

APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 50-445/94-05
50-446/94-05

Operating Licenses: NPF-87
NPF-88

Licensee: TU Electric
Skyway Tower
400 North Olive Street, L.B. 81
Dallas, Texas 75201

Facility Name: Comanche Peak Steam Electric Station, Units 1 and 2

Inspection At: Glen Rose, Texas

Inspection Conducted: January 24-28, 1994

Inspector: J. B. Nicholas, Ph.D., Senior Radiation Specialist
Facilities Inspection Programs Section

Approved:

Blaine Murray
Blaine Murray, Chief, Facilities Inspection
Programs Branch

2/28/94
Date

Inspection Summary

Areas Inspected (Units 1 and 2): Routine, announced inspection of the licensee's water chemistry and radiochemistry programs including water chemistry and radiochemistry confirmatory measurements.

Results Units 1 and 2):

- Organizational structure and staffing of the chemistry department met Technical Specification requirements (Section 1.1).
- The chemistry department had implemented an excellent chemistry program (Section 1.1).
- The chemistry department underwent reorganizational changes and additions of new personnel to support the startup and operation of Unit 2 (Section 1.1).
- The chemistry department was fully staffed with qualified personnel (Section 1.1).

- An excellent quality assurance audit and excellent quality assurance surveillances of the chemistry program had been performed and were considered a strength (Section 2.1).
- An excellent water chemistry program had been implemented (Section 3.1).
- The water chemistry confirmatory measurements performance was good (Section 3.1).
- An excellent radiological analytical measurement program had been implemented (Section 4.1).
- State-of-the-art radiological counting instrumentation was calibrated and maintained (Section 4.1).
- The radiological confirmatory measurements performance was excellent (Section 4.1).

Attachments:

- Attachment 1 - Persons Contacted and Exit Meeting
- Attachment 2 - Water Chemistry Confirmatory Measurements Results (Secondary Chemistry Laboratory)
- Attachment 3 - Water Chemistry Confirmatory Measurements Results (Primary Chemistry Laboratory)
- Attachment 4 - Water Chemistry Confirmatory Measurements Results (Water Chemistry Laboratory)
- Attachment 5 - Criteria for Comparing Water Chemistry Analytical Measurements
- Attachment 6 - Radiological Confirmatory Measurement Results
- Attachment 7 - 1992 Quality Assurance Liquid Capability Test Sample Results
- Attachment 8 - Criteria for Comparing Radiological Analytical Measurements

DETAILS

1 ORGANIZATION AND MANAGEMENT CONTROLS (84750)

The inspector reviewed the organization and staffing of the chemistry department to determine agreement with commitments in Chapter 13 of the Updated Safety Analysis Report and compliance with the requirements in Technical Specification 6.2.

1.1 Discussion

The inspector reviewed the organizational structure of the chemistry department. The inspector reviewed the organizational and staffing changes in the chemistry department since the previous NRC inspection of this area conducted in November 1991. These changes included the addition of a fourth chemistry supervisor, a contractor staff chemist, 10 chemistry technicians, and two contract technicians. All of the new chemistry personnel had either worked at other commercial nuclear power facilities or as contractors with the licensee during startup of Unit 2, and they all met the qualifications specified in ANSI-N18.1-1971. These personnel changes during the past 2 years had no negative affect on the performance of the chemistry program. The organizational structure and staffing of the chemistry department was as defined in the Updated Safety Analysis Report and Technical Specifications. Departmental procedures were reviewed for the assignment of responsibilities for the management and implementation of the chemistry program. The inspector determined that the duties and responsibilities specified in the plant procedures were being implemented, and the chemistry department activities were well managed. The chemistry department was fully staffed. Five lead chemistry technicians, 30 chemistry technicians, and 5 contract chemistry technicians staffed 5 rotational shifts plus day-shift support positions. All chemistry staff personnel were qualified and directly responsible for performing the required chemistry activities and responsibilities for monitoring and controlling chemistry parameters of plant water and effluent systems by collecting and analyzing plant system samples in accordance with the Technical Specification and Offsite Dose Calculation Manual requirements. The inspector interviewed several of the chemistry technicians and determined that they were familiar with the requirements of the chemistry program and maintained a high level of performance.

1.2 Conclusions

The organizational structure and staffing of the chemistry department met the commitments in the Updated Safety Analysis Report and the requirements in the Technical Specifications. Chemistry department management controls were being implemented in accordance with plant procedures. During the past 2 years, the chemistry department underwent a reorganization and an increase in staffing to support the startup and operation of Unit 2. The organizational changes and addition of new personnel had no negative effect on the performance of the chemistry program. The chemistry department was fully staffed with qualified personnel.

2 QUALITY ASSURANCE PROGRAM (84750)

The inspector reviewed the quality assurance audit and surveillance programs regarding the chemistry program activities to determine agreement with the commitments in Chapters 13 and 17 of the Updated Safety Analysis Report and compliance with the requirements in Technical Specification 6.5.2.8.

2.1 Discussion

The inspector reviewed the quality assurance 1991-1993 audit schedule issued June 3, 1993. This schedule reflected a biennial audit schedule for the chemistry control program. The audit schedule indicated that the Chemical/Radiochemical Control audit was to be performed in May or June of the odd numbered years. The audit schedule was in compliance with the Technical Specification audit frequency requirements. The inspector reviewed the quality assurance audit plans and checklists and the qualifications of the quality assurance auditors who performed the audits of the chemistry program.

The inspector reviewed the 1993 quality assurance audit report of the "Chemistry Control Program" (QAA-93-117) which was conducted during the time period May 24 through June 11, 1993, for scope, thoroughness of program evaluation, and timely followup of identified deficiencies. The audit was performed by qualified personnel who were knowledgeable in nuclear chemistry program activities and in accordance with quality assurance procedures and schedules. The audit team evaluated the implementation of chemistry control program. The evaluation included, in part, reviews and assessments of the organizational structure, staffing, sampling and analytical activities, chemistry parameter trending and control, training and qualifications of chemistry personnel, and compliance with the surveillance requirements of the Technical Specifications and Offsite Dose Calculation Manual. One deficiency was identified in the chemistry program concerning an instrument that was not being controlled as required to prevent its use after its calibration due date had been exceeded. The instrument was verified not to have been used after the calibration due date, the licensee took immediate corrective action to control the instrument from use until it was calibrated, and the audit deficiency was closed before the completion of the audit. The 1993 audit of the chemistry program was comprehensive and of excellent quality to evaluate the licensee's performance in implementing the chemistry program and was conducted in agreement with Updated Safety Analysis Report commitments and met Technical Specification requirements.

The Independent Safety Engineering Group had been assigned the responsibilities for the administration and implementation of the operating quality assurance surveillance program. The inspector reviewed 23 Independent Safety Engineering Group Field Note Sheets which documented the Independent Safety Engineering Group's quality assurance surveillances of the chemistry program related activities since the previous NRC inspection of this area conducted in November 1991. The inspector determined that the operating quality assurance surveillances of the chemistry program were thorough and technically comprehensive and were conducted in sufficient depth to evaluate the licensee's compliance with Technical Specification and Offsite Dose

Calculation Manual requirements. One deficiency was identified by the licensee during their surveillance activities and documented on One Form FX-93-265. The frequency and thoroughness of the quality assurance surveillances of the chemistry program activities was considered a strength.

2.2 Conclusion

An excellent quality assurance audit of the chemistry program had been performed as required. The audit was technically comprehensive and provided excellent program evaluation and management oversight. Excellent quality assurance surveillances which monitored chemistry program activities had been performed and were considered a strength.

3 WATER CHEMISTRY CONTROL, CHEMICAL ANALYSIS, AND CONFIRMATORY MEASUREMENTS (84750)

The inspector reviewed the water chemistry control and analysis program including implementation of the water chemistry control program, facilities and equipment, quality control program for chemical measurements, analytical procedures, and water chemistry confirmatory measurements to determine agreement with commitments in Chapter 10 of the Updated Safety Analysis Report and compliance with the requirements in Technical Specifications 3/4.4.6, 3/4.5.4, 3/4.7.1.4, 3/4.9.1, 6.8.1, and 6.8.3.c.

