APPENDIX

U. S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report: 50-298/83-30

Docket: 50-298 License: DPR-46

Licensee: Nebraska Public Power District
P. O. Box 499
Columbus, NE 68601

Facility Name: Cooper Nuclear Station

Inspection At: Cooper Nuclear Station, Brownville, Nebraska

Inspection Conducted: October 17-21, 1983

Inspectors: J. Blair Nicholas — 11/23/83
J. B. Nicholas, Radiation Specialist — Date

Russell Wise — 11/23/83
Russell Wise, Radiation Specialist — Date

Approved: Blaine Murray — 11/23/83
Blaine Murray, Chief, Facilities Radiation Protection Section — Date

D M Hunnicutt — 12/16/83
D. M. Hunnicutt, Chief, Reactor Project Section A — Date

Inspection Summary

Inspection conducted October 17-21, 1983 (Report: 50-298/83-30)

Areas Inspected: Routine announced inspection of the licensee's radiochemistry program including review of outstanding open items, organization, staffing, training program, licensee audits of radiochemistry activities, sample collection, sample treatment and analysis, analytical procedures, instrument calibration and quality control of analytical measurements, and confirmatory measurements using the Region IV mobile counting laboratory for comparisons of split sample and radioactive standard results. The inspection involved 76 inspector-hours onsite by two NRC inspectors.

Results: Within the six areas inspected, no violations or deviations were identified. One previously identified open item was closed; no new open items were identified.

DETAILS

1. Persons Contacted

Nebraska Public Power District (NPPD)

*P. V. Thomason, Division Manager of Nuclear Operations
R. Beilke, Training Manager
*G. W. Ketner, Lead Chemistry Technician
J. H. Kuttler, Health Physicist
*R. J. McDonald, Chemistry and Health Physics Supervisor
*J. V. Sayer, Assistant to Technical Manager
*J. R. Warren, Chemist
*V. L. Wolstenholm, Quality Assurance (QA) Manager

Others Contacted

*D. L. DuBois, NRC Resident Inspector
B. R. Thompson, Training Manager, General Electric Company

*Denotes those present during the exit briefing on October 20, 1983.

The NRC inspectors also interviewed several other Cooper Nuclear Station (CNS) personnel during the inspection.

2. Scope of Inspection

The purpose of this routine inspection was to review the licensee's status on outstanding open items in the area of chemistry/radiochemistry; examine the chemistry/radiochemistry organization; review the chemistry/radiochemistry staff training program; review licensee audits of chemistry/radiochemistry activities; review the licensee's chemistry/radiochemistry instrument calibration and quality control (QC) program for the period October 1, 1982, through September 30, 1983; and perform confirmatory measurements on selected plant radioactive effluent samples and radioactive standards. The previous chemistry/radiochemistry QC and confirmatory measurements inspection was performed during the period October 4-8, 1982.

3. Licensee Action on Previous Inspection Findings

(Closed) Open Item (298/8227-02): Radiochemistry Personnel Qualifications - This item involved the licensee's lack of procedures which would provide definitive selection and qualification criteria for hiring radiochemistry personnel which were consistent with the Updated Safety Analysis Report (USAR) commitments. The licensee's responses were considered satisfactory. See paragraph 6 for details. This item is considered closed.

The NRC inspectors reviewed the licensee's responses to eight other previous open items discussed in NRC Inspection Report 50-298/82-27. The findings are discussed in paragraphs 5, 7, 8, 9, and 10 of this report.

4. Open Items This Inspection

No new open items were identified during this inspection.

5. Radiochemistry Organization

The NRC inspectors reviewed the CNS staff functional area assignments in regard to radiochemistry responsibilities. See Attachment 1 for the present radiochemistry organizational structure and assigned individuals.

Since the previous radiochemistry/confirmatory measurements inspection the CNS radiochemistry organizational structure and personnel assignments have changed. The NRC inspectors found that the CNS organizational structure and radiochemistry staffing appeared to be satisfactory for routine plant operation. However, during times of intense training and outages the laboratory staff may have to be supplemented with additional personnel.

