U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report Nos. 50-528/87-03, 50-529,87-04 and 50-530/87-04

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

License No. NPF-41, NPF-51 and CPPR-143

Construction Permit No. CPPR-143

Licensee: Arizona Public Service Company
P. O. Box 21666
Phoenix, Arizona 85836

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

Inspection at: Palo Verde Site - Wintersburg, Arizona

Inspection Conducted: February 2-6, 23-27, March 2-6 and telephone calls of March 17-18, 1987

Inspected by: C.A. Hooker for — 4/9/87
H. S. North, Senior Radiation Specialist — Date Signed

C.A. Hooker — 4/9/87
C. A. Hooker, Radiation Specialist — Date Signed

Approved by: M. Ellis for — 4/9/87
G. P. Yuhas, Chief — Date Signed
Facilities Radiological Protection Section

Summary:

Inspection during the period of February 2-6, 23-27, March 2-6 and telephone calls of March 17-18, 1987 (Report Nos. 50-528/87-03, 50-529/87-04, 50-530/87-04

Areas Inspected: Routine unannounced inspection of Unit 3 facilities and equipment, solid wastes, gaseous waste system, liquids and liquid wastes, external occupational exposure and personal dosimetry, internal exposure control and assessment, plant systems affecting plant water chemistry, Units 1 and 2 LWR water chemistry control and chemical analysis, occupational exposure control during extended outages, Unit 1 solid wastes, liquids and liquid wastes, gaseous waste system, Units 1 and 2, quality assurance and confirmatory measurement for in-plant radiochemical analysis, Unit 3 control of radioactive materials and contamination, surveys and monitoring, maintaining occupational exposures ALARA, quality assurance and confirmatory measurements for in-plant radiochemical analysis, a transportation incident and plant tours. Inspection procedures 30703, 83527, 84522, 84524, 84523, 83524, 83525, 79502, 79701, 83729, 84722, 84723, 84724, 84725, 83526, 83528, 84525, 86721 and 92701 were addressed.

Results: In the 18 areas addressed, no violations or deviations were identified in 17 areas. In one area, one apparent violation of 10 CFR 71.5 transport requirements for low specific activity radioactive materials, in that a strong, tight package leaked radioactive materials, was identified (Report Section 12).

DETAILS

1. Persons Contacted

APS-ANPP

+*O. J. Zeringue, Manager Technical Support
+*R. R. Baron, Compliance Supervisor
+ L. E. Brown, Manager Radiation Protection and Chemistry
+ L. D. Johnson, Nuclear Safety Engineer
+ D. M. LeBoeuf, QA Engineer
*G. D. Perkins, Manager Radiological Services
+ J. M. Quan, Licensing Engineer
+ C. N. Russo, Manager Quality Audits and Monitoring
*J. W. Ryan, Unit 3 Operation's Shift Supervisor
*T. D. Shriver, Manager Compliance
+ J. M. Sills, Senior Compliance Engineer
*L. A. Souza, Assistant Director Corporate QA/QC

NRC

*R. Zimmerman, Senior Resident Inspector

*Denotes attendance at the February 6, 1987 exit interview.

+Denotes attendance at the March 6, 1987 exit interview.

In addition to the individuals identified above, the inspectors met and held discussions with other members of the licensee's staff.

During the inquiry into the Transportation Incident, the following individuals were interviewed by telephone:

R. K. Ferrar, Manager, Design Engineering, Associated Technologies Incorporated

F. L. Wolking, Supervisor, Plant Radiation Protection, Clinton Station, Illinois Power Company

R. A. Paul, Radiation Specialist, NRC Region III

2. (Closed) Followup (50-530/86-16-02) - Facilities and Equipment - Unit 3 (83527)

Facilities

The facilities provided for radiation protection activities include an area for the decontamination of instruments and small equipment. A separate dedicated facility was used to support respirator cleaning, testing, maintenance and repair for all three Units. In addition, a protective clothing laundry (dry cleaning) facility and separate decontamination facility were constructed and equipped as a part of Unit 1.

Two separate decontamination showers with sinks and appropriate supplies were located in the radiation protection area.

Appropriate change rooms/locker rooms were provided for both men and women. The facilities, while more than adequate for normal operations, would not be adequate for a major outage. The licensee had prepared, and used during a Unit 1 outage, a portable change/access control facility for use during major outages.

Appropriate storage facilities for instruments, air samplers and miscellaneous radiation protection related supplies were available and stocked.