3.1 Discussion

The inspector's review of the water chemistry program determined that the licensee had revised and approved administrative procedures, surveillance procedures, chemical control procedures, sampling procedures, analytical instrument calibration and quality control procedures, and analytical procedures. A review of selected water chemistry procedures indicated that the licensee had established and implemented excellent water chemistry programmatic procedures to meet the commitments in the Updated Safety Analysis Report and the requirements in the Technical Specifications.

The inspector inspected the primary chemistry and secondary chemistry laboratory facilities and the analytical instrumentation used by the chemistry staff for water chemistry analytical measurements and control. The chemistry laboratories were equipped with the necessary chemicals, reagents, and state-of-the-art analytical instrumentation to perform the required analyses to monitor the various water system chemical parameters.

The inspector reviewed selected chemistry analytical procedures and procedures for the operation, calibration, and quality control of the analytical instrumentation used for the analyses of the NRC water chemistry standards. It was verified, by review of records and direct observation, that the chemistry laboratories analytical instruments were calibrated, and an instrument quality control program was implemented in accordance with licensee's procedures.

During the inspection, the inspector provided prepared standard chemical solutions to the licensee for confirmatory measurement analyses. The standard solutions were prepared by Oak Ridge National Laboratory, Analytical Chemistry Division, for the NRC. The NRC standards were analyzed by the licensee in the primary chemistry, secondary chemistry, and water chemistry laboratories using routine analytical methods and instrumentation. The analytical results of the chemical standards were used to verify the licensee's capability to monitor chemical parameters in the various station water systems with respect to Technical Specification requirements and industry standards. In addition, the chemical analyses of the NRC standards were used to evaluate the licensee's analytical procedures with respect to accuracy and precision.

As part of the water chemistry confirmatory measurements inspection, a Unit-1 steam generator blowdown sample was collected on January 27, 1994. The sample was split into three equal aliquots. An aliquot of the sample was analyzed for chloride, fluoride, and sulfate in the secondary chemistry laboratory, and the other two aliquots were shipped to Oak Ridge National Laboratory for confirmatory analyses of chloride, fluoride, and sulfate. The comparisons of the analytical results will be reported in a future NRC inspection report.

The results of the initial water chemistry confirmatory measurement analyses and their comparison with the NRC's certified known analytical concentrations are listed for the secondary chemistry laboratory, primary chemistry laboratory, and water chemistry laboratory in Attachments 2, 3, and 4, respectively. Attachment 5 contains the criteria used to evaluate the analytical results.

The licensee's original analytical results from the analyses performed in the secondary chemistry laboratory indicated minor problems with the analyses for chloride and iron. The original analytical results showed that 24 of the 26 analytical results compared (92 percent) were in agreement or qualified agreement using the criteria presented in Attachment 5.

- The licensee's original chloride low range concentration analytical result was in **disagreement**. The analytical result was biased high indicating possible sample contamination. The licensee recalibrated the ion chromatograph for chloride and performed a retest chloride analysis. The retest analytical result was still in **disagreement**.
- The licensee's original iron low range concentration analytical result was in **disagreement**. The analytical result was biased low indicating a possible instrument calibration problem. The licensee recalibrated the atomic absorption spectrometer and performed a retest iron analysis. The retest analytical result was in agreement.

The licensee's final analytical results from the analyses performed in the secondary chemistry laboratory, after the retest analyses to resolve the original disagreements, indicated that 96 percent of the compared analytical

results were in agreement or qualified agreement with the NRC's certified known analytical concentrations based on 26 analytical results compared.

The licensee's original analytical results from the analyses performed in the primary chemistry laboratory indicated minor problems with the analyses for chloride, sulfate, boron, nickel, and lithium. The original analytical results showed that 16 of the 21 analytical results compared (76 percent) were in agreement or qualified agreement using the criteria presented in Attachment 5.

- The licensee's original chloride low range concentration analytical result was in **disagreement**. The analytical result was biased low indicating possible instrument calibration problem. The licensee recalibrated the ion chromatograph for chloride and performed a retest chloride analysis. The retest analytical result was still in **disagreement**.
- The licensee's original sulfate low range concentration analytical result was in **disagreement**. The analytical result was biased high indicating a possible instrument calibration problem. The licensee recalibrated the ion chromatograph for sulfate and performed a retest sulfate analysis. The retest analytical result was in agreement.
- The licensee's original boron low range concentration analytical result was in **disagreement**. The analytical result was biased low indicating a possible calibration problem. The licensee restandardized the sodium hydroxide titrant for the boron analysis and performed a retest boron analysis. The retest analytical result was in agreement.
- The licensee's original nickel high range concentration analytical result was in **disagreement**. The analytical result was biased high indicating a possible instrument calibration problem or sample preparation problem. The licensee prepared new dilutions of NRC nickel standard 92I-56 and performed a retest nickel analysis. The retest analytical result was in agreement.
- The licensee's original lithium low range concentration analytical result was in **disagreement**. The analytical result was biased high indicating a possible instrument calibration problem or sample preparation problem. The licensee prepared new dilutions of NRC lithium standard 92JJ-96, recalibrated the atomic absorption spectrometer, and performed a retest lithium analysis. The retest analytical result was still in **disagreement**.

The licensee's final analytical results from the analyses performed in the primary chemistry laboratory, after the retest analyses to resolve the original disagreements, indicated that 90 percent of the compared analytical

results were in agreement or qualified agreement with the NRC's certified known analytical concentrations based on 21 analytical results compared.

The licensee's original analytical results from the analyses performed in the water chemistry laboratory indicated problems with the analysis for silica. The original analytical results showed that only one of the three analytical results compared was in agreement using the criteria presented in Attachment 5.

- The licensee's original silica mid-range and high range concentration analytical results were in disagreement. The analytical results were biased high indicating possible sample contamination. The licensee prepared new dilutions of the NRC silica standards, prepared new silica calibration standards, recalibrated the ion chromatograph, and performed retest silica analyses. The retest analytical results were in agreement.

The licensee's final analytical results from the analyses performed in the water chemistry laboratory, after the retest analyses to resolve the original disagreements, indicated that 100 percent of the compared analytical results were in agreement with the NRC's certified known analytical concentrations based on 3 analytical results compared.

The licensee's performance in the area of water chemistry confirmatory measurements in the secondary, primary, and water chemistry laboratories was good but not as good as achieved during the previous NRC inspection of this area in November 1991. The licensee was continuing to work on the resolution of the analytical results which were still in disagreement at the end of the inspection. The resolved disagreement analytical results with the chloride and lithium analyses were not severe enough to cause any major problems in the chemistry control of the station's water systems.

3.2 Conclusion

An excellent water chemistry program was being implemented. The chemistry laboratories and analytical instrumentation were being maintained satisfactorily. The licensee's performance in the water chemistry confirmatory measurements was good but not as good as achieved during the previous inspection of this area in November 1991.

4 RADIOLOGICAL CONFIRMATORY MEASUREMENTS (84750)

The inspector reviewed the radiochemistry program including analytical procedures, facilities and equipment, implementation of a quality control program for radiochemistry measurements, and performed radiological confirmatory measurements to determine agreement with commitments in Chapters 5 and 9 of the Updated Safety Analysis Report and compliance with the requirements in Technical Specifications 3/4.4.7, 3/4.7.1.4, 6.8.1, and 6.8.3.e; and the Offsite Dose Calculation Manual Sections 3/4.11.1 and 3/4.11.2 and Tables 4.11-1 and 4.11-2.

4.1 Discussion

The inspector reviewed selected radiochemistry analytical procedures revised and approved since the previous chemistry inspection conducted in November 1991 and determined that the licensee had implemented satisfactory procedures to meet commitments in the Updated Safety Analysis Report and the Technical Specifications and Offsite Dose Calculation Manual requirements.

