number of meteorological monitoring instrumentation channels OPERABLE for more than 7 days, prepare and submit a report to the Commission within the next 10 days outlining the cause of the malfunction and the plans for restoring the channel(s) to OPERABLE status. | 16

SURVEILLANCE REQUIREMENTS

4.3.3.6 Each of the above meteorological monitoring instrumentation channels shall be demonstrated OPERABLE:

a. At least once per 24 hours by performance of a CHANNEL CHECK; and

b. At least once per 184 days by performance of a CHANNEL CALIBRATION except the wind speed and wind direction sensors which are replaced with calibrated sensors at least once per 12 months. | 18

TABLE 3.3-9

METEOROLOGICAL MONITORING INSTRUMENTATION

INSTRUMENT CHANNEL	LOCATION	MINIMUM OPERABLE	
1. WIND SPEED		1 of 3	
a. X-S-4117	Nominal Elev. 60 m.		18
b. X-S-4118	Nominal Elev. 10 m.		
c: X-S-4128*	Nominal Elev. 10 m.		
2. WIND DIRECTION		1 of 3	
a. X-Z-4115	Nominal Elev. 60 m.		18
b. X-Z-4116	Nominal Elev. 10 m.		
c. X-Z-4126*	Nominal Elev. 10 m.		
3. AIR TEMPERATURE - ΔT		1 of 2	
a. X-T-4119	Nominal Elev. 60 m. and Nominal Elev. 10 m.		18
b. X-T-4120	Nominal Elev. 60 m. and Nominal Elev. 10 m.		

* Mounted on backup tower.

INSTRUMENTATION

SEALED SOURCE CONTAMINATION

CONTROLS

3.7.15 Each sealed source containing radioactive material either in excess of 100 microCuries of beta and/or gamma emitting material or 5 microCuries of alpha emitting material shall be free of greater than or equal to 0.005 microCurie of removable contamination.

APPLICABILITY: At all times.

ACTION

With a sealed source having removable contamination in excess of the above limits, immediately withdraw the sealed source from use and either:

1. Decontaminate and repair the sealed source, or

2. Dispose of the sealed source in accordance with Commission Regulations.

SURVEILLANCE REQUIREMENTS

4.7.15.1 Test Requirements - Each sealed source shall be tested for leakage and/or contamination by:

a. The licensee, or

b. Other persons specifically authorized by the Commission or an Agreement State.

The test method shall have a detection sensitivity of at least 0.005 microCurie per test sample.

4.7.15.2 Test Frequencies - Each category of sealed sources (excluding startup sources and fission detectors previously subjected to core flux) shall be tested at the frequency described below.

a. Sources in use - At least once per 6 months for all sealed sources containing radioactive materials:

1) With a half-life greater than 30 days (excluding Hydrogen 3), and

2) In any form other than gas.

b. Stored sources not in use - Each sealed source and fission detector shall be tested prior to use or transfer to another licensee unless tested within the previous 6 months. Sealed sources and fission detectors transferred without a certificate indicating the last test date shall be tested prior to being placed into use; and

c. Startup sources and fission detectors - Each sealed startup source and fission detector shall be tested prior to installation or within 31 days prior to being subjected to core flux and following repair or maintenance to the source.

4.7.15.3 Reports - A report shall be prepared and submitted to the Commission on an annual basis if sealed source or fission detector leakage tests reveal the presence of greater than or equal to 0.005 microCurie of removable contamination.

3/4.11 RADIOACTIVE EFFLUENTS

3/4.11.1 LIQUID EFFLUENTS

CONCENTRATION CONTROLS

3.11.1.1 In accordance with CPSES TS 5.5.4.b and 5.5.4.c the concentration of radioactive material released in liquid effluents from the site to CONTROLLED AREAS and UNRESTRICTED AREAS (see Figure 5.1-3) 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 2×10^{-4} microCurie/ml total activity. 16

APPLICABILITY: At all times.

ACTION:

a. With the concentration of radioactive material released in liquid effluents to CONTROLLED AREAS and UNRESTRICTED AREAS exceeding the above limits, immediately restore the concentration to within the above limits. 8

b. The provisions of Controls 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.1.1.1 Radioactive liquid wastes shall be sampled and analyzed according to the sampling and analysis program of Table 4.11-1.

4.11.1.1.2 The results of the radioactivity analyses shall be used in accordance with the methodology and parameters in Part II of the ODCM to assure that the concentrations at the point of release are maintained within the limits of Control 3.11.1.1. 8

TABLE 4.11-1
Radioactive Liquid Waste Sampling and Analysis Program

LIQUID RELEASE TYPE	SAMPLING FREQUENCY	MINIMUM ANALYSIS FREQUENCY	TYPE OF ACTIVITY ANALYSIS	LOWER LIMIT OF DETECTION[1] (μCi/ml)	
1A. Batch Waste Release [2] Tanks to the Circulating Water Discharge a. Waste Monitor Tanks b. Laundry Holdup & Monitor Tanks c. Waste Water Holdup Tanks [8] d. Plant Effluent Tanks	P Each Batch	P Each Batch	Principal Gamma Emitters [3]	5.0E-07	7
			I-131	1.0E-06	
			Dissolved & Entrained[3] Gases (Gamma Emitters)	1.0E-05	8
		M Composite [4]	H-3	1.0E-05	7
			Gross Alpha	1.0E-07	
		Q Composite [4]	Sr-89, Sr-90	5.0E-08	7A
			Fe-55	1.0E-06	
1B Batch Waste Release [2] Tanks to the Waste Water Management System a. Condensate Polisher Backwash Recovery Tanks [6,7] b. Waste Water Holdup Tanks [6,8] c. Temporary holdup tanks [10]	P Each Batch	P Each Batch	Principal Gamma Emitters [3]	5.0E-07	14 7
			1-131	1.0E-06	9
			H-3	1.0E-05	14
2A. Continuous Release[5] to the Circulating Water Discharge a. Low Volume Waste Pond Effluents	Monthly Grab [11]	Monthly Grab [11]	Dissolved & Entrained [3] Gases (Gamma Emitters)	[11]	20
	Daily Grab Sample [9]	Composite over pond discharge period [4]	Principal Gamma Emitters [3]	5.0E-07	7
			I-131	1.0E-06	
			H-3	1.0E-05	
			Gross Alpha	1.0E-07	
		Q Composite [4]	Sr-89, Sr-90	5.0E-08	
			Fe-55	1.0E-06	
2B. Continuous Releases [5] to the Waste Water Management System a. Turbine Bldg. Sump No. 2 Effluents [6,7] b. Turbine Bldg. Sump No. 4 Effluents [6,7] c. Auxillary Bldg. Secondary Effluents [6,7]	W Grab Sample	W	Principal Gamma Emitters [3]	5.0E-07	14 7
			I-131	1.0E-.06	
			H-3	1.0E-05	9

TABLE 4.11-1 (Continued)

TABLE NOTATIONS

(1) The LLD is defined, for purposes of these specifications, as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66\ s_b}{E \cdot V \cdot 2.22 \times 10^6 \cdot Y \cdot \exp(-\lambda \Delta t)}$$

Where:

LLD = the "a priori" lower limit of detection (microCurie per unit mass or volume),

s_b = the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (counts per minute),

E = the counting efficiency (counts per disintegration),

V = the sample size (units of mass or volume),

2.22×10^6 = the number of disintegrations per minute per microCurie,

Y = the fractional radiochemical yield, when applicable,

λ = the radioactive decay constant for the particular radionuclide (s^{-1}), and

Δt = the elapsed time between the midpoint of sample collection and the time of counting (s).

Typical values of E, V, Y, and t should be used in the calculation.

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement.

(2) A batch release is the discharge of liquid wastes of a discrete volume. Prior to sampling for analyses, each batch shall be isolated, and then thoroughly mixed by a method described in Part II of the ODCM to assure representative sampling. | 8

TABLE 4.11-1 (Continued)

TABLE NOTATIONS

(3) The principal gamma emitters for which the LLD specification applies include the following radionuclides: Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, and Ce-141 for fission and corrosion products, and Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135, and Xe-138 for dissolved or entrained gases. Ce-144 shall also be measured, but with an LLD of 5×10^{-6}. This list does not mean that only these nuclides are to be considered. Other gamma peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Radioactive Effluent Release Report pursuant to Control 6.9.1.4 in the format outlined in Regulatory Guide 1.21, Appendix B, Revision 1, June 1974. | 8 | 16

(4) A composite sample is one in which the quantity of liquid sampled is proportional to the quantity of liquid waste discharged and in which the method of sampling employed results in a specimen that is representative of the liquids released.

(5) A continuous release is the discharge of liquid wastes of a nondiscrete volume, e.g., from a volume of a system that has an input flow during the continuous release.