A well equipped medical/first aid facility was available on site. The facility was staffed by a physician and two registered nurses during dayshift, five days per week with emergency medical technician coverage during back shifts and weekends. Formal agreements have been executed with Maryvale and Good Samaritan Hospitals. Two fully equipped ambulances were available on site although principal reliance was placed on West Valley or Buckeye ambulance service. Air evacuation service was available and had been used in drills to evacuate to Good Samaritan Hospital. In the event of contaminated patients, a health physics technician accompanies the patient as well as medical staff members. The facility was equipped with two trauma areas and had available portable drug supplies, defibrillator, EKG radiophone patch at Maryvale Hospital, IV solutions and supplies for casting. Communications included base station/ambulance CB radio and radio to the onsite fire department. In addition, first aid supplies and facilities were provided in the radiation protection space in Unit 3; however, principal reliance was placed on the medical facility.

Equipment

Several Copus blowers were available for use with HEPA filter units for localized ventilation. The HEPA filter containers were on order but had not been received. Transportable temporary shielding materials were onsite stored in the warehouse. Communications systems available included telephones, plant paging system and individual pagers.

No deviations or violations were identified.

(Closed) Followup (50-530/86-16-03) - Solid Wastes - Unit 3 (84522)

Sampling

Discussion with the licensee established that provisions for sampling solid waste streams were the same in Unit 3 as in Units 1 and 2. A potential for scalding type accidents had been identified with respect to sampling hot concentrates from the liquid waste evaporator. A Design Change Package (DCP) was issued March 18, 1986 and work was budgeted for 1988, to install specialized sampling equipment in all three units. The equipment would permit safe

sampling from a recirculating stream with flush capability. A similar device will be used to sample flowing, but not recirculating resin streams. The device can collect multiple equal samples at selected intervals to assure representative samples.

Test Program and Completion for Solid Waste System

The test program included three tests which encompassed the entire solid waste system. The licensee had been using the services of contractors for solidification and/or dewatering of spent resins and bitumen dewatering and solidification of evaporator concentrates. A compactor was used for loading dry active compactible waste. The licensee was not using (Units 1 and 2) the installed cement solidification systems but considered those systems in all three units to be a viable option depending on economic considerations.

Test, 73TI-1SR01, Revision 00, Solid Radwaste Capping Verification, designed to test the automatic capping capability of the cement solidification system was not complete. Testing had been terminated and testing responsibility transferred to operations. The licensee had the capability to cap manually, the test was to verify the automatic capping capability.

Test, 91PE-3SR01, Revision 0, Resin Transfer/Dewatering System, was examined and found to be 90+% complete. Outstanding were sluicing CVCS and deborating ion exchange resins and sluicing boric acid evaporator condensate ion exchange resins. Testing had verified the ability to transfer resin to both the low and high activity resin tanks and the resin feed tank and the feed tank to the contractor truck connection.

Test, 91PE-3SR02, Revision 0, Solid Radwaste System, awaiting Test Working Group (TWG) review was examined. Testing was complete except for resin slurry and boric acid solidification testing. Letter ANPM-00075-BJG-97.35, dated February 16, 1987 requested that the testing be stopped and the uncompleted tests be identified as test exceptions. The letter also requested that startup verify the sluicing of spent resin tanks to the contractor supplied portable radwaste system. The uncompleted testing was to be completed by Operations prior to use. The licensee was planning to use contractor supplied mobile systems. The use of the mobile systems had been demonstrated successfully at Unit 1.

Process Monitors

The preoperational test program identified the process monitors and verified operability and calibration using calibrated test equipment. Test equipment records were maintained showing calibration due dates. No discrepancies were identified.

No violations or deviations were identified.

(Closed) Followup (50-530/86-16-05) - Gaseous Waste System - Unit 3 (84524)

Sampling

Plant vent sampling systems and monitors were provided as described in FSAR Table 11.5-1. The installed systems were comparable to those installed in Units 1 and 2. The licensee had performed evaluations of sampling system deposition in Unit 1 which were applicable to Unit 3. In addition, the licensee had operating experience in the use of the comparable Unit 1 and 2 systems. A shielded, chemical fume hood type sampling station was provided for collection of samples from the gaseous waste system.

Test Program and Test Completion

The licensee had developed and approved preoperational test procedures for the gaseous waste system.

Preoperational tests reviewed included:

- Procedure 91PE-3GR01, Revision 0, Gaseous Radwaste System, which addressed FSAR 14B-40 Phase I testing, had been completed and approved. The test incorporated complementary tests 91FL-3GR01, Gaseous Radwaste Flush, 73PE-3SQ03, Radiation Monitoring Preop and 92PE-3HR01, Radwaste Building HVAC.

- 91PE-3HA01, Revision 0, Auxiliary Building HVAC System, which addressed the testing requirements of FSAR 14B-21.

- 91PE-3HR01, Revision 0, Radwaste Building HVAC Preoperational Test Procedure, which addressed the testing requirements of FSAR 14B-46.

The licensee had established an HVAC group responsible for the overall coordination and testing of all HVAC systems including monitoring operating times for charcoal sampling and monitoring painting, welding and solvent use.

