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April 26, 2001

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 2000 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, 2000 through December 31, 2000.

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.

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

Sincerely,

C. L. Terry

By: 

Roger D. Walker
Regulatory Affairs Manager

CLW/clw
Enclosure

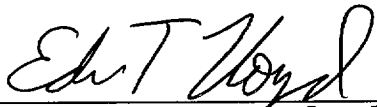
c - Mr. E. W. Merschoff, Region IV w/encl.
Mr. D. N. Graves, Region IV (clo)
Mr. D. H. Jaffe, NRR (clo)
Resident Inspectors, CPSES w/encl.

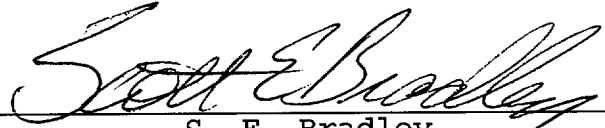
COMANCHE PEAK STEAM ELECTRIC STATION

UNITS 1 AND 2

RADIOACTIVE EFFLUENT
RELEASE REPORT

January 1, 2000 - December 31, 2000

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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, 2000, through December 31, 2000.

1.1 Executive Summary

The radioactive effluent monitoring program for the year 2000 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.

A summation of all the radioactive gaseous releases to the environment during 2000 produced the following results:

- The total gaseous tritium released from the site for 2000 was 29.6 Curies which is a decrease from 43.6 Curies in 1999 and 77.5 Curies in 1998.
- The total gaseous fission and activation activity (Noble gas) released from the site in 2000 was 1.05 Curies which is a decrease from both 1999 and 1998 which were both 1.6 Curies. This maintains Comanche Peak in the first Quartile of the ANI Three Year Weighted Average for all U.S. Power Plants.
- The total gaseous particulate activity released for 2000 was again 0.0 Curies.
- The gross alpha and iodine released has continued at 0.0 Curies for 2000 matching the performance of the previous four years. This is indicative of excellent fuel integrity and chemistry controls.
- The calculated gamma air dose from the site due to noble gases released during 2000 is 9.47 E-04 mrad which is an increase from 1999 which calculated out as 7.49 E-04 mrad; however, this represents only 0.00474% of the annual limit for each unit. (Note: Dose is nuclide specific therefore air dose may increase while total activity decreases based on individual nuclides released.)
- The calculated beta air dose from the site due to noble gases released during 2000 is 3.42 E-04 mrad which is a decrease from 1999 which calculated out as 3.73 E-04 mrad; however, this represents only 0.00085% of the annual limit.
- 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 2000 calculated

out to be 0.03 mrem. This value is a decrease from the 1999 whole body dose of 0.04 mrem. This decrease is directly attributable to the decrease in gaseous tritium released since tritium is responsible for >99% of the total gaseous dose.

- 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 2000 produced the following results:

- The total number of Curies of radioactive nuclides released from the site in liquid effluents in 2000 was 1222.73 Curies.
- Of the total Curies released from the site, tritium accounted for 1222.6 Curies while all other nuclides released accounted for only 0.13 Curies. The total curies of tritium released is down from the 1999 total of 1550 Curies.
- The total whole body dose from the site due to liquid effluents calculated out at 9.94 E-02 mrem which is only 1.66% 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 2000 averaged 11,000 pCi/l which is down from 1999.
- The 2000 average SCR tritium concentration of 11,000 pCi/l is 36.7% of the reporting limit of 30,000 pCi/l.

The CPSES meteorological system achieved a 95.3% 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 achieved a >90% recoverable data rate.

There are three ODCM noncompliance related issues discussed in this annual report. The first issue was an abnormal gaseous release in which the pressurizer steam space was being vented to the Volume Control Tank via the process sample system. During the evolution, Argon-41 was detected being released from the plant vent stack. The relief valve on the process sample system had been lifting allowing the monitored abnormal release to occur. The second issue was a continuing problem with the Plant Vent Stack Wide Range Gas Monitor velocity probes performance and probes being replaced past the calibration laboratory specified due dates. The third issue was the failure of the vendor laboratory to complete a composite sample analysis resulting in a surveillance being missed. Additional details of these issues are discussed in section 6.5 of this report.

During 2000 there were no Technical Specification/ODCM effluent radiation monitors out of service for >30 days.

There were no revisions to the ODCM approved or implemented in 2000.

For 2000, the total volume of solid radwaste buried was 19.2 cubic meters and the total radioactivity buried was 149 curies. The majority of the buried solid waste volume comes from dry active waste at 13.1 cubic meters. Also, spent resins and filters were responsible for >96% 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.

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

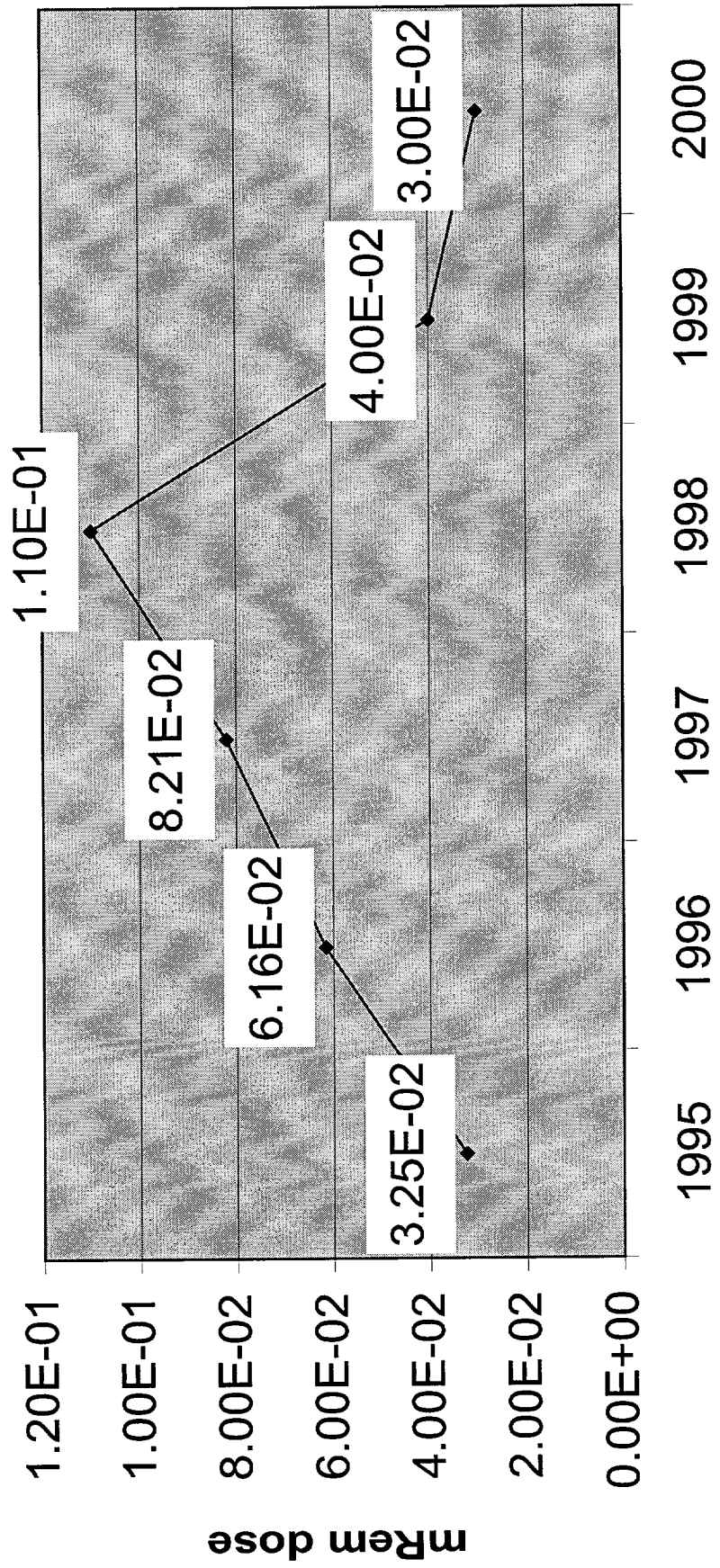
- A summary of the quantities of radioactive liquid and gaseous effluents released from CPSES during the reporting period in the format outlined in Appendix B of Regulatory Guide 1.21, Revision 1, June 1974.
- A summary of solid waste shipped from CPSES in the format shown in Appendix B of Regulatory 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 2000.

