



TXU Energy
Comanche Peak Steam
Electric Station
P.O. Box 1002 (E01)
Glen Rose, TX 76043
Tel: 254 897 5209
Fax: 254 897 6652
mike.blevins@txu.com

Mike Blevins
Senior Vice President & Principal Nuclear Officer

CPSES-200401137
log # TXX-04077
RP-09

Ref. # 10CFR50.36a(a)(2)

April 21, 2004

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

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)
DOCKET NOS. 50-445 AND 50-446
TRANSMITTAL OF YEAR 2003 RADIOACTIVE EFFLUENT
RELEASE REPORT

Gentlemen:

In accordance with Section 5.6.3 of the CPSES Unit 1 and 2 Technical Specifications (Appendix A to License Nos. NPF-87 and NPF-89) and Section 6.9.1.4 of the CPSES Offsite Dose Calculation Manual (ODCM), enclosed is the Radioactive Effluent Release Report which covers the reporting period from January 1, 2003 through December 31, 2003.

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

During this reporting period there were no changes to the CPSES ODCM.

A member of the **STARS** (Strategic Teaming and Resource Sharing) Alliance

Callaway • Comanche Peak • Diablo Canyon • Palo Verde • South Texas Project • Wolf Creek

JE48

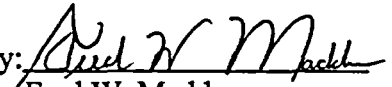
TXX-04077
Page 2 of 2

This communication contains no new licensing basis commitments regarding CPSES
Units 1 and 2.

Sincerely,

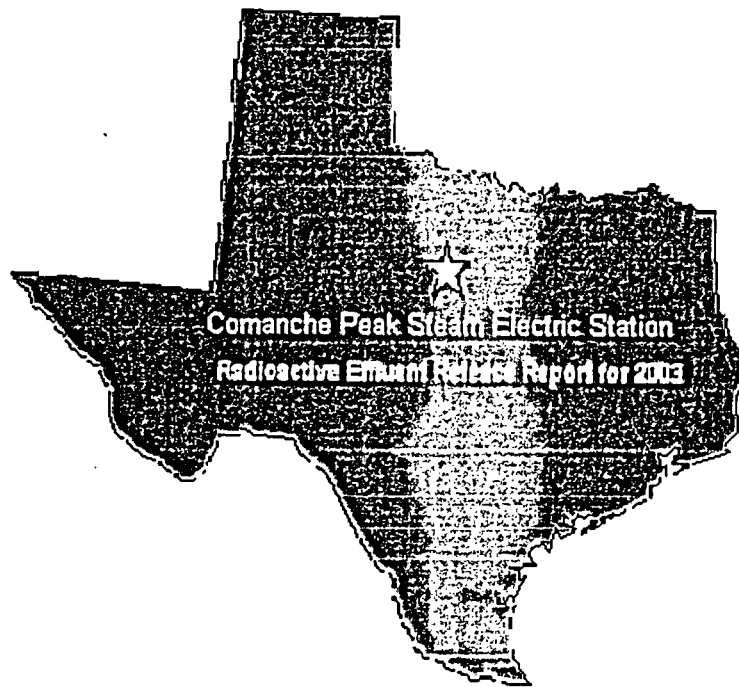
TXU Generation Company LP
By: TXU Generation Management Company LLC,
Its General Partner

Mike Blevins

By: 
Fred W. Madden
Regulatory Affairs Manager

CLW/clw
Enclosure

c - B. S. Mallett, Region IV w/encl.
W. D. Johnson, Region IV (clo)
M. C. Thadani, NRR (clo)
Resident Inspectors, CPSES w/encl.



COMANCHE PEAK STEAM ELECTRIC STATION

UNITS 1 AND 2

RADIOACTIVE EFFLUENT
RELEASE REPORT

January 1, 2003 - December 31, 2003

Prepared By: E. T. Floyd
E. T. Floyd
Radiation Protection Technician

Date: 17 Apr 2004

Reviewed By: Ruben F. Garcia
Ruben F. Garcia
Radiation Protection Supervisor

Date: 19 - Apr. 2004

Approved By: J. R. Curtis
J. R. Curtis
Radiation Protection Manager

Date: 4/19/04

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 or Unplanned 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 -2003
- 7.2 Abnormal Batch Liquid and Gaseous Release Summary -2003
- 7.3 Gaseous Effluents--Summation of All Releases -2003
- 7.4 Gaseous Effluents--Ground Level Releases -2003
- 7.5 Liquid Effluents--Summation of All Releases -2003
- 7.6 Liquid Effluents -2003
- 7.7 Doses From Liquid Effluents -2003
- 7.8 Doses From Gaseous Effluents -2003; Noble Gas Air Dose
- 7.9 Doses From Gaseous Effluents -2003; Site Iodines, Particulates and Tritium Dose, Adult Age Group
- 7.10 Doses From Gaseous Effluents -2003; Site Iodines, Particulates and Tritium Dose, Teen Age Group
- 7.11 Doses From Gaseous Effluents -2003; Site Iodines, Particulates and Tritium Dose, Child Age Group
- 7.12 Doses From Gaseous Effluents -2003; Site Iodines, Particulates and Tritium Dose, Infant Age Group
- 7.13 Solid Waste and Irradiated Fuel Shipments -2003

8.0 ATTACHMENTS

- 8.1 Joint Frequency Tables for 2003

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, 2003, through December 31, 2003.

1.1 Executive Summary

The radioactive effluent monitoring program for the year 2003 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 2003 produced the following results:

- The total gaseous tritium activity released from the site for 2003 was 49.1 Curies which is a decrease from the 57.1 Curies in 2002. 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 2003 was 1.48 Curies. This was a return to normal values after the significant increase experienced in 2002. During 2002, fission and activation activity released was 228 Curies due to the fuel defects of the Unit 1 core and relief valve testing that took place in conjunction with the earlier than expected refueling shutdown of Unit 1 due to the primary to secondary leakage from the steam generator.
- The total gaseous particulate activity released for 2003 was 0.00 Curies. This value has returned to normal from the 1.14E-05 Curies released in 2002 due to a single Chemistry stack sample that detected the presence of Co-58.
- The gross alpha released has continued at 0.0 Curies for 2003 matching the performance of the previous seven years. The iodine released was also 0.00 Curies for 2003.

- The calculated gamma air dose from the site due to noble gases released during 2003 is $9.09\text{E-}04$ mrad. This is a decrease from 2002 which calculated out as $9.40\text{E-}03$ mrad; the 2003 value represents only 0.005% of the annual limit for each reactor unit.
- The calculated beta air dose from the site due to noble gases released during 2003 is $3.99\text{E-}04$ mrad which is a decrease from 2002 which calculated out as $2.63\text{E-}02$ mrad; however, this represents only 0.001% of the annual limit. This decrease is a return to normal values due to good fuel integrity and no detectable primary to secondary leakage from the steam generators.
- 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 2003 calculated out to be 0.047 mrem. This value is a decrease from the 2002 whole body dose of 0.055 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 2003 produced the following results:

- The total number of Curies of radioactive nuclides released from the site in liquid effluents in 2003 was 1430.07 Curies, up from 1390.52 Curies in 2002.
- Of the total Curies released from the site, tritium accounted for 1430.0 Curies while all other nuclides released accounted for only 0.07 Curies. The total curies of tritium released is up from the 2002 total of 1390.0 Curies. Tritium production is dependent on fuel type, power production and core power history.
- The total whole body dose from the site due to liquid effluents calculated out at $9.37\text{E-}02$ mrem which is only 1.56% 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 2003 averaged 11,475 pCi/l which is statistically constant from 2002 which averaged 11,400 pCi/l.
- The 2003 average SCR tritium concentration of 11,475 pCi/l is 38.25% of the reporting limit of 30,000 pCi/l.