(6) These waste streams shall be sampled and analyzed, in accordance with this table, if radioactive material is detected in the LVW Pond composite samples in concentrations that exceed 10% of the limits of 10 CFR 20, Appendix B, Table 2, Column 2. This sampling shall continue until 2 consecutive samples from the waste stream show that the concentration of radioactive materials in the waste stream is less than or equal to 10% of the limits of 10 CFR 20, Appendix B, Table 2, Column 2. | 7 | 8 | 7

(7) All flow from these waste streams shall be diverted to the Waste Water Holdup Tanks if activity is present in the waste stream in concentrations that exceed 10 times the limits of 10 CFR 20, Appendix B, Table 2, Column 2. Sampling and analysis of the respective Tanks or sumps are not required when flow is diverted to the Waste Water Holdup Tanks. | 12 | 7

(8) Waste Water Holdup Tanks (WWHT) shall be discharged directly to the Circulating Water Discharge Tunnel when results of sample analyses indicate activity in concentrations that exceed 10 times the limits of 10 CFR 20, Appendix B, Table 2, Column 2. Otherwise, WWHTs may be discharged to the Low Volume Waste Pond. WWHT discharges to the Circulating Water Discharge Tunnel shall be sampled and analyzed per Item 1A.c of this table. WWHT discharges to the LVW Pond shall be sampled and analyzed per Item 1B.b of this table. | 12 | 8 | 7 | 10

TABLE 4.11-1 (CONTINUED)

TABLE NOTATIONS

(9) Samples shall be taken at least once per 24 hours while the release is occurring. To be representative of the liquid effluent, the sample volume shall be proportioned to the effluent stream discharge volume. The ratio of sample volume to effluent discharge volume shall be maintained constant for all samples taken for the composite sample. | 7

(10) Temporary holdup tanks used to support special plant activities (e.g., Steam Generator Secondary Cleaning) involving potentially radioactive systems may be transferred to the Waste Water Management System when sampled in accordance with this table and the special plant activity has been evaluated in accordance with the 50.59 process. This waste stream shall not be discharged to the Waste Water Management System if activity is present in the waste stream in concentrations that exceed 10 times the limits of 10CFR20, Appendix B, Table 2, Column 2. | 14

(11) Dissolved and entrained gases should be included in the analysis (including Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135, and Xe-138). There are no LLD requirements for these gases in the LVW samples since the half life of the isotopes are relatively short with respect to the sample counting frequency. Gases are also not expected to be found in the LVW due to delay times associated with water being transported to the LVW and the open exposure of the ponds which would aid in the degasification of the liquids. One sample should be obtained monthly from the Low Volume Waste in addition to the composite sample to analyze for these noble gases. The count time for the sample should be equal to the time required to establish LLD values for the noble gas isotopes (e.g., 2000 seconds or the same count time used for effluent liquid batch releases). | 20

RADIOACTIVE EFFLUENTS

DOSE

CONTROLS

3.11.1.2 In accordance with CPSES TS 5.5.4.d and 5.5.4.e the dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released, from each unit, to CONTROLLED AREAS and UNRESTRICTED AREAS (see Figure 5.1-3) shall be limited: 16

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.

APPLICABILITY: At all times.

ACTION:

a. With the calculated dose from the release of radioactive materials in liquid effluents exceeding any of the above limits, prepare and submit a report to the Commission within 30 days, pursuant to 10 CFR 50, Appendix I, that identifies the cause(s) for exceeding the limit(s) and defines the corrective actions that have been taken to reduce the releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with the above limits. This report shall also include: (1) the results of radiological analyses of the drinking water source, and (2) the radiological impact on finished drinking water supplies with regard to the requirements of 40 CFR Part 141, Safe Drinking Water Act. 16

b. The provisions of Controls 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.1.2 Cumulative dose contributions from liquid effluents for the current calendar quarter and the current calendar year shall be determined in accordance with the methodology and parameters in Part II of the ODCM at least once per 31 days. 8

LIQUID RADWASTE TREATMENT SYSTEM

CONTROLS

3.11.1.3 In accordance with CPSES TS 5.5.4.f, the Liquid Radwaste Treatment System shall be OPERABLE and appropriate portions of the system shall be used to reduce releases of radioactivity when the projected doses due to the liquid effluent, from each unit, to CONTROLLED AREAS and UNRESTRICTED AREAS (see Figure 5.1-3) would exceed 0.06 mrem to the whole body or 0.2 mrem to any organ in a 31-day period. 16

APPLICABILITY: At all times.

ACTION:

a. With radioactive liquid waste being discharged without treatment and in excess of the above limits and any portion of the Liquid Radwaste Treatment System not in operation, prepare and submit a report to the Commission within 30 days, pursuant to 10 CFR 50, Appendix I, that includes the following information: 16

   1) Explanation of why liquid radwaste was being discharged without treatment, identification of any inoperable equipment or subsystems, and the reason for the inoperability,

   2) Action(s) taken to restore the inoperable equipment to OPERABLE status, and

   3) Summary description of action(s) taken to prevent a recurrence.

b. The provisions of Controls 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.1.3.1 Doses due to liquid releases from each unit to CONTROLLED AREAS and UNRESTRICTED AREAS shall be projected at least once per 31 days in accordance with the methodology and parameters in Part II of the ODCM when Liquid Radwaste Treatment Systems are not being fully utilized. 8

4.11.1.3.2 The installed Liquid Radwaste Treatment System shall be considered OPERABLE by meeting Controls 3.11.1.1 and 3.11.1.2. 1

RADIOACTIVE EFFLUENTS

LVW POND RESIN INVENTORY | 7

CONTROLS

3.11.1.4 The quantity of radioactive material contained in resins transferred to the LVW Pond shall be limited by the following expression : | 7

$$\frac{264}{V} \cdot \sum_j \cdot \frac{A_j}{C_j} < 1.0 \quad | 7$$

excluding tritium, dissolved or entrained noble gases, and radionuclides with less than an 8 day half life, | 7

where: | 7

A_j = pond inventory limit for single radionuclide "j" (Curies), | 7

C_j = 10 CFR 20, Appendix B, Table 2, Column 2, concentration for single radionuclide "j" (microCuries/ml), | 8

V = volume of resins in the pond (gallons), and | 7

264 = unit conversion factor (microCuries/Curie per milliliter/gallon). | 7

APPLICABILITY: At all times. | 2

ACTION:

a. With the quantity of radioactive material contained in resins in the LVW Pond exceeding the above limit, immediately suspend all additions of resins to the pond. | 8

b. The provisions of Controls 3.0.3 and 3.0.4 are not applicable. | 2

SURVEILLANCE REQUIREMENTS

4.11.1.4 Prior to transferring any batch of used powdex resin to the pond, the total inventory of radioactive materials in resins contained in the pond, including the batch to be transferred, shall be determined to be within the above limit. The inventory shall be determined based on analysis of a representative sample of the resin batch. Decay of radionuclides in previously discharged resins may be taken into account in determining inventory levels. | 8

LVW POND RESIN INVENTORY | 7

SURVEILLANCE REQUIREMENTS (Continued)

Additionally, each batch of resins transferred to the pond shall be limited by the expression: | 8

$$\sum_j \frac{Q_j}{C_j} \leq 0.1$$ | 8

Where: Q_j = Concentration of radioactive materials (microCuries/ml) in wet, drained slurry (used powdex resin) for radionuclide "j", excluding tritium, dissolved or entrained noble gases, and radionuclides with less than an 8-day half-life. The analysis shall include at least Ce-144, Cs-134, Cs-137, Co-58 and Co-60. Estimates of the Sr-89 and Sr-90 batch concentration shall be included based on the most recent quarterly composite analysis, | 8 | 7

C_j = 10 CFR 20, Appendix B, Table 2, Column 2, concentration for single radionuclide "j" (microCuries/milliliter). | 8

3/4.11 RADIOACTIVE EFFLUENTS

3/4.11.2 GASEOUS EFFLUENTS

DOSE RATE

3.11.2.1 In accordance with CPSES TS 5.5.4.c and 5.5.4.g, the dose rate due to radioactive materials released in gaseous effluents from the site to areas at or beyond the SITE BOUNDARY (see Figure 5.1-3) shall be limited to the following: 16

a. For noble gases: Less than or equal to a dose rate of 500 mrems/yr to the total body and less than or equal to 3000 mrems/yr to the skin; and 12

b. For Iodine-131, for Iodine-133, for tritium, and for all radionuclides in particulate form with half-lives greater than 8 days: Less than or equal to a dose rate of 1500 mrem/yr to any organ.

APPLICABILITY: At all times.

ACTION:

a. With the dose rate(s) exceeding the above limits, immediately restore the release rate to within the above limits(s).

b. The provisions of Controls 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.2.1.1 Radioactive gaseous wastes shall be sampled and analyzed according to the sampling and analysis program of Table 4.11-2. 8

4.11.2.1.2 The results of the radioactivity analyses shall be used in accordance with the methodology and parameters in Part II of the ODCM to assure that the dose rates at or beyond the SITE BOUNDARY are maintained within the limits of Control 3.11.2.1. 12

TABLE 4.11-2

Radioactive Gaseous Waste Sampling and Analysis Program (*)

GASEOUS RELEASE TYPE	SAMPLING FREQUENCY	MINIMUM ANALYSIS FREQUENCY	TYPE OF ACTIVITY ANALYSIS	LOWER LIMIT OF DETECTION (LLD)(1) (μCi/ml)
1. Waste Gas Storage Tank	P Each Tank Grab Sample	P Each Tank	Principal Gamma Emitters(2)	$1x10^{-4}$
2. Containment Purge or Vent	P Each Release(3) Grab Sample	P Each Release(3)	Principal Gamma Emitters(2)	$1x10^{-4}$
		M	H-3 (oxide)	$1x10^{-6}$
3. Plant Vent	M(3), (4), (5) Grab Sample	M(3)	Principal Gamma Emitters(2)	$1x10^{-4}$
			H-3 (oxide)	$1x10^{-6}$
	Continuous(6)	W(7) Radioiodine Adsorber	I-131	$1x10^{-12}$
	Continuous(6)	W(7) Particulate Sample	Principal Gamma Emitters(2)	$1x10^{-11}$
	Continuous(6)	M Composite Particulate Sample	Gross Alpha	$1x10^{-11}$
	Continuous(6)	Q Composite Particulate Sample	Sr-89, Sr-90	$1x10^{-11}$
	Continuous(6)	Noble Gas ** Beta or Gamma	Noble Gas	$1x10^{-6}$

*Table notations next page

**This sample is continuously analyzed by a radiation monitor

TABLE 4.11-2 (Continued)

TABLE NOTATIONS

(1) The LLD is defined, for purposes of these specifications, as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66\ s_b}{E \cdot V \cdot 2.22 \times 10^6 \cdot Y \cdot \exp(-\lambda \Delta t)}$$

Where:

LLD = the "a priori" lower limit of detection (microCurie per unit mass or volume),

s_b = the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (counts per minute),

E = the counting efficiency (counts per disintegration),

V = the sample size (units of mass or volume),

2.22 x 106 = the number of disintegrations per minute per microCurie,

Y = the fractional radiochemical yield, when applicable,

λ = the radioactive decay constant for the particular radionuclide (sec^{-1}), and

Δt= the elapsed time between the midpoint of sample collection and the time of counting (s).