- 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

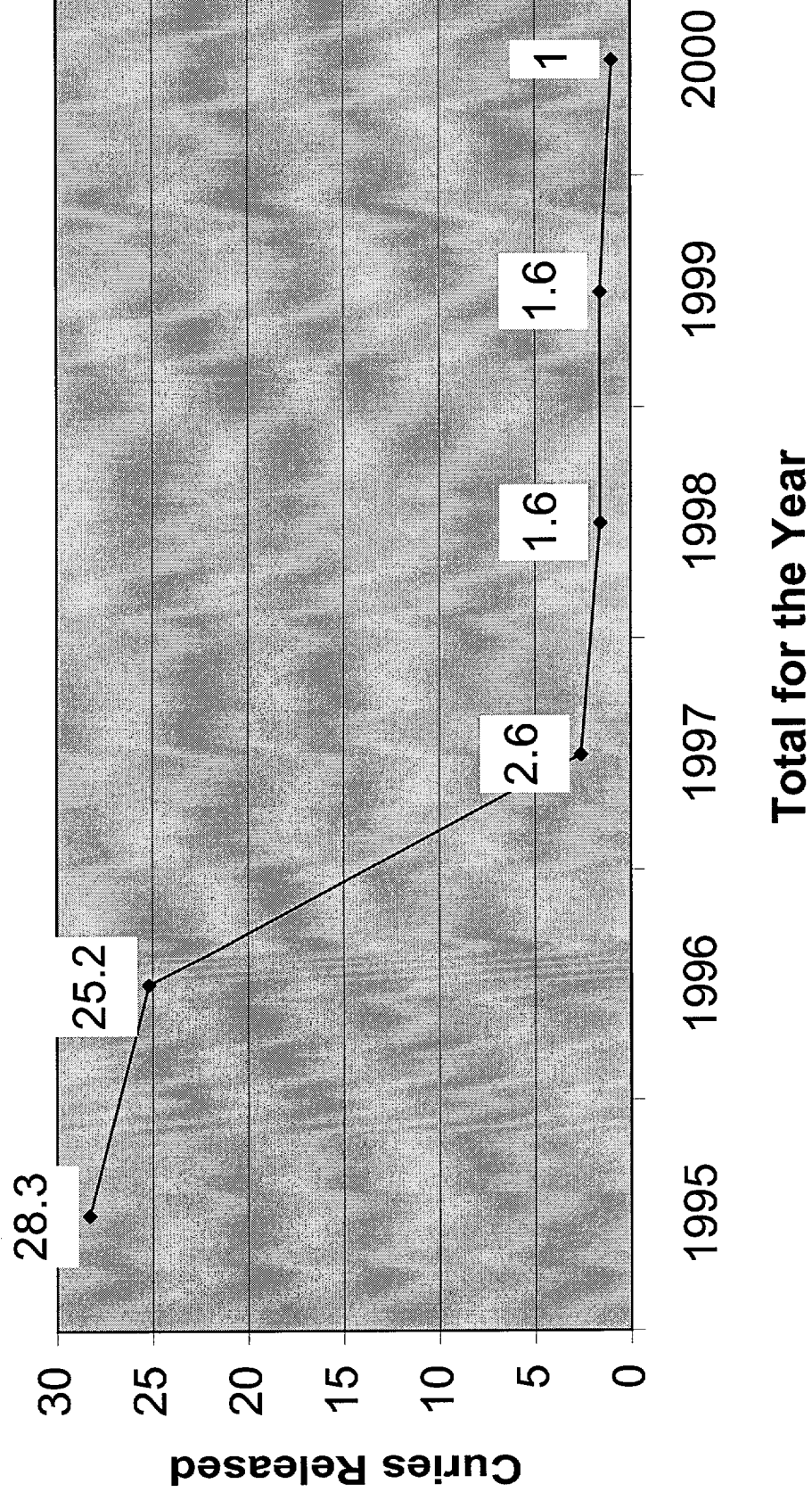
- Total Whole Body Dose due to Gaseous Activity
- Total Gaseous Fission and Activation Activity Released
- Total Gaseous Tritium Released
- Total Whole Body Dose due to Liquid Effluents
- Total Curies of Tritium Released in Liquid Effluents
- Squaw Creek Reservoir Average Tritium Concentration