The CPSES meteorological system achieved a 97.8% 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 except for 60-meter wind direction which only achieved an 85% recovery rate for 2003.

There are two ODCM noncompliance related issues discussed in this annual report. The first issue is a deviation from the ODCM Bases dealing with the calibration frequency and certification of wind direction meteorological sensors. The second issue involved a loss of a monthly liquid composite sample for the 4th 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 2003 there were no Technical Specification/ODCM effluent radiation monitors out of service for >30 days.

There was no revision to the ODCM approved or implemented in 2003.

For 2003, the total volume of solid radwaste buried was 18.7 cubic meters and the total radioactivity buried was 255 curies. The majority of the buried solid waste volume comes from dry active waste at 16.5 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.

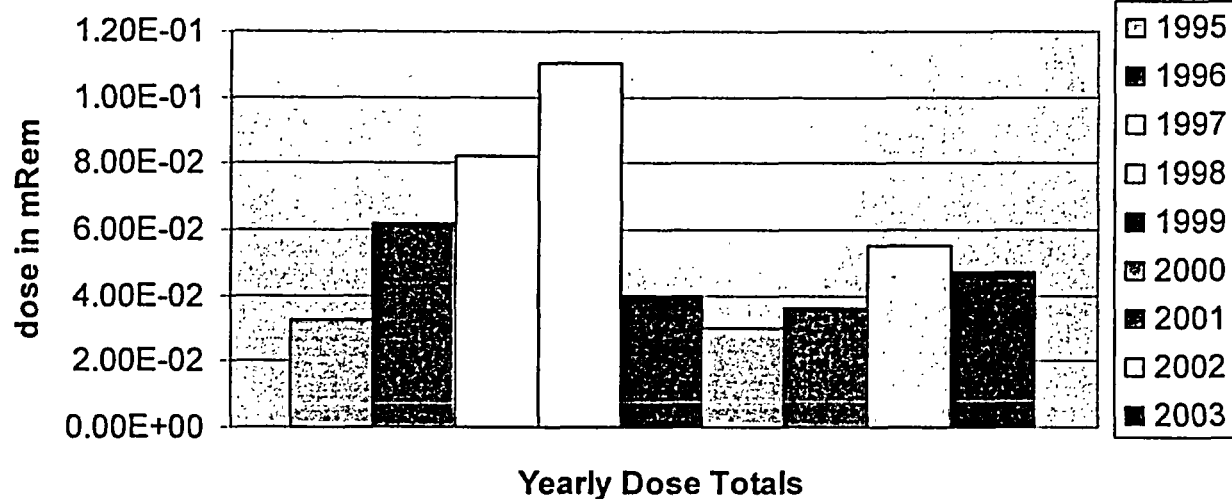
- Changes to the ODCM in the form of a complete, legible copy of the entire ODCM.
- A listing of new locations for dose calculations and/or environmental monitoring identified by the Land Use Census.
- A description of the events leading to liquid holdup tanks or gas storage tanks exceeding Technical 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 2003.
- 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

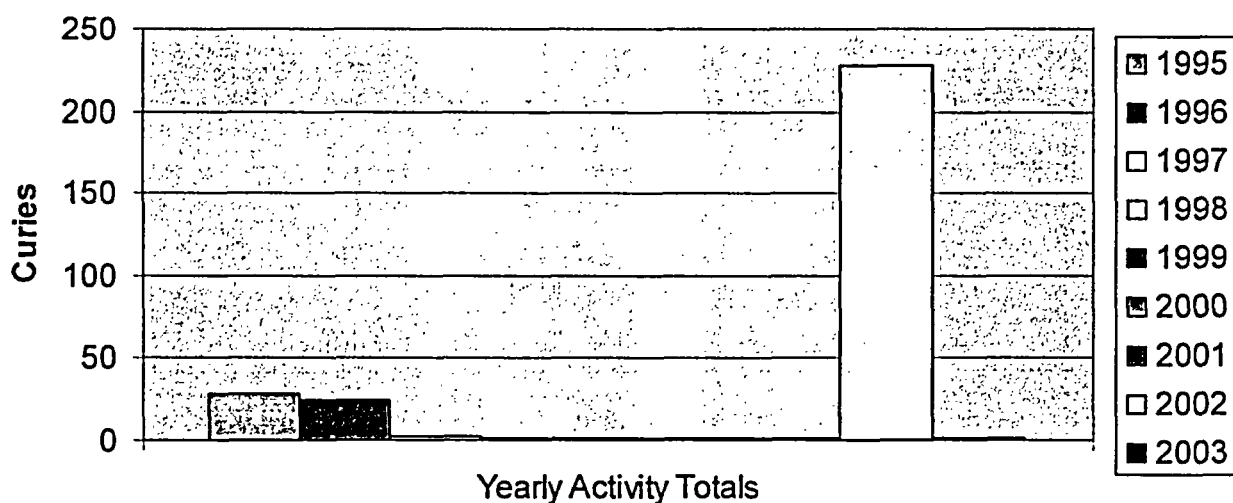
- Total Whole Body Dose due to Gaseous Activity Released from CPSES
- Total Gaseous Fission and Activation Activity Released from CPSES
- Total Gaseous Tritium Activity Released from CPSES

- 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

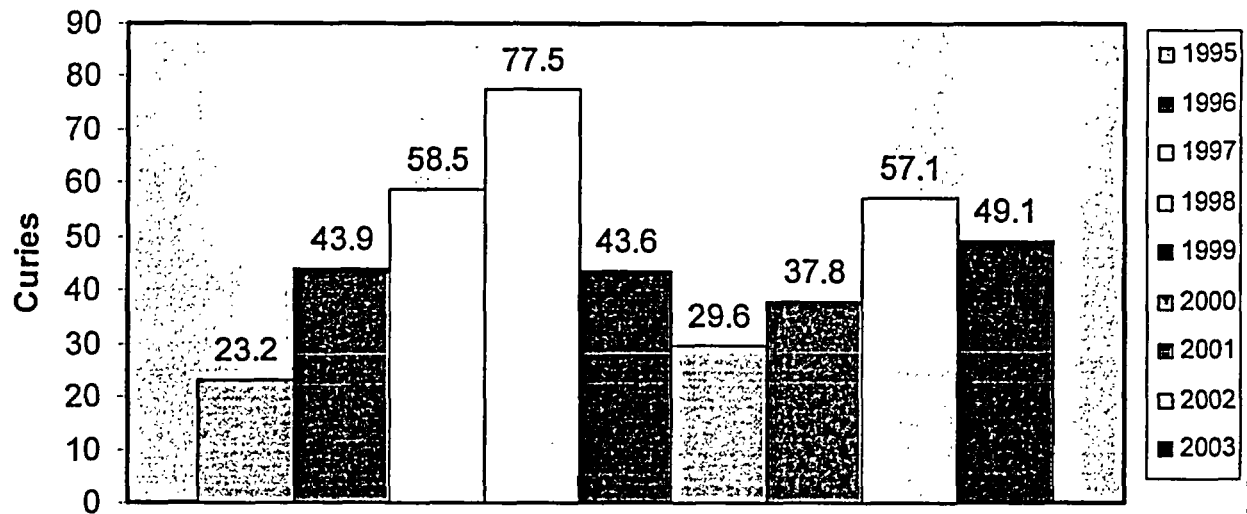
Total Whole Body Dose due to Gaseous Activity Released from CPSES