The NRC inspectors reviewed the licensee's response to Open Item 298/8227-01 which involved the lack of formal management-approved job descriptions for the radiochemistry and health physics staff and procedures governing functional area assignments. The licensee provided the NRC inspectors with position questionnaires for the two exempt positions of chemistry and health physics supervisor and chemist and position descriptions for lead chemistry technician and chemistry technician. The duties, responsibilities, and qualifications of the radiochemistry staff appeared to be adequately described. However, the position descriptions gave no indication that station management had reviewed and approved them as official station or district documents. Procedures governing functional area assignments had not been developed by the licensee and the NRC inspectors were informed that this type of procedure was not planned. The licensee stated that laboratory assignments are made verbally by the lead chemistry technician and are rotated among the chemistry technicians to facilitate crosstraining and continued familiarity of all laboratory tasks by all technicians. It is the responsibility of the lead chemistry technician to direct the laboratory activities and assure that all assignments are completed as scheduled. The NRC inspectors expressed concern as to whether this method of management could continue if there was a sudden change in experienced work force in the laboratory. This item will remain open pending issuance of formal station management-approved position descriptions for the radiochemistry and health physics staff and some form of written laboratory assignment schedule to provide adequate management control and to ensure completion of required analyses if the laboratory staff should experience a sudden change in experienced CNS personnel.

No violations or deviations were identified.

6. Radiochemistry Personnel Qualifications

The NRC inspectors reviewed the qualifications of the radiochemistry personnel to determine compliance with commitments in the USAR and

Technical Specifications and agreement with the recommendations of Regulatory Guide 1.8 and ANSI N18.1-1971. The NRC inspectors reviewed the documents listed in Attachment 2, Section 2.1, during the inspection to support the findings of this inspection area.

The NRC inspectors found that all radiochemistry personnel presently on staff met the educational and experience qualification requirements committed to in the USAR and recommended in ANSI N18.1-1971.

The NRC inspectors reviewed the licensee's response to Open Item 298/8227-02 which involved the lack of procedures which would provide definitive guidance for the determination of acceptable radiochemistry experience for station radiochemistry laboratory personnel. The licensee's response consisted of a statement that this type of written guidance is considered a long-term goal, but was not being given a high priority. The licensee feels that the present position descriptions and job postings listing position qualifications are and have been satisfactory. Based on the licensee's response and review of applicable documents, this item is considered closed.

No violations or deviations were identified.

7. Radiochemistry Training

The NRC inspectors reviewed the licensee's radiochemistry training program to determine compliance with USAR commitments, 10 CFR 19.12 requirements, and the recommendations of ANSI N18.1-1971 and Regulatory Guide 1.8. The NRC inspectors reviewed the documents listed in Attachment 2, Section 2.2, during the inspection to support the findings of this inspection area.

The NRC inspectors reviewed the radiochemistry staff individual training records maintained by the station chemist. The licensee had made efforts to compile radiochemistry staff training records. The on-job-training (OJT) checkoff lists for the radiochemistry staff were reviewed and found to be compiled and summarized in an organized manner so that all training was documented on one form. The licensee admitted that documentation of training received prior to 1979 was not complete. The station chemist is in the process of developing a new OJT record based on sample task analysis rather than individual analytical procedures to be incorporated into the new training program.

The NRC inspectors reviewed the licensee's response to Open Item 298/8227-03 which involved the lack of a formal training and requalification program for radiochemistry personnel. The licensee has established a training department and hired a training manager to be responsible for station training requirements. The licensee has contracted with General Electric to develop and implement a training program for the radiochemistry department. General Electric proposed a two-part training program consisting of a short-term program composed of a 2-week training course covering theoretical aspects of chemistry/radiochemistry and a long-term program to be developed for CNS and provide site specific training material to meet the needs for

teaching BWR chemistry to plant management, engineers, operators, and technicians. The 2-week short-term lecture program on chemistry commenced on November 7, 1983, and will be taught three times over a 3-month period in order to accommodate all of CNS's chemistry personnel. A qualified health physics and chemistry instructor from General Electric has been assigned to the station training staff for a 2-year period to conduct the training and develop the long-term site specific program. The projected completion date for training program development has been set for October 31, 1985. An interview with the General Electric training manager indicated plans were being developed for a fully staffed training department to conduct site specific training in all areas of the plant activities which require specialized training and periodic requalification. All personnel training records and schedules for personnel training will be developed and maintained by the training department. The NRC inspectors found satisfactory progress being accomplished in the training area. This item will remain open pending completion of the chemistry training program development and its implementation.