Total Whole Body Dose due to Gaseous Activity released from CPSES

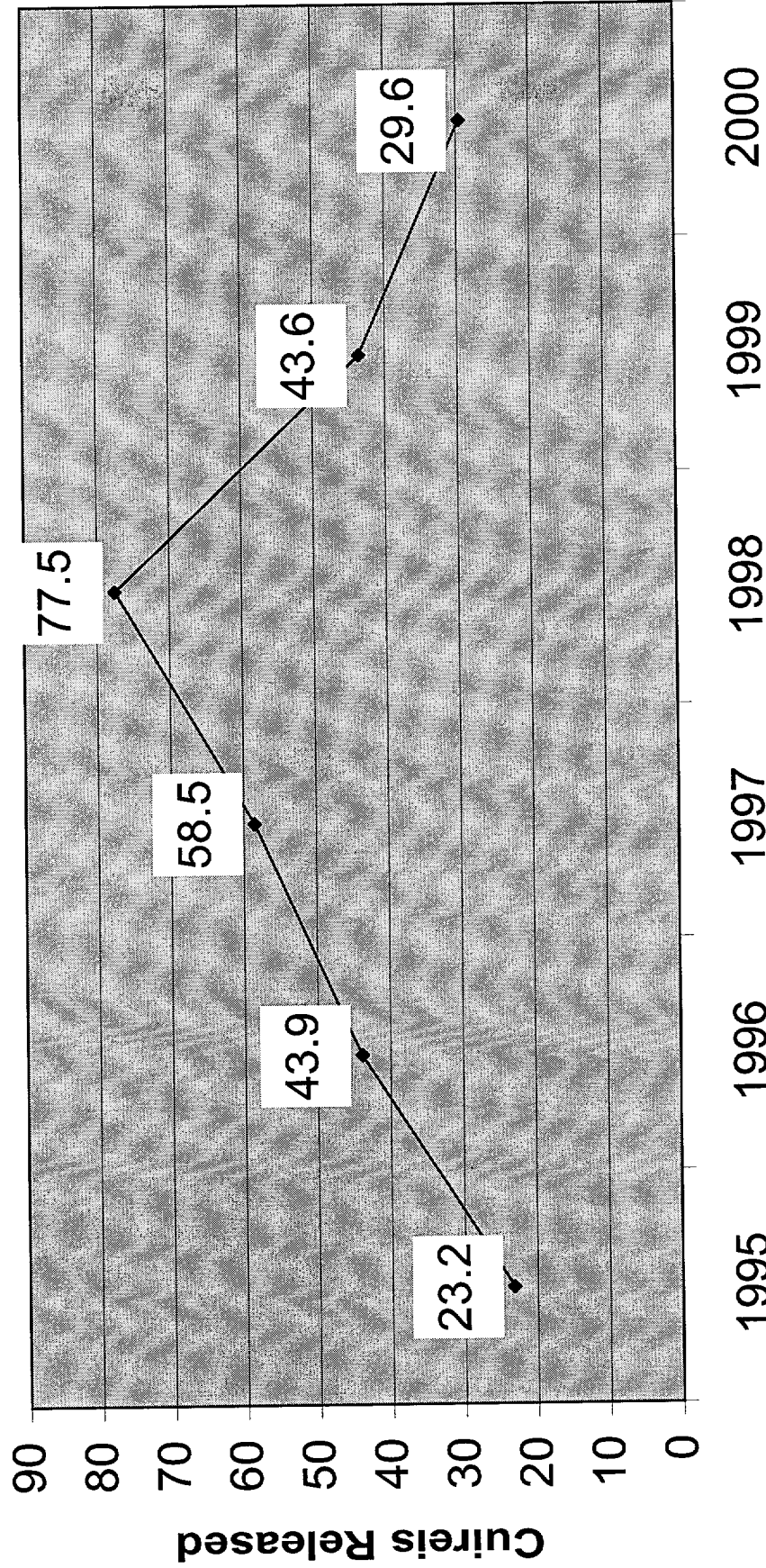


Total for the Year

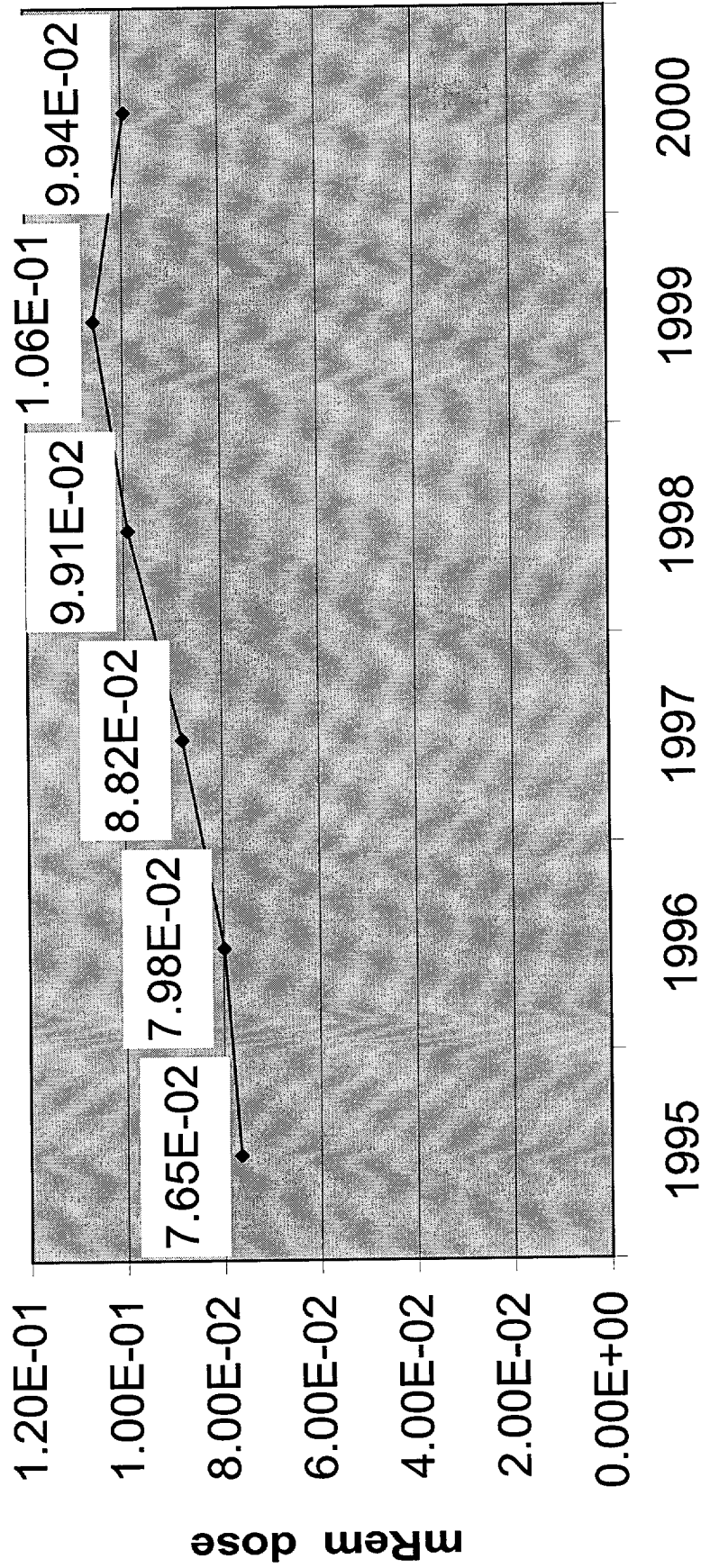
Total Gaseous Fission and Activation Activity Released From CPSES



