U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report Nos. 50-528/88-05, 50-529/88-05 and 50-530/88-05

Docket Nos. 50-528, 50-529 and 50-530

License Nos. NPF-41, NPF-51 and NPF-74

Licensee: Arizona Nuclear Power Project
P. O. Box 52034
Phoenix, Arizona 85072-2034

Facility Name: Palo Verde Nuclear Generating Station - Units 1, 2 and 3

Inspection at: Palo Verde Site - Wintersburg, Arizona

Inspection Conducted: February 23-24, 1988, February 29-March 3, 1988

Inspected by: GP Yuhas for 3/30/88
W. K. TenBrook, Radiation Specialist — Date Signed

Approved by: GP Yuhas 3/30/88
G. P. Yuhas, Chief — Date Signed
Facilities Radiological Protection Section

Summary:

Inspection during the period of February 23-24 and February 29-March 3, 1988 (Report Nos. 50-528/88-08, 50-529/88-08, 50-530/88-08)

Areas Inspected: Routine unannounced inspection of quality assurance for radiochemical analyses, chemistry control, chemical analysis, onsite followup of inpector identified items and plant tours. Inspection procedures 30703, 79701, 84725 and 92701 were addressed.

Results: Based on the areas inspected, the licensee's chemistry program appears to be adequate to fulfill its safety function. Strong performance was observed in the areas of laboratory analytical control standards for non-radioactive analytes (Section 3) and plant chemistry control (Section 3). Weak areas observed were the implementation of the interlaboratory comparison sample program for radiological analysis (Section 4) and one example of a lack of attention to detail regarding proper implementation and review of a gaseous radioactive release permit (Section 4). The latter example resulted in a violation for failure to implement procedural detection limits for radioactivity analysis of a waste gas decay tank sample.

DETAILS

1. Persons Contacted

Licensee

*L. Brown, Manager, Radiation Protection and Chemistry
*R. Butler, Director, Standards and Technical Support
*J. Cederquist, Supervisor, Chemistry Standards
*W. Doyle, Manager, Unit 2 Radiation Protection
*R. Ferro, Manager, Unit 2 Chemistry
*D. Fuller, Manager, Unit 1 Chemistry
C. Gray, Lead Technician, Unit 3 Chemistry
*J. Haynes, Vice President, Nuclear Production
*J. Mann, Supervisor, Health Physics Controls
R. Ochoa, Lead Health Physicist, Health Physics Controls
*R. Rouse, Engineer, Compliance
*J. Schlag, Supervisor, Radioactive Waste Standards
*J. Schmedeke, Manager, Operations Computer Systems
*J. Scott, Manager, Unit 3 Chemistry
*R. Selman, Manager, Central Radiation Protection
*J. Shawver, Scientist, Chemistry Standards
*W. Sneed, Manager, Unit 3 Radiation Protection
*L. Souza, Manager, Quality Audits and Monitoring
*E. Van Brunt, Jr., Executive Vice President, ANPP
D. Whitcomb, Senior Scientist, Chemistry Standards

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*H. North, Senior Radiation Specialist, Region V
*T. Polich, Senior Resident Inspector, Palo Verde

(*) Denotes individuals attending exit interview on March 3, 1988.

2. Followup (92701)

Open Item 50-528/87-04-01 (Closed) This matter concerned the capability of vendor laboratories to obtain accurate measurements of Sr-89/Sr-90 and H-3 as reflected by analysis of an NRC blind sample. The licensee's contractor laboratory analyzed the NRC sample and had obtained adequate measurements for Sr-89 and tritium, but had not obtained adequate accuracy for Sr-90. The inspector reviewed records submitted to the licensee from the licensee's contract laboratory describing the contractor's participation in the Environmental Protection Agency (EPA) Intercomparison Program. Two samples of Sr-90 in water were analyzed by the contractor in 1987. The results of the EPA intercomparison indicated adequate agreement. The licensee did not submit any additional blind samples to its vendor laboratory beyond the sample provided by NRC. Based on the adequate performance of the licensee's contractor in the EPA intercomparisons for Sr-90 in water, 1987, this item is considered closed.

3. LWR Chemistry Control and Chemical Analysis (79701)

The inspector reviewed Quality Assurance Audit Report No. 87-007, "ANPP Plant Chemistry". The audit was conducted March 6-April 3, 1987 and was applicable to all three units. Content of the audit included Systems Chemistry Specifications and Chemistry Control Instructions, Nuclear Sampling, Document Control, Secondary Water Chemistry, Post-Accident Sampling and Laboratory Analytical Control. An emphasis was placed on Laboratory Analytical Control. Three Corrective Action Requests (CAR) and four items requiring follow-up were generated as a result of Audit 87-007. One CAR, CA87-0041, involved safeguards information and had not been closed at the time of the inspection. The two remaining CARs are described below:

CA87-0047, Failure to meet two week deadline for submittal of reviewed surveillance test packages to SPGC.