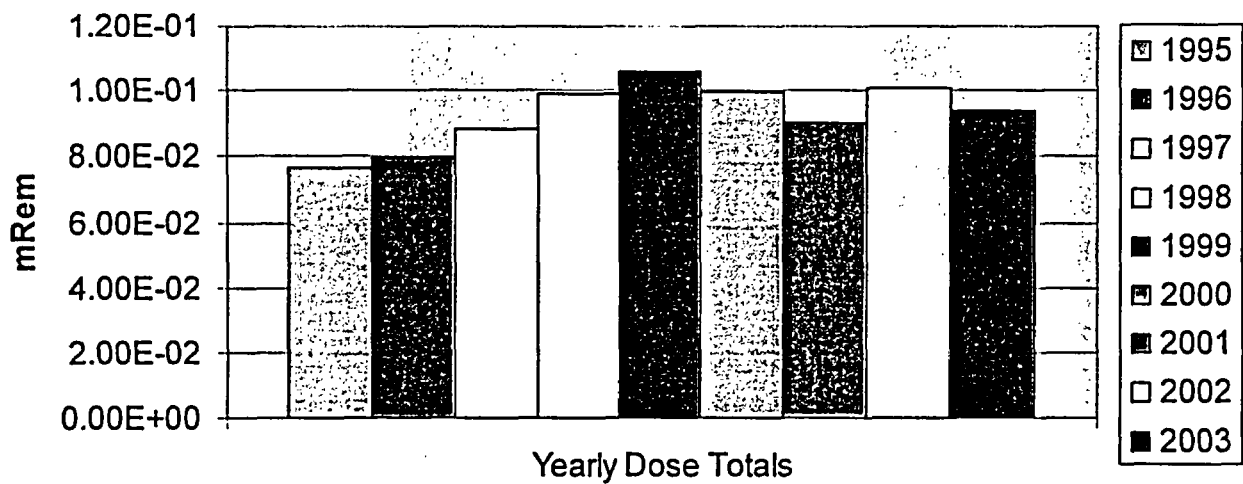
Total Gaseous Fission and Activation Activity Released from CPSES



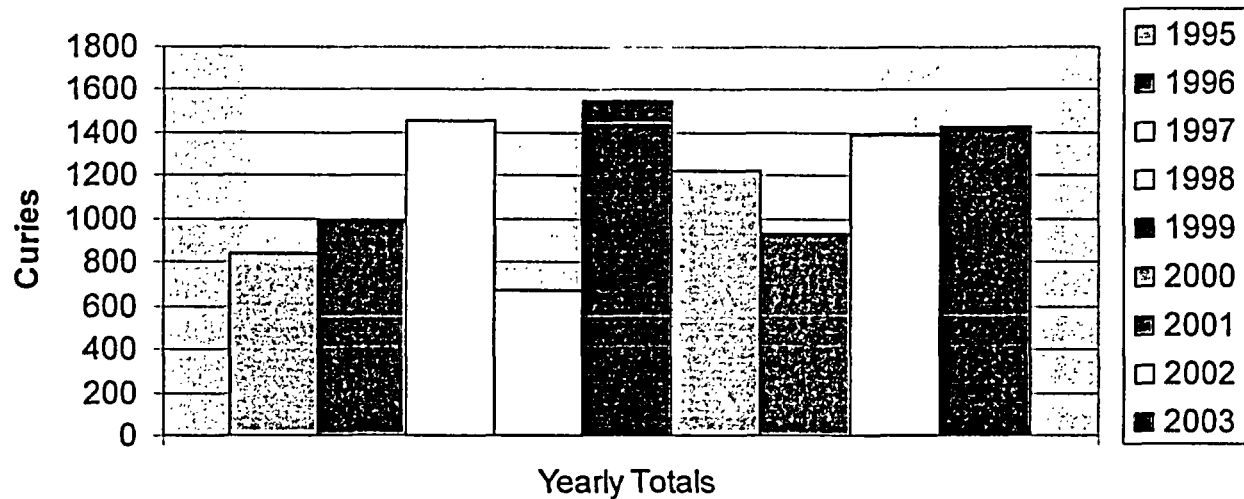
Total Gaseous Tritium Activity Released from CPSES



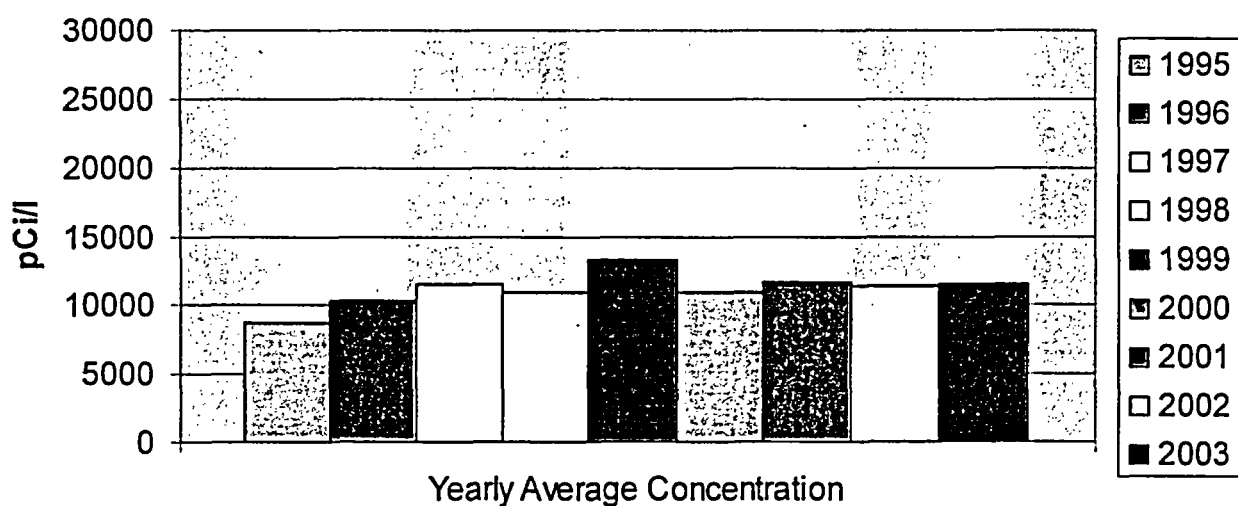
Total Whole Body Dose Due to Liquid Effluents Released from CPSES



Total Curies of Tritium Released in Liquid Effluents from CPSES



Squaw Creek Reservoir Average Tritium Concentration



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 $2.0\text{E-}4$ $\mu\text{Ci/ml}$ total activity.

The dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released, from each unit, to unrestricted areas shall be limited:

- a. During any calendar quarter to less than or equal to 1.5 mrem to the whole body and to less than or equal to 5 mrem to any organ, and
- b. During any calendar year to less than or equal to 3 mrem to the whole body and to less than or equal to 10 mrem to any organ.

2.1.4 LVW Pond Resin Inventory

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

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

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

A_j = pond inventory limit for a single radionuclide j (Curies),

C_j = 10CFR20, Appendix B, Table 2 Column 2, concentration for a single radionuclide j ($\mu\text{Ci/ml}$),

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

264 = conversion factor ($\mu\text{Ci/Ci}$ per ml/gal)

2.1.5 Total Dose

The annual (calendar year) dose or dose commitment to any MEMBER OF THE PUBLIC due to releases of radioactivity and to radiation from uranium fuel cycle sources shall be limited to less than or equal to 25 mrem to the whole body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mrem.

2.2 Effluent Concentration Limits

2.2.1 Gaseous Effluents

For gaseous effluents, effluent concentration limits (ECL) values are not directly used in release rate calculations since the applicable limits are expressed in terms of dose rate at the site boundary.

2.2.2 Liquid Effluents

The values specified in 10 CFR Part 20, Appendix B, Table 2, Column 2 are used as the ECL for liquid radioactive effluents released to unrestricted areas.

A value of $2.0\text{E-}04$ $\mu\text{Ci/ml}$ 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. The results of the composite analyses from the previous month or quarter were used to estimate the quantities

of these radionuclides in liquid effluents during the current month or quarter. The total radioactivity in liquid effluent releases was determined from the measured and estimated concentrations of each radionuclide present and the total volume of the effluent released during periods of discharge.

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

For continuous releases to the Circulating Water Discharge from the LVW pond, daily grab samples were obtained over the period of pond discharge. These samples were composited and analyzed for gamma emitting radionuclides, using gamma spectroscopy techniques. Composite samples were also analyzed for tritium and gross alpha radioactivity using liquid scintillation and gas flow proportional counting techniques, respectively. Composite samples were analyzed quarterly for Sr-89, Sr-90 and Fe-55 by a contract laboratory.

2.3.2 Gaseous Radioactive Effluents

Each gaseous batch release was sampled and analyzed for radioactivity prior to release. For releases from Waste Gas Decay Tanks, noble gas grab samples were analyzed for gamma emitting radionuclides using gamma spectroscopy. For releases from the Containment Building, samples were taken using charcoal and particulate filters, in addition to noble gas and tritium grab samples, and analyzed for gamma emitting radionuclides prior to each release 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 a contract laboratory.

2.4 Batch Releases

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

2.5 Abnormal or Unplanned Releases

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

No abnormal 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

During the period covered by this report, there was no revision to the ODCM approved or implemented.

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 2003 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 2003 Land Use Census.

6.4 Liquid Holdup and Gas Storage Tanks

ODCM Administrative Control 6.9.1.4 requires a description of the events leading to liquid holdup or gas storage tanks exceeding the limits required to be established by Technical Specification 5.5.12. Technical Requirements Manual 13.10.33 limits the quantity of radioactive material contained in each unprotected outdoor tank to less than or equal to ten curies, excluding tritium and dissolved or entrained noble gases. Technical Requirements Manual 13.10.32 limits the quantity of radioactive material contained in each gas storage tank to less than or equal to 200,000 curies of noble gases (considered as Xe-133 equivalent). These limits were not exceeded during the period covered by this report.

6.5 Noncompliance with Radiological Effluent Control Requirements

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

6.5.1 Abnormal or Unplanned Gaseous and Liquid Releases

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

6.5.2 Wind direction sensor calibration

During performance of a surveillance work order, a wind direction sensor was installed in the field that was outside the calibration cycle allowed by the ODCM Bases 3/4.3.3.6. The Bases states "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."

The wind direction sensor was calibrated by the vendor on 01-10-2000 and placed in service on the back-up tower 10-meter wind direction loop(X-Z-4126) on 03-04-2003, approximately 14 months beyond the acceptable criteria.

On 04-10-2003 the wind direction sensor was replaced with a properly calibrated wind direction sensor. There was no operability problem with the wind direction portion of the meteorological system since the minimum number of operable channels was maintained.

Corrective actions taken included finding generic issues with wind speed sensors and changing storage and inventory requirements for both wind direction and wind speed sensors. Six I&C procedures were revised to add the requirement to verify the calibration date prior to sensor installation and ensure the sensor has at least 12 months of service life available before installation. Shelf life will be documented on in-storage sensors and calibration data will be vaulted as permanent records.

Complete documentation of this issue is maintained on-site in Smart Form 2003-000904 if further details are required.

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 fourth quarter composite was being compiled for shipment when it was discovered that the October monthly sample could not be found. The fourth quarter composite would not be available based on the normal method of compiling equal volumes of the three monthly samples. A similar event occurred in 2002 (SMF-2002-003448) and corrective actions from that event and this event are explained below

In order to provide data, the quarterly sample was composited of only November and December saved samples and shipped for analysis. The returned analytical data was consistent with expected values. The Strontium 89 - 90 values were less than LLD and the Iron 55 was $4.01e-07$ uCi/ml.

The following corrective actions were taken by Chemistry. These actions created a 'composite sample storage area' in a cabinet in the Hot Lab and the Secondary Lab. Procedures were changed to better control the composite samples through the Chemistry Supervisors. Unique red labels were created for composite samples and procedure changes require approval of a supervisor to discard any composite sample. The Surveillance Work Orders are being changed to require independent signatures for the saved samples to ensure they are placed into storage. These actions should ensure samples are not lost in the future. (Smart Form 2004-000060)

6.6 Resin Releases to the LVW Pond

A total of 476 ft^3 of resin was transferred to the LVW pond during the period covered by this report. The results of the

sample analyses indicate 0.35uCi of radioactive Cs-134 and Cs-137 was transferred to the pond, well within the limits described in Section 2.1.4.

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 2003, 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 2003 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 $1.27\text{E-}4$ 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.