No violations or deviations were identified.

8. Licensee's Internal Audits

The NRC inspectors reviewed the QA organization and audit program to determine compliance with USAR commitments, 10 CFR 50, Appendix B requirements, and the recommendations of ANSI N18.7-1976 and Regulatory Guide 1.33. The NRC inspectors reviewed the documents listed in Attachment 2, Section 2.3, during the inspection to support the findings of this inspection area.

The NRC inspectors reviewed Quality Assurance Procedure QAP-900 and the audit report of the audit performed under this procedure conducted in July 1983. The audit report was reviewed for adequate scope and depth to ensure thoroughness of program evaluation and timely followup of deficiencies identified. The NRC inspectors found that the audit procedure appeared to be adequate and that response and corrective actions to audit findings were performed immediately and documented in a followup audit conducted August 26, 1983.

The NRC inspectors reviewed the licensee's response to Open Item 298/8227-04 which involved the licensee not including a member on the audit team for chemistry/radiochemistry audits who was experienced and technically knowledgeable in chemistry/radiochemistry procedures and activities at nuclear power facilities. The licensee indicated that their QA auditors were attending the specialized health physics and chemistry training currently being conducted by the training department for the health physics and chemistry technicians. The licensee felt that by training the QA auditors in this way that the QA staff would attain the background and experience to relieve the concerns addressed in the open item. The licensee's QA department will have two auditors trained in chemistry and one auditor trained in health physics by January 1984. The licensee has committed to using these auditors with specialized training on audit teams performing audits requiring specialized technical knowledge in chemistry/radiochemistry or health physics. This item

will remain open pending completion of auditor specialized training in health physics and chemistry and using these trained auditors on future audits in the specialized technical areas.

No violations or deviations were identified.

9. QC of Radiological Analytical Measurements

The NRC inspectors visited the radiochemistry counting room, chemistry/radiochemistry laboratory, and health physics counting room and reviewed the program for QC of radiological analytical measurements to determine compliance with Technical Specifications and recommendations of Regulatory Guides 1.33 and 4.15. The NRC inspectors reviewed the documents listed in Attachment 2, Section 2.4, during the inspection to support the findings of this inspection area.

The NRC inspectors examined the licensee's radiochemistry counting room QC procedures, counting instrument calibration data, counting instrument performance check data, trend charts, and other documentation of instrument performance. Data for the period October 1982 through September 1983 were reviewed for the following counting instruments: Tennelec LP-1000 Alpha/Beta Counter, Beckman LS-100 Liquid Scintillation Spectrometer, Harshaw Well Counter, and Tracor Northern TN-11 Gamma Spectrometer System. The licensee's records were in order and data presented according to procedure. The NRC inspectors verified that the licensee was maintaining an adequate QC program.

The NRC inspectors reviewed the licensee's response to Open Item 298/8227-05 which involved the finding that the licensee had not designated in any procedure which staff position was assigned the responsibility of managing and conducting the radiochemistry QC program. The licensee indicated that all members of the radiochemistry staff were QC-qualified to perform all QC functions in the laboratory and no one person need be assigned in a procedure to oversee the radiochemistry QC program. The ultimate responsibility for all plant activities rests with the station superintendent. The licensee felt that the present method of QC review implemented in the laboratory was satisfactory and was reluctant to assign a management staff position the responsibility to manage the laboratory QC activities. The NRC inspectors realize there is no regulation which requires the management of the laboratory QC program be assigned to one specific staff position; however, the NRC inspection and enforcement inspection program guidance prefers activities of the laboratory QC program be assigned to one responsible staff position. This has become standard operating practice at most operating nuclear power facilities and is an accepted industry standard. This item will remain open pending further discussions with the licensee.