Total Gaseous Tritium Released From CPSES

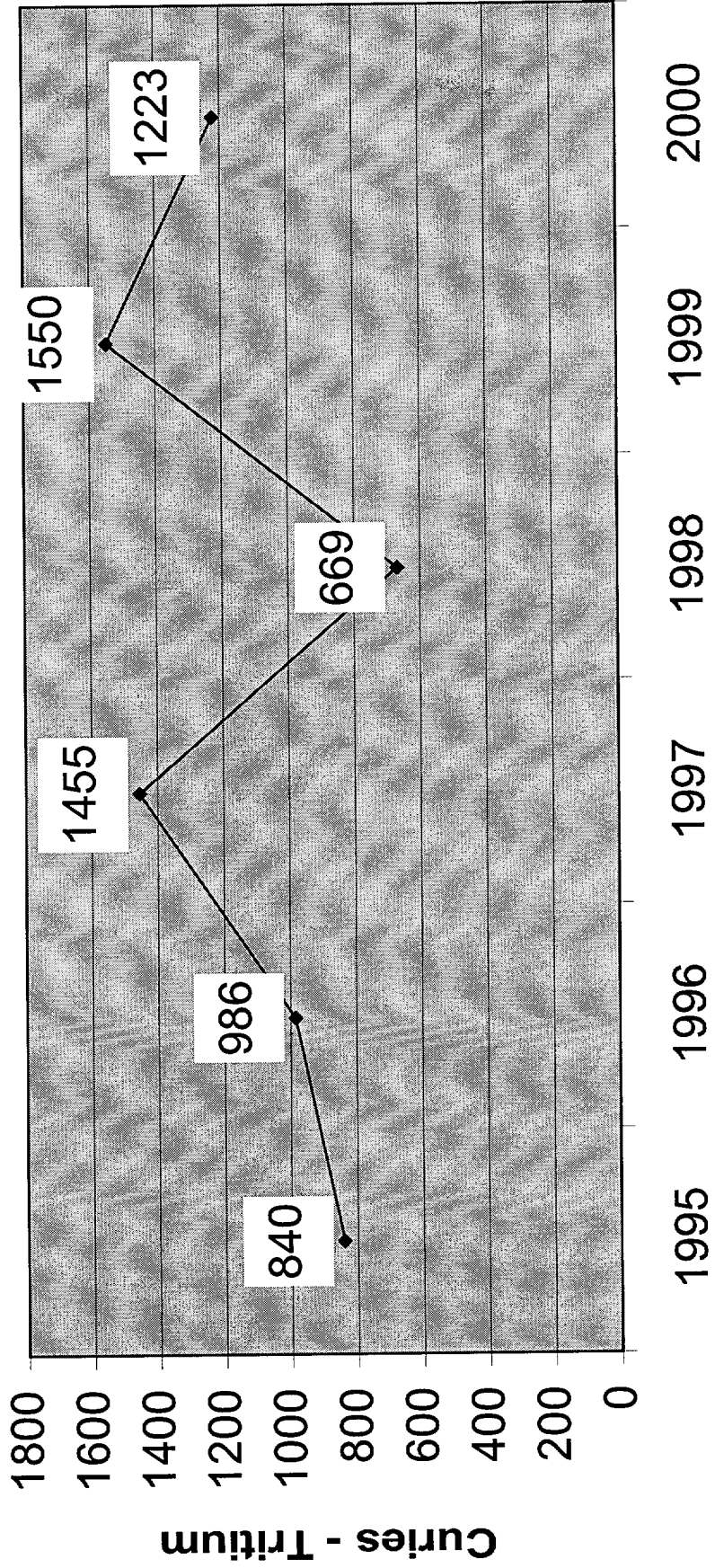


Total Whole Body Dose due to Liquid Effluents Released from CPSES

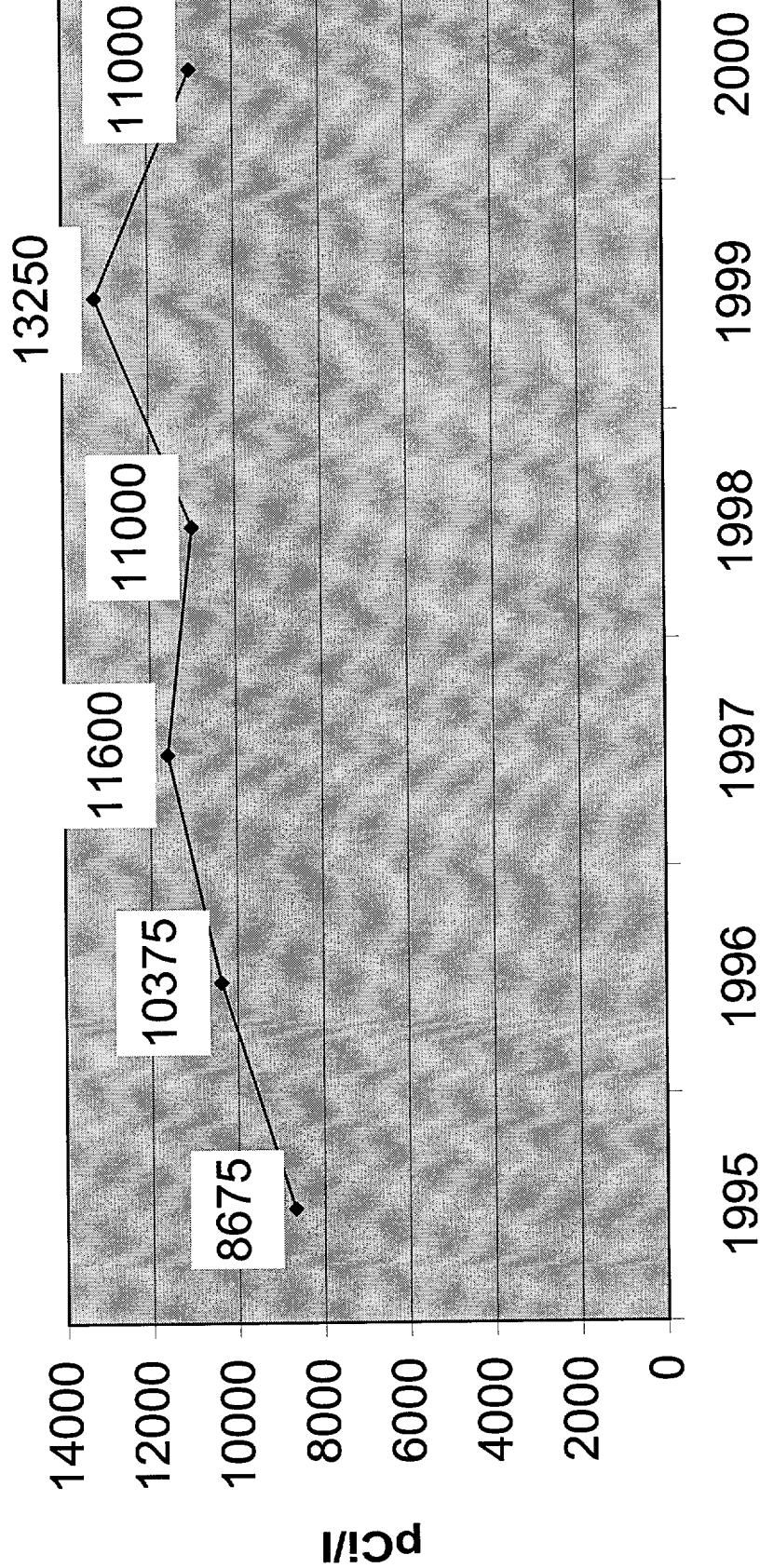


Total for the Year

Total Curies of Tritium Released in Liquid Effluents from CPSES



Squaw Creek Reservoir Average Tritium Concentration



Average Concentration for the Year

2.0 SUPPLEMENTAL INFORMATION

2.1 Regulatory Limits

The ODCM Radiological Effluent Control limits applicable to the release of radioactive material in liquid and gaseous effluents are described in the following sections.

2.1.1 Fission and Activation Gases (Noble Gases)

The dose rate due to radioactive materials released in gaseous effluents from the site to areas at and beyond the site boundary shall be limited to less than or equal to 500 mrem/yr to the whole body and less than or equal to 3000 mrem/yr to the skin.

The air dose due to noble gases released in gaseous effluents, from each unit, to areas at and beyond the site boundary shall be limited to the following:

- a. During any calendar quarter: Less than or equal to 5 mrad for gamma radiation and less than or equal to 10 mrad for beta radiation, and
- b. During any calendar year: Less than or equal to 10 mrad for gamma radiation and less than or equal to 20 mrad for beta radiation.

2.1.2 Iodine-131, Iodine-133, Tritium and Radioactive Material in Particulate Form

The dose rate due to iodine-131, iodine-133, tritium and all radionuclides in particulate form with half lives greater than 8 days, released in gaseous effluents from the site to areas at and beyond the site boundary, shall be limited to less than or equal to 1500 mrem/yr to any organ.

The dose to a MEMBER OF THE PUBLIC from iodine-131, iodine-133, tritium and all radionuclides in particulate form with half lives greater than 8 days, in gaseous effluents released, from each unit, to areas at and beyond the site boundary, shall be limited to the following:

- a. During any calendar quarter: Less than or equal to 7.5 mrem to any organ, and
- b. During any calendar year: Less than or equal to 15 mrem to any organ.

2.1.3 Liquid Effluents

The concentration of radioactive material released in liquid effluents to unrestricted areas shall be limited to 10 times the concentrations specified in 10 CFR Part 20, Appendix B, Table 2, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to 2.0E-4 $\mu\text{Ci/ml}$ 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 mrems to the whole body and to less than or equal to 5 mrems to any organ, and
- b. During any calendar year to less than or equal to 3 mrems to the whole body and to less than or equal to 10 mrems to any organ.

2.1.4 LVW Pond Resin Inventory

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

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

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

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

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

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 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 $2.0\text{E-}04$ $\mu\text{Ci/ml}$ 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 (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.

One abnormal gaseous effluent release occurred during the period covered by this report. Details are discussed in section 6.5.1 of this report and a summary of information for gaseous and liquid abnormal releases is included in Table 7.2.

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

There were no revisions issued to the Offsite Dose Calculation Manual during 2000.

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 2000 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 were included in the 2000 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 was one abnormal gaseous release during this reporting period.

Starting at 1540 on 6 November, 2000, as a part of Unit-2 startup, the pressurizer steam space was vented to the Volume Control Tank (VCT) in an effort to maintain primary chemistry in the Reactor Coolant System (RCS). The pressurizer steam space was being vented to the VCT by way of the process sample system and then diverted to the Waste Gas System (WGS). During this venting evolution, a routine gaseous activity sample was being taken on both plant vent stacks. Analysis of these plant vent stack samples indicated the expected 'no detectable activity' for the south vent stack but the results of the north vent stack indicated concentrations of Argon-41 at the level of $8.09 \text{ E-}08 \text{ uCi/cc}$. An unplanned non-routine effluent permit was generated

upon discovery of the release of the Argon-41 and documented for inclusion in this annual report.

A work request was written to evaluate the functionality of relief valve 2PS-0241 which was suspected of lifting and allowing the release to occur. The relief valve was determined to be functional; therefore, for this pathway to be used in the future a planned non-routine permit will be needed and future plans may pursue including this pathway into the routine pathways documented in the ODCM.

The measured value of $8.09 \text{ E-}08 \text{ uCi/cc}$ exceeds the 10CFR20 environmental concentration limit (ecl) for Argon-41 ($1.0 \text{ E-}8 \text{ uCi/cc}$ - submersion). Since 10CFR20 allows for the concentration to be averaged for the year, no dose limits (10CFR20, 10CFR50, or ODCM) were exceeded and no actual reportable limits were challenged. This is an unplanned release per ODCM Administrative Control 6.9.1.4 but it was determined that it **does not qualify as a performance indicator event.**

The calculated theoretical dose resulting from this release, $1.99 \text{ E-}04 \text{ mrem}$, was a very small contributor to the already low total gaseous dose resulting from routine releases from CPSES to members of the public.

6.5.2 Stack Wide Range Gas Monitor(WRGM) Flow Velocity Probes Out-Of-Calibration

The primary vent stack WRGM flow velocity probes are routinely replaced by Surveillance Work Orders as part of the CPSES program for implementing the ODCM surveillance requirements for radioactive gaseous effluent monitoring instrumentation. ODCM Surveillance Requirement 4.3.3.5 for Table 4.3-4, Instrument 2.d specifies an 18-month channel calibration frequency applicable to the probes. However, the velocity probe manufacturer (Kurtz) only recommends a 12-month in-service use of a calibrated probe and the offsite vendor calibration laboratory certifies each probe at the time-of-calibration for 18 months.

Confusion over the actual due dates for replacing in-service probes has resulted in probes being left in-service past their calibration laboratory specified expiration dates (but not past ODCM required channel calibration due dates). The problem exists because it is possible to exceed the vendor specified probe calibration expiration date but not exceed the corresponding channel calibration

due date assigned by the plant Surveillance Work Order tracking system for the applicable ODCM surveillance. The failure to recognize this condition and set a clear expectation and conservative due date has resulted in probes being replaced past their calibration laboratory specified expiration dates on several occasions in both 1999 and 2000.

In addition to the above scheduling problem, the offsite calibration laboratory for the velocity probes has in recent years informed CPSES about increasing cases of probe 'as found failure' that requires adjustment and/or circuit board probe damage that needs to be repaired at the manufacturer before a successful recalibration can be performed. Also, recently the manufacturer informed the calibration laboratory and CPSES of it's inability to repair these probes due to obsolescence. This has resulted in the need to reevaluate the existing CPSES program to support probe calibration, maintenance and repairs. Other contributors to the program reevaluation were primarily equipment degradation during handling/shipping or possibly from aging of the probe population.