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

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

SECTION 7.0

TABLES

Table 7.1

BATCH LIQUID AND GASEOUS RELEASE SUMMARY - 2003

	<u>Quarter 1</u>	<u>Quarter 2</u>	<u>Quarter 3</u>	<u>Quarter 4</u>
<u>A. Liquid Releases All Sources</u>				
Number of Batch Releases	6.00E+00	1.30E+01	1.80E+01	1.70E+01
Total Time Period for Batch Releases (min)	1.77E+03	3.92E+03	5.39E+03	5.14E+03
Maximum Time Period for a Batch Release (min)	3.45E+02	3.45E+02	3.60E+02	3.90E+02
Average Time Period for a Batch Release (min)	2.95E+02	3.01E+02	2.99E+02	3.03E+02
Minimum Time Period for a Batch Release (min)	2.54E+02	2.47E+02	1.20E+02	1.49E+02
Average Stream Flow During Periods of Release (ft ³ /s)	N/A	N/A	N/A	N/A
<u>B. Gaseous Releases All Sources</u>				
Number of Batch Releases	4.60E+01	4.90E+01	4.50E+01	4.50E+01
Total Time Period for Batch Releases (min)	1.75E+04	1.84E+04	1.69E+04	1.91E+04
Maximum Time Period for a Batch Release (min)	4.95E+02	4.69E+02	7.20E+02	1.48E+03
Average Time Period for a Batch Release (min)	3.80E+02	3.76E+02	3.76E+02	4.24E+02
Minimum Time Period for a Batch Release (min)	2.78E+02	2.50E+02	2.40E+02	1.51E+02

TABLE 7.2

ABNORMAL BATCH LIQUID AND GASEOUS RELEASE SUMMARY - 2003

	<u>Quarter 1</u>	<u>Quarter 2</u>	<u>Quarter 3</u>	<u>Quarter 4</u>
A. <u>Liquids</u>				
Number of Releases	0	0	0	0
Total Activity Released, Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B. <u>Gases</u>				
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 - 2003

Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Est.Total Error, %
-------	--------------	--------------	--------------	--------------	-----------------------

A. Fission and Activation Gases

1. Total release (site)	ci	2.98E-01	2.37E-01	2.68E-01	6.77E-01	2.35E+01
2. Average release rate for period (site)	μCi/sec	3.83E-02	3.02E-02	3.37E-02	8.52E-02	
3. Percent of ODCM REC limit (Dose Rate 500 mrem/yr/site)	%	6.11E-05	5.29E-05	5.08E-05	7.64E-05	
4. Percent of ODCM REC limit (Skin Dose Rate 3000 mrem/yr/site)	%	4.49E-05	4.23E-05	4.01E-05	4.63E-05	

B. Iodines

1. Total Iodine-131 (site)	ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E+01
2. Average release rate for period (site)	μCi/sec	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
3. Percent of ODCM REC limit (Organ Dose Rate 1500 mrem/yr/site)	%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	

C. Particulates

1. Particulates with half lives > 8 days (site)	ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.13E+01
2. Average release rate for period (site)	μCi/sec	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
3. Percent of ODCM REC limit (Organ Dose Rate 1500 mrem/yr/site)	%	0.00E+00	0.00E+00	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	1.00E+01	1.33E+01	1.26E+01	1.32E+01	2.38E+01
2. Average release rate for period (site)	μCi/sec	1.29E+00	1.69E+00	1.59E+00	1.66E+00	
3. Percent of ODCM REC limit (Organ Dose 7.5 mrem/qtr/unit)	%	6.40E-02	8.50E-02	8.10E-02	8.45E-02	

TABLE 7.4

GASEOUS EFFLUENTS--GROUND LEVEL RELEASES--2003Continuous Mode

Nuclides Released from the site	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
------------------------------------	-------	--------------	--------------	--------------	--------------

A. Fission and Activation Gases

None	ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
None	ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
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. 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-Half-life \geq 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	9.98E+00	1.32E+01	1.26E+01	1.31E+01
Total for period	ci	9.98E+00	1.32E+01	1.26E+01	1.31E+01

TABLE 7.4 (con't.)

GASEOUS EFFLUENTS--GROUND LEVEL RELEASES--2003Batch Mode

Nuclides Released from the site	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
------------------------------------	-------	--------------	--------------	--------------	--------------

A. Fission and Activation Gases

Ar-41	ci	2.40E-01	2.34E-01	2.22E-01	2.05E-01
Kr-85	ci	5.45E-02	0.00E+00	0.00E+00	6.88E-02
Kr-85M	ci	0.00E+00	0.00E+00	0.00E+00	1.24E-04
Kr-87	ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-88	ci	0.00E+00	0.00E+00	0.00E+00	7.89E-06
Xe-131M	ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-133	ci	3.48E-03	3.35E-03	4.63E-02	3.05E-01
Xe-133M	ci	0.00E+00	0.00E+00	0.00E+00	1.91E-04
Xe-135	ci	6.87E-05	0.00E+00	0.00E+00	9.82E-02
Xe-135M	ci	0.00E+00	0.00E+00	0.00E+00	3.07E-05
Xe-138	ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for period	ci	2.98E-01	2.37E-01	2.68E-01	6.77E-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-Half-life \geq 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	2.34E-02	4.39E-02	3.52E-02	7.01E-02
Total for period	ci	2.34E-02	4.39E-02	3.52E-02	7.01E-02

TABLE 7.5
LIQUID EFFLUENTS--SUMMATION OF ALL RELEASES - 2003

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	4.03E-02	3.72E-02	2.93E-02	9.34E-03	3.03E+01
2. Average diluted concentration during period (site)	µCi/ml	8.12E-09	3.09E-09	1.45E-09	5.18E-10	
3. Percent of ODCM REC limit (Σ diluted conc/10*ECL)	%	3.06E-03	2.08E-03	1.47E-03	3.65E-04	

B. Tritium

1. Total release (site)	Ci	5.28E+01	3.83E+02	7.64E+02	2.27E+02	1.34E+01
2. Average diluted concentration during period (site)	µCi/ml	1.06E-05	3.18E-05	3.78E-05	1.26E-05	
3. Percent of ODCM REC limit (diluted conc/1E-02 µCi/ml)	%	1.06E-01	3.18E-01	3.78E-01	1.26E-01	

C. Dissolved and Entrained Gases

1. Total release (site)	Ci	0.00E+00	2.66E-04	5.97E-04	4.12E-04	1.16E+01
2. Average diluted concentration during period (site)	µCi/ml	0.00E+00	2.21E-11	2.96E-11	2.28E-11	
3. Percent of ODCM REC limit (diluted conc/2.0E-04 µCi/ml)	%	0.00E+00	1.11E-05	1.48E-05	1.14E-05	

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	3.89E+05	8.86E+05	1.22E+06	1.15E+06	2.20E+00
--------------------------------------------------------	--------	----------	----------	----------	----------	----------

F. Volume dilution of water used during period (Note 1)(site)	Liters	4.97E+09	1.21E+10	2.02E+10	1.80E+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 effluent releases occurring is not included.