The NRC inspectors reviewed Procedure CP-8.2.1, "Chemistry Analysis and Instrument Calibration Schedule," Revision 8, August 5, 1980, to determine the licensee's progress in closing Open Item 298/8227-06 which dealt with the findings that the frequency of calibration and performance checks on specific counting room instruments were not clearly defined and not consistent

between the respective individual instrument procedures and CP-8.2.1. To close this open item, review and revision of CP-8.2.1 would be required to make the frequency of calibration and performance checks consistent with those specified in individual instrument procedures. Several individual instrument procedures had been written and revised to specify calibration and performance check frequencies as committed to by the licensee as they became due for review on a 2-year cycle. The NRC inspectors noted that CP-8.2.1 was last reviewed in September 1982 and, therefore, not scheduled for review until September 1984 according to station procedure. The NRC inspectors expressed concern that in the meantime the station's instrument procedures, which interface between instruments, were not consistently stating the same requirements. The licensee stated that they did not plan to deviate from the 2-year review cycle as it placed an additional administrative burden on the chemistry staff. The NRC inspectors felt that procedural information must be consistent when it appeared in various procedures. Revisions to these procedures must be completed in a timely manner to reflect identical information even if the frequency of review and revision must be less than 2 years. This item will remain open pending review and revision of CP-8.2.1 and all affected instrument procedures to provide information consistency.

The NRC inspectors reviewed the licensee's progress in closing Open Item 298/8227-07 which dealt with the licensee's lack of detailed radiochemistry and health physics analytical instrument calibration and performance check procedures. The NRC inspectors examined selected procedures which had been written or reviewed since the previous inspection. The licensee had made efforts to incorporate into the laboratory instrument procedures the suggestions outlined in the open item as the various procedures came due in the 2-year review cycle. The NRC inspectors found the licensee's efforts satisfactory in procedural content; however, the 2-year review cycle is not considered an acceptable response time to close the open item. This item will remain open pending completion of procedure review to update all affected radiochemistry and health physics analytical instrument procedures per review schedule or preferably sooner.

The NRC inspectors reviewed the licensee's progress in closing Open Item 298/8227-08 which identified the lack of written procedures for preparation of radioactive calibration standards traceable to the National Bureau of Standards (NBS). The licensee currently purchases commercially available NBS traceable radioactive calibration standard nuclides for gamma spectroscopy, tritium, gross alpha, and gross beta instrument calibrations. The licensee prepares their own specific counting geometry standards from the NBS traceable standard solutions and gas mixtures. The licensee had developed a draft procedure for preparing the various required radioactive calibration standards. The NRC inspectors reviewed the draft procedure and made suggestions that more detail was needed as to how various standards were to be prepared. The objective is for the procedure to produce uniformity in radioactive standard preparation among technicians. This item will remain open pending review of an approved and implemented procedure.

No violations or deviations were identified.

10. Chemistry/Radiochemistry Sampling

The NRC inspectors reviewed the licensee's chemistry/radiochemistry sampling procedures to determine compliance with USAR and Technical Specification commitments and the recommendations of Regulatory Guides 1.21 and 1.33. The NRC inspectors reviewed the documents listed in Attachment 2, Section 2.5, during the inspection to support the findings of this inspection area.

The NRC inspectors reviewed the procedures listed in Attachment 2, Section 2.5, in respect to addressing Open Item 298/8227-09 which identified the licensee's lack of detailed sampling procedures for all manually taken chemistry/radiochemistry samples. The licensee's procedures were found to be written with various degrees of detail and did not include all the specific items of concern outlined in the open item, nor was there a procedure for each sample taken by the chemistry/radiochemistry staff. Detailed step-by-step sampling procedures were not developed to provide guidance in the proper techniques for collection of specific routine grab samples such as reactor water, reactor water demineralizer, reactor core isolation cooling system, residual heat removal system, condensate system, equipment cooling water systems, and radwaste systems. Detailed sampling procedures for all manually taken chemistry/radiochemistry samples should be written to include such items as sampling frequency, sample point valve identification, sample point location, valve lineups, tank recirculation times, health physics handling precautions, safety considerations, sample line flush time to provide a representative sample, sample quantity, and sample container labeling. The NRC inspectors noted that by using a combination of the reviewed procedures some of the specific inspection items of concern could be found and others were never addressed. For ease of use by the technicians and for training of staff personnel, specific sampling procedures should be written for each sample including in each procedure the items specified in the open item. This item will remain open pending development of detailed sampling procedures for all chemistry/radiochemistry samples.

No violations or deviations were identified.