The inspector inspected the primary chemistry laboratory, radiochemistry counting facility, and the health physics counting facility and determined that the licensee had sufficient state-of-the-art analytical instrumentation to perform the required radiochemistry analytical measurements. The inspector reviewed selected radiochemistry analytical instrument calibration and quality control records and verified that the radiochemistry and health physics counting facilities instruments were properly calibrated and that an excellent quality control program was being implemented. The inspector accompanied and observed chemistry personnel collect and prepare for analysis the radioactive waste gas sample from Waste Gas Decay Tank 7, the radioactive waste liquid sample from Floor Drain Tank 3, and the gas and degassed liquid samples from the Unit-1 Reactor Coolant System. The sampling and preparation of the samples for analysis were performed in accordance with approved procedures.

During the inspection, radiological confirmatory measurements were performed on split samples and standards analyzed by the chemistry department and health physics department staffs in the radiochemistry and health physics counting facilities, and analyzed by the inspector in the Region IV mobile laboratory on site. The samples and standards were analyzed by the licensee using routine methods and instrumentation.

Radiological confirmatory measurements were performed on the following samples:

- Waste Gas Decay Tank No. 7 Sample (1 liter gas Marinelli beaker)
- NRC Scott Charcoal Cartridge Standard (44712-109)
- Floor Drain Tank No. 3 Sample (1 liter liquid Marinelli beaker)
- Monitor Holdup Tank Crud Filter Sample (filtered sample in a petri dish)
- Unit-1 Reactor Coolant System Gas Sample (15 cc serum vial)
- Unit-1 Reactor Coolant System Liquid Sample (20 ml scintillation vial)
- Unit-1 Reactor Coolant System Tritium Sample
- Unit-2 Reactor Coolant System Tritium Sample

The radiological confirmatory measurement tests consisted of comparing the analytical results from the licensee's radiochemistry and health physics

counting instrumentation with the NRC Region IV mobile laboratory's analytical results. The NRC Region IV mobile laboratory's measurements were referenced to the National Institute of Standards and Technology by laboratory intercomparisons. The radiological confirmatory measurement comparisons were made only for those nuclides identified by the NRC as being present in concentrations greater than 10 percent of the respective isotopic values for liquid and gas concentrations as stated in 10 CFR Part 20, Appendix B, Table II.

At the time of the inspection, the licensee was utilizing four high purity germanium detectors in the radiochemistry counting facility and two in the health physics counting facility. These detectors were used routinely for isotopic analysis of radioactive samples to demonstrate compliance with Technical Specification and Offsite Dose Calculation Manual requirements. Individual sample analytical results and their comparison with the NRC analytical results are tabulated in Attachment 6. The tabulated analytical results from the licensee's six detectors are listed in the following order:

- Radiochemistry Counting Facility - Detector No. 1
- Radiochemistry Counting Facility - Detector No. 2
- Radiochemistry Counting Facility - Detector No. 3
- Radiochemistry Counting Facility - Detector No. 4
- Health Physics Counting Facility - Detector No. 1
- Health Physics Counting Facility - Detector No. 2

The licensee's radiochemistry counting facilities isotopic analytical results from the samples listed in Attachment 6 showed 98.5 percent agreement with the NRC's isotopic analytical results based on 128 agreement results out of 130 total analytical results compared. The licensee's tritium results of the two reactor coolant system samples were in agreement with the NRC analyses results. The licensee's radiochemistry counting facility's performance in the area of radiological confirmatory measurements was consistent with the excellent high quality performance of 99 percent agreement achieved during the previous NRC inspection of this area in November 1991.

The licensee's health physics counting facilities isotopic analytical results from the samples listed in Attachment 6 showed 98.1 percent agreement with the NRC's isotopic analytical results based on 51 agreement results out of 52 total analytical results compared. The licensee's health physics counting facility's performance in the area of radiological confirmatory measurements was consistent with the excellent high quality performance of 100 percent agreement achieved during the previous NRC inspection of this area in November 1991.

The licensee performed radiological confirmatory measurements on a quality assurance liquid capability test sample prepared by the NRC's reference laboratory, the Department of Energy's Radiological and Environmental Sciences Laboratory, in Idaho Falls, Idaho. The licensee's analytical results were compared to the certified sample radionuclide activities and the results of the comparisons are presented in Attachment 7. The analytical results from the gamma isotopic and tritium analyses performed by the licensee were in agreement. The analytical results from the strontium-89 and strontium-90 analyses performed by a contract laboratory were in agreement. However, the initial analytical result from the iron-55 analysis performed by the licensee's contract laboratory was in disagreement. The licensee submitted an iron-55 quality control follow-up sample to be analyzed by the contract laboratory. The analytical result from the follow-up iron-55 analysis was in agreement. The criteria used to compare the analytical results is presented in Attachment 8.

4.2 Conclusion

An excellent radiological analytical measurement program was being implemented in both the radiochemistry and health physics counting facilities. The licensee had satisfactorily calibrated and maintained state-of-the-art radiological counting instrumentation. The licensee's performance in the area of radiological confirmatory measurements was excellent and consistent with the high quality performance achieved during the previous NRC inspection of this area in November 1991.

ATTACHMENT 1

1 PERSONS CONTACTED

1.1 Licensee Personnel

- *C. L. Terry, Vice President, Nuclear Operations
- *M. R. Blevins, Manager, Nuclear Operations
- *D. M. Bozeman, Manager, Chemistry
- *C. M. Carella, Chemistry Supervisor
- *E. T. Floyd, Staff Health Physicist
- *N. S. Harris, Licensing Engineer
- *D. C. Kay, Supervisor, Radiation Protection Technical Support
- *D. R. Kross, Manager, Operations Support
- *G. B. Moore, Chemistry Supervisor
- *D. L. Perkins, Chemistry Counting Room Coordinator
- W. Z. Prickett, Chemistry Technician
- *R. L. Ramsour, Radiation Protection Supervisor
- *G. H. Ruzala, Chemist
- *J. M. Stevens, Chemistry Supervisor
- *R. L. Theimer, Chemistry Supervisor

1.2 NRC Personnel

- *D. N. Graves, Senior Resident Inspector

In addition to the personnel listed above, the inspector contacted other personnel during the inspection.

*Indicates those present at the exit meeting on January 28, 1994.

2 EXIT MEETING

An exit meeting was conducted on January 28, 1994. During this meeting, the inspector reviewed the scope and findings of the inspection. The licensee did not express a position on the inspection findings documented in this report. The licensee did not identify as proprietary any information provided to, or reviewed by, the inspector.

Attachment 2

WATER CHEMISTRY CONFIRMATORY MEASUREMENTS RESULTS

Secondary Chemistry Laboratory

COMANCHE PEAK STEAM ELECTRIC STATION

NRC INSPECTION REPORT: 50-445/94-05; 50-446/94-05

1 Chloride Analysis (Ion Chromatography)				
Sample	CPSES Results (ppm)	NRC Results (ppm)	CPSES/NRC Ratio	Comparison Decision
92A-3	28.4±3.1	19.0±0.3	1.495	Disagreement
92B-28	38.8±0.8	36.0±1.2	1.078	Qualified Agreement
92C-14	79.0±0.9	75.3±3.0	1.049	Agreement
Retest - recalibrated the ion chromatograph for chloride and performed retest analysis				
92A-3	23.0±2.6	19.0±0.3	1.210	Disagreement

2 Fluoride Analysis (Ion Chromatography)				
Sample	CPSES Results (ppm)	NRC Results (ppm)	CPSES/NRC Ratio	Comparison Decision
92A-3	19.2±0.5	20.2±1.0	0.950	Agreement
92B-28	40.3±0.3	40.2±2.6	1.002	Agreement
92C-14	Out of Range	85.1±4.9		

Attachment 2 (cont'd)

3 Sulfate Analysis (Ion Chromatography)				
Sample	CPSES Results (ppm)	NRC Results (ppm)	CPSES/NRC Ratio	Comparison Decision
92A-3	19.6±1.6	19.4±0.3	1.010	Agreement
92B-28	37.8±1.9	38.8±0.8	0.974	Agreement
92C-14	76.8±1.5	79.3±2.1	0.968	Agreement