Typical values of E, V, Y, and Δt should be used in the calculation.

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement.

TABLE 4.11-2 (Continued)

TABLE NOTATIONS (Continued)

(2) The principal gamma emitters for which the LLD specification applies include the following radionuclides: Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135, and Xe-138 in noble gas releases and Mn-54, Fe-59, Co-58, Co-60, Zn-65, I-131, Cs-134, Cs-137, Ce-141 and Ce-144 in iodine and particulate releases. This list does not mean that only these nuclides are to be considered. Other gamma peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Radioactive Effluent Release Report, pursuant to Control 6.9.1.4, in the format outlined in Regulatory Guide 1.21, Appendix B, Revision 1, June 1974. | 16

(3) Sampling and analysis shall also be performed following shutdown, startup, or a THERMAL POWER change ≥ 15% of RATED THERMAL POWER within a 1-hour period. This requirement does not apply if: (1) analysis of primary coolant activity performed pursuant to Technical Specification 3.4.16 shows that the DOSE EQUIVALENT I-131 concentration in the primary coolant has not increased more than a factor of 3, and (2) noble gas monitoring shows that effluent activity has not increased more than a factor of 3. | 20 | 16 | 20

(4) Tritium grab samples shall be taken at least once per 24 hours when the refueling canal is flooded.

(5) Tritium grab samples shall be taken at least once per 7 days from the ventilation exhaust from the spent fuel pool area, whenever spent fuel is in the spent fuel pool.

(6) The ratio of the sample flow rate to the sampled stream flow rate shall be known for the time period covered by each dose or dose rate calculation made in accordance with Controls 3.11.2.1, 3.11.2.2, and 3.11.2.3.

(7) Samples shall be changed at least once per 7 days and analyses shall be completed within 48 hours after changing, or after removal from the sampler. Sampling shall also be performed at least once per 24 hours for at least 7 days following each shutdown, startup or THERMAL POWER change ≥ 15% of RATED THERMAL POWER within a 1-hour period and analyses shall be completed within 48 hours of changing. When samples collected for 24 hours are analyzed, the corresponding LLDs may be increased by a factor of 10. This requirement does not apply if: (1) analysis shows that the DOSE EQUIVALENT I-131 concentration in the reactor coolant has not increased more than a factor of 3; and (2) noble gas monitoring shows that effluent activity has not increased more than a factor of 3. | 20 | 8

RADIOACTIVE EFFLUENTS

DOSE - NOBLE GASES

CONTROLS

3.11.2.2 In accordance with CPSES TS 5.5.4.e and 5.5.4.h, the air dose due to noble gases released in gaseous effluents, from each unit, to areas at and beyond the SITE BOUNDARY (see Figure 5.1-3) shall be limited to the following: 16

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.

APPLICABILITY: At all times.

ACTION:

a. With the calculated air dose from radioactive noble gases in gaseous effluents exceeding any of the above limits, prepare and submit a report to the NRC within 30 days, pursuant to 10 CFR 50, Appendix I, that identifies the cause(s) for exceeding the limit(s) and defines the corrective actions that have been taken to reduce the releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with the above limits. 16

b. The provisions of Controls 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.2.2 Cumulative dose contributions for the current calendar quarter and current calendar year for noble gases shall be determined in accordance with the methodology and parameters in Part II of the ODCM at least once per 31 days. 8

RADIOACTIVE EFFLUENTS

DOSE - IODINE-131, IODINE-133, TRITIUM, AND RADIOACTIVE MATERIAL IN PARTICULATE FORM

CONTROLS

3.11.2.3 In accordance with CPSES TS 5.5.4.e and 5.5.4.i, 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 (see Figure 5.1-3) shall be limited to the following: 16

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.

APPLICABILITY: At all times.

ACTION:

a. With the calculated dose from the release of Iodine-131, Iodine-133, tritium, and radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents exceeding any of the above limits, prepare and submit a report to the NRC within 30 days, pursuant to 10 CFR 50, Appendix I, that identifies the cause(s) for exceeding the limit and defines the corrective actions that have to be taken to assure that subsequent releases will be in compliance with the above limits. 16

b. The provisions of Controls 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.2.3 Cumulative dose contributions for the current calendar quarter and current calendar year for Iodine-131, Iodine-133, tritium, and radionuclides in particulate form with half-lives greater than 8 days shall be determined in accordance with the metholodogy and parameters in Part II of the ODCM at least once per 31 days. 8

CONTROLS

3.11.2.4 In accordance with CPSES TS 5.5.4.f, the PRIMARY PLANT VENTILATION SYSTEM and the WASTE GAS HOLDUP SYSTEM shall be OPERABLE and appropriate portions of these systems shall be used to reduce releases of radioactivity when the projected doses in 31 days due to gaseous effluent releases, from each unit, to areas at and beyond the SITE BOUNDARY (see Figure 5.1-3) would exceed: 16

a. 0.2 mrad to air from gamma radiation, or

b. 0.4 mrad to air from beta radiation, or

c. 0.3 mrem to any organ of a MEMBER OF THE PUBLIC.

APPLICABILITY: At all times.

ACTION:

a. With radioactive gaseous waste being discharged without treatment and in excess of the above limits, prepare and submit a report to the NRC within 30 days, pursuant to 10 CFR 50, Appendix I, that includes the following information: 16

   1) Identification of any inoperable equipment or subsystems, and the reason for the inoperability.

   2) Action(s) taken to restore the inoperable equipment to OPERABLE status, and

   3) Summary description of action(s) taken to prevent a recurrence.

b. The provisions of Controls 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.2.4.1 Doses due to gaseous releases from each unit to areas at and beyond the SITE BOUNDARY shall be projected at least once per 31 days in accordance with the methodology and parameters in Part II of the ODCM when Gaseous Radwaste Treatment Systems are not being fully utilized. 8

4.11.2.4.2 The installed PRIMARY PLANT VENTILATION SYSTEM and WASTE GAS HOLDUP SYSTEM shall be considered OPERABLE by meeting Controls 3.11.2.1 and 3.11.2.2 or 3.11.2.3.

3/4.11.4 TOTAL DOSE

CONTROLS

3.11.4 In accordance with CPSES TS 5.5.4.j, 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 total body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mrems. 16

APPLICABILITY: At all times.

ACTION:

a. With the calculated doses from the release of radioactive materials in liquid or gaseous effluents exceeding twice the limits of Controls 3.11.1.2a., 3.11.1.2b, 3.11.2.2a, 3.11.2.2b, 3.11.2.3a., or 3.11.2.3b., calculations shall be made including direct radiation contributions from the units and from outside storage tanks to determine whether the above limits of Control 3.11.4 have been exceeded. If such is the case, prepare and submit a report to the NRC within 30 days, pursuant to 10 CFR 20.1301(d) and 10 CFR 20.2203(a)(4) that defines the corrective action to be taken to reduce subsequent releases to prevent recurrence of exceeding the above limits and includes the schedule for achieving conformance with the above limits. This report, as defined in 10 CFR 20.2203(b), shall include an analysis that estimates the radiation exposure (dose) to a MEMBER OF THE PUBLIC from uranium fuel cycle sources, including all effluent pathways and direct radiation, for the calendar year that includes the release(s) covered by this report. It shall also describe levels of radiation and concentration of radioactive material involved, and the cause of the exposure levels or concentrations. If the estimated dose(s) exceeds the above limits, and if the release condition resulting in violation of 40 CFR Part 190 has not already been corrected, the report shall include a request for a variance in accordance with the provisions of 40 CFR Part 190. Submittal of the report is considered a timely request, and a variance is granted until staff action on the request is complete. 16 16

b. The provisions of Controls 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.4.1 Cumulative dose contributions from liquid and gaseous effluents shall be determined in accordance with Controls 4.11.1.2, 4.11.2.2, and 4.11.2.3, and in accordance with the methodology and parameters in Part II of the ODCM. 8

3/4.11.4 TOTAL DOSE

SURVEILLANCE REQUIREMENTS

4.11.4.2 Cumulative dose contributions from direct radiation from the units and from radwaste storage tanks shall be determined in accordance with the methodology and parameters in Part II of the ODCM. This requirement is applicable only under conditions set forth in ACTION a. of Control 3.11.4. | 8

3/4.12 RADIOLOGICAL ENVIRONMENTAL MONITORING

3/4.12.1 MONITORING PROGRAM

CONTROLS

3.12.1 The Radiological Environmental Monitoring Program shall be conducted as specified in Table 3.12-1. | 12

APPLICABILITY: At all times.