The HVAC staff included an engineer certified as a Level 3 Test Director in accordance with ANSI N45.2.6. The licensee had purchased the equipment required to perform HEPA and charcoal adsorber testing and had prepared, approved and implemented the surveillance test procedures for Units 1 and 2. The licensee stated that Unit 3 HEPA and charcoal surveillance tests on systems HJ, Control Room Essential Ventilation System and HF, Fuel Building Essential Ventilation System had been completed. The test report on the HF system had been submitted to the Test Results Review Group (TRRG) and the Test Results report on the HJ system was in preparation. The HP, hydrogen purge system, was tested only in Unit 1 since the hydrogen recombiner and HEPA-adsorber train was a portable system designed for use at any of the three units. The results of the in-place HEPA and adsorber tests were examined for systems HF and HJ. The results met the requirements of ANSI-N-510.

The system testing satisfied the testing commitments of FSAR 14B-21, Auxiliary Building Essential HVAC and Fuel Building Essential. Exhaust Systems and 14B-23, Control Building Essential HVAC. A training course in filter-adsorber testing and maintenance was scheduled for March 16-25, 1987.

Process and Effluent Monitors

On March 6, 1987, the licensee stated that preoperational testing on all Technical Specification identified monitors except RU-145 and 146, low and high range Fuel Building Exhaust Monitors had been completed. Thirteen of the monitors not identified in the Technical Specifications remained incomplete. Following completion of the preoperational testing, the completed test packages were to be reviewed by TRRG. On completion of testing the Technical Specification monitors were placed on the surveillance test schedule and the non-Technical Specification monitors were placed on the preventive maintenance schedule. The results of testing of the radiation monitors will be examined during a subsequent inspection (50-530/87-04-02).

No violations or deviations were identified.

(Closed) Followup (50-530/86-16-06) - Liquids and Liquid Wastes - Unit 3 (84523)

Liquid Sampling

Liquid sampling was discussed with Unit 3 chemistry and radwaste group representatives. The NSSS and secondary sampling systems were used during the hot functional tests and were found to be operable and serviceable. Some problems associated with secondary system valve mislabeling were identified and resolved. The liquid radwaste system sampling points consist of spigots on various systems. No central sampling station was provided. The licensee stated, based on observations in Units 1 and 2, that the sampling capability was adequate and serviceable and while improvements could be made they were not required for safety of operations. The licensee's procedures require circulation of 2½ tank volumes prior to sampling. The radwaste system sampling line runs were very short. The points of origin had been verified and purge volumes for primary and secondary sampling lines had been determined.

The Post Accident Sampling System (PASS) was not operational. Preoperational testing was just starting. The staff planned to use a hydrolaser to supply high pressure to the PASS during testing. The chemistry group planned to conduct hands-on PASS training during the preoperational PASS testing phase.

Test Program and Results Completion for Liquid Waste System

Test procedures were reviewed and approved by the Test Working Group (TWG) with test exception review by Operations. Completed tests

were referred to the Test Results Review Group (TRRG) for final review and approval. The liquid waste system tests included:

91PE-3CH09, Revision 00, Boric Acid Concentrator Test
91PE-3CH10, Revision 00, Holdup Tank and Pumps Including Gas Stripper
91PE-3LR01, Revision 00, Liquid Radwaste Tanks and Ion Exchangers
91PE-3LR02; Revision 00, LRS Evaporator Package
91PE-3LR03, Revision 00, LRS Concentrate Monitor Tanks
91PE-3LR04, Revision 00, Chemical Drain Tanks and Pumps
91PE-3RD01, Revision 00, Radioactive Waste Drainage System
91PE-3SS01, Revision 0, Nuclear Sampling Test
91SU-3SC01, Revision 0, Secondary Sample Test

Test, 91PE-3CH09, Boric Acid Concentrator Test, was 90% complete. Faulty screens in the associated ion exchanger required repair. It was estimated that 3 to 4 weeks would be required to complete the repairs and the testing. The following test procedures/reports were examined:

91PE-3LR01 - Testing complete, results reviewed and approved TWG and Startup Manager
91-E-3LR02 - Testing complete, no outstanding test exceptions, awaiting TWG review
91PE-3LR03 - Testing complete, results reviewed and approved by TWG
91PE-3LR04 - Testing complete, results reviewed and approved by TWG and Startup Manager
91PE-3SS01 - Testing complete, TWG meeting held, report awaiting incorporation of TWG comments
91SU-3SC01 - Testing and results review complete

Liquid Process and Effluent Monitors

The liquid waste system includes no plant effluent or essential safety system monitors since the plant design does not provide for the discharge of radioactive liquid wastes. FSAR Table 11.5-1 identifies the following liquid monitors:

Monitor Designation	Function	Type
RU-2 and RU-3	Essential Cooling Water System Monitors	Offline-liquid
RU-4 and RU-5	Steam Generator Blowdown Monitors	Offline-liquid
RU-6	Nuclear Cooling Water System Monitor	Offline-liquid
RU-7	Auxiliary Steam Condensate Receiver Tank Inlet Monitor	Tank Recirc-liquid

RU-204	NSSS Process Radiation Monitor	Inline-liquid
RU-265	NSSS Gas Stripper Effluent Monitor	Inline-liquid

None of the above comparable Unit 1 and 2 monitors were identified by the Technical Specifications.