4 Iron Analysis (Atomic Absorption - Graphite Furnace)				
Sample	CPSES Results (ppm)	NRC Results (ppm)	CPSES/NRC Ratio	Comparison Decision
92G-79	15.0±0.0	19.9±0.2	0.754	Disagreement
92H-37	36.0±0.0	39.8±0.4	0.904	Agreement
92I-56	76.0±1.7	79.5±0.7	0.956	Agreement
Retest - recalibrated the atomic absorption spectrometer for iron and performed retest analysis				
92G-79	19.7±2.3	19.9±0.2	0.989	Agreement

Attachment 2 (cont'd)

5 Copper Analysis (Atomic Absorption - Graphite Furnace)				
Sample	CPSES Results (ppm)	NRC Results (ppm)	CPSES/NRC Ratio	Comparison Decision
92G-79	20.0±0.0	20.2±0.2	0.990	Agreement
92H-37	38.0±0.0	40.3±0.4	0.943	Agreement
92I-56	75.7±1.1	81.0±1.0	0.935	Agreement

6 Sodium Analysis (Atomic Absorption - Graphite Furnace)				
Sample	CPSES Results (ppm)	NRC Results (ppm)	CPSES/NRC Ratio	Comparison Decision
92J-5	6.1±0.8	5.3±0.2	1.147	Agreement
92K-78	10.7±0.4	10.2±0.3	1.049	Agreement
92L-144	15.6±0.4	15.5±0.4	1.006	Agreement

7 Ammonia Analysis (Ion Chromatography)				
Sample	CPSES Results (ppm)	NRC Results (ppm)	CPSES/NRC Ratio	Comparison Decision
92M-7	107.0±2.1	109.78±2.86	0.974	Agreement
92N-36	291.0±5.0	304.98±5.13	0.954	Agreement
92O-12	478.0±6.5	481.87±7.43	0.992	Agreement

Attachment 2 (cont'd)

8 Hydrazine Analysis (UV-VIS Spectroscopy)				
Sample	CPSES Results (ppm)	NRC Results (ppm)	CPSES/NRC Ratio	Comparison Decision
92P-57	12.7±0.6	13.23±0.06	0.960	Qualified Agreement
92Q-87	31.0±1.7	34.12±0.32	0.909	Agreement
92R-16	53.7±0.6	56.52±0.95	0.950	Agreement

9 Silica Analysis (UV-VIS Spectroscopy)				
Sample	CPSES Results (ppm)	NRC Results (ppm)	CPSES/NRC Ratio	Comparison Decision
92S-260	16.0±0.0	15.44±1.68	1.036	Agreement
92T-180	28.6±0.6	28.36±0.36	1.008	Agreement
92U-263	59.3±2.1	60.14±0.99	0.986	Agreement

Attachment 3

WATER CHEMISTRY CONFIRMATORY
MEASUREMENTS RESULTS

Primary Chemistry Laboratory

COMANCHE PEAK STEAM ELECTRIC STATION

NRC INSPECTION REPORT: 50-445/94-05; 50-446/94-05

1 Chloride Analysis (Ion Chromatography)				
Sample	CPSES Results (ppm)	NRC Results (ppm)	CPSES/NRC Ratio	Comparison Decision
92A-3	10.6±2.1	19.0±0.3	0.558	Disagreement
92B-28	32.9±0.8	36.0±1.2	0.914	Qualified Agreement
92C-14	67.2±3.1	75.3±3.0	0.892	Qualified Agreement
Retest - recalibrated the ion chromatograph for chloride and performed retest analysis				
92A-3	13.8±3.2	19.0±0.3	0.726	Disagreement

Attachment 3 (cont'd)

2 Fluoride Analysis (Ion Chromatography)				
Sample	CPSES Results (ppm)	NRC Results (ppm)	CPSES/NRC Ratio	Comparison Decision
92A-3	18.1±0.8	20.2±1.0	0.900	Agreement
92B-28	38.7±1.3	40.2±2.6	0.963	Agreement
92C-14	77.1±0.3	85.1±4.9	0.906	Qualified Agreement

3 Sulfate Analysis (Ion Chromatography)				
Sample	CPSES Results (ppm)	NRC Results (ppm)	CPSES/NRC Ratio	Comparison Decision
92A-3	23.1±1.6	19.4±0.3	1.191	Disagreement
92B-28	40.1±0.9	38.8±0.8	1.034	Agreement
92C-14	79.9±0.9	79.3±2.1	1.010	Agreement
Retest - recalibrated the ion chromatograph for sulfate and performed retest analysis				
92A-3	20.4±0.6	19.4±0.3	1.051	Agreement

Attachment 3 (cont'd)

4 Boron Analysis (Mannitol Titration)				
Sample	CPSES Results (ppm)	NRC Results (ppm)	CPSES/NRC Ratio	Comparison Decision
92D-95	997±6	1049±11	0.950	Disagreement
92E-81	3035±5	3038±36	0.983	Agreement
92F-99	5068±3	5062±80	1.001	Agreement
Retest - restandardized the sodium hydroxide titrant for boron and performed retest analysis				
92D-95	1063±6	1049±11	1.013	Agreement

5 Nickel Analysis (Atomic Absorption - Flame)				
Sample	CPSES Results (ppm)	NRC Results (ppm)	CPSES/NRC Ratio	Comparison Decision
92G-79	20.9±0.5	19.9±0.2	1.050	Agreement
92H-37	44.2±0.6	40.0±0.4	1.105	Qualified Agreement
92I-56	85.7±0.6	80.0±0.8	1.071	Disagreement
Retest - prepared new NRC nickel standard dilutions for 92H-37 and 92I-56 and performed retest analyses				
92H-37	41.5±0.9	40.0±0.4	1.037	Agreement
92I-56	83.0±3.8	80.0±0.8	1.038	Agreement

Attachment 3 (cont'd)

6 Lithium Analysis (Atomic Absorption - Flame)				
Sample	CPSES Results (ppm)	NRC Results (ppm)	CPSES/NRC Ratio	Comparison Decision
92JJ-96	6.5±0.0	4.93±0.07	1.318	Disagreement
92KK-14	13.6±0.4	12.44±0.2	1.000	Agreement
92LL-14	26.0±0.3	24.30±0.3	1.070	Agreement
Retest - prepared new NRC lithium standard dilution for 92JJ-96, recalibrated the atomic absorption spectrometer, and performed retest analysis				
92JJ-96	6.5±0.1	4.93±0.07	1.318	Disagreement

7 Silica Analysis (UV-VIS Spectroscopy)				
Sample	CPSES Results (ppm)	NRC Results (ppm)	CPSES/NRC Ratio	Comparison Decision
92S-260	18.0±0.0	15.44±1.68	1.165	Qualified Agreement
92T-180	30.3±0.6	28.36±0.36	1.068	Agreement
92U-263	60.3±0.6	60.14±0.99	1.002	Agreement

Attachment 4

WATER CHEMISTRY CONFIRMATORY
MEASUREMENTS RESULTS

Water Chemistry Laboratory

COMANCHE PEAK STEAM ELECTRIC STATION

NRC INSPECTION REPORT: 50-445/94-05; 50-446/94-05

1 Silica Analysis (Ion Chromatography)				
Sample	CPSES Results (ppm)	NRC Results (ppm)	CPSES/NRC Ratio	Comparison Decision
92S-260	17.5±0.1	15.44±1.68	1.131	Agreement
92T-77	32.3±0.3	28.36±0.36	1.139	Disagreement
92U-276	68.6±2.7	60.14±0.99	1.141	Disagreement
Retest - prepared new NRC silica standard dilutions, prepared new silica calibration standards, recalibrated the ion chromatograph, and performed retest analyses				
92T-180	30.2±0.5	28.36±0.36	1.065	Agreement
92U-263	63.2±5.9	60.14±0.99	1.051	Agreement

Attachment 5

CRITERIA FOR COMPARING WATER CHEMISTRY ANALYTICAL MEASUREMENTS

The following are the criteria used in comparing the results of the capability tests and verification measurements. The criteria for the judgement limits was based on the data from Table 2.1 of NUREG/CR-5244, "Evaluation of Non-Radiological Water Chemistry at Power Reactors," applied to Oak Ridge National Laboratory data. Licensee values within the plus or minus two standard deviations range of the known values are considered to be in agreement. Licensee values outside the plus or minus two standard deviations range but within the plus or minus three standard deviations range of the known values are considered to be in qualified agreement. Licensee values greater than the plus or minus three standard deviations range of the known values are in disagreement. The standard deviations were computed using the average percent standard deviation values of each analyte in Table 2.1 of NUREG/CR-5244.