ACTION:

a. With the Radiological Environmental Monitoring Program not being conducted as specified in Table 3.12-1, prepare and submit to the NRC, in the Annual Radiological Environmental Operating Report required by Control 6.9.1.3, a description of the reason(s) for not conducting the program as required and the plan for preventing a recurrence. | 12

b. With the level of radioactivity as the result of plant effluents in an environmental sampling medium at a specified location exceeding the reporting levels of Table 3.12-2 when averaged over any calendar quarter, prepare and submit a report to the NRC within 30 days, pursuant to 10 CFR 50, Appendix I, that identifies the cause(s) for exceeding the limit(s) and defines the corrective action to be taken to reduce radioactive effluents so that the potential annual dose* to a MEMBER OF THE PUBLIC is less than the calendar year limits of Control 3.11.1.2, 3.11.2.2, or 3.11.2.3. When more than one of the radionuclides in Table 3.12-2 are detected in the sampling medium, this report shall be submitted if: | 16

$$\frac{\text{concentration (1)}}{\text{reporting level (1)}} + \frac{\text{concentration (2)}}{\text{reporting level (2)}} + \ldots \geq 1.0$$

When radionuclides other than those in Table 3.12-2 are detected and are the result of plant effluents, this report shall be submitted if the potential annual dose* to A MEMBER OF THE PUBLIC from all radionuclides is equal to or greater than the calendar year limits of Control 3.11.1.2, 3.11.2.2, or 3.11.2.3. This report is not required if the measured level of radioactivity was not the result of plant effluents; however, in such an event, the condition shall be reported and described in the Annual Radiological Environmental Operating Report required by Control 6.9.1.3.

* The methodology and parameters used to estimate the potential annual dose to a MEMBER OF THE PUBLIC shall be indicated in this report.

3/4.12 RADIOLOGICAL ENVIRONMENTAL MONITORING

3/4.12.1 MONITORING PROGRAM

CONTROLS (Continued)

c. With milk or fresh leafy vegetable samples unavailable from one or more of the sample locations required by Table 3.12-1, identify locations for obtaining replacement samples and add them within 30 days to the Radiological Environmental Monitoring Program. The specific locations from which samples were unavailable may then be deleted from the monitoring program. New sampling locations shall be listed in the results of the annual Land Use Census. 12

d. The provisions of Controls 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.12.1 The radiological environmental monitoring samples shall be collected pursuant to Table 3.12-1 and shall be analyzed pursuant to the requirements of Table 3.12-1 and the detection capabilities required by Table 4.12-1. The specific sample locations for the Radiological Environmental Monitoring Program shall be listed and maintained current in the results of the annual Land Use Census. 12

TABLE 3.12-1
Radiological Environmental Monitoring Program

EXPOSURE PATHWAY AND/OR SAMPLE	NUMBER OF REPRESENTATIVE SAMPLES AND SAMPLE LOCATIONS(1)	SAMPLING AND COLLECTION FREQUENCY	TYPE AND FREQUENCY OF ANALYSIS
1. Direct Radiation(2)	Forty routine monitoring stations either with two or more dosimeters or with one instrument for measuring and recording dose rate continuously, placed as follows: An inner ring of stations, one in each meteorological sector in the general area of the SITE BOUNDARY; An outer ring of stations, one in each meteorological sector in the 6- to 8-km range from the site; and The balance of the stations to be placed in special interest areas such as population centers, nearby residences, schools, and in one or two areas to serve as control stations.	Quarterly.	Gamma dose quarterly
2. Airborne Radioiodine and Particulates	Samples from five locations: Three samples from close to the three SITE BOUNDARY locations, in different sectors, of the highest calculated annual average ground-level D/Q;	Continuous sampler operation with sample collection weekly, or more frequently if required by dust loading.	Radioiodine Cannister: I-131 analysis weekly Particulate Sampler: Gross beta radioactivity analysis following filter change; (4) and gamma isotopic analysis (5) of composite (by location quarterly.

TABLE 3.12-1 (Continued)
Radiological Environmental Monitoring Program

EXPOSURE PATHWAY AND/OR SAMPLE	NUMBER OF REPRESENTATIVE SAMPLES AND SAMPLE LOCATIONS(1)	SAMPLING AND COLLECTION FREQUENCY	TYPE AND FREQUENCY OF ANALYSIS
	One sample from the vicinity of a community having the highest calculated annual average ground-level D/Q; and One sample from a control location, as for example 15 to 30 km distant and in the least prevalent wind direction. (3)		
3. Waterborne			
a. Surface	Squaw Creek Reservoir (6)	Monthly composite of weekly grab samples.	Gamma isotopic analysis(5) monthly. Composite for tritium analysis quarterly.
	Lake Granbury	Monthly composite of weekly grab samples when Lake Granbury is receiving letdown from SCR. Otherwise, monthly grab sample.(7)	Gamma isotopic analysis(5) monthly. Composite for tritium analysis quarterly.
	Control-Brazos River upstream of Lake Granbury	Monthly	Gamma isotopic analysis(5) monthly. Composite for tritium analysis quarterly.
b. Ground	Samples from two sources if likely to be affected(8).	Quarterly	Gamma isotopic(5) and tritium analysis quarterly.

TABLE 3.12-1 (Continued)
Radiological Environmental Monitoring Program

EXPOSURE PATHWAY AND/OR SAMPLE	NUMBER OF REPRESENTATIVE SAMPLES AND SAMPLE LOCATIONS(1)	SAMPLING AND COLLECTION FREQUENCY	TYPE AND FREQUENCY OF ANALYSIS
3. Waterborne (Continued)			
c. Drinking	One sample from Squaw Creek Reservoir.	Composite of weekly grab samples over 2-week period when I-131 analysis is performed; monthly composite of weekly grab samples otherwise.	I-131 analysis of each composite sample when the dose calculated for the consumption of the water is greater than 1 mrem per year(9). Gross beta and gamma isotopic analyses(5) monthly. Composite for tritium analysis quarterly.
d. Sediment from Shoreline	One sample from downstream area with existing or potential recreational value.	Semiannually.	Gamma isotopic analysis(5) semiannually.
4. Ingestion			
a. Milk	Samples from milking animals in three locations within 5 km distance having the highest dose potential. If there are none, sample from milking animals in each of three areas between 5 to 8 km distant where doses are calculated to be greater than 1 mrem per yr.(9) One sample from milking animals at a control location, 15 to 30 km distant and in the least prevalent wind direction.(3)	Semimonthly when animals are on pasture; monthly at other times.	Gamma isotopic(5) and I-131 analysis semimonthly when animals are on pasture; monthly at other times.

TABLE 3.12-1 (Continued)
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

EXPOSURE PATHWAY AND/OR SAMPLE	NUMBER OF REPRESENTATIVE SAMPLES AND SAMPLE LOCATIONS[1]	SAMPLING AND COLLECTION FREQUENCY	TYPE AND FREQUENCY OF ANALYSIS	
4. Ingestion (Continued)				
b. Fish and Invertebrates	One sample of at least two recreationally important species in vicinity of plant discharge area. One sample of same species in areas not influenced by plant discharge.	Sample semiannually.	Gamma sotopic analysis[5] on edible portions semiannually	14
c. Food Products*	One sample of each principal class of food products from any area that is irrigated by water in which liquid plant wastes have been discharged.	At time of harvest[10]	Gamma isotopic analysis[5] on eible portion following sample collection.	14
	A sample of broad leaf vegetation grown nearest each of two different offsite locations of highest predicted annual average ground level D/Q if milk sampling is not performed at all required locations.	Monthly, when available.	Gamma isotopic[5] andI-131 analyses, monthly, when samples are collected	14
	One sample of each of the similar broad leaf vegetation grown 15 to 30 km distant in the least prevalent wind direction[3] if milk sampling is not performed at all required locations.	Monthly, when available.	Gamma isotopic[5] and I-131 analyses, monthly, when samples are collected	14

* Reports from 3 additional airborne radioiodine sample locations may be supplemented for broad leaf vegetation samples.

TABLE 3.12-1 (Continued)

TABLE NOTATIONS

(1) For each sample location required by Table 3.12-1, specific parameters of distance and direction sector from the centerline of one reactor, and additional description where pertinent, are provided in information maintained current in the results of the annual Land Use Census. Deviations are permitted from the required sampling schedule if specimens are unobtainable due to circumstances such as hazardous conditions, seasonal unavailability, and malfunction of automatic sampling equipment. If specimens are unobtainable due to sampling equipment malfunction, effort shall be made to complete corrective action prior to the end of the next sampling period. All deviations from the sampling schedule shall be documented in the Annual Radiological Environmental Operating Report pursuant to Control 6.9.1.3. It is recognized that, at times, it may not be possible or practicable to continue to obtain samples of the media of choice at the most desired location or time. In these instances suitable specific alternative media and locations may be chosen for the particular pathway in question and appropriate substitutions made within 30 days in the Radiological Environmental Monitoring Program. New sampling locations shall be lised in the results of the annual Land Use Census. 12 8 12

(2) One or more instruments, such as a pressurized ion chamber, for measuring and recording dose rate continuously may be used in place of, or in addition to, integrating dosimeters. For the purposes of this table, a thermoluminescent dosimeter (TLD) is considered to be one phosphor; two or more phosphors in a packet are considered as two or more dosimeters. Film badges shall not be used as dosimeters for measuring direct radiation.