11. Analytical Measurements

a. Confirmatory Measurements

Confirmatory measurements were performed on the following samples and standards in the Region IV mobile laboratory at CNS during the inspection:

(1) NRC Particulate Filter Standard (SRS-13162-109)

(2) NRC Face Loaded Charcoal Cartridge (SRS-13161-109)

(3) Liquid Floor Drain Collector

(4) Reactor Water

The confirmatory measurements test consists of comparing measurements made by the licensee, NRC's mobile laboratory, and NRC's reference laboratory, Radiological and Environmental Sciences Laboratory (RESL) in Idaho Falls, Idaho. RESL's and the NRC's mobile laboratory measurements are referenced to the NBS by laboratory intercomparisons. Confirmatory measurements are made only for those nuclides identified by the mobile laboratory or RESL 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, and above the Lower Limit of Detection (LLD) for stack samples. Stack charcoal cartridge and stack particulate filter comparisons are based on established LLD's for total activity per sample.

Attachment 3 contains the criteria used to compare results.

b. Results

The sample analyses and comparison of analytical results of the confirmatory measurements are tabulated in Attachment 4.

The NRC inspectors provided the licensee with a particulate filter standard and a face loaded charcoal cartridge standard for analysis in place of comparing analysis results of actual elevated release point samples. The licensee analyzed seven of seven nuclides correctly on the particulate filter and six of seven nuclides correctly in the face loaded charcoal cartridge. It should be noted that it took the licensee 2 days to complete the analyses due to the lack of an isotope library containing the isotopes contained in the standards.

The licensee and the NRC analyzed a floor drain collector sample for gamma emitting nuclides, gross beta, and tritium. The gamma scan confirmatory measurements results indicated four of five nuclides identified were in agreement between the licensee's and the NRC's measurements. The results from the gross beta analysis and tritium analysis were in agreement between the licensee and the NRC.

The licensee and the NRC analyzed a reactor water sample for gamma emitting nuclides. The NRC analysis identified 13 isotopes. The licensee reported analysis for 11 of these 13 isotopes. Six of the eleven isotopes reported by the licensee were in agreement between the licensee's and the NRC's measurements. One of the nuclides not reported by the licensee was not included in the isotope library used for the routine analysis of reactor water. Three of the nuclides reported by the NRC were not analyzed by the licensee's analysis program since the peak identification parameters appeared to be set at sensitivity levels which would not allow analysis of nuclides at sensitivity levels recommended for principal gamma emitters in liquid samples as presented in the draft standard Technical Specifications for boiling water reactors or at activity levels equal to or less than 10 percent of the isotopic values stated in 10 CFR Part 20,

Appendix B, Table II, Column 2. The NRC inspectors noted that the licensee did not have a comprehensive isotopic library for analysis of reactor water or for industry standard mixed gamma standards. If a comprehensive isotopic library had been available, it is believed that the NRC standards would have been analyzed in a more timely manner.

To complete the confirmatory measurements inspection and provide strontium nuclide analyses at activity levels which can be easily detected and compared, the NRC inspectors have requested RESL to send the licensee an unknown sample prepared by RESL using known nuclide concentrations for analysis of ^{89}Sr, ^{90}Sr, tritium, and several gamma emitting nuclides. The licensee is to analyze the sample and report the results as requested. The analytical results will be compared to the known sample activities and the results of the comparisons will be reported in the next NRC confirmatory measurements report.

c. Previous Confirmatory Measurements

Confirmatory measurements were performed on a liquid floor drain storage tank sample taken during an inspection (Report 50-298/82-27) conducted in October 1982. The omitted strontium results were eported to the licensee in a letter dated February 14, 1983, to J. M. ilant from G. L. Madsen. In that letter the comparison data were given. For formal documentation purposes the sample analysis comparisons have been included in this inspection report. The comparison data are presented in Attachment 4, sample (5).

The NRC inspectors noted the strontium analyses disagreements for the above referenced sample. To assist in resolving these disagreements, in conjunction with the present inspection, a supplemental sample for strontium analysis has been requested which is to provide isotopic concentrations of ^{89}Sr and ^{90}Sr at levels which will give good statistical comparative results.

No violations or deviations were identified.

12. Facilities and Equipment

The NRC inspectors visited the licensee's radiochemistry counting room and health physics counting room. The counting facilities and instrumentation were found acceptable and adequate. New alpha/beta counting equipment had been added to the radiochemistry laboratory to replace retired equipment. A new gamma spectroscopy system had been installed in the two counting rooms as a backup to the present operating system. At the time of the inspection, the new system had not been calibrated or placed in service.