CA87-0049, Various instances of nonconformance with chemistry procedures.

The inspector evaluated the follow-up to CA87-0047 and CA87-0049. The response from the Manager, Chemistry Services and subsequent QA closeout was documented for both CARs. Given the number of deficiencies described in CA87-0049, QA gave only partial approval to the initial response, and requested additional commitment for more extensive review of the subject procedures by chemistry personnel. The final response and QA approval were documented.

All four Monitoring Reports requiring followup generated by Audit 87-007 were closed by QA at the time of the inspection.

The inspector examined twelve Quality Monitoring Reports in the chemistry area from the year 1987. Each Monitoring Report had been closed at the time of the inspection. The inspector also verified that Chemistry Control Instructions (CCIs) for dispersant addition to the Unit 1 essential spray pond system had been issued by Unit 1 chemistry in response to Monitoring Report ST-87-1011.

Changes to the chemistry control and analysis program were identified in two areas: Sampling and analysis practices and laboratory facilities. Procedure 74CH-9XC16, "Sampling and Analytical Schedule", has been amended to delete the circulating water system analytical schedule and to include pH and halogen analysis on closed cooling systems and to specify the frequency of Reactor Coolant System (RCS) ammonia analysis during hot functional testing. Changes to the unit laboratories included the procurement of a new ion chromatograph for analysis of RCS organic acids at Unit 2. Contamination of the cold-side laboratory area and steam generator blowdown demineralizer system had occurred in Unit 1 due to a primary-to-secondary system leak. Areas with non-removable contamination remained at the Unit 1 wet racks and sample sinks. Cleanup operations were continuing at the Unit 1 blowdown demineralizer system. No changes were identified in chemistry control action levels or procedures for chemistry control implementation.

A major reorganization of chemistry personnel was completed in 1987 as part of an overall reorganization of ANPP staff. The Chemistry Services Department, under the authority of the site-wide Plant Manager, had previously implemented the plant chemistry program via three Unit chemistry organizations answering to the Chemistry Services Manager. The licensee's reorganization had eliminated the position of site-wide Plant Manager in favor of three Plant Managers, one assigned to each Unit. Also, the Chemistry Services Department was eliminated in favor of a new Chemistry Standards Department. Following the reorganization, the chemistry staff associated with each Unit were under the authority of the Unit's assigned Plant Manager. The inspector observed that the Chemistry Standards Department did not have direct supervisory authority over the Unit chemistry organizations. The inspector did not identify any new administrative channels by which Chemistry Standards could effect change in the Unit chemistry organization. At the time of the inspection, it appeared that the Chemistry Standards Department's means for affecting Unit chemistry performance were programs for procedure improvement, such as refinement of laboratory procedures and systems chemistry specifications, implementation of various aspects of the laboratory analytical control program, and technical assistance to the Unit chemistry organizations. Given that the site-wide Chemistry Services Department was eliminated, the performance of the Unit chemistry organizations in implementing the chemistry program and Chemistry Standards Department initiatives were particularly dependent upon the Unit Plant Manager and Unit Chemistry Manager.

The inspector reviewed Chemistry Control Instructions (CCIs) at the unit chemistry laboratories. The chief sources of CCIs were elevated levels of sodium (greater than 20 ppb) in feedwater/steam generator blowdown and ongoing needs for control of pH and dispersant in the essential spray pond system. The Chemistry staff and Radwaste staff of Units 1 and 2 were pursuing means to minimize sodium intrusion to the secondary system by refining techniques for condensate demineralizer regeneration and improving resin layering. The sodium intrusion problem appears to be largely corrected in Unit 2.

Procedure 74CH-9XC16, "Sampling and Analytical Schedule", Procedure 74AC-9ZZ04, "Systems Chemistry Specifications", and Procedure 74AC-9ZZ03, "Chemistry Control Instructions" basically constitute the licensee's chemistry control program. These procedures provide for analysis of appropriate plant samples, acceptance criteria for analytical results, and corrective actions for conditions out of specification. The licensee's program fulfills the requirements of technical specification 6.8.4, item (c), Secondary Water Chemistry.