(3) The purpose of this sample is to obtain background information. If it is not practical to establish control locations in accordance with the distance and wind direction criteria, other sites that provide valid background data may be substituted. The control sample location at 12.3 miles in the southwest sector has been evaluated and found to be an acceptable substitute sampling location. 15

(4) Airborne particulate sample filters shall be analyzed for gross beta radioactivity 24 hours or more after sampling to allow for radon and thoron daughter decay. If gross beta activity in air particulate samples is greater than 10 times the yearly mean of control samples, gamma isotopic analysis shall be performed on the individual samples.

TABLE 3.12-1 (Continued)

TABLE NOTATIONS (Continued)

(5) Gamma isotopic analysis means the identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents from the facility.

(6) The Reservoir shall be sampled in an area at or beyond but near the mixing zone. Also, the Reservoir shall be sampled at a distance beyond significant influence of the discharge.

(7) Lake Granbury shall be sampled near the letdown discharge and at a distance beyond significant influence of the discharge.

(8) Groundwater samples shall be taken when this source is tapped for drinking or irrigation purposes in areas where the hydraulic gradient or recharge properties are suitable for contamination.

(9) The dose shall be calculated for the maximum organ and age group, using the methodology and parameters in Part II of the ODCM. | 8

(10) If harvest occurs more than once a year, sampling shall be performed during each discrete harvest. If harvest occurs continuously, sampling shall be monthly. Attention shall be paid to including samples of tuberous and root food products.

TABLE 3.12-2

Reporting Levels for Radioactivity Concentrations in Environmental Samples

ANALYSIS	WATER (pCi/l)	AIRBORNE PARTICULATE OR GASES (pCi/m3)	FISH (pCi/kg, wet)	MILK (pCi/l)	FOOD PRODUCTS (pCi/kg, wet)
H-3	20,000(*)				
Mn-54	1,000		30,000		
Fe-59	400		10,000		
Co-58	1,000		30,000		
Co-60	300		10,000		
Zn-65	300		20,000		
Zr-Nb-95	400				
I-131	2(**)	0.9		3	100
Cs-134	30	10	1,000	60	1,000
Cs-137	50	20	2,000	70	2,000
Ba-La-140	200			300	

(*) For drinking water samples. This is 40 CFR Part 141 value. If no drinking water pathway exists, a value of 30,000 pCi/l may be used.

(**) If no drinking water pathway exists, a value of 20 pCi/l may be used.

TABLE 4.12-1
Detection Capabilities for Environmental Sample Analysis (1)(2)

Lower Limit of Detection (LLD) (3)

ANALYSIS	WATER (pCi/l)	AIRBORNE PARTICULATE OR GASES (pCi/m3)	FISH (pCi/kg, wet)	MILK (pCi/l)	FOOD PRODUCTS (pCi/kg, wet)	SEDIMENT (pCi/kg, dry)
Gross Beta	4	0.01				
H-3	2000*					
Mn-54	15		130			
Fe-59	30		260			
Co-58, 60	15		130			
Zn-65	30		260			
Zr-Nb-95	15					
I-131	1**	0.07		1	60	
Cs-134	15	0.05	130	15	60	150
Cs-137	18	0.06	150	18	80	180
Ba-La-140	15			15		

* If no drinking water pathway exists, a value of 3000 pCi/l may be used.

** If no drinking water pathway exists, a value of 15 pCi/l may be used.

TABLE 4.12-1 (Continued)

TABLE NOTATIONS

(1) The list does not mean that only these nuclides are to be considered. Other peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Annual Radiological Environmental Operating Report pursuant to Control 6.9.1.3.

(2) Required detection capabilities for thermoluminescent dosimeters used for environmental measurements shall be in accordance with the recommendations of Regulatory Guide 4.13.

(3) The LLD is defined, for purposes of these specifications, as the smallest concentrations of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only a 5% probability of falsely concluding that a blank observation represents a "real" signal.

$$LLD = \frac{4.66 s_b}{E \cdot V \cdot Y \cdot \exp(-\lambda \Delta t) \; 2.22}$$

1

Where:

LLD = the "a priori" lower limit of detection (picoCurie per unit mass or volume),

s_b = the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (counts per minute),

E = the counting efficiency (counts per disintegration),

V = the sample size (units of mass or volume),

2.22 = the number of disintegrations per minute per picoCurie,

Y = the fractional radiochemical yield, when applicable,

λ = the radioactive decay constant for the particular radionuclide (sec^{-1}), and

Δt = the elapsed time between the midpoint of sample collection and the time of counting(s).

Typical values of E, V, Y, and Δt should be used in the calculation.

TABLE 4.12-1 (Continued)

TABLE NOTATIONS (Continued)

(3) Continued

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement. Analyses shall be performed in such a manner that the stated LLDs will be achieved under routine conditions. Occasionally background fluctuations, unavoidable small sample sizes, the presence of interfering nuclides, or other uncontrollable circumstances may render these LLD's unachievable. In such cases, the contributing factors shall be identified and described in the Annual Radiological Environmental Operating Report pursuant to Control 6.9.1.3.

3/4.12.2 LAND USE CENSUS

CONTROLS

3.12.2 A Land Use Census shall be conducted and shall identify within a distance of 8 km (5 miles) the location in each of the 16 meteorological sectors of the nearest milk animal, the nearest residence, and the nearest garden* of greater than 50m^2 (500 ft^2) producing broad leaf vegetation. 12

APPLICABILITY: At all times.

ACTION:

a. With a Land Use Census identifying a location(s) that yields a calculated dose or dose commitment greater than the values currently being calculated in Control 4.11.2.3, pursuant to Control 6.9.1.4, identify the new location(s) in the next Radioactive Effluent Release Report. 16

b. With a Land Use Census identifying a location(s) that yields a calculated dose or dose commitment (via the same exposure pathway) 20% greater than at a location from which samples are currently being obtained in accordance with Control 3.12.1, add the new location(s) within 30 days, to the Radiological Environmental Monitoring Program. The sampling locations having the lowest calculated dose or dose commitment(s), via the same exposure pathway, may be deleted from this monitoring program after October 31 of the year in which this Land Use Census was conducted. New sampling locations shall be listed in the results of the annual Land Use Census. 12 12

c. The provisions of Controls 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.12.2 The Land Use Census shall be conducted during the growing season at least once per 12 months using that information that will provide the best results, such as by a door-to-door survey, aerial survey, or by consulting local agriculture authorities. The results of the Land Use Census shall be included in the Annual Radiological Environmental Operating Report pursuant to Control 6.9.1.3.

---

* Broad leaf vegetation sampling of at least three different kinds of vegetation may be performed at the SITE BOUNDARY in each of two different direction sectors with the highest predicted D/Qs in lieu of the garden census. Specifications for broad leaf vegetation sampling in Table 3.12-1, Item 4.c. shall be followed, including analysis of control samples.

3/4.12.3 INTERLABORATORY COMPARISON PROGRAM

CONTROLS

3.12.3 Analyses shall be performed on all radioactive materials, supplied as part of an Interlaboratory Comparison Program, that correspond to samples required by Table 3.12-1. | 12

APPLICABILITY: At all times.

ACTION:

a. With analyses not being performed as required above, report the corrective actions taken to prevent a recurrence to the NRC in the Annual Radiological Environmental Operating Report pursuant to Control 6.9.1.3. | 12

b. The provisions of Controls 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.12.3 The Interlaboratory Comparison Program shall be described in Part II of the ODCM. A summary of the results obtained as part of the above required Interlaboratory Comparison Program shall be included in the Annual Radiological Environmental Operating Report pursuant to Control 6.9.1.3. | 8

BASES

3/4.3.3.4 RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

The radioactive liquid effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in liquid effluents during actual or potential releases of liquid effluents. The Alarm/Trip Setpoints for these instruments shall be calculated and adjusted in accordance with the methodology and parameters in Part II of the ODCM to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20. The OPERABILITY and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10CFR50. | 8

3/4.3.3.5 RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

The radioactive gaseous effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in gaseous effluents during actual or potential releases of gaseous effluents. The Alarm/Trip Setpoints for these instruments shall be calculated and adjusted in accordance with the methodology and parameters in Part II of the ODCM to ensure that the alarm/trip will occur prior to exceeding the dose rate limits of Control 3.11.2.1. The OPERABILITY and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50. | 8

3/4.3.3.6 METEOROLOGICAL MONITORING INSTRUMENTATION

The OPERABILITY of the meteorological instrumentation ensures that sufficient meteorological data are available for estimating potential radiation doses to the public as a result of routine or accidental release of radioactive materials to the atmosphere. This capability is required to evaluate the need for initiating protective measures to protect the health and safety of the public and is consistent with the recommendations of the second proposed Revision 1 to Regulatory Guide 1.23, "Onsite Meteorological Programs," April 1986.