Analyte	Sample	Agreement Range	Qualified Agreement Range
Ammonia	92M	99.02 - 120.54	93.64 - 125.92
	92N	275.70 - 334.26	261.06 - 348.90
	92O	436.48 - 527.08	413.85 - 549.71
Boron	92D	1028 - 1070	1018 - 1080
	92E	2977 - 3099	2947 - 3129
	92F	4941 - 5183	4880 - 5244
Chloride	92A	17.6 - 20.4	16.9 - 21.1
	92B	33.7 - 38.3	32.5 - 39.5
	92C	69.1 - 81.5	66.0 - 84.6

Attachment 5 (cont'd)

Analyte	Sample	Agreement Range	Qualified Agreement Range
Chromium	92G	18.0 - 22.0	17.0 - 23.0
	92H	35.9 - 44.5	33.8 - 46.6
	92I	73.5 - 87.3	70.0 - 90.8
Copper	92G	18.3 - 22.1	17.3 - 23.1
	92H	36.0 - 44.6	33.9 - 46.7
	92I	74.2 - 87.8	70.8 - 91.2
Fluoride	92A	16.5 - 23.9	14.6 - 25.8
	92B	36.8 - 43.6	35.1 - 45.3
	92C	77.9 - 92.3	74.4 - 95.8
Hydrazine	92P	12.83 - 13.63	12.63 - 13.83
	92Q	29.96 - 38.28	27.88 - 40.36
	92R	52.00 - 61.04	49.74 - 63.3
Iron	92G	18.6 - 21.2	17.9 - 21.9
	92H	35.9 - 43.7	33.9 - 45.7
	92I	69.6 - 89.4	64.7 - 94.3
Lithium	92JJ	4.05 - 5.81	3.61 - 6.25
	92KK	10.9 - 13.9	10.1 - 14.7
	92LL	21.4 - 27.2	20.0 - 28.6

Attachment 5 (cont'd)

Analyte	Sample	Agreement Range	Qualified Agreement Range
Nickel	92G	18.6 - 21.2	17.9 - 21.9
	92H	36.6 - 43.4	35.0 - 45.0
	92I	77.1 - 82.9	75.7 - 84.3
Silica	92S	13.15 - 17.73	12.01 - 18.87
	92T	26.32 - 30.40	25.30 - 31.42
	92U	56.53 - 63.75	54.73 - 65.55
Sodium	92J	4.37 - 6.27	3.90 - 6.74
	92K	9.00 - 11.4	8.30 - 12.1
	92L	13.7 - 17.3	12.8 - 18.2
Sulfate	92A	17.5 - 21.3	16.5 - 22.3
	92B	35.8 - 41.8	34.4 - 43.2
	92C	70.9 - 87.7	66.7 - 91.9
Zinc	92X	-----	-----
	92Y	-----	-----
	92Z	-----	-----

Attachment 6

RADIOLOGICAL CONFIRMATORY MEASUREMENT RESULTS
 COMANCHE PEAK STEAM ELECTRIC STATION
 NRC INSPECTION REPORT: 50-445/94-05; 50-446/94-05

1 WASTE GAS DECAY TANK 7 SAMPLE - 1260 cc Sampled: 10:40, CST, January 25, 1994 Radiochemistry Detectors: (1), (2), (3), and (4) Health Physics Detectors: (1) and (2)				
Nuclide	CPSES Results ($\mu\text{Ci/cc}$)	NRC Results ($\mu\text{Ci/cc}$)	CPSES/NRC Ratio	Comparison Decision
Kr-85	2.089 \pm 0.125E-2	2.222 \pm 0.006E-2	0.94	Agreement
	2.129 \pm 0.126E-2		0.96	Agreement
	2.143 \pm 0.124E-2		0.96	Agreement
	2.194 \pm 0.127E-2		0.99	Agreement
	2.093 \pm 0.107E-2		0.94	Agreement
	2.152 \pm 0.109E-2		0.97	Agreement
Xe-133	1.148 \pm 0.167E-5	1.210 \pm 0.029E-5	0.95	Agreement
	1.131 \pm 0.165E-5		0.93	Agreement
	1.163 \pm 0.173E-5		0.96	Agreement
	1.203 \pm 0.184E-5		0.99	Agreement
	1.208 \pm 0.123E-5		0.99	Agreement
	1.215 \pm 0.123E-5		1.00	Agreement

Attachment 6 (cont'd)

2 NRC SCOTT CHARCOAL CARTRIDGE STANDARD (44712-109) Sampled: 12:00, CST, January 25, 1994 Radiochemistry Detectors: (1), (2), (3), and (4) Health Physics Detectors: (1) and (2)				
Nuclide	CPSES Results ($\mu\text{Ci}/\text{Sample}$)	NRC Results ($\mu\text{Ci}/\text{Sample}$)	CPSES/NRC Ratio	Comparison Decision
Cd-109	6.412 \pm 0.594E-1	6.088 \pm 0.041E-1	1.05	Agreement
	6.340 \pm 0.588E-1		1.04	Agreement
	6.207 \pm 0.588E-1		1.02	Agreement
	6.538 \pm 0.624E-1		1.07	Agreement
	6.069 \pm 0.482E-1		0.99	Agreement
	6.360 \pm 0.478E-1		1.04	Agreement
Co-57	7.457 \pm 0.507E-3	7.959 \pm 0.100E-3	0.94	Agreement
	7.267 \pm 0.483E-3		0.91	Agreement
	7.004 \pm 0.466E-3		0.88	Agreement
	7.269 \pm 0.496E-3		0.91	Agreement
	8.196 \pm 0.352E-3		1.03	Agreement
	8.107 \pm 0.353E-3		1.02	Agreement
Ce-139	3.369 \pm 0.328E-3	3.727 \pm 0.089E-3	0.90	Agreement
	3.342 \pm 0.323E-3		0.90	Agreement
	3.256 \pm 0.300E-3		0.87	Agreement
	3.325 \pm 0.310E-3		0.89	Agreement
	3.692 \pm 0.237E-3		0.99	Agreement
	3.571 \pm 0.235E-3		0.96	Agreement

Attachment 6 (cont'd)

2 NRC SCOTT CHARCOAL CARTRIDGE STANDARD (44712-109) (cont'd)				
Sampled: 12:00, CST, January 25, 1994				
Radiochemistry Detectors: (1), (2), (3), and (4)				
Health Physics Detectors: (1) and (2)				
Nuclide	CPSES Results ($\mu\text{Ci}/\text{Sample}$)	NRC Results ($\mu\text{Ci}/\text{Sample}$)	CPSES/NRC Ratio	Comparison Decision
Sn-113	2.915 \pm 0.239E-3	3.448 \pm 0.177E-3	0.85	Agreement
	2.900 \pm 0.218E-3		0.84	Agreement
	2.957 \pm 0.243E-3		0.86	Agreement
	2.950 \pm 0.252E-3		0.86	Agreement
	3.238 \pm 0.245E-3		0.94	Agreement
	3.029 \pm 0.221E-3		0.88	Agreement
Cs-137	5.535 \pm 0.401E-2	5.837 \pm 0.034E-2	0.95	Agreement
	5.466 \pm 0.395E-2		0.94	Agreement
	5.249 \pm 0.361E-2		0.90	Agreement
	5.448 \pm 0.377E-2		0.93	Agreement
	6.125 \pm 0.320E-2		1.05	Agreement
	5.951 \pm 0.315E-2		1.02	Agreement
Y-88	4.257 \pm 0.271E-3	4.471 \pm 0.197E-3	0.95	Agreement
	4.203 \pm 0.243E-3		0.94	Agreement
	3.995 \pm 0.270E-3		0.89	Agreement
	4.305 \pm 0.297E-3		0.96	Agreement
	4.826 \pm 0.263E-3		1.08	Agreement
	4.781 \pm 0.237E-3		1.07	Agreement