No violations or deviations were identified.

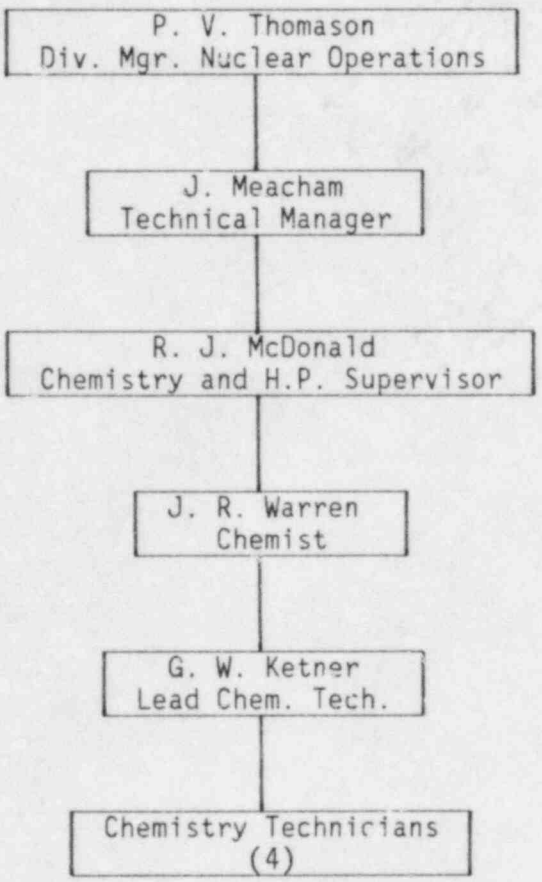
13. Exit Briefing

The NRC inspectors met with the licensee representatives identified in paragraph 1 of this report and with the senior resident inspector at the conclusion of the inspection on October 20, 1983. The lead NRC inspector summarized the scope of the inspection, discussed the inspection findings, expressed concern for the lack of progress in closing previously identified open items discussed in paragraphs 5, 7, 8, 9, and 10 of this report, and informed the licensee of the results of the confirmatory measurements results available at the time of the exit briefing.

ATTACHMENT 1

Cooper Nuclear Station

Radiochemistry Organizational Chart



ATTACHMENT 2

Documents Reviewed

2.1 Radiochemistry Personnel Qualifications

- USAR, Section 13.3.0, "Personnel Qualifications and Training"
- Administrative Procedure 1.5, "Selection and Training of Station Personnel," Revision 9, March 3, 1983
- Radiochemistry personnel education and experience resumes

2.2 Radiochemistry Training

- Individual training file for each radiochemistry staff member
- Radiochemistry staff member's on-the-job training checkoff list
- General Electric's proposed training program for chemistry staff and course outline

2.3 Licensee's Internal Audits

- QAP Audit Schedule for 1983
- QAP-900, "Quality Assurance Plan for Chemistry, Health Physics, and Environmental Monitoring," Revision 6, October 3, 1980
- QAP-900, Audit Report No. 83-15, July 14, 1983
- SALP Meeting Response, October 12, 1983, from Verne Wolstenholm to Jeff Weaver

2.4 Quality Control of Radiological Analytical Measurements

- CP-8.2.1, "Chemistry Analysis and Instrument Calibration Schedule," Revision 8, August 5, 1980
- CP-8.5.2.1, "Gamma Spectrometer," Revision 2, June 18, 1981
- CP-8.5.2.2, "Alpha/Beta Counter," Revision 0, June 22, 1983
- CP-8.5.2.3, "Liquid Scintillation System," Revision 3, March 25, 1980
- CP-8.5.2.4, "Well Counter," Revision 6, December 17, 1980
- CP-8.5.2.5, "Gamma Spectrometer (TN-11, GeLi)," Revision 1, March 30, 1978