The surveillance requirements of the meteorological instrumentation are consistent with the recommendations of the second proposed Revision 1 to Reg. Guide 1.23 except for the calibration requirements for the Wind Speed and Wind Direction sensors which are replaced with calibrated sensors at least once per each 12 months. The calibration interval starts when the sensor is installed provided the sensor has been vendor calibrated within two years, and the sensor has been in proper storage up to the time of installation. These controls have been shown to meet the accuracy and data recovery recommendations of the above reference version of Reg. Guide 1.23. | 18

3/4.7.15 SEALED SOURCE CONTAMINATION

The limitations on removable contamination for sources requiring leak testing, including alpha emitters, are based on 10CFR70.39(c) limits for plutonium. This limitation will ensure that leakage from Byproduct, Source, and Special Nuclear Material sources will not exceed allowable intake values.

Sealed sources are classified into three groups according to their use, with Surveillance Requirements commensurate with the probability of damage to a source in that group. Those sources which are frequently handled are required to be tested more often than those which are not. Sealed sources which are continuously enclosed within a shielded mechanism (i.e., sealed sources within radiation monitoring or boron measuring devices) are considered to be stored and need not be tested unless they are removed from the shielded mechanism.

3/4.11.1 LIQUID EFFLUENTS

3/4.11.1.1 CONCENTRATION CONTROLS

This control is provided to ensure that the concentration of radioactive materials released in liquid waste effluents to CONTROLLED AREAS and UNRESTRICTED AREAS will be less than 10 times the concentration values specified in Appendix B, Table 2, Column 2 to 10 CFR 20.1001-20.2402. It provides operational flexibility for releasing liquid effluents in concentrations to follow the Section II.A and II.C design objectives of Appendix I to 10 CFR Part 50. This limitation provides reasonable assurance that the levels of radioactive materials in bodies of water in CONTROLLED AREAS and UNRESTRICTED AREAS will result in exposures within (1) the Section II.A design objectives of Appendix I, 10 CFR Part 50, to a MEMBER OF THE PUBLIC and (2) restrictions authorized by 10 CFR 20.1301(e). The concentration limit for the dissolved or entrained noble gases is based upon the assumption that XE-135 is the controlling radionuclide and its effluent concentration in air (submersion) was converted to an equivalent concentration in water. This control does not affect the requirement to comply with the annual limitation of 10 CFR 20.1301 (a). 12

This control applies to the release of radioactive materials in liquid effluents from all units at the site.

The required detection capabilities for radioactive materials in liquid waste samples are tabulated in terms of the lower limits of detection (LLDs). Detailed discussion of the LLD and other detection limits can be found in Currie, L.A., "Lower Limit of Detection Definition and Elaboration of a Proposed Position for Radiological Effluent and Environmental Measurements," NUREG/CR-4007 (September 1984), and in the HASL Procedures Manual, HASL-300.

3/4.11.1.2 DOSE

This control is provided to implement the requirements of Sections II.A, III.A and IV.A of 10CFR50, Appendix I. The Control implements the guides set forth in Section II.A of Appendix I. The ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive material in liquid effluents to CONTROLLED AREAS and UNRESTRICTED AREAS will be kept "as low as is reasonably achievable." Also, for fresh water sites with drinking water supplies that can be potentially affected by plant operations, there is reasonable assurance that the operation of the facility will not result in radionuclide concentrations in the finished drinking water that are in excess of the requirements of 40CFR141. The dose calculation methodology and parameters in Part II of the ODCM implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data, such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The equations specified in Part II of the ODCM for calculating the doses due to the actual release rates of 8 8

3/4.11.1.2 DOSE (Continued)

radioactive materials in liquid effluents are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.113, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I," April 1977.

This control applies to the release of radioactive materials in liquid effluents from each unit at the site. The liquid effluents from the shared radwaste treatment system are proportioned equally between Unit 1 and Unit 2. 8

3/4.11.1.3 LIQUID RADWASTE TREATMENT SYSTEM

The OPERABILITY of the Liquid Radwaste Treatment System ensures that this system will be available for use whenever liquid effluents require treatment prior to release to the environment. The requirement that the appropriate portions of this system be used when specified provides assurance that the releases of radioactive materials in liquid effluents will be kept "as low as is reasonably achievable." This control implements the requirements of 10 CFR 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50 and the design objective given in Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the Liquid Radwaste Treatment System were specified as a suitable fraction of the dose design objectives set forth in Section II.A of Appendix I, 10 CFR Part 50 for liquid effluents.

This control applies to the release of radioactive materials in liquid effluents from each unit at the site. The liquid effluents from the shared radwaste treatment system are proportioned equally between Unit 1 and Unit 2. 8

3/4.11.1.4 LVW POND RESIN INVENTORY

The inventory limits of the LVW Pond are based on limiting the consequences of an uncontrolled release of the pond resin inventory. The expression in Control 3.11.1.4 assumes the pond inventory is uniformly mixed, and that the pond is located in a CONTROLLED AREA as defined in 10 CFR Part 20, and that the concentration limit in Note 4 to Appendix B of 10 CFR Part 20 applies. This expression limits the total quantity of radioactive materials in resins discharged to the LVW Pond to a value such that the average concentration in the resins, calculated over the total volume of resins in the pond, will not exceed the Effluent Concentration Limits specified in 10 CFR 20, Appendix B, Table 2, Column 2. Because Control 3.11.1.1 limits the concentration of liquid effluents from other pathways to the LVW Pond to 10 times the 10 CFR 20 Effluent Concentration values, also limiting the average concentration in resins to the Effluent Concentration values will assure that the average concentration in the pond from all sources, calculated over the total volume of the pond (liquid and resins), will not exceed the limits of Control 3.11.1.1. 8 12

3/4.11.1.4 LVW POND RESIN INVENTORY (Continued) | 7

The batch limits for resins transferred to the LVW Pond assure that radioactive material in the slurry transferred to the Pond are "as low as is reasonably achievable" in accordance with 10 CFR 50.36a. The expression in Control 4.11.1.4 assures no batch of slurry will be transferred to the Pond unless the sum of the ratios of the activity of the radionuclides to their respective concentration limitation is less than 10% of the limits established in 10 CFR 20, Appendix B. | 8 | 8

The batch limit is arbitrarily established at 10% of the 10 CFR 20, Appendix B limits to minimize input of radioactive materials to the LVW Pond consistent with detection limits for the resin analysis. The batch limit also provides assurance that the radioactive material released is within the inventory limitation of Control 3.11.1.4. | 8

3/4.11.2 GASEOUS EFFLUENTS

3/4.11.2.1 DOSE RATE

This control, in conjunction with Controls 3.11.2.2 and 3.11.2.3, is provided to ensure that the dose at or beyond the SITE BOUNDARY from gaseous effluents from all units on the site will be within the annual dose limits of 10CFR20 for MEMBERS OF THE PUBLIC. The specified release rate limits restrict, at all times, the corresponding gamma and beta dose rates above background to a MEMBER OF THE PUBLIC at or beyond the SITE BOUNDARY to less than or equal to 500 mrems/year to the total body or to less than or equal to 3000 mrems/year to the skin. These release rate limits also restrict, at all times, the corresponding thyroid dose rate above background to a child via the inhalation pathway to less than or equal to 1500 mrems/year. Because these dose rate limits are applied on an instantaneous basis and because of the overriding 10 CFR 50, Appendix I, cumulative dose limitations established in Controls 3.11.2.2 and 3.11.2.3, these limits provide reasonable assurance that radioactive material discharged in gaseous effluents will not result in the exposure of a MEMBER OF THE PUBLIC, either within or outside the SITE BOUNDARY, to annual average concentrations that would result in exceeding the annual total effective dose equivalent limit specified in 10 CFR 20.1301(a). For MEMBERS OF THE PUBLIC who may at times be in CONTROLLED AREAS within the SITE BOUNDARY, the occupancy factors for those MEMBERS OF THE PUBLIC will usually be sufficiently low to compensate for any increase in the atmospheric diffusion factor above that for the SITE BOUNDARY. The methodology for calculating doses for such MEMBERS OF THE PUBLIC is provided in PART II of the ODCM. 12 12 8

This control applies to the release of radioactive materials in gaseous effluents from all units at the site.