Attachment 6 (cont'd)

2 NRC SCOTT CHARCOAL CARTRIDGE STANDARD (44712-109) (cont'd)				
Sampled: 12:00, CST, January 25, 1994				
Radiochemistry Detectors: (1), (2), (3), and (4)				
Health Physics Detectors: (1) and (2)				
Nuclide	CPSES Results ($\mu\text{Ci}/\text{Sample}$)	NRC Results ($\mu\text{Ci}/\text{Sample}$)	CPSES/NRC Ratio	Comparison Decision
Co-60	7.192 \pm 0.314E-2	7.659 \pm 0.044E-2	0.94	Agreement
	7.135 \pm 0.310E-2		0.93	Agreement
	6.784 \pm 0.284E-2		0.89	Agreement
	6.995 \pm 0.295E-2		0.91	Agreement
	7.644 \pm 0.247E-2		0.99	Agreement
	7.699 \pm 0.259E-2		1.01	Agreement

3 FLOOR DRAIN TANK 3 SAMPLE - 500 ml				
Sampled: 16:05, CST, January 24, 1994				
Radiochemistry Detectors: (1), (2), (3), and (4)				
Health Physics Detectors: (1) and (2)				
Nuclide	CPSES Results ($\mu\text{Ci}/\text{ml}$)	NRC Results ($\mu\text{Ci}/\text{ml}$)	CPSES/NRC Ratio	Comparison Decision
Na-24	1.901 \pm 0.317E-6	1.624 \pm 0.084E-6	1.17	Agreement
	2.276 \pm 0.317E-6		1.40	Disagreement
	2.384 \pm 0.500E-6		1.47	Disagreement
	1.867 \pm 0.448E-6		1.15	Agreement
	2.149 \pm 0.394E-6		1.32	Agreement
	2.530 \pm 0.335E-6		1.56	Disagreement

Attachment 6 (cont'd)

3 FLOOR DRAIN TANK 3 SAMPLE - 500 ml (cont'd)				
Sampled: 16:05, CST, January 24, 1994				
Radiochemistry Detectors: (1), (2), (3), and (4)				
Health Physics Detectors: (1) and (2)				
Nuclide	CPSES Results ($\mu\text{Ci/ml}$)	NRC Results ($\mu\text{Ci/ml}$)	CPSES/NRC Ratio	Comparison Decision
Mn-54	2.433 \pm 0.214E-6	2.521 \pm 0.114E-6	0.97	Agreement
	2.293 \pm 0.179E-6		0.91	Agreement
	2.246 \pm 0.242E-6		0.89	Agreement
	2.135 \pm 0.249E-6		0.85	Agreement
	2.326 \pm 0.216E-6		0.92	Agreement
	2.087 \pm 0.172E-6		0.83	Agreement
Co-58	5.743 \pm 0.350E-5	5.782 \pm 0.031E-5	0.99	Agreement
	5.832 \pm 0.351E-5		1.01	Agreement
	5.761 \pm 0.350E-5		0.99	Agreement
	5.795 \pm 0.354E-5		1.00	Agreement
	5.404 \pm 0.209E-5		0.93	Agreement
	5.401 \pm 0.208E-5		0.93	Agreement
Fe-59	5.083 \pm 1.113E-7	3.146 \pm 1.317E-7	1.62	Agreement
	4.877 \pm 0.849E-7		1.55	Agreement
	3.210 \pm 0.923E-7		1.02	Agreement
	No Peak		----	-----
	4.944 \pm 1.976E-7		1.57	Agreement
	4.509 \pm 0.971E-7		1.43	Agreement

Attachment 6 (cont'd)

3 FLOOR DRAIN TANK 3 SAMPLE - 500 ml (cont'd)				
Sampled: 16:05, CST, January 24, 1994				
Radiochemistry Detectors: (1), (2), (3), and (4)				
Health Physics Detectors: (1) and (2)				
Nuclide	CPSES Results ($\mu\text{Ci/ml}$)	NRC Results ($\mu\text{Ci/ml}$)	CPSES/NRC Ratio	Comparison Decision
Tc-99m	3.200 \pm 0.898E-7	4.136 \pm 0.697E-7	0.77	Agreement
	3.043 \pm 0.735E-7		0.74	Agreement
	2.448 \pm 1.023E-7		0.59	Agreement
	No Peak		----	-----
	2.965 \pm 1.142E-7		0.71	Agreement
	2.751 \pm 0.995E-7		0.66	Agreement
Nb-95	3.122 \pm 0.988E-7	1.681 \pm 0.713E-7	1.86	Agreement
	2.405 \pm 0.672E-7		1.43	Agreement
	3.785 \pm 1.237E-7		2.25	Agreement
	No Peak		----	-----
	3.054 \pm 1.071E-7		1.82	Agreement
	3.643 \pm 0.891E-7		2.17	Agreement
I-131	6.272 \pm 1.439E-7	5.997 \pm 1.037E-7	1.05	Agreement
	6.608 \pm 1.125E-7		1.10	Agreement
	7.383 \pm 1.789E-7		1.23	Agreement
	7.789 \pm 1.962E-7		1.30	Agreement
	7.052 \pm 1.599E-7		1.18	Agreement
	6.832 \pm 1.332E-7		1.14	Agreement

Attachment 6 (cont'd)

3 FLOOR DRAIN TANK 3 SAMPLE - 500 ml (cont'd)				
Sampled: 16:05, CST, January 24, 1994				
Radiochemistry Detectors: (1), (2), (3), and (4)				
Health Physics Detectors: (1) and (2)				
Nuclide	CPSES Results ($\mu\text{Ci/ml}$)	NRC Results ($\mu\text{Ci/ml}$)	CPSES/NRC Ratio	Comparison Decision
I-133	1.210 \pm 0.325E-6	1.024 \pm 0.129E-6	1.18	Agreement
	1.074 \pm 0.275E-6		1.05	Agreement
	1.196 \pm 0.460E-6		1.17	Agreement
	1.043 \pm 0.455E-6		1.02	Agreement
	1.060 \pm 0.362E-6		1.04	Agreement
	1.098 \pm 0.280E-6		1.07	Agreement
Cs-134	3.030 \pm 0.103E-5	3.088 \pm 0.024E-5	0.98	Agreement
	2.955 \pm 0.092E-5		0.96	Agreement
	3.023 \pm 0.112E-5		0.98	Agreement
	3.121 \pm 0.116E-5		1.01	Agreement
	3.002 \pm 0.089E-5		0.97	Agreement
	2.980 \pm 0.082E-5		0.97	Agreement
Cs-137	4.128 \pm 0.303E-5	4.052 \pm 0.029E-5	1.02	Agreement
	4.182 \pm 0.304E-5		1.03	Agreement
	4.027 \pm 0.295E-5		0.99	Agreement
	4.106 \pm 0.303E-5		1.01	Agreement
	4.045 \pm 0.221E-5		1.00	Agreement
	4.066 \pm 0.220E-5		1.00	Agreement

Attachment 6 (cont'd)

3 FLOOR DRAIN TANK 3 SAMPLE - 500 ml (cont'd)				
Sampled: 16:05, CST, January 24, 1994				
Radiochemistry Detectors: (1), (2), (3), and (4)				
Health Physics Detectors: (1) and (2)				
Nuclide	CPSES Results ($\mu\text{Ci}/\text{ml}$)	NRC Results ($\mu\text{Ci}/\text{ml}$)	CPSES/NRC Ratio	Comparison Decision
Co-60	9.248 \pm 0.466E-6	8.770 \pm 0.145E-6	1.05	Agreement
	9.192 \pm 0.437E-6		1.05	Agreement
	9.084 \pm 0.491E-6		1.04	Agreement
	9.371 \pm 0.517E-6		1.07	Agreement
	9.149 \pm 0.406E-6		1.04	Agreement
	8.920 \pm 0.368E-6		1.02	Agreement