To eliminate the above problems, CPSES organizations with responsibility for velocity probe performance are taking the following actions:

- 1) An in-service time limitation of 12 months consistent with the manufacturer's recommendation has been applied to the testing schedule for in-service probes. This 12-month in-service interval is being used as the effective probe 'calibration frequency' and is tracked by conservative administrative scheduling work practices that have been recommended by System Engineering and adopted until further notice.
- 2) CPSES has issued a purchase order for a wind tunnel for onsite use. Upon arrival, scheduled for 2001, the wind tunnel is to be used by CPSES personnel to better determine the 'as found' condition of each probe promptly upon removal from service. Additionally, CPSES plans to develop an onsite qualified capability for calibrating the probes. This capability is intended to replace the use of the offsite vendor facility and eliminate much of the handling, packaging and shipping activities which may have adversely impacted the probe's hardware or calibration in the past. In the

interim, handling, packaging and shipping procedures have been improved to reduce the chance for such damage.

- 3) CPSES has developed an onsite capability to repair and refurbish the current inventory of aging Kurtz model velocity probes. Each existing probe is to be examined post-service for 'as found' condition and adjusted, refurbished or repaired as required prior to recalibration and reuse.
- 4) Post-service 'as found' probe data is planned to be trended by System Engineering to monitor adequacy or adjustment to the 'calibration' frequency if needed. Based on the 'as found' data trend over the next 2-3 in-service cycles, CPSES Regulatory Affairs will determine if the calibration frequency in the ODCM should be revised or if the currently implemented and more conservative 12-month frequency can be restored to the existing ODCM requirement of 18 months.

6.5.3 Required ODCM Surveillance for Quarterly Composites not completed on time

ODCM Table 4.11-1 and 4.11-2 require a quarterly composite sample to be collected and analyzed from the Plant Vent Stacks, Batch Waste Release Tanks and the Low Volume Waste Pond. These samples must be analyzed for Sr-89, Sr-90 and/or Fe-55 depending on the sample type.

The appropriate samples were collected by CPSES chemistry personnel on 12 September, 2000 and on 20 September, 2000, and were shipped to an off-site vendor on 20 October, 2000. The off-site vendor did not acknowledge receipt of the samples until 21 December, 2000, and at that time there was no indication that the results would not be received prior to the violation dates (5 January, 2001 and 13 January, 2001).

Prior to the violation date, the chemistry supervisor called the off-site vendor requesting the results. The vendor indicated they had not attempted to analyze the samples and indicated that they would probably not be able to supply the results on time. The vendor had made major changes in personnel and location and had made it impossible to meet their contractual obligations.

The results were finally provided in March 2001, over three months past the violation date. The composite results have been updated in the radiological effluent software as of 23 March, 2001.

The off-site vendor has been removed from participation in CPSES programs involving radiological effluents, radiological environmental, 10CFR61 analysis and soon from the composite analysis. A substitute vendor now has the contract to supply CPSES with timely and accurate analysis.

6.6 Resin Releases to the LVW Pond

A total of 328 ft³ 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.

During the summer months of 2000, a new generation Filter Demineralizer System (FDS) was installed, tested and placed into service. The new FDS is a higher capacity portable filtration/resin system. The technical evaluation confirmed there were no plant modifications required to support the new FDS equipment. A 10CFR50.59 Activity Screen was prepared for an FSAR change and resulted in being classified as a trivial change. The new FDS system is currently being used and evaluated. The amount of radioactivity released in liquid radwaste discharges to the environment processed through this new generation FDS is continuing to be decreased.

6.8 Meteorological Monitoring Program

In accordance with ODCM Administrative Control 6.9.1.4, a summary of hourly meteorological data, collected during 2000, 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 infant, child, teen and adult 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 2000 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

	<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	4.	9.	15.	15.
Total Time Period for Batch Releases (min)	1.49E+03	3.36E+03	6.02E+03	5.64E+03
Maximum Time Period for a Batch Release (min)	4.39E+02	4.59E+02	4.90E+02	4.45E+02
Average Time Period for a Batch Release (min)	3.73E+02	3.73E+02	4.01E+02	3.76E+02
Minimum Time Period for a Batch Release (min)	2.54E+02	2.10E+02	3.17E+02	3.19E+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	41.	41.	41.	38.
Total Time Period for Batch Releases (min)	1.62E+04	1.53E+04	1.41E+04	1.59E+04
Maximum Time Period for a Batch Release (min)	5.45E+02	4.37E+02	4.15E+02	1.40E+03
Average Time Period for a Batch Release (min)	3.95E+02	3.73E+02	3.44E+02	4.18E+02
Minimum Time Period for a Batch Release (min)	2.92E+02	2.60E+02	2.37E+02	2.00E+00 *

*Relief valve testing release permit of short duration.

TABLE 7.2

ABNORMAL BATCH LIQUID AND GASEOUS RELEASE SUMMARY

	<u>Quarter 1</u>	<u>Quarter 2</u>	<u>Quarter 3</u>	<u>Quarter 4</u>
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	1
Total Activity Released, Ci	0.00E+00	0.00E+00	0.00E+00	2.64E-01

TABLE 7.3
GASEOUS EFFLUENTS--SUMMATION OF ALL RELEASES

Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Est.Total Error, %
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A. Fission and Activation Gases

1. Total release (site)	Ci	1.99E-01	2.02E-01	1.91E-01	4.56E-01	2.35E+01
2. Average release rate for period (site)	µCi/sec	2.53E-02	2.57E-02	2.40E-02	5.73E-02	
3. Percent of ODCM REC limit (Dose Rate 500 mrem/yr/site)	%	1.41E-04	1.41E-04	1.31E-04	3.03E-04	
4. Percent of ODCM REC limit (Skin Dose Rate 3000 mrem/yr/site)	%	3.48E-05	3.45E-05	3.20E-05	7.41E-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	4.63E+00	7.43E+00	1.00E+01	7.52E+00	2.38E+01
2. Average release rate for period (site)	µCi/sec	5.89E-01	9.45E-01	1.26E+00	9.46E-01	
3. Percent of ODCM REC limit (Organ Dose 7.5 mrem/qtr/unit)	%	2.97E-02	4.75E-02	6.41E-02	4.81E-02	

TABLE 7.4

GASEOUS EFFLUENTS--GROUND LEVEL RELEASES

Nuclides Released from the site	Units	Continuous Mode		Batch Mode	
		Quarter 1	Quarter 2	Quarter 1	Quarter 2

A. Fission and Activation Gases

Ar-41	Ci	0.00E+00	0.00E+00	1.90E-01	1.90E-01
Xe-131M	Ci	0.00E+00	0.00E+00	0.00E+00	3.70E-03
Xe-133	Ci	0.00E+00	0.00E+00	8.24E-03	8.13E-03
Total for period	Ci	0.00E+00	0.00E+00	1.98E-01	2.02E-01

B. Iodines

I-131	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-133	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

	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	4.61E+00	7.41E+00	2.77E-02	1.90E-02
Total for period	Ci	4.61E+00	7.41E+00	2.77E-02	1.90E-02

TABLE 7.4 (con't.)

GASEOUS EFFLUENTS--GROUND LEVEL RELEASES

Continuous Mode

Batch Mode

Nuclides Released from the site	Units	Quarter 3	Quarter 4	Quarter 3	Quarter 4
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A. Fission and Activation Gases

Ar-41	Ci	0.00E+00	0.00E+00	1.78E-01	4.12E-01
Kr-85	Ci	0.00E+00	0.00E+00	0.00E+00	1.09E-03
Kr-85M	Ci	0.00E+00	0.00E+00	0.00E+00	1.51E-06
Kr-87	Ci	0.00E+00	0.00E+00	0.00E+00	8.87E-06
Kr-88	Ci	0.00E+00	0.00E+00	0.00E+00	5.74E-06
Xe-131M	Ci	0.00E+00	0.00E+00	0.00E+00	2.25E-05
Xe-133	Ci	0.00E+00	0.00E+00	1.26E-02	4.21E-02
Xe-133M	Ci	0.00E+00	0.00E+00	0.00E+00	5.19E-05
Xe-135	Ci	0.00E+00	0.00E+00	9.96E-05	2.39E-05
Xe-135M	Ci	0.00E+00	0.00E+00	0.00E+00	1.36E-05
Xe-138	Ci	0.00E+00	0.00E+00	0.00E+00	2.34E-05
Total for period	Ci	0.00E+00	0.00E+00	1.91E-01	4.55E-01