The inspector reviewed the licensee's program for laboratory quality assurance for non-radioactive analytes. The Chemistry Standards group implements an analytical blind program at each Unit laboratory. The analytes and the number of samples analyzed in 1987 are presented below:

Analyte	Quantity of Samples
Hydrazine	27

Fluoride	32
Chloride	32
Sulfate	31
Lithium	28
Iron	21
Copper	21
Sodium	98
Sodium (25 ppb)	35
Silica	36
Phosphate	18
Ammonia	23
Boron	39
Total Organic Carbon	27

The analytic blind program has been effective in identifying problems in Unit laboratories such as difficulties with copper analysis in Unit 1. However, strict criteria for acceptance and corrective action were not implemented. The Chemistry Standards Department was developing more rigorous acceptance criteria for Unit laboratory measurements of analytic blinds.

The inspector reviewed documentation in Unit 2 and Unit 3 laboratories associated with the atomic absorbtion spectrophotometer (AA) and ion chromatograph (IC). Spikes and replicates were provided as required for the instruments examined. Verifications of calibrations and recalibrations were performed as required. No control charts were kept for the AA or IC since recalibrations or calibration verifications are procedurally required before each analysis to maintain instrument accuracy.

The inspector reviewed reactor coolant chemistry surveillances for dissolved oxygen, flouride, chloride and boron at Unit 2 and Unit 3. Results were reported as "less than" levels at both Units. Unit 3 "less than" values for fluoride and chloride were one order of magnitude below TS requirements. However, Unit 2 "less than" values were approximately equal to the TS values. The Unit 2 Chemistry Manager explained that the analysis for chloride was more sensitive than the "less than" value, but the fluoride sensitivity by ion selective electrode was consistent with the "less than" value, 100 ppb. The ion selective electrode is considered the method of choice for RCS fluoride monitoring by industry groups. Also, utility experience indicates that good RCS chemistry control can reduce reactor coolant fluoride to less than 50 ppb. This suggests that an improvement of RCS fluoride measurement sensitivity to a level at or below 50 ppb should be possible with the apparatus available. As noted above, the Unit 1 and Unit 2 laboratories have procured advanced ion chromatographs, which has been successfully used for fluoride analysis at Unit 3.

The inspector discussed with the licensee representative the valve in reviewing reporting practices for analyses to assure that "less than" values actually reflect a measurement below instrument sensitivity. If analytical sensitivity for for a given RCS chemistry surveillance are approximately equal to the Limiting Condition for Operation, then analytical sensitivity provides no operating margin below the TS steady

state limit. This matter will be tracked as an "Open Item" (50-529/88-08-01) for examination in a future inspection.

The licensee's program for chemistry control and analysis appears capable of fulfilling its safety function. An improving trend is noted in the implementation of the analytical blind program. Continued management support is encouraged in the area of feedwater sodium control to disseminate lessons learned between Unit organizations involved in secondary chemistry and condensate demineralizer operations. The licensee representative indicated that they would review the adequacy of analytical sensitivities for RCS chemistry and reporting of data from RCS surveillances.

No violations or deviations were identified.

4. Quality Assurance and Confirmatory Measurements for In-Plant Radiochemical Analysis (84725)

The inspector reviewed the licensee's program for quality assurance of laboratory radiological measurements. The Chemistry Standards Department began participating in a laboratory analytical blind program for radioactive analytes in 1987. A private laboratory provided a single set of blind samples on a quarterly basis. The samples contained alpha, beta and gamma activity in solid, liquid and gas matrices commonly found at nuclear power facilities. Chemistry Standards then provided the sample set to each unit laboratory for analysis. The licensee's contractor for this service is employed by many other facilities in the U.S., and the content of the program is regarded as excellent. The agreement criteria used by the contractor for assessing the licensee's results is substantially similar to those used by the NRC confirmatory measurements program.

The administration of the radiological blind sample program has encountered difficulties in 1987. The sample set for the third quarter, 1987, was misplaced prior to analysis by the Unit laboratories. The sample set for the fourth quarter, 1987, had not been exchanged with Unit 2 laboratory. The Unit 2 Chemistry Manager stated that radiological blinds had not been analyzed in the Unit 2 laboratory since the October, 1987 reorganization of Unit chemistry personnel.

The inspector examined selected quality control records and practices at the Unit 1 and Unit 2 laboratories for gas flow proportional counters (gross alpha and beta analysis) and gamma spectrometers. Proportional counters had been annually calibrated for gross alpha and gross beta measurements, and control logs and charts were kept for alpha and beta efficiency response and background. Gamma spectrometers had been annually calibrated for the four liter Marinelli beaker geometry, and control logs were kept for centroid channel, efficiency response and resolution, each at two energies. Control charts were kept for efficiency response at two energies.