- CP-8.5.1.1, "Sartorius 2462 and 2662 Analytical Balance," Revision 5, October 13, 1983
- CP-8.5.1.3, "Conductivity Bridge RC-19," Revision 6, January 27, 1983
- CP-8.5.1.7, "Klett-Summerson Colorimeter," Revision 2, February 7, 1983
- CP-8.5.1.8, "Expandomatic SS-2 and Zeromatic SS-3 pH Meters," Revision 5, February 18, 1983
- CP-8.5.1.9, "Orion 801A Specific Ion Analyzer," Revision 1, January 27, 1983
- CP-8.5.1.10, "Turbidimeter Ratio 2000," Revision 0, October 14, 1983
- CP-8.5.1.11, "Spectrometer DU-2," Revision 4, January 12, 1983
- CP-8.5.1.12, "Turbidimeter Hach Model 2100A," Revision 3, March 28, 1983
- CP-8.5.1.13, "Atomic Absorption Spectrometer Model 503," Revision 3, February 12, 1983
- CP-8.5.1.15, "Orbisphere Oxygen Analyzer," Revision 0, March 28, 1983
- CP-8.5.3.3, "pH Calibration of Reactor Water," Revision 3, March 28, 1983
- CP-8.6.2, "ERP and Vent Monitor Calibrations," Revision 8, July 6, 1983
- CP-8.6.5, "Control Room and Drywell Air Monitors," Revision 0, June 22, 1983

2.5 Chemistry/Radiochemistry Sampling

- CP-8.2.2, "Process Sampling System," Revision 1, March 6, 1976
- CP-8.2.3, "Table of Liquid and Gas Sample Points," Revision 3, August 20, 1982
- CP-8.4, "Routine Sampling Procedures," Revision 2, March 28, 1980
- CP-8.8.1.17, "Radiochemical Noble Gas Sampling," Revision 0, June 22, 1983
- CP-8.8.1.31, "Radiochemical Analysis of Tritium," Revision 0, January 14, 1980
- CP-8.8.3, "Metals Analysis," Revision 3, February 27, 1978
- CP-8.8.4, "Off Gas Grab Samples Isotopic Analysis," Revision 5, October 3, 1983

. CP-8.8.7, Liquid Waste Discharge Preparation and Analysis," Revision 7, August 3, 1981

. CP-8.8.8, "Particulate Filters, Iodine Cartridges, and Noble Gas EPR Vent Monitors Sample Collection," Revision 5, June 8, 1983

ATTACHMENT 3

Criteria for Comparing 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 judgment 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	RATIO		
	Agreement	Possible Agreement A	Possible Agreement B
3	0.4 - 2.5	0.3 - 3.0	No Comparison
4 - 7	0.5 - 2.0	0.4 - 2.5	0.3 - 3.0
8 - 15	0.6 - 1.66	0.5 - 2.0	0.4 - 2.5
16 - 50	0.75 - 1.33	0.6 - 1.66	0.5 - 2.0
51 - 200	0.80 - 1.25	0.75 - 1.33	0.6 - 1.66
> 200	0.85 - 1.18	0.80 - 1.25	0.75 - 1.33

"A" criteria are applied to the following analyses:

Gamma Spectrometry where principal gamma energy used for identification is greater than 250 keV.

Tritium analyses of liquid samples.

Iodine on adsorbers.

"B" criteria are applied to the following analyses:

Gamma Spectrometry where principal gamma energy used for identification is less than 250 keV.

^{89}Sr and ^{90}Sr determinations.

Gross Beta where samples are counted on the same date using the same reference nuclide.

ATTACHMENT 4

Confirmatory Measurements Results

(1) NRC Particulate Filter Standard (SRS-13162-109)
(Standardized 11:00 CST, January 1, 1983)

Nuclide	NPPD Result (uCi/Sample)	NRC Result (uCi/Sample)	NPPD/NRC Ratio	Decision
^{57}Co	2.25±0.02E-02	2.34±0.01E-02	0.96	Agreement
^{60}Co	3.11±0.03E-02	3.18±0.02E-02	0.98	Agreement
^{88}Y	7.83±0.20E-02	7.67±0.08E-02	1.02	Agreement
^{109}Cd	7.85±0.05E-01	7.51±0.02E-01	1.05	Agreement
^{113}Sn	4.23±0.10E-02	3.88±0.04E-02	1.09	Agreement
^{137}Cs	3.55±0.03E-02	3.53±0.02E-02	1.01	Agreement
^{139}Ce	1.94±0.03E-02	1.95±0.01E-02	0.99	Agreement

(2) NRC Face Loaded Charcoal Cartridge (SRS-13161-109)
(Standardized 11:00 CST, January 1, 1983)