TABLE 7.6

LIQUID EFFLUENTS--2003Continuous 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--2003Batch Mode

Nuclides Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
-------------------	-------	-----------	-----------	-----------	-----------

A. Fission and Activation Products

Br-82	Ci	0.00E+00	0.00E+00	7.22E-04	0.00E+00
Co-57	Ci	5.86E-05	4.00E-05	5.33E-05	2.89E-06
Co-58	Ci	3.49E-03	2.09E-03	1.36E-03	6.48E-04
Co-60	Ci	2.66E-03	4.50E-03	4.74E-03	7.21E-04
Cr-51	Ci	3.86E-04	3.95E-04	5.66E-04	4.13E-04
Fe-55	Ci	2.90E-02	1.47E-02	2.80E-03	1.75E-03
Fe-59	Ci	5.86E-06	0.00E+00	0.00E+00	2.02E-05
Hf-181	Ci	0.00E+00	3.17E-06	0.00E+00	0.00E+00
In-113M	Ci	2.82E-05	0.00E+00	0.00E+00	0.00E+00
Mn-54	Ci	3.70E-04	4.61E-04	4.34E-04	1.44E-04
Mn-56	Ci	0.00E+00	3.28E-06	0.00E+00	0.00E+00
Nb-95	Ci	5.11E-04	2.20E-04	1.32E-04	4.35E-05
Sb-124	Ci	5.28E-05	2.24E-03	4.31E-03	2.40E-04
Sb-125	Ci	3.46E-03	1.24E-02	1.41E-02	5.31E-03
Sn-113	Ci	2.39E-05	2.94E-06	0.00E+00	0.00E+00
Zr-95	Ci	3.08E-04	1.21E-04	5.66E-05	3.26E-05
Total for Period	Ci	4.04E-02	3.72E-02	2.93E-02	9.33E-03

B. Tritium

H-3	Ci	5.28E+01	3.83E+02	7.64E+02	2.27E+02
Total for period	Ci	5.28E+01	3.83E+02	7.64E+02	2.27E+02

C. Dissolved and Entrained Gases

Xe-133	Ci	0.00E+00	2.66E-04	5.90E-04	4.12E-04
Xe-135	Ci	0.00E+00	0.00E+00	7.36E-06	0.00E+00
Total for period	Ci	0.00E+00	2.66E-04	5.97E-04	4.12E-04

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 -2003 (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	1.15E-04	2.39E-02	2.39E-02	2.39E-02	2.39E-02	2.40E-02	2.86E-02
% Limit per unit	1.15E-03	2.39E-01	7.97E-01	2.39E-01	2.39E-01	2.40E-02	2.86E-01
Quarter 2	5.66E-05	2.42E-02	2.42E-02	2.42E-02	2.42E-02	2.45E-02	2.62E-02
% Limit per unit	5.66E-04	2.42E-01	8.07E-01	2.42E-01	2.42E-01	2.45E-01	2.62E-01
Quarter 3	1.22E-05	2.34E-02	2.34E-02	2.34E-02	2.34E-02	2.36E-02	2.44E-02
% Limit per unit	1.22E-04	2.34E-01	7.80E-01	2.34E-01	2.34E-01	2.36E-01	2.44E-01
Quarter 4	6.82E-06	2.22E-02	2.22E-02	2.22E-02	2.22E-02	2.23E-02	2.26E-02
% Limit per unit	6.82E-05	2.22E-01	7.40E-01	2.22E-01	2.22E-01	2.23E-01	2.26E-01
Total 2003	1.67E-04	9.38E-02	9.37E-02	9.36E-02	9.36E-02	9.45E-02	1.01E-01
% Limit per unit	8.35E-04	4.69E-01	1.56E+00	4.68E-01	4.68E-01	4.73E-01	5.05E-01

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

TABLE 7.8

DOSES FROM GASEOUS EFFLUENTS -2003

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	2.34E-04	9.39E-05
% Limit per unit	2.34E-03	4.69E-04
Quarter 2	2.28E-04	8.06E-05
% Limit per unit	2.28E-03	4.03E-04
Quarter 3	2.17E-04	8.12E-05
% Limit per unit	2.17E-03	4.06E-04
Quarter 4	2.30E-04	1.43E-04
% Limit per unit	2.30E-03	7.15E-04
Total 2003	9.09E-04	3.99E-04
% Limit per unit	4.55E-03	9.98E-04

TABLE 7.9
DOSES FROM GASEOUS EFFLUENTS -2003

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	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03	1.35E-03
% Limit per Unit	0.00E+00	4.25E-02	4.25E-02	4.25E-02	4.25E-02	4.25E-02	4.25E-02	9.00E-03
Qtr-2	0.00E+00	8.45E-03	8.45E-03	8.45E-03	8.45E-03	8.45E-03	8.45E-03	1.27E-03
% Limit per Unit	0.00E+00	5.63E-02	5.63E-02	5.63E-02	5.63E-02	5.63E-02	5.63E-02	8.47E-03
Qtr-3	0.00E+00	8.05E-03	8.05E-03	8.05E-03	8.05E-03	8.05E-03	8.05E-03	1.20E-03
% Limit per Unit	0.00E+00	5.37E-02	5.37E-02	5.37E-02	5.37E-02	5.37E-02	5.37E-02	8.00E-03
Qtr-4	0.00E+00	8.39E-03	8.39E-03	8.39E-03	8.39E-03	8.39E-03	8.39E-03	1.39E-03
% Limit per Unit	0.00E+00	5.59E-02	5.59E-02	5.59E-01	5.59E-02	5.59E-02	5.59E-02	9.27E-03
Total 2003	0.00E+00	3.13E-02	3.13E-02	3.13E-02	3.13E-02	3.13E-02	3.13E-02	5.21E-03
% Limit per Unit	0.00E+00	1.04E-01	1.04E-01	1.04E-01	1.04E-01	1.04E-01	1.04E-01	1.74E-02

TABLE 7.10

DOSES FROM GASEOUS EFFLUENTS -2003

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	6.98E-03	6.98E-03	6.98E-03	6.98E-03	6.98E-03	6.98E-03	1.35E-03
% Limit per Unit	0.00E+00	4.65E-02	4.65E-02	4.65E-02	4.65E-02	4.65E-02	4.65E-02	9.00E-03
Qtr-2	0.00E+00	9.25E-03	9.25E-03	9.25E-03	9.25E-03	9.25E-03	9.25E-03	1.27E-03
% Limit per Unit	0.00E+00	6.17E-02	6.17E-02	6.17E-02	6.17E-02	6.17E-02	6.17E-02	8.47E-03
Qtr-3	0.00E+00	8.82E-03	8.82E-03	8.82E-03	8.82E-03	8.82E-03	8.82E-03	1.20E-03
% Limit per Unit	0.00E+00	5.88E-02	5.88E-02	5.88E-02	5.88E-02	5.88E-02	5.88E-02	8.00E-03
Qtr-4	0.00E+00	9.19E-03	9.19E-03	9.19E-03	9.19E-03	9.19E-03	9.19E-03	1.39E-03
% Limit per Unit	0.00E+00	6.13E-02	6.13E-02	6.13E-02	6.13E-02	6.13E-02	6.13E-02	9.27E-03
Total 2003	0.00E+00	3.42E-02	3.42E-02	3.42E-02	3.42E-02	3.42E-02	3.42E-02	5.21E-03
% Limit per Unit	0.00E+00	1.14E-01	1.14E-01	1.14E-01	1.14E-01	1.14E-01	1.14E-01	1.74E-02