B. Iodines

I-131	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-133	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

	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	1.00E+01	7.48E+00	1.29E-02	3.98E-02
Total for period	Ci	1.00E+01	7.48E+00	1.29E-02	3.98E-02

TABLE 7.5
LIQUID EFFLUENTS--SUMMATION OF ALL RELEASES

Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Est.Total Error, %
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A. Fission and Activation Products

1. Total release (not including tritium, gases, alpha) (site)	Ci	2.30E-02	2.69E-02	3.01E-02	4.46E-02	3.03E+01
2. Average diluted concentration during period (site)	µCi/ml	5.50E-09	2.21E-09	1.38E-09	2.23E-09	
3. Percent of ODCM REC limit (Σ diluted conc/10*ECL)	%	6.52E-03	3.10E-03	7.91E-04	7.08E-04	

B. Tritium

1. Total release (site)	Ci	3.26E+01	1.77E+02	6.25E+02	3.88E+02	1.34E+01
2. Average diluted concentration during period (site)	µCi/ml	7.78E-06	1.45E-05	2.86E-05	1.94E-05	
3. Percent of ODCM REC limit (diluted conc/1E-02 µCi/ml)	%	7.78E-02	1.45E-01	2.86E-01	1.94E-01	

C. Dissolved and Entrained Gases

1. Total release (site)	Ci	0.00E+00	2.97E-04	2.44E-03	1.18E-03	1.16E+01
2. Average diluted concentration during period (site)	µCi/ml	0.00E+00	2.44E-11	1.12E-10	5.91E-11	
3. Percent of ODCM REC limit (diluted conc/2.0E-04 µCi.ml)	%	0.00E+00	1.22E-05	5.60E-05	2.96E-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
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E. Volume of waste released (prior to dilution) (site)	Liters	3.02E+05	7.05E+05	1.29E+06	1.26E+06	2.20E+00
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F. Volume dilution of water used during period (Note 1) (site)	Liters	4.19E+09	1.22E+10	2.18E+10	2.01E+10	1.00E+01
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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

Continuous Mode

Batch Mode

Nuclides Released	Units	Quarter 1	Quarter 2	Quarter 1	Quarter 2
Cr-51	Ci	0.00E+00	0.00E+00	1.38E-04	1.89E-04
Mn-54	Ci	0.00E+00	0.00E+00	3.13E-04	7.48E-04
Fe-55	Ci	0.00E+00	0.00E+00	5.43E-03	1.08E-02
Co-57	Ci	0.00E+00	0.00E+00	1.99E-04	1.61E-04
Co-58	Ci	0.00E+00	0.00E+00	8.96E-03	1.97E-03
Fe-59	Ci	0.00E+00	0.00E+00	2.78E-05	0.00E+00
Co-60	Ci	0.00E+00	0.00E+00	6.52E-03	8.84E-03
Nb-95	Ci	0.00E+00	0.00E+00	7.24E-05	1.04E-04
Zr-95	Ci	0.00E+00	0.00E+00	9.24E-05	3.24E-05
Ag-110M	Ci	0.00E+00	0.00E+00	0.00E+00	1.38E-04
Sb-124	Ci	0.00E+00	0.00E+00	0.00E+00	1.41E-05
Sb-125	Ci	0.00E+00	0.00E+00	1.26E-03	3.88E-03
Cs-137	Ci	0.00E+00	0.00E+00	0.00E+00	4.45E-05
Total for period	Ci	0.00E+00	0.00E+00	2.28E-02	2.68E-02

H-3	Ci	0.00E+00	0.00E+00	3.26E+01	1.77E+02
Total for period	Ci	0.00E+00	0.00E+00	3.26E+01	1.77E+02

Xe-133	Ci	0.00E+00	0.00E+00	0.00E+00	2.97E-04
Total for period	Ci	0.00E+00	0.00E+00	0.00E+00	2.97E-04

TABLE 7.6 (continued)

LIQUID EFFLUENTS

Continuous Mode

Batch Mode

Nuclides Released	Units	Quarter 3	Quarter 4	Quarter 3	Quarter 4
Na-24	Ci	0.00E+00	0.00E+00	0.00E+00	1.69E-05
Cr-51	Ci	0.00E+00	0.00E+00	6.58E-05	6.41E-04
Mn-54	Ci	0.00E+00	0.00E+00	2.99E-04	3.07E-05
Fe-55	Ci	0.00E+00	0.00E+00	2.06E-02	2.01E-02
Co-57	Ci	0.00E+00	0.00E+00	4.42E-06	3.72E-05
Co-58	Ci	0.00E+00	0.00E+00	1.65E-04	1.17E-02
Fe-59	Ci	0.00E+00	0.00E+00	0.00E+00	1.10E-04
Co-60	Ci	0.00E+00	0.00E+00	2.35E-03	4.69E-04
Zn-65	Ci	0.00E+00	0.00E+00	0.00E+00	1.38E-05
Nb-95	Ci	0.00E+00	0.00E+00	2.21E-05	1.57E-05
Ru-103	Ci	0.00E+00	0.00E+00	0.00E+00	4.32E-06
Ag-110M	Ci	0.00E+00	0.00E+00	1.06E-05	0.00E+00
Sb-122	Ci	0.00E+00	0.00E+00	0.00E+00	6.89E-05
Sb-124	Ci	0.00E+00	0.00E+00	0.00E+00	6.80E-04
Sb-125	Ci	0.00E+00	0.00E+00	6.50E-03	1.07E-02
Sb-126	Ci	0.00E+00	0.00E+00	0.00E+00	6.34E-05
Cs-137	Ci	0.00E+00	0.00E+00	4.99E-05	0.00E+00
Total for period	Ci	0.00E+00	0.00E+00	3.01E-02	4.44E-02

H-3	Ci	0.00E+00	0.00E+00	6.25E+02	3.88E+02
Total for period	Ci	0.00E+00	0.00E+00	6.25E+02	3.88E+02

Xe-133	Ci	0.00E+00	0.00E+00	2.44E-03	1.18E-03
Total for period	Ci	0.00E+00	0.00E+00	2.44E-03	1.18E-03

TABLE 7.7

DOSES FROM LIQUID EFFLUENTS (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	2.19E-05	2.77E-02	2.77E-02	2.77E-02	2.77E-02	2.77E-02	2.86E-02
% Limit per unit	2.19E-04	2.77E-01	9.23E-01	2.77E-01	2.77E-01	2.77E-01	2.86E-01
Quarter 2	1.11E-04	2.45E-02	2.44E-02	2.43E-02	2.44E-02	2.44E-02	2.53E-02
% Limit per unit	1.11E-03	2.45E-01	8.13E-01	2.43E-01	2.44E-01	2.44E-01	2.53E-01
Quarter 3	1.51E-04	2.38E-02	2.38E-02	2.37E-02	2.37E-02	2.38E-02	2.39E-02
% Limit per unit	1.51E-03	2.38E-01	7.93E-01	2.37E-01	2.37E-01	2.38E-01	2.39E-01
Quarter 4	6.64E-05	2.35E-02	2.35E-02	2.34E-02	2.34E-02	2.37E-02	2.37E-02
% Limit per unit	6.64E-04	2.35E-01	7.83E-01	2.34E-01	2.34E-01	2.37E-01	2.37E-01
Total 2000	3.54E-04	9.95E-02	9.94E-02	9.91E-02	9.92E-02	9.97E-02	1.01E-01
% Limit per unit	1.77E-03	4.98E-01	1.66E+00	4.96E-01	4.96E-01	4.99E-01	5.05E-01

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

TABLE 7.8

DOSES FROM GASEOUS EFFLUENTS

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	1.85E-04	6.62E-05
% Limit per unit	1.85E-03	3.31E-04
Quarter 2	1.85E-04	6.65E-05
% Limit per unit	1.85E-03	3.31E-04
Quarter 3	1.74E-04	6.25E-05
% Limit per unit	1.74E-03	3.13E-04
Quarter 4	4.03E-04	1.46E-04
% Limit per unit	4.03E-03	7.30E-04
Total 2000	9.47E-04	3.42E-04
% Limit per unit	4.74E-03	8.55E-04