Nuclide	NPPD Result (uCi/Sample)	NRC Result (uCi/Sample)	NPPD/NRC Ratio	Decision
^{57}Co	2.75±0.02E-02	2.57±0.01E-02	1.07	Agreement
^{60}Co	3.64±0.05E-02	3.44±0.02E-02	1.06	Agreement
^{88}Y	8.83±0.20E-02	8.52±0.08E-02	1.04	Agreement
^{109}Cd	1.09±0.01E+00	8.08±0.02E-01	1.35	Disagreement
^{113}Sn	4.53±0.08E-02	4.30±0.04E-02	1.06	Agreement
^{137}Cs	4.06±0.03E-02	3.85±0.02E-02	1.06	Agreement
^{139}Ce	2.36±0.03E-02	2.16±0.02E-02	1.09	Agreement

(3) Liquid Floor Drain Collector
(Sampled 10:00 CDT, October 20, 1983)

Nuclide	NPPD Result (uCi/ml)	NRC Result (uCi/ml)	NPPD/NRC Ratio	Decision
tritium	5.58±0.09E-04	5.89±0.03E-04[1/]	0.95	Agreement
gross beta (11/10/83)	3.90±0.03E-04	4.6±0.2E-04[1/]	0.85	Agreement
^{54}Mn	2.83±0.06E-05	3.26±0.05E-05	0.87	Agreement
^{58}Co	4.61±0.38E-06	5.26±0.30E-06	0.88	Agreement
^{60}Co	7.32±0.07E-05	8.79±0.08E-05	0.83	Agreement
^{134}Cs	1.97±0.10E-04	2.51±0.01E-04	0.78	Disagreement
^{137}Cs	2.19±0.01E-04	2.53±0.01E-04	0.87	Agreement

1/ Analytical results as reported by the Radiological and Environmental Science Laboratory, Idaho Falls, Idaho.

(4) Reactor Water
(Sampled 11:45 CDT, October 20, 1983)

Nuclide	NPPD Result (uCi/ml)	NRC Result (uCi/ml)	NPPD/NRC Ratio	Decision
^{51}Cr	1.61±0.47E-04	1.65±0.04E-04	0.98	Agreement
^{54}Mn	8.75±0.62E-05	4.36±0.09E-05	2.01	Disagreement
^{58}Co	5.65±0.58E-05	2.56±0.07E-05	2.21	Disagreement
^{60}Co	2.83±0.37E-05	3.41±0.10E-05	0.83	Agreement
^{65}Zn	<2.95E-05	1.80±0.13E-05	-	Disagreement[1/]
^{99}Mo	5.61±0.51E-04	5.71±0.14E-04	0.98	Agreement
^{110m}Ag	8.12±6.38E-05	4.58±0.12E-05	1.77	Disagreement
^{131}I	4.55±0.61E-05	4.41±0.10E-05	1.03	Agreement
^{132}Te	Not Reported	2.42±0.10E-05	-	Disagreement[2/]
^{133}I	4.97±0.10E-04	6.39±0.21E-04	0.78	Agreement
^{140}Ba	<6.04E-05	8.92±0.34E-04	-	Disagreement[1/]

^{140}La	Not Reported	3.11±0.07E-04	-	Disagreement 1/
^{239}Np	2.00±0.37E-04	2.48±0.09E-04	0.81	Agreement

1/ Licensee's peak confidence level for peak identification along with other analysis parameters had been established so as not to allow analysis of nuclides at sensitivity levels recommended for principal gamma emitters in liquid samples as presented in the draft standard Technical Specifcations for boiling water reactors or at actvity levels equal to or less than 10 percent of the isotopic values stated in 10 CFR Part 20, Appendix B, Table II, Column 2.

2/ Nuclide was not reported by the licensee because it was not included in the isotope library used for the routine analysis of this sample type.

(5) Liquid Floor Drain Storage Tank
(Sampled 09:00 CDT, October 6, 1982)

Nuclide	NPPD Result (uCi/ml)	NRC Result (uCi/ml)	NPPD/NRC Ratio	Decision
^{89}Sr	3.45±0.02E-05	1.21±0.05E-04	0.28	Disagreement
^{90}Sr	8.57±0.39E-07	2.5±0.2E-07	3.43	Disagreement