TABLE 7.11

DOSES FROM GASEOUS EFFLUENTS -2003

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	9.60E-03	9.60E-03	9.60E-03	9.60E-03	9.60E-03	9.60E-03	1.35E-03
% Limit per Unit	0.00E+00	6.40E-02	6.40E-02	6.40E-02	6.40E-02	6.40E-02	6.40E-02	9.00E-03
Qtr-2	0.00E+00	1.27E-02	1.27E-02	1.27E-02	1.27E-02	1.27E-02	1.27E-02	1.27E-03
% Limit per Unit	0.00E+00	8.47E-02	8.47E-02	8.47E-02	8.47E-02	8.47E-02	8.47E-02	8.47E-03
Qtr-3	0.00E+00	1.21E-02	1.21E-02	1.21E-02	1.21E-02	1.21E-02	1.21E-02	1.20E-03
% Limit per Unit	0.00E+00	8.07E-02	8.07E-02	8.07E-02	8.07E-02	8.07E-02	8.07E-02	8.00E-03
Qtr-4	0.00E+00	1.27E-02	1.27E-02	1.27E-02	1.27E-02	1.27E-02	1.27E-02	1.39E-03
% Limit per Unit	0.00E+00	8.47E-02	8.47E-02	8.47E-02	8.47E-02	8.47E-02	8.47E-02	9.27E-03
Total 2003	0.00E+00	4.71E-02	4.71E-02	4.71E-02	4.71E-02	4.71E-02	4.71E-02	5.21E-03
% Limit per Unit	0.00E+00	1.57E-01	1.57E-01	1.57E-01	1.57E-01	1.57E-01	1.57E-01	1.74E-02

TABLE 7.12

DOSES FROM GASEOUS EFFLUENTS -2003

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	4.19E-03	4.19E-03	4.19E-03	4.19E-03	4.19E-03	4.19E-03	1.35E-03
% Limit per Unit	0.00E+00	2.79E-02	2.79E-02	2.79E-02	2.79E-02	2.79E-02	2.79E-02	9.00E-03
Qtr-2	0.00E+00	5.55E-03	5.55E-03	5.55E-03	5.55E-03	5.55E-03	5.55E-03	1.27E-03
% Limit per Unit	0.00E+00	3.67E-02	3.67E-02	3.67E-02	3.67E-02	3.67E-02	3.67E-02	8.47E-03
Qtr-3	0.00E+00	5.29E-03	5.29E-03	5.29E-03	5.29E-03	5.29E-03	5.29E-03	1.20E-03
% Limit per Unit	0.00E+00	3.53E-02	3.53E-02	3.53E-02	3.53E-02	3.53E-02	3.53E-02	8.00E-03
Qtr-4	0.00E+00	5.52E-03	5.52E-03	5.52E-03	5.52E-03	5.52E-03	5.52E-03	1.39E-03
% Limit per Unit	0.00E+00	3.68E-02	3.68E-02	3.68E-02	3.68E-02	3.68E-02	3.68E-02	9.27E-03
Total 2003	0.00E+00	2.05E-02	2.05E-02	2.05E-01	2.05E-02	2.05E-02	2.05E-02	5.21E-03
% Limit per Unit	0.00E+00	6.83E-02	6.83E-02	6.83E-02	6.83E-02	6.83E-02	6.83E-02	1.74E-02

TABLE 7.13
SOLID RADWASTE AND IRRADIATED FUEL SHIPMENTS -2003

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

1. Type of Waste	Shipped m ³	Shipped Ci	Buried m ³	Buried Ci	Percent Error
a. Spent resins/filters	1.95E+01	4.62E+02	2.23E+00	2.54E+02	±25%
b. Dry active waste	3.98E+02	7.57E-01	1.65E+01	7.12E-01	±25%
c. Irradiated components	-0-	-0-	-0-	-0-	N/A
d. Other (oil/miscellaneous liquids sent to processor for reduction) volume	7.65E+00	6.42E-05	-0-	-0-	N/A
TOTAL	4.25E+02	4.63E+02	1.87E+01	2.55E+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	Ni-63	44.52	2.06E+02
	Fe-55	23.20	1.07E+02
	Co-60	18.06	8.34E+01
	Co-58	7.31	3.38E+01
	Mn-54	4.68	2.16E+01
	H-3	0.05	2.23E-01
	C-14	0.32	1.49E+00
	Tc-99	LLD	-0-
	I-129	LLD	-0-
	Other*	1.86	8.62E+00
	Total	100.00	4.62E+02

* Nuclides representing <1% of total shipped activity: Cr-51, Co-57, Fe-59, Ni-59, Zn-65, Sr-90, Nb-95, Zr-95, Sn-113, Sb-125, 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 -2003

2. Estimate of Major Nuclide Composition (by type of waste)	Nuclide	% Abund.	Activity (Ci)
b. Dry active waste	Fe-55	43.20	3.27E-01
	Co-58	24.86	1.88E-01
	Ni-63	13.08	9.90E-02
	Co-60	7.04	5.32E-02
	Cr-51	2.38	1.80E-02
	H-3	4.36	3.30E-02
	C-14	0.89	6.72E-03
	Tc-99	0.13	9.96E-04
	I-129	0.00	1.78E-05
	Other*	4.06	3.08E-02
	Total	100.00	7.57E-01

- Nuclides representing <1% of total shipped activity: Mn-54, Co-57, Fe-59, Nb-95, Zr-95, Sn-113, Sb-125, Cs-134, Cs-137, Ce-144.

2. Estimate of Major Nuclide Composition (by type of waste)	Nuclide	% Abund.	Activity (Ci)
d. other (oil/miscellaneous liquids sent to processor for volume reduction)	Fe-55	75.52	4.85E-05
	Co-60	9.15	5.87E-06
	Ni-63	7.89	5.06E-06
	Co-58	4.40	2.83E-06
	Cs-137	2.18	1.40E-06
	H-3	LLD	-0-
	C-14	LLD	-0-
	Tc-99	LLD	-0-
	I-129	LLD	-0-
	Other*	0.85	5.48E-07
	Total	100.00	6.42E-05

- Nuclides representing <1% of total shipped activity: Mn-54, Sr-90, Cd-109, Cs-134, Ce-144, Pu-238, Pu-239/40, Pu-241, Am-241, Cm-242, Cm-243/44

TABLE 7.13 (Continued)

SOLID RADWASTE AND IRRADIATED FUEL SHIPMENTS -2003

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. Studsvik Erwin, TN.
	B	Poly *HIC	4	
b. Dry active waste	A	Strong-tight	9	GTS Duratek Oak Ridge, TN.