4 MONITOR HOLDUP TANK CRUD FILTER SAMPLE				
Sampled: 16:00, CST, January 25, 1994				
Radiochemistry Detectors: (1), (2), (3), and (4)				
Health Physics Detectors: (1) and (2)				
Nuclide	CPSES Results ($\mu\text{Ci}/\text{sample}$)	NRC Results ($\mu\text{Ci}/\text{sample}$)	CPSES/NRC Ratio	Comparison Decision
Mn-54	6.374 \pm 0.641E-4	7.054 \pm 0.338E-4	0.90	Agreement
	7.254 \pm 0.606E-4		1.03	Agreement
	7.108 \pm 0.752E-4		1.01	Agreement
	6.948 \pm 0.782E-4		0.98	Agreement
	6.741 \pm 0.800E-4		0.95	Agreement
	7.503 \pm 0.682E-4		1.06	Agreement

Attachment 6 (cont'd)

4 MONITOR HOLDUP TANK CRUD FILTER SAMPLE (cont'd) Sampled: 16:00, CST, January 25, 1994 Radiochemistry Detectors: (1), (2), (3), and (4) Health Physics Detectors: (1) and (2)				
Nuclide	CPSES Results ($\mu\text{Ci}/\text{sample}$)	NRC Results ($\mu\text{Ci}/\text{sample}$)	CPSES/NRC Ratio	Comparison Decision
Co-57	6.476 \pm 1.056E-5	6.181 \pm 0.648E-5	1.07	Agreement
	5.936 \pm 0.933E-5		0.96	Agreement
	6.196 \pm 1.070E-5		1.00	Agreement
	6.234 \pm 1.235E-5		1.00	Agreement
	6.324 \pm 1.295E-5		1.02	Agreement
	7.224 \pm 1.235E-5		1.16	Agreement
Co-58	1.102 \pm 0.091E-3	1.019 \pm 0.064E-3	1.02	Agreement
	1.120 \pm 0.084E-3		1.04	Agreement
	1.040 \pm 0.094E-3		0.96	Agreement
	1.069 \pm 0.099E-3		0.99	Agreement
	1.214 \pm 0.107E-3		1.12	Agreement
	1.133 \pm 0.086E-3		1.05	Agreement
Co-60	9.725 \pm 0.442E-3	9.272 \pm 0.082E-3	1.05	Agreement
	1.008 \pm 0.045E-2		1.09	Agreement
	9.862 \pm 0.439E-3		1.06	Agreement
	9.907 \pm 0.444E-3		1.07	Agreement
	9.931 \pm 0.384E-3		1.07	Agreement
	1.010 \pm 0.036E-2		1.09	Agreement

Attachment 6 (cont'd)

4 MONITOR HOLDUP TANK CRUD FILTER SAMPLE (cont'd)				
Sampled: 16:00, CST, January 25, 1994				
Radiochemistry Detectors: (1), (2), (3), and (4)				
Health Physics Detectors: (1) and (2)				
Nuclide	CPSES Results ($\mu\text{Ci}/\text{sample}$)	NRC Results ($\mu\text{Ci}/\text{sample}$)	CPSES/NRC Ratio	Comparison Decision
Sb-125	1.199 \pm 0.075E-3	1.109 \pm 0.058E-3	1.08	Agreement
	1.120 \pm 0.063E-3		1.01	Agreement
	1.169 \pm 0.084E-3		1.05	Agreement
	1.165 \pm 0.089E-3		1.05	Agreement
	1.146 \pm 0.094E-3		1.03	Agreement
	1.097 \pm 0.078E-3		0.99	Agreement

5 U-1 REACTOR COOLANT SYSTEM GAS SAMPLE - 10 cc				
Sampled: 08:40, CST, January 26, 1996				
Radiochemistry Detectors: (1), (2), (3), and (4)				
Nuclide	CPSES Results ($\mu\text{Ci}/\text{cc}$)	NRC Results ($\mu\text{Ci}/\text{cc}$)	CPSES/NRC Ratio	Comparison Decision
Ar-41	2.073 \pm 0.129E-2	1.820 \pm 0.015E-2	1.14	Agreement
	2.112 \pm 0.131E-2		1.16	Agreement
	1.876 \pm 0.113E-2		1.03	Agreement
	1.937 \pm 0.118E-2		1.06	Agreement
Kr-85M	8.868 \pm 0.590E-4	8.004 \pm 0.221E-4	1.11	Agreement
	8.914 \pm 0.553E-4		1.11	Agreement
	8.048 \pm 0.521E-4		1.01	Agreement
	8.135 \pm 0.534E-4		1.02	Agreement

Attachment 6 (cont'd)

5 U-1 REACTOR COOLANT SYSTEM GAS SAMPLE - 10 cc (cont'd)				
Sampled: 08:40, CST, January 26, 1996				
Radiochemistry Detectors: (1), (2), (3), and (4)				
Nuclide	CPSES Results ($\mu\text{Ci/cc}$)	NRC Results ($\mu\text{Ci/cc}$)	CPSES/NRC Ratio	Comparison Decision
Kr-87	2.078 \pm 0.139E-3	1.835 \pm 0.085E-3	1.13	Agreement
	1.865 \pm 0.120E-3		1.02	Agreement
	1.935 \pm 0.147E-3		1.05	Agreement
	1.893 \pm 0.160E-3		1.03	Agreement
Kr-88	2.172 \pm 0.124E-3	2.086 \pm 0.075E-3	1.04	Agreement
	2.170 \pm 0.106E-3		1.04	Agreement
	1.952 \pm 0.125E-3		0.94	Agreement
	1.909 \pm 0.128E-3		0.92	Agreement
Xe-133M	2.004 \pm 0.793E-4	No Peak	----	-----
	1.884 \pm 0.572E-4		----	-----
	1.878 \pm 0.646E-4		----	-----
	2.245 \pm 0.710E-4		----	-----
Xe-133	4.726 \pm 0.680E-3	4.145 \pm 0.059E-3	1.14	Agreement
	4.552 \pm 0.655E-3		1.10	Agreement
	4.252 \pm 0.617E-3		1.03	Agreement
	4.406 \pm 0.643E-3		1.06	Agreement
Xe-135m	2.442 \pm 0.186E-2	3.128 \pm 0.525E-2	0.78	Agreement
	2.346 \pm 0.199E-2		0.75	Agreement
	1.960 \pm 0.351E-2		0.63	Agreement
	2.007 \pm 0.701E-2		0.64	Agreement

Attachment 6 (cont'd)

5 U-1 REACTOR COOLANT SYSTEM GAS SAMPLE - 10 cc (cont'd)				
Sampled: 08:40, CST, January 26, 1994				
Radiochemistry Detectors: (1), (2), (3), and (4)				
Nuclide	CPSES Results ($\mu\text{Ci/cc}$)	NRC Results ($\mu\text{Ci/cc}$)	CPSES/NRC Ratio	Comparison Decision
Xe-135	7.514 \pm 0.518E-3	6.785 \pm 0.038E-3	1.11	Agreement
	7.160 \pm 0.462E-3		1.06	Agreement
	6.936 \pm 0.474E-3		1.02	Agreement
	6.739 \pm 0.477E-3		0.99	Agreement