The required detection capabilities for radioactive materials in gaseous waste samples are tabulated in terms of the lower limits of detection (LLDs). Detailed discussion of the LLDs and other detection limits can be found in Currie, L.A., "Lower Limit of Detection Definition and Elaboration of a Proposed Position for Radiological Effluent and Environmental Measurements," NUREG/CR-4007 (September 1984), and in the HASL Procedures Manual, HASL-300. 12

3/4.11.2.2 DOSE - NOBLE GASES

This control is provided to implement the requirements of Sections II.B, III.A and IV.A of 10CFR50, Appendix I. The control implements the guides set forth in Section I.B of Appendix I. The ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive material in gaseous effluents to CONTROLLED AREAS and UNRESTRICTED AREAS will be kept "as low as is reasonably achievable." The Surveillance Requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The dose calculation methodology and parameters established in Part II of the ODCM for calculating the doses due to the actual release rates of the radioactive noble gases in gaseous effluents are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Dose to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water Cooled Reactors," Revision 1, July 1977. The ODCM equations provided for determining the air doses at or beyond the SITE BOUNDARY are based upon the historical average atmospheric conditions. 8 12

This control applies to the release of radioactive materials in gaseous effluents from each unit at the site. The gaseous effluents from the shared radwaste treatment system are proportioned equally between Unit 1 and Unit 2. 8

3/4.11.2.3 DOSE - IODINE-131, IODINE-133, TRITIUM, AND RADIOACTIVE MATERIAL IN PARTICULATE FORM

This control is provided to implement the requirements of Sections II.C, III.A, and IV.A of 10CFR50, Appendix I. The Controls are the guides set forth in Section II.C of Appendix I. The ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive materials in gaseous effluents to CONTROLLED AREAS and UNRESTRICTED AREAS will be kept "as low as is reasonably achievable." The ODCM calculational methods specified in the Surveillance Requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The calculational methodology and parameters specified in Part II of the ODCM for calculating the doses due to the actual release rates of the subject materials are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors," Revision 1, July 1977. These equations also provide for determining the actual doses based upon the historical average atmospheric conditions. The release rate specification for Iodine-131, Iodine-133, tritium, and radionuclides in particulate form with half-lives greater than 8 days is dependent upon the existing radionuclide pathways to man in the areas at or beyond the SITE BOUNDARY. The pathways that were examined in the development of the calculations were: (1) individual inhalation of airborne radionuclides, (2) deposition of radionuclides onto green leafy vegetation with subsequent consumption by man, (3) deposition onto grassy areas where milk animals and meat-producing animals graze with consumption of the milk and meat by man, and (4) deposition on the ground with subsequent exposure of man. 8 12

This control applies to the release of radioactive materials in gaseous effluents from each unit at the site. The gaseous effluents from the shared radwaste treatment system are proportioned equally between Unit 1 and Unit 2. 8

3/4.11.2.4 GASEOUS RADWASTE TREATMENT SYSTEM

The OPERABILITY of the WASTE GAS HOLDUP SYSTEM and the PRIMARY PLANT SYSTEM ensures that the systems will be available for use whenever gaseous effluents require treatment prior to release to the environment. The requirement that the appropriate portions of these systems be used, when specified, provides reasonable assurance that the releases of radioactive materials in gaseous effluents will be kept "as low as is reasonably achievable." This control implements the requirements of 10 CFR 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50 and the design objectives given in Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the systems were specified as a suitable fraction of the dose design objectives set forth in Sections II.B and II.C of Appendix I, 10 CFR Part 50, for gaseous effluents.

This control applies to the release of radioactive materials in gaseous effluents from each unit at the site. The gaseous effluents from the shared radwaste treatment system are proportioned equally between Unit 1 and Unit 2. | 8

3/4.11.4 TOTAL DOSE

This control is provided to meet the dose limitations of 40 CFR Part 190 that have been incorporated into 10 CFR Part 20.1301(d). The control requires the preparation and submittal of a report whenever the calculated doses due to releases of radioactivity and to radiation from uranium fuel cycle sources exceed 25 mrems to the total body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mrems. For sites containing up to four reactors, it is highly unlikely that the resultant dose to a MEMBER OF THE PUBLIC will exceed the dose limits of 40 CFR Part 190 if the individual reactors remain within twice the dose design objectives of Appendix I, and if direct radiation doses from the units (including outside storage tanks, etc.) are kept small. The report will describe a course of action that should result in the limitation of the annual dose to a MEMBER OF THE PUBLIC to within the 40 CFR Part 190 limits. For the purposes of the report, it may be assumed that the dose commitment to the MEMBER OF THE PUBLIC from other uranium fuel cycle sources is negligible, with the exception that dose contributions from other nuclear fuel cycle facilities at the same site or within a radius of 8 km must be considered. If the dose to any MEMBER OF THE PUBLIC is estimated to exceed the requirements of 40 CFR Part 190, the report with a request for a variance (provided the release conditions resulting in violation of 40 CFR Part 190 have not already been corrected), in accordance with the provisions of 40 CFR 190.11 and 10 CFR 20.2203(a)(4) and 20.2203(b), is considered to be a timely request and fulfills the requirements of 40 CFR Part 190 until NRC staff action is completed. The variance only relates to the limits of 40 CFR Part 190, and does not apply in any way to the other requirements for dose limitation of 10 CFR Part 20, as addressed in Controls 3.11.1.1 and 3.11.2.1. An individual is not considered a MEMBER OF THE PUBLIC during any period in which he/she is engaged in carrying out any operation that is part of the nuclear fuel cycle. Demonstration of compliance with the limits of 40 CFR Part 190 or with the design objectives of Appendix I to 10 CFR Part 50 will be considered to demonstrate compliance with the 0.1 rem limit of 10 CFR 20.1301. 12 16 16 12

BASES

3/4.12.1 MONITORING PROGRAM

The Radiological Environmental Monitoring Program required by this control provides representative measurements of radiation and of radioactive materials in those exposure pathways and for those radionuclides that lead to the highest potential radiation exposure of MEMBERS OF THE PUBLIC resulting from the plant operation. This monitoring program implements Section IV.B.2 of Appendix I to 10 CFR Part 50 and thereby supplements the Radiological Effluent Monitoring Program by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and the modeling of the environmental exposure pathways. Guidance for this monitoring program is provided by the Radiological Assessment Branch Technical Position on Environmental Monitoring, Revision 1, November 1979. The initially specified monitoring program will be effective for at least the first 3 years of commercial operation. Following this period, program changes may be initiated based on operational experience.

The required detection capabilities for environmental sample analyses are tabulated in terms of the lower limits of detection (LLDs). The LLDs required by Table 4.12-1 are considered optimum for routine environmental measurements in industrial laboratories. It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement.

Detailed discussion of the LLD, and other detection limits, can be found in Currie, L. A., "Lower Limit of Detection: Definition and Elaboration of a Proposed Position for Radiological Effluent and Environmental Measurements," NUREG/CR-4007 (September 1984), and in the HASL Procedures Manual, HASL-300.

3/4.12.2 LAND USE CENSUS

This control is provided to ensure that changes in the use of areas at or beyond the SITE BOUNDARY are identified and that modifications to the Radiological Environmental Monitoring Program are made if required by the results of this census. The best information from the door-to-door survey, from aerial survey or from consulting with local agricultural authorities shall be used. This census satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR Part 50. Restricting the census to gardens of greater than 50 m^2 provides assurance that significant exposure pathways via leafy vegetables will be identified and monitored since a garden of this size is the minimum required to produce the quantity (26 kg/year) of leafy vegetables assumed in Regulatory Guide 1.109 for consumption by a child. To determine this minimum garden size, the following assumptions were made: (1) 20% of the garden was used for growing broad leaf vegetation (i.e., similar to lettuce and cabbage), and (2) a vegetation yield of 2 kg/m^2. 12

3/4.12.3 INTERLABORATORY COMPARISON PROGRAM

The requirement for participation in an approved Interlaboratory Comparison Program is provided to ensure that independent checks on the precision and accuracy of the measurements of radioactive materials in environmental sample matrices are performed as part of the quality assurance program for environmental monitoring in order to demonstrate that the results are valid for the purposes of Section IV.B.2 of Appendix I to 10 CFR Part 50.

SECTION 5.0

DESIGN FEATURES

MAP DEFINING CONTROLLED AREAS, UNRESTRICTED AREAS AND SITE BOUNDARY FOR RADIOACTIVE GASEOUS AND LIQUID EFFLUENTS 8

5.1.3 Information regarding radioactive gaseous and liquid effluents, which allows identification of structures and release points as well as definition of CONTROLLED AREAS, UNRESTRICTED AREAS and the SITE BOUNDARY are shown in Figure 5.1-3.

The UNRESTRICTED AREA, as shown in Figure 5.1-3, is that area beyond the SITE BOUNDARY. Access to this area is not limited or controlled by the licensee. This is consistent with the definition of UNRESTRICTED AREA given in 10 CFR 20.1003. The SITE BOUNDARY coincides with the Exclusion (fenced) Area Boundary, as defined in 10 CFR 100.3(a). For calculations performed pursuant to 10 CFR 50.36a, the concept of UNRESTRICTED AREAS, established at or beyond the SITE BOUNDARY, is utilized in the Controls to keep levels of radioactive materials in liquid and gaseous effluents as low as is reasonably achievable. 12

The CONTROLLED AREA, as shown in Figure 5.1-3, is that area that is inside the SITE BOUNDARY but is outside of any plant areas defined by the licensee as restricted areas, per the definition of restricted area in 10 CFR 20.1003. Access to the CONTROLLED AREA is limited or controlled by the licensee. This is consistent with the definition of CONTROLLED AREA given in 10 CFR 20.1003. 8