* High Integrity Container

B. Irradiated Fuel Shipments (Disposition)

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
0	N/A	N/A

ATTACHMENT 8.1

Joint Frequency Tables for

2003

R. G. 1.21 JOINT FREQUENCY TABLE

TXU ENERGY

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 01-JAN-03 00:00 TO 31-DEC-03 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	2	17	10	5	0	34
NNE	2	2	2	7	0	0	13
NE	5	9	5	1	0	0	20
ENE	2	6	4	0	0	0	12
E	1	8	3	0	0	0	12
ESE	0	15	28	5	0	0	48
SE	1	6	30	5	1	0	43
SSE	1	8	54	27	0	0	90
S	0	10	32	48	13	0	103
SSW	0	7	16	24	4	0	51
SW	0	7	13	3	3	0	26
WSW	0	2	7	0	1	0	10
W	0	1	0	2	0	0	3
WNW	0	0	1	1	0	0	2
NW	0	0	3	8	6	4	21
NNW	0	2	20	22	18	11	73
VARIABLE	11	3	0	0	0	0	14
TOTAL	23	88	235	163	51	15	575

Periods of calm (hours): 1

Hours of missing data: 0

R. G. 1.21 JOINT FREQUENCY TABLE

TXU ENERGY

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 01-JAN-03 00:00 TO 31-DEC-03 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	1	1	9	18	5	2	36
NNE	1	11	12	5	0	0	29
NE	3	21	5	3	0	0	32
ENE	3	14	1	0	0	0	18
E	1	9	5	0	0	0	15
ESE	3	18	16	2	0	0	39
SE	0	13	20	7	1	0	41
SSE	0	14	30	27	3	0	74
S	0	16	37	62	20	1	136
SSW	0	7	18	11	9	0	45
SW	2	14	31	4	1	0	52
WSW	0	5	10	8	0	0	23
W	0	3	1	1	0	0	5
WNW	0	0	3	3	1	0	7
NW	0	1	2	16	4	0	23
NNW	1	6	11	20	15	15	68
VARIABLE	14	5	0	0	0	0	19
TOTAL	29	158	211	187	59	18	662

Periods of calm (hours): 1

Hours of missing data: 0

R. G. 1.21 JOINT FREQUENCY TABLE

TXU ENERGY

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 01-JAN-03 00:00 TO 31-DEC-03 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	14	16	27	8	2	69
NNE	7	15	21	6	2	0	51
NE	13	13	6	4	0	0	36
ENE	10	17	6	2	0	0	35
E	3	14	2	0	0	0	19
ESE	1	30	12	2	0	0	45
SE	1	21	22	6	1	0	51
SSE	4	14	31	29	6	0	84
S	0	12	30	46	26	1	115
SSW	0	3	6	14	2	0	25
SW	2	11	14	3	0	0	30
WSW	1	10	4	9	3	0	27
W	0	3	3	2	1	00	9
WNW	0	4	3	1	4	0	12
NW	3	4	4	14	7	1	33
NNW	1	10	8	13	20	13	65
VARIABLE	23	5	0	0	0	0	28
TOTAL	71	200	188	178	80	17	734

Periods of calm (hours): 0

Hours of missing data: 0

R. G. 1.21 JOINT FREQUENCY TABLE

TXU ENERGY

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 01-JAN-03 00:00 TO 31-DEC-03 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	12	115	189	120	30	3	469
NNE	13	76	103	38	5	0	235
NE	20	63	109	12	2	0	206
ENE	24	50	66	13	0	0	153
E	21	83	24	1	0	0	129
ESE	30	138	81	3	1	0	253
SE	20	125	227	39	0	0	411
SSE	16	85	313	187	24	4	629
S	15	47	194	248	35	0	539
SSW	11	37	64	28	3	2	145
SW	11	19	32	15	5	0	82
WSW	8	19	8	7	0	0	42
W	4	10	8	3	0	0	25
WNW	4	22	19	29	7	9	90
NW	6	20	25	54	19	11	135
NNW	10	62	107	130	47	11	367
VARIABLE	78	18	10	1	0	0	107
TOTAL	303	989	1579	928	178	40	4017

Periods of calm (hours): 7

Hours of missing data: 11

R. G. 1.21 JOINT FREQUENCY TABLE

TXU ENERGY

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 01-JAN-03 00:00 TO 31-DEC-03 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	5	33	13	0	0	0	51
NNE	7	24	20	0	1	0	52
NE	4	8	4	1	0	0	17
ENE	9	9	2	1	0	0	21
E	14	40	5	0	0	0	59
ESE	33	97	10	0	0	0	140
SE	25	205	189	3	0	0	422
SSE	8	136	258	16	0	0	418
S	14	61	108	21	0	0	204
SSW	21	46	68	10	0	0	145
SW	26	18	29	11	1	0	85
WSW	17	28	14	3	1	0	63
W	7	13	2	0	0	0	22
WNW	15	19	19	0	0	0	53
NW	14	43	22	1	1	0	81
NNW	10	26	16	1	0	0	53
VARIABLE	63	13	4	2	0	0	82
TOTAL	292	819	783	70	4	0	1968

Periods of calm (hours): 10

Hours of missing data: 1

R. G. 1.21 JOINT FREQUENCY TABLE

TXU ENERGY

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 01-JAN-03 00:00 TO 31-DEC-03 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	1	0	1	0	0	0	2
NNE	0	2	0	0	0	0	2
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	6	1	0	0	0	9
SE	7	36	16	1	0	0	60
SSE	17	30	11	0	0	0	58
S	14	27	14	0	0	0	55
SSW	18	21	11	0	0	0	50
SW	27	20	6	0	0	0	53
WSW	18	39	10	0	0	0	67
W	9	4	2	1	0	0	16
WNW	13	9	7	0	0	0	29
NW	9	30	3	0	0	0	42
NNW	1	3	0	0	0	0	4
VARIABLE	18	1	0	0	0	0	19
TOTAL	154	228	82	2	0	0	466

Periods of calm (hours): 1

Hours of missing data: 0

R. G. 1.21 JOINT FREQUENCY TABLE

TXU ENERGY

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 01-JAN-03 00:00 TO 31-DEC-03 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	0	0	0	0	0	0	0
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	1	0	0	0	0	0	1
SE	3	4	1	0	0	0	8
SSE	1	2	1	0	0	0	4
S	11	9	1	0	0	0	21
SSW	22	20	6	0	0	0	48
SW	18	25	6	0	0	0	49
WSW	16	29	9	0	0	0	54
W	9	3	1	0	0	0	13
WNW	11	5	0	0	0	0	16
NW	8	24	1	0	0	0	33
NNW	1	3	0	0	0	0	4
VARIABLE	7	1	1	0	0	0	9
TOTAL	108	125	27	0	0	0	260

Periods of calm (hours): 1

Hours of missing data: 0

R. G. 1.21 JOINT FREQUENCY TABLE

TXU ENERGY

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD: 01-JAN-03 00:00 TO 31-DEC-03 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	21	165	245	175	48	7	661
NNE	31	130	158	56	8	0	383
NE	46	114	129	21	2	0	312
ENE	49	96	79	16	0	0	240
E	40	154	39	1	0	0	234
ESE	70	304	148	12	1	0	535
SE	57	410	505	61	3	0	1036
SSE	47	289	698	286	33	4	1357
S	54	182	416	425	94	2	1173
SSW	72	141	189	87	18	2	509
SW	86	114	131	36	10	0	377
WSW	60	132	62	27	5	0	286
W	29	37	17	9	1	0	93
WNW	43	59	52	34	12	9	209
NW	40	122	60	93	37	16	368
NNW	25	112	162	186	100	50	635
VARIABLE	214	46	15	3	0	0	278
TOTAL	984	2607	3105	1528	372	90	8686

Periods of calm (hours): 22

Hours of missing data: 52