The inspector examined records of analyses of cooling water hold-up tank (CWHUT) samples, Chemical Waste Neutralizer Tank (CWNT) samples and Waste Gas Decay Tank (WGDT) samples to determine compliance with chemistry

procedures and radioactive effluent technical specification requirements. The CWHUTs at Unit 2 and Unit 3 were analyzed shiftly for indications of intrusion of activity to the CWNTs. The CWNT was promptly surveyed for total activity content by Unit 2 chemistry laboratory following an addition of activity in February, 1988, per TS 4.11.1.3.

The inspector reviewed WGDT grab sample analyses for radioiodine, noble gas and particulates at Unit 2 and Unit 3. The analyses for radioiodine and particulates were satisfactory at both Units. However, Gaseous Radioactive Release Permit 882044, Update 1, dated February 27, 1988 contained an analysis of a WGDT "B" noble gas grab sample by Unit 2 chemistry laboratory that did not meet the lower limits of detection (LLDs) required by Procedure 75AC-9ZZ02, "Gaseous Radioactive Effluent Release Administrative Control", Appendix B, "Effluent Sampling Schedule". The inspector noted that the licensee does not employ an a priori LLD determination of measurement system sensitivity for radioactive effluent measurements, but instead relies on review of all analytical data from the count room to insure that each measurement meets procedural or TS LLDs, a posteriori. The licensee's technique, when properly implemented, would insure adequate sensitivity for each analysis. However, if the LLDs were not met for a particular sample, there was no a priori data to verify that the measurement method was adequate. The subject analysis, dated February 25, 1988, involved a WGDT "B" noble gas sample in a 9.2 ml vial, 1020 seconds counting time. The required sensitivity for principal gamma emitters was 1 E-4 uCi/ml. The following detection limits exceeded those required:

Radionuclide	Reported Detection Limit (uCi/ml)
Kr-87	1.6 E-4
Kr-88	1.9 E-4
Xe-138	3.6 E-4

The licensee stated that the subject analysis was part of an effluent technician training activity, and the results obtained were intended to verify that WGDT "B" could be released within the limits of TS 3.11.2.a. The effluent technician verified that the release was within TS 3.11.2.a limits, and identified the LLD deficiency in the analytical data. Two hours had elapsed since the initial sampling, so an additional sample was obtained in keeping with internal laboratory practice. However, laboratory technicians erred in assuming the initial sample had fulfilled all analytical requirements. The second sample was not analyzed and the permit was subsequently issued with the deficient analytical data attached. This occurred despite review by an effluent technician as verified by initial on the "Permit Package Checklist" under "Check for Correct LLD's". No completion or review signitures were found on the Ortec "Gamma 1" data for the sample, per internal laboratory practice. WGDT "B" was released to the environment on February 26, 1988, at 3:58 am. The noble gas activities exceeding the procedural LLDs were entered into the Gaseous Radioactive Effluent Tracking System after the inspector identified the deficient analysis. No Limiting Conditions for Operation were exceeded by the release.

It appears that the cause of the analytical deficiency was a poor turnover between the technician who identified the LLD deficiency in the first sample, and the laboratory personnel responsible for analysis of the second sample. Procedures for effluent administrative control, effluent permits, gaseous effluent surveillance and gamma analysis state that LLDs are to be met, but contain no guidance as to actions to be taken for analyses not meeting analytical sensitivities to insure that adequate analytical data are obtained.

The inspector reviewed six waste gas decay tank release permits from the latter half of 1987. No additional deficiencies were identified. This is the second incidence of radioactive effluent release to the environment without meeting required detection limits. On August 7, 1987, NRC Region V received Licensee Event Report, LER 87-016-00, from the licensee describing the release of liquid effluent from Unit 2 Chemical Waste Neutralizer Tank to the onsite evaporation pond without an analysis adequate to meet the LLD for Mo-99 required by TS Table 4.11-1. The deficiency in the analysis contained in Permit 882044 was subsequently identified as an apparent violation of TS 6.8.1 (50-529/88-08-02).

The NRC mobile laboratory was not operable at the time of the inspection. Confirmatory measurements will be performed on split samples and replicate samples during a future inspection.

The licensee's program in the area of radiochemical measurements is adequate to carry out its safety function. However, additional attention is warranted to insure proper implementatation of procedures for radiological analytic blinds and review of analytical data for radiological effluents. One apparent violation was identified involving gaseous effluent administrative control.

5. Exit Interview

The inspector met with the licensee management on March 3, 1988 to discuss the scope and findings of the inspection. The licensee was informed that the failure to obtain a gas sample analysis of Unit 2 waste gas decay tank "b" sufficient to meet the detection limits specified in TS Table 4.11-2 was an apparent violation of TS 4.11.2.1.2.