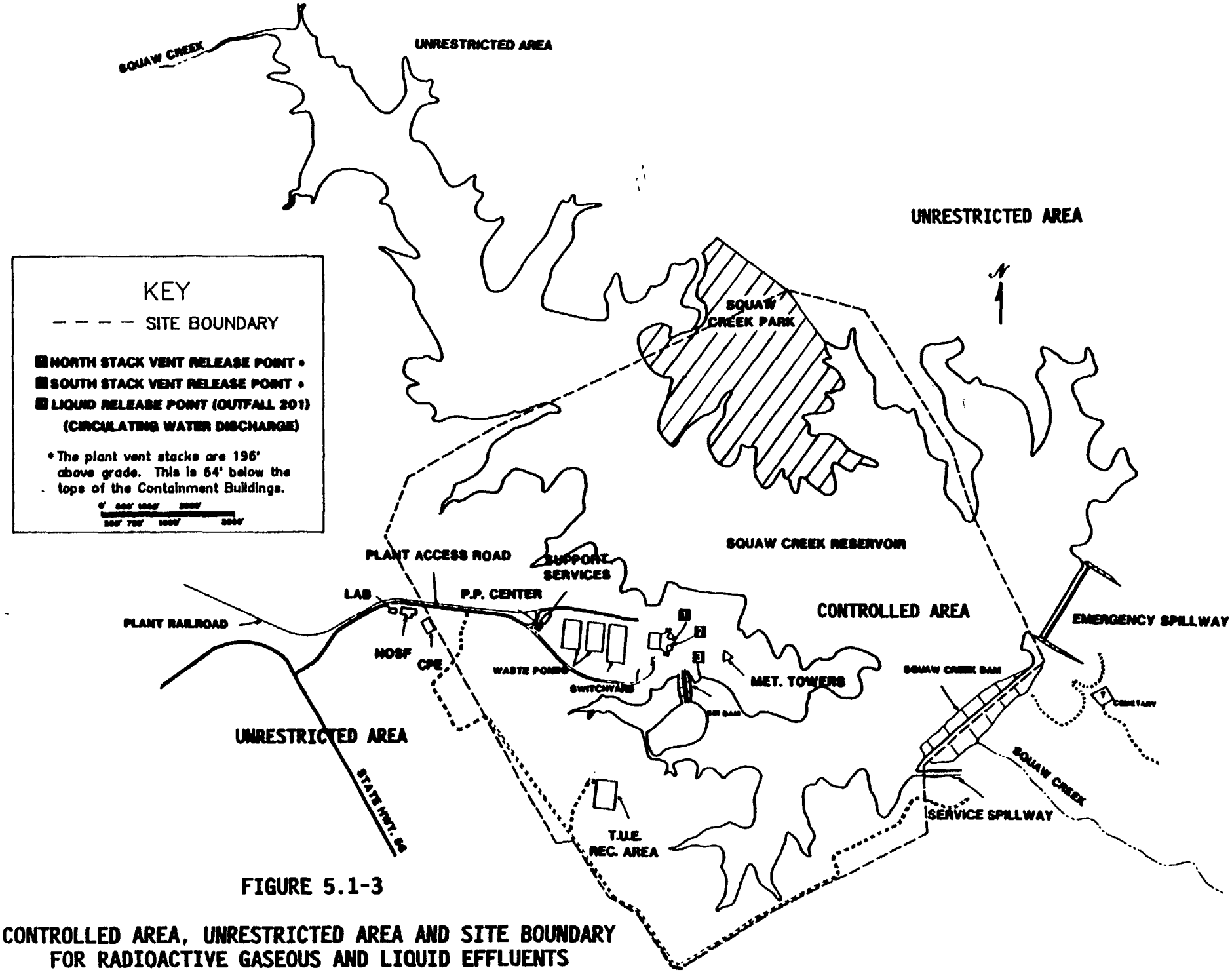


FIGURE 5.1-3

CONTROLLED AREA, UNRESTRICTED AREA AND SITE BOUNDARY FOR RADIOACTIVE GASEOUS AND LIQUID EFFLUENTS

SECTION 6.0

ADMINISTRATIVE CONTROLS

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT*

6.9.1.3 A Routine Annual Radiological Environmental Operating Report covering the operation of the units during the previous calendar year shall be submitted prior to May 1 of each year. | 8

The Annual Radiological Environmental Operating Report shall include summaries, interpretations, and an analysis of trends of the results of the radiological environmental surveillance activities for the report period, including a comparison with preoperational studies and with operational controls, as appropriate, and with previous environmental surveillance reports, and an assessment of the observed impacts of the plant operation on the environment. The report shall also include the results of the annual Land Use Census required by Control 3.12.2. | 12

The Annual Radiological Environmental Operating Report shall include the results of analysis of all radiological environmental samples and of all environmental radiation measurements taken during the period pursuant to the locations listed and maintained current in the results of the annual Land Use Census, as well as summarized and tabulated results of these analyses and measurements in the format of the table in the Radiological Assessment Branch Technical Position, Revision 1, November 1979. In the event that some individual results are not available for inclusion with the report, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted as soon as possible in a supplementary report. | 12

The Annual Radiological Environmental Operating Report shall also include the following: a summary description of the Radiological Environmental Monitoring Program; at least two legible maps** covering all sampling locations keyed to a table giving distances and directions from the centerline of one reactor; the results of participation in the Interlaboratory Comparison Program and the corrective action taken if the specified program is not being performed as required by Control 3.12.3; reasons for not conducting the Radiological Environmental Monitoring Program as required by Control 3.12.1, and discussion of all deviations from the sampling schedule of Table 3.12-1; discussion of environmental sample measurements that exceed the reporting levels of Table 3.12-1; and discussion of all analyses in which the LLD required by Table 4.12-1 was not achievable. | 12

---

* A single submittal may be made for both units. | 8

** One map shall cover stations near the SITE BOUNDARY; a second shall include the more distant stations. Maps are included in the results of the annual Land Use Census. | 12

RADIOACTIVE EFFLUENT RELEASE REPORT* | 16

6.9.1.4 A routine Radioactive Effluent Release Report covering the operation of the units during the previous year of operation shall be submitted prior to May 1 of each year. The period of the first report shall begin with the date of initial criticality. | 16

The Radioactive Effluent Release Report shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit as outlined in Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants," Revision 1, June 1974, with data summarized on a quarterly basis following the format of Appendix B thereof. For solid wastes, the format for Table 3 in Appendix B shall be supplemented with three additional categories: class of solid wastes (as defined by 10 CFR Part 61), type of container (e.g., LSA, Type A, Type B, Large Quantity) and SOLIDIFICATION agent or absorbent (e.g., cement, urea formaldehyde). | 16

The Radioactive Effluent Release Report shall include an annual summary of hourly meteorological data collected over the previous year. This annual summary may be either in the form of an hour-by-hour listing on magnetic tape of wind speed, wind direction, atmospheric stability, and precipitation (if measured), or in the form of joint frequency distributions of wind speed, wind direction, and atmospheric stability.** This same report shall include an assessment of the radiation doses due to the radioactive liquid and gaseous effluents released from the unit or station during the previous calendar year. This same report shall also include an assessment of the radiation doses from radioactive liquid and gaseous effluents to MEMBERS OF THE PUBLIC due to their activities inside the SITE BOUNDARY (Figure 5.1-3) during the report period. All assumptions used in making these assessments, i.e., specific activity, exposure time, and location, shall be included in these reports. Historical average meteorological conditions or the meteorological conditions concurrent with the time of release of radioactive materials in gaseous effluents, as determined by sampling frequency and measurement, shall be used for determining the gaseous pathway doses. The assessment of radiation doses shall be performed in accordance with the methodology and parameters in Part II of the OFFSITE DOSE CALCULATION MANUAL (ODCM). | 16 | 8

* A single submittal may be made for both units. The submittal should combine those sections that are common to both units at the station. | 12

** In lieu of submission with the Radioactive Effluent Release Report, the licensee has the option of retaining this summary of required meteorological data on site in a file that shall be provided to the NRC upon request. | 16

RADIOACTIVE EFFLUENT RELEASE REPORT (Continued) | 16

The Radioactive Effluent Release Report shall also include an assessment of radiation doses to the likely most exposed MEMBER OF THE PUBLIC from reactor releases and other nearby uranium fuel cycle sources, including doses from primary effluent pathways and direct radiation, for the previous calendar year to show conformance with 40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operation." Acceptable methods for calculating the dose contribution from liquid and gaseous effluents are given in Regulatory Guide 1.109, Rev. 8, October 1977. | 16

The Radioactive Effluent Release Report shall include a list and description of unplanned releases, from the site to CONTROLLED AREAS and UNRESTRICTED AREAS, of radioactive materials in gaseous and liquid effluents made during the reporting period. | 16

The Radioactive Effluent Release Report shall include a listing of new locations for dose calculations and/or environmental monitoring identified by the Land Use Census pursuant to Control 3.12.2. | 16

The Radioactive Effluent Release Report shall also include the following: an explanation as to why the inoperability of liquid or gaseous effluent monitoring instrumentation was not corrected within the time specified in Controls 3.3.3.4 or 3.3.3.5, respectively; and a description of the events leading to liquid holdup tanks or gas storage tanks exceeding the Technical Specification limits. | 16

6.14 OFFSITE DOSE CALCULATION MANUAL (ODCM)

Changes to the ODCM:

a. Shall be documented and records of reviews performed shall be retained as required by FSAR Section 17.2.17.1.3. This documentation shall contain: | 16

   1) Sufficient information to support the change together with the appropriate analyses or evaluations justifying the change(s) and

   2) A determination that the change will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR Part 50 and not adversely impact the accuracy or reliability of effluent, dose, or setpoint calculations. | 8

b. Shall become effective after review and acceptance by the SORC and the approval of the Vice President of Nuclear Operations. | 19

6.14 OFFSITE DOSE CALCULATION MANUAL (ODCM) (Continued)

c. Shall be submitted to the Commission in the form of a complete, legible copy of the entire ODCM as a part of or concurrent with the Radioactive Effluent Release Report for the period of the report in which any change to the ODCM was made. Each change shall be identified by markings in the margin of the affected pages, clearly indicating the area of the page that was changed, and shall indicate the date (e.g., month/year) the change was implemented. 16