TABLE 7.9

DOSES FROM GASEOUS EFFLUENTS

Iodines, Particulates and Tritium
 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	2.95E-3	2.95E-3	2.95E-3	2.95E-3	2.95E-3	2.95E-3	1.04E-03
% Limit per Unit	0.00E+00	1.97E-02	1.97E-02	1.97E-02	1.97E-02	1.97E-02	1.97E-02	6.93E-03
Qtr-2	0.00E+00	4.73E-03	4.73E-03	4.73E-03	4.73E-03	4.73E-03	4.73E-03	1.03E-03
% Limit per Unit	0.00E+00	3.15E-02	3.15E-02	3.15E-02	3.15E-02	3.15E-02	3.15E-02	6.87E-03
Qtr-3	0.00E+00	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03	9.59E-04
% Limit per Unit	0.00E+00	4.25E-02	4.25E-02	4.25E-02	4.25E-02	4.25E-02	4.25E-02	6.39E-03
Qtr-4	0.00E+00	4.79E-03	4.79E-03	4.79E-03	4.79E-03	4.79E-03	4.79E-03	2.22E-03
% Limit per Unit	0.00E+00	3.19E-02	3.19E-02	3.19E-02	3.19E-02	3.19E-02	3.19E-02	1.48E-02
Total 2000	0.00E+00	1.88E-02	1.88E-02	1.88E-02	1.88E-02	1.88E-02	1.88E-02	5.25E-03
% Limit per Unit	0.00E+00	6.27E-02	6.27E-02	6.27E-02	6.27E-02	6.27E-02	6.27E-02	1.75E-02

TABLE 7.10

DOSES FROM GASEOUS EFFLUENTS

Iodines, Particulates and Tritium
 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	3.23E-03	3.23E-03	3.23E-03	3.23E-03	3.23E-03	3.23E-03	1.04E-03
% Limit per Unit	0.00E+00	2.15E-02	2.15E-02	2.15E-02	2.15E-02	2.15E-02	2.15E-02	6.93E-03
Qtr-2	0.00E+00	5.18E-03	5.18E-03	5.18E-03	5.18E-03	5.18E-03	5.18E-03	1.03E-03
% Limit per Unit	0.00E+00	3.45E-02	3.45E-02	3.45E-02	3.45E-02	3.45E-02	3.45E-02	6.87E-03
Qtr-3	0.00E+00	6.98E-03	6.98E-03	6.98E-03	6.98E-03	6.98E-03	6.98E-03	9.59E-04
% Limit per Unit	0.00E+00	4.65E-02	4.65E-02	4.65E-02	4.65E-02	4.65E-02	4.65E-02	6.39E-03
Qtr-4	0.00E+00	5.24E-03	5.24E-03	5.24E-03	5.24E-03	5.24E-03	5.24E-03	2.22E-03
% Limit per Unit	0.00E+00	3.49E-02	3.49E-02	3.49E-02	3.49E-02	3.49E-02	3.49E-02	1.48E-02
Total 2000	0.00E+00	2.06E-02	2.06E-02	2.06E-02	2.06E-02	2.06E-02	2.06E-02	5.25E-03
% Limit per Unit	0.00E+00	6.87E-02	6.87E-02	6.87E-02	6.87E-02	6.87E-02	6.87E-02	1.75E-02

TABLE 7.11

DOSES FROM GASEOUS EFFLUENTS

Iodines, Particulates and Tritium
 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	4.45E-03	4.45E-03	4.45E-03	4.45E-03	4.45E-03	4.45E-03	1.04E-03
% Limit per Unit	0.00E+00	2.97E-02	2.97E-02	2.97E-02	2.97E-02	2.97E-02	2.97E-02	6.93E-03
Qtr-2	0.00E+00	7.13E-03	7.13E-03	7.13E-03	7.13E-03	7.13E-03	7.13E-03	1.03E-03
% Limit per Unit	0.00E+00	4.75E-02	4.75E-02	4.75E-02	4.75E-02	4.75E-02	4.75E-02	6.87E-03
Qtr-3	0.00E+00	9.61E-03	9.61E-03	9.61E-03	9.61E-03	9.61E-03	9.61E-03	9.59E-04
% Limit per Unit	0.00E+00	6.41E-02	6.41E-02	6.41E-02	6.41E-02	6.41E-02	6.41E-02	6.39E-03
Qtr-4	0.00E+00	7.22E-03	7.22E-03	7.22E-03	7.22E-03	7.22E-03	7.22E-03	2.22E-03
% Limit per Unit	0.00E+00	4.81E-02	4.81E-02	4.81E-02	4.81E-02	4.81E-02	4.81E-02	1.48E-02
Total 2000	0.00E+00	2.84E-02	2.84E-02	2.84E-02	2.84E-02	2.84E-02	2.84E-02	5.25E-03
% Limit per Unit	0.00E+00	9.47E-02	9.47E-02	9.47E-02	9.47E-02	9.47E-02	9.47E-02	1.75E-02

TABLE 7.12

DOSES FROM GASEOUS EFFLUENTS

Iodines, Particulates and Tritium
 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	1.94E-03	1.94E-03	1.94E-03	1.94E-03	1.94E-03	1.94E-03	1.04E-03
% Limit per Unit	0.00E+00	1.29E-02	1.29E-02	1.29E-02	1.29E-02	1.29E-02	1.29E-02	6.93E-03
Qtr-2	0.00E+00	3.11E-03	3.11E-03	3.11E-03	3.11E-03	3.11E-03	3.11E-03	1.03E-03
% Limit per Unit	0.00E+00	2.07E-02	2.07E-02	2.07E-02	2.07E-02	2.07E-02	2.07E-02	6.87E-03
Qtr-3	0.00E+00	4.19E-03	4.19E-03	4.19E-03	4.19E-03	4.19E-03	4.19E-03	9.59E-04
% Limit per Unit	0.00E+00	2.79E-02	2.79E-02	2.79E-02	2.79E-02	2.79E-02	2.79E-02	6.39E-03
Qtr-4	0.00E+00	3.15E-03	3.15E-03	3.15E-03	3.15E-03	3.15E-03	3.15E-03	2.22E-03
% Limit per Unit	0.00E+00	2.10E-02	2.10E-02	2.10E-02	2.10E-02	2.10E-02	2.10E-02	1.48E-02
Total 2000	0.00E+00	1.24E-02	1.24E-02	1.24E-02	1.24E-02	1.24E-02	1.24E-02	5.25E-03
% Limit per Unit	0.00E+00	4.13E-02	4.13E-02	4.13E-02	4.13E-02	4.13E-02	4.13E-02	1.75E-02

TABLE 7.13
SOLID RADWASTE AND IRRADIATED FUEL SHIPMENTS

**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	7.89E+00	1.44E+02	6.13E+00	1.44E+02	±25%
b. Dry active waste	2.59E+02	5.10E+00	1.31E+01	4.85E+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	2.67E+02	1.49E+02	1.92E+01	1.49E+02	±25%

Includes 128.0 m³ of suspected clean trash sent to offsite processor for monitoring before final disposition.

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 that are handled and processed in a manner that is consistent with this waste stream.

2. Estimate of Major Nuclide Composition (by type of waste)	Nuclide	% Abund.	Activity (Ci)
a. Spent resins/filters	Fe-55	56.00	8.07E+01
	Ni-63	20.00	2.88E+01
	Co-60	12.27	1.77E+01
	Mn-54	2.42	3.49E+00
	Co-58	1.66	2.39E+00
	H-3	4.29	6.18E+00
	C-14	0.01	1.71E-02
	Tc-99	LLD	0
	I-129	LLD	-0-
	Other*	3.35	4.83E+00
Total	100.00	1.44E+02	

* Nuclides representing <1% of total shipped activity: Be-7, Cr-51, Co-57, Fe-59, Zn-65, Sr-90, Nb-95, Zr-95, Ag-110M, 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

2. Estimate of Major Nuclide Composition (by type of waste)	Nuclide	% Abund.	Activity (Ci)
b. Dry active waste	Fe-55	74.18	3.79E+00
	Co-60	8.59	4.38E-01
	Ni-63	7.07	3.61E-01
	Co-58	4.48	2.28E-01
	Cs-137	1.84	9.41E-02
	Mn-54	1.69	8.61E-02
	H-3	0.01	4.62E-04
	C-14	LLD	-0-
	Tc-99	LLD	-0-
	I-129	LLD	-0-
	Other*	<u>2.14</u>	<u>1.09E-01</u>
	Total	100.00	5.10E+00

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

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	ATG Oak Ridge, TN
	C	Poly *HIC	1	Chem-Nuclear Barnwell, SC
b. Dry active waste	A	Strong-tight	5	GTS Duratek Oak Ridge, TN
	A	Strong-tight	4	US Ecology 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

2000

R.G. 1.21 JOINT FREQUENCY TABLE

T. U. ELECTRIC COMPANY

HOURS AT EACH WIND SPEED AND DIRECTION

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

STABILITY CLASS: A

ELEVATION: 10 m.