6 U-1 REACTOR COOLANT SYSTEM LIQUID SAMPLE - 3.11 gm				
Sampled: 08:40, CST, January 26, 1994				
Radiochemistry Detectors: (1), (2), (3), and (4)				
Health Physics Detectors: (1) and (2)				
Nuclide	CPSES Results ($\mu\text{Ci/gm}$)	NRC Results ($\mu\text{Ci/gm}$)	CPSES/NRC Ratio	Comparison Decision
Na-24	2.550 \pm 0.226E-3	2.615 \pm 0.087E-3	0.98	Agreement
	2.617 \pm 0.207E-3		1.00	Agreement
	2.827 \pm 0.266E-3		1.08	Agreement
	2.923 \pm 0.280E-3		1.12	Agreement
	2.798 \pm 0.199E-3		1.07	Agreement
	2.847 \pm 0.180E-3		1.09	Agreement
I-131	3.297 \pm 1.093E-4	4.037 \pm 0.879E-4	0.82	Agreement
	3.406 \pm 0.737E-4		0.84	Agreement
	3.856 \pm 1.008E-4		0.96	Agreement
	3.913 \pm 1.046E-4		0.97	Agreement
	3.969 \pm 0.759E-4		0.98	Agreement
	3.257 \pm 0.543E-4		0.81	Agreement

Attachment 6 (cont'd)

6 U-1 REACTOR COOLANT SYSTEM LIQUID SAMPLE - 3.11 gm (cont'd) Sampled: 03:40, CST, January 26, 1994 Radiochemistry Detectors: (1), (2), (3), and (4) Health Physics Detectors: (1) and (2)				
Nuclide	CPSES Results ($\mu\text{Ci/gm}$)	NRC Results ($\mu\text{Ci/gm}$)	CPSES/NRC Ratio	Comparison Decision
I-132	6.621 \pm 0.266E-3	7.018 \pm 0.189E-3	0.94	Agreement
	6.249 \pm 0.229E-3		0.89	Agreement
	6.824 \pm 0.305E-3		0.97	Agreement
	6.886 \pm 0.320E-3		0.98	Agreement
	7.343 \pm 0.267E-3		1.05	Agreement
	6.880 \pm 0.241E-3		0.98	Agreement
I-133	4.167 \pm 0.334E-3	4.217 \pm 0.079E-3	0.99	Agreement
	4.086 \pm 0.310E-3		0.97	Agreement
	4.361 \pm 0.351E-3		1.03	Agreement
	4.191 \pm 0.349E-3		0.99	Agreement
	4.446 \pm 0.295E-3		1.05	Agreement
	4.522 \pm 0.277E-3		1.07	Agreement
I-134	1.132 \pm 0.036E-2	1.339 \pm 0.085E-2	0.85	Agreement
	1.136 \pm 0.033E-2		0.85	Agreement
	1.206 \pm 0.049E-2		0.90	Agreement
	1.339 \pm 0.060E-2		1.00	Agreement
	1.298 \pm 0.060E-2		0.97	Agreement
	1.214 \pm 0.063E-2		0.91	Agreement

Attachment 6 (cont'd)

6 U-1 REACTOR COOLANT SYSTEM LIQUID SAMPLE - 3.11 gm (cont'd)				
Sampled: 08:40, CST, January 26, 1994				
Radiochemistry Detectors: (1), (2), (3), and (4)				
Health Physics Detectors: (1) and (2)				
Nuclide	CPSES Results ($\mu\text{Ci/gm}$)	NRC Results ($\mu\text{Ci/gm}$)	CPSES/NRC Ratio	Comparison Decision
I-135	6.859 \pm 0.306E-3	7.703 \pm 0.283E-3	0.89	Agreement
	7.164 \pm 0.256E-3		0.93	Agreement
	7.403 \pm 0.363E-3		0.95	Agreement
	7.760 \pm 0.380E-3		1.01	Agreement
	8.606 \pm 0.328E-3		1.12	Agreement
	8.036 \pm 0.270E-3		1.04	Agreement
Cs-134	No Peak	1.054 \pm 0.330E-4	----	-----
	No Peak		----	-----
	No Peak		----	-----
	1.009 \pm 0.598E-4		0.96	Agreement
	1.243 \pm 0.321E-4		1.18	Agreement
	8.692 \pm 2.019E-5		0.82	Agreement
Cs-138	1.284 \pm 0.060E-2	1.439 \pm 0.173E-2	0.89	Agreement
	1.219 \pm 0.058E-2		0.85	Agreement
	1.232 \pm 0.088E-2		0.86	Agreement
	1.255 \pm 0.114E-2		0.87	Agreement
	1.104 \pm 0.149E-2		0.77	Agreement
	9.741 \pm 2.694E-3		0.68	Agreement

Attachment 6 (cont'd)

7 U-1 REACTOR COOLANT SYSTEM TRITIUM SAMPLE				
Sampled: 07:20, CST, January 28, 1994				
Nuclide	CPSES Results ($\mu\text{Ci/gm}$)	NRC Results ($\mu\text{Ci/gm}$)	CPSES/NRC Ratio	Comparison Decision
H-3	4.09 \pm 0.04E-1	4.33 \pm 0.03E-1	0.94	Agreement

8 U-2 REACTOR COOLANT SYSTEM TRITIUM SAMPLE				
Sampled: 07:30, CST, January 28, 1994				
Nuclide	CPSES Results ($\mu\text{Ci/gm}$)	NRC Results ($\mu\text{Ci/gm}$)	CPSES/NRC Ratio	Comparison Decision
H-3	4.21 \pm 0.04E-1	4.42 \pm 0.03E-1	0.95	Agreement

Attachment 7

1992 QUALITY ASSURANCE LIQUID CAPABILITY TEST
SAMPLE RESULTS

COMANCHE PEAK STEAM ELECTRIC STATION

NRC INSPECTION REPORT: 50-445/94-05; 50-446/94-05

1 Gamma Isotopic Analyses				
Nuclide	CPSES Results ($\mu\text{Ci/ml}$)	NRC Results ($\mu\text{Ci/ml}$)	CPSES/NRC Ratio	Comparison Decision
Mn-54	9.31 \pm 1.10E-6	8.85 \pm 0.24E-6	1.05	Agreement
Co-60	7.39 \pm 0.75E-6	7.40 \pm 0.26E-6	1.00	Agreement
Cs-137	1.15 \pm 0.12E-5	1.15 \pm 0.04E-5	1.00	Agreement
2 Beta Isotopic Analyses				
Nuclide	CPSES Results ($\mu\text{Ci/ml}$)	NRC Results ($\mu\text{Ci/ml}$)	CPSES/NRC Ratio	Comparison Decision
H-3	1.07 \pm 0.03E-4	1.05 \pm 0.03E-4	1.02	Agreement
Sr-89	9.50 \pm 1.00E-5	1.13 \pm 0.03E-4	0.84	Agreement
Sr-90	2.50 \pm 0.10E-5	1.87 \pm 0.06E-5	1.33	Agreement
Fe-55	1.70 \pm 0.10E-5	9.98 \pm 0.29E-6	1.70	Disagreement
Retest - second sample submitted for analysis				
Fe-55	2.40E-4	2.46E-4	0.98	Agreement

The licensee's analytical analyses for Sr-89, Sr-90, and Fe-55 were performed by the licensee's contract laboratory.

Attachment 8

CRITERIA FOR COMPARING RADIOCHEMISTRY ANALYTICAL MEASUREMENTS

The following are the criteria used in comparing the results of capability tests and verification measurements. The criteria are based on an empirical relationship established through prior experience and this program's analytical requirements.

In these criteria, the judgement limits vary in relation to the comparison of the resolution.

$$\text{Resolution} = \frac{\text{NRC VALUE}}{\text{NRC UNCERTAINTY}}$$

$$\text{Ratio} = \frac{\text{LICENSEE VALUE}}{\text{NRC VALUE}}$$

Comparisons are made by first determining the resolution and then reading across the same line to the corresponding ratio. The following table shows the acceptance values.

RESOLUTION	AGREEMENT RATIO
< 4	0.40 - 2.50
4 - 7	0.50 - 2.00
8 - 15	0.60 - 1.66
16 - 50	0.75 - 1.33
51 - 200	0.80 - 1.25
> 200	0.85 - 1.18

The above criteria are applied to the following analyses:

- (1) Gamma Spectrometry
- (2) Tritium in liquid samples
- (3) Iodine on adsorbers
- (4) ⁸⁹Sr and ⁹⁰Sr determinations
- (5) Gross Beta where samples are counted on the same date using the same reference nuclide.