Wind Direction	Wind Speed (mph) at 10 m. level						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
	---	---	---	---	---	---	---
N	4	6	7	10	3	0	30
NNE	0	5	10	2	2	0	19
NE	5	3	13	2	3	0	26
ENE	4	15	13	1	0	0	33
E	5	19	11	0	0	0	35
ESE	6	43	23	2	0	0	74
SE	6	29	57	4	0	0	96
SSE	3	25	77	41	7	0	153
S	6	17	66	53	5	0	147
SSW	1	5	19	21	1	0	47
SW	2	5	3	1	0	0	11
WSW	1	4	0	0	0	0	5
W	0	0	0	1	0	0	1
WNW	0	5	1	2	1	0	9
NW	0	11	4	5	0	1	21
NNW	1	10	6	19	11	0	47
VARIABLE	20	1	4	0	0	0	25
Total	64	203	314	164	33	1	779

 R.G. 1.21 JOINT FREQUENCY TABLE

T. U. ELECTRIC COMPANY

HOURS AT EACH WIND SPEED AND DIRECTION

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

STABILITY CLASS: B
 ELEVATION: 10 m.

Wind Direction	Wind Speed (mph) at 10 m. level						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
	---	---	---	---	---	---	---
N	1	6	3	3	2	1	16
NNE	0	9	9	5	0	0	23
NE	2	10	6	1	5	0	24
ENE	1	11	5	2	0	0	19
E	1	7	4	1	0	0	13
ESE	1	21	9	0	0	0	31
SE	0	15	23	2	0	0	40
SSE	0	12	33	23	7	0	75
S	0	9	27	32	8	1	77
SSW	1	8	25	17	5	2	58
SW	0	2	7	0	0	0	9
WSW	0	3	1	1	0	0	5
W	1	2	1	1	1	0	6
WNW	0	1	1	0	0	0	2
NW	0	2	1	4	4	0	11
NNW	0	8	10	11	9	11	49
VARIABLE	16	1	0	0	0	0	17
Total	24	127	165	103	41	15	475

 R.G. 1.21 JOINT FREQUENCY TABLE

T. U. ELECTRIC COMPANY

HOURS AT EACH WIND SPEED AND DIRECTION

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

STABILITY CLASS: C
 ELEVATION: 10 m.

Wind Direction	Wind Speed (mph) at 10 m. level						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
	---	---	----	-----	-----	---	-----
N	0	7	7	11	5	0	30
NNE	1	10	9	16	5	0	41
NE	2	13	15	7	2	0	39
ENE	6	17	5	0	0	0	28
E	2	8	3	1	0	0	14
ESE	2	16	8	0	0	0	26
SE	1	10	25	12	2	0	50
SSE	0	16	23	35	7	0	81
S	1	12	28	34	15	4	94
SSW	0	8	24	22	8	0	62
SW	1	7	9	2	0	0	19
WSW	0	10	10	5	0	0	25
W	0	2	2	5	2	0	11
WNW	0	1	0	0	1	0	2
NW	1	1	3	1	1	1	8
NNW	1	8	9	16	5	8	47
VARIABLE	12	1	1	0	0	0	14
Total	30	147	181	167	53	13	591

R.G. 1.21 JOINT FREQUENCY TABLE

T. U. ELECTRIC COMPANY

HOURS AT EACH WIND SPEED AND DIRECTION

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

STABILITY CLASS: D

ELEVATION: 10 m.

Wind Direction	Wind Speed (mph) at 10 m. level						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
	---	---	---	---	---	---	---
N	7	56	156	146	50	10	425
NNE	10	65	164	98	18	0	355
NE	17	42	114	25	6	0	204
ENE	15	48	84	9	1	0	157
E	10	64	85	4	0	0	163
ESE	22	108	58	3	0	0	191
SE	11	133	249	64	7	0	464
SSE	7	93	304	196	63	7	670
S	4	59	295	386	136	17	897
SSW	1	39	101	91	18	1	251
SW	6	36	32	20	2	0	96
WSW	0	20	23	8	3	0	54
W	2	17	9	9	5	0	42
WNW	1	21	24	3	5	0	54
NW	2	13	29	48	18	6	116
NNW	5	22	68	125	23	5	248
VARIABLE	50	17	13	1	0	0	81
Total	170	853	1808	1236	355	46	4468

 R.G. 1.21 JOINT FREQUENCY TABLE

T. U. ELECTRIC COMPANY

HOURS AT EACH WIND SPEED AND DIRECTION

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

STABILITY CLASS: E

ELEVATION: 10 m.

Wind Direction	Wind Speed (mph) at 10 m. level						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
	---	---	----	-----	-----	---	-----
N	4	20	21	6	0	0	51
NNE	4	25	22	6	0	0	57
NE	0	5	9	0	0	0	14
ENE	3	7	5	0	0	0	15
E	4	28	11	0	0	0	43
ESE	16	110	11	0	0	0	137
SE	18	215	153	2	0	0	388
SSE	11	196	221	16	0	0	444
S	11	75	146	12	1	0	245
SSW	17	47	70	8	0	0	142
SW	14	18	31	7	0	0	70
WSW	13	18	13	0	0	0	44
W	4	13	4	1	0	0	22
WNW	5	21	16	3	2	0	47
NW	2	38	14	1	0	0	55
NNW	2	8	8	6	0	0	24
VARIABLE	54	16	4	0	0	0	74
Total	182	860	759	68	3	0	1872

R.G. 1.21 JOINT FREQUENCY TABLE

T. U. ELECTRIC COMPANY

HOURS AT EACH WIND SPEED AND DIRECTION

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

STABILITY CLASS: F
ELEVATION: 10 m.

Wind Direction	Wind Speed (mph) at 10 m. level						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	0	0	0	0	0	0	0
NNE	0	1	0	0	0	0	1
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	1	1	0	0	0	0	2
ESE	4	6	0	0	0	0	10
SE	11	32	8	0	0	0	51
SSE	8	42	10	0	0	0	60
S	10	28	18	0	0	0	56
SSW	15	18	9	0	0	0	42
SW	12	11	18	2	0	0	43
WSW	5	14	12	2	0	0	33
W	4	3	2	0	0	0	9
WNW	6	8	4	1	1	0	20
NW	12	13	0	0	0	0	25
NNW	5	1	1	0	0	0	7
VARIABLE	21	0	0	0	0	0	21
Total	114	178	82	5	1	0	380

R.G. 1.21 JOINT FREQUENCY TABLE

T. U. ELECTRIC COMPANY

HOURS AT EACH WIND SPEED AND DIRECTION

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

STABILITY CLASS: G

ELEVATION: 10 m.

Wind Direction	Wind Speed (mph) at 10 m. level						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
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	1	0	0	0	0	1
ESE	1	0	0	0	0	0	1
SE	2	2	1	0	0	0	5
SSE	6	1	0	0	0	0	7
S	9	4	3	0	0	0	16
SSW	15	14	1	0	0	0	30
SW	10	8	5	0	0	0	23
WSW	3	10	16	0	0	0	29
W	9	2	6	0	0	0	17
WNW	6	2	0	0	0	0	8
NW	12	7	0	0	0	0	19
NNW	0	0	0	0	0	0	0
VARIABLE	10	0	0	0	0	0	10
Total	83	51	32	0	0	0	166

R.G. 1.21 JOINT FREQUENCY TABLE

T. U. ELECTRIC COMPANY

HOURS AT EACH WIND SPEED AND DIRECTION

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

STABILITY CLASS: ALL

ELEVATION: 10 m.

Wind Direction	Wind Speed (mph) at 10 m. level						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	16	95	194	176	60	11	552
NNE	15	115	214	127	25	0	496
NE	26	73	157	35	16	0	307
ENE	29	98	112	12	1	0	252
E	24	129	114	6	0	0	273
ESE	53	305	109	5	0	0	472
SE	49	436	516	84	9	0	1094
SSE	35	385	668	311	84	7	1490
S	41	204	583	517	165	22	1532
SSW	50	139	249	159	32	3	632
SW	45	87	105	32	2	0	271
WSW	22	79	75	16	3	0	195
W	20	39	24	17	8	0	108
WNW	18	59	46	9	10	0	142
NW	29	85	51	59	23	8	255
NNW	14	57	102	177	48	24	422
VARIABLE	183	36	22	1	0	0	242
Total	669	2421	3341	1743	486	75	8735