The licensee stated that of the non-Technical Specification identified Unit 3 monitors, preoperational testing was incomplete on 13 monitors. Testing on 6 of the 13 monitors was 90-99% complete with an overall completion of approximately 70%. The licensee expected to complete all testing by March 9, 1987. The licensee was informed that NRR would be advised to require a Justification for Interim Operation if the preoperational testing of the radiation monitoring system was not complete by March 16, 1987. The results of preoperational testing of the previously identified radiation monitors will be examined during a subsequent inspection (50-530/87-04-01).

No violations or deviations were identified.

(Closed) Followup (50-530/86-30-01) - External Occupational Exposure Control and Personal Dosimetry - Unit 3 (83524)

Procedures for emergency operation's were contained in EPIP-16, Revision 4, In-Plant Surveys and Monitoring, which provided for initial dose rate evaluations from the RMS or ERFDADS, addressed emergency exposure limits of EPIP-18 and provided for the use of emergency kit equipment.

EPIP-18, Revision 3, Emergency Exposure Guidelines, provides guidance for exceeding both ANPP administrative and 10 CFR 20 exposure limits during an emergency and lists maximum exposures for accident conditions, corrective actions and life saving with reference to the source of the information. The procedure also specified that monitoring devices and protective equipment were to be appropriate for the conditions expected, including various dosimetry devices, KI, protective clothing and respirators.

EPIP-38, Revision 8, Emergency Equipment and Supplies Inventory, listed the supplies to be available in various emergency kits. The dosimetry and survey instrument and protective clothing, air samplers, and respirator supplies in the Unit 3 Technical Support Center (TSC) and Operations Support Center (OSC) were examined and compared with the inventory lists. The dosimeter chargers were verified to be serviceable.

No deviations or violations were identified.

(Closed) Followup (50-530/86-30-02) - Internal Exposure Control and Assessment - Unit 3 (83525)

Air Sampling for Assessing Individual Exposure

Procedure 75RP-9ZZ48, Revision 4, Airborne Radioactivity Sampling, addressed noble gas, particulate, iodine and tritium sampling, provisions for use of silver zeolite cartridges in high noble gas concentrations, limits on iodine cartridge airflows and breathing zone sampling. Sample analysis was to be provided by the unit radiation protection counting room in accordance with 75RP-9ZZ70, Revision 0, Operation of Canberra Series 90 Multichannel Analyzer. The sample data sheet provided for review of the sample analytical result. A lower tier procedure RP-007, Revision 2, Evaluation of Airborne Radioactivity, addressed MPC calculation, MPC hour tracking, determination of skin dose from noble gases and document control.

Quarterly air sampler calibration was required by 75RP-9XC05, Revision 4, Flow Calibration and Maintenance of Air Samplers. This procedure also specified calibration tolerances, required annual calibration of the air flow calibrator and provided for calibration documentation and record retention. Adequate supplies of appropriate types of air sampling equipment were available in Unit 3.

No violations or deviations were identified.

(Closed) Followup (50-530/86-30-03) - Plant Systems Affecting Plant Water Chemistry - Unit 3 (79502)

Primary and Secondary Water Systems

Discussion with the chemistry staff established that the Unit 3 systems were the same as Units 1 and 2. The licensee stated that the Unit 3 systems had not been modified. On January 17, 1987, Unit 1 experienced a steam generator tube failure. Subsequent eddy current testing in both Units 1 and 2 identified the problem to be tube to support wear resulting from flow induced tube vibration. The locations of flow induced wear in Units 1 and 2 were bounded and the bounded locations in the Unit 3 steam generators were staked and plugged as a precautionary measure. The licensee reported that from a chemistry viewpoint, the Unit 1 and 2 primary and secondary systems had performed well.

Auxiliary Water Systems

The licensee stated that Unit 1 and 2 operating experience and Unit 3 testing established that the system flows met design criteria and that the quality of the water was adequate. Some of the secondary side instrumentation maintenance was too labor intensive and the licensee elected not to continue using the equipment. In some cases, the instruments were of old design and upgrading was underway.

Demineralizers

The licensee stated that in Unit 1 all primary system resins had been disposed as waste rather than recharged. Secondary side resins were recharged until the primary to secondary leak of January 17, 1987 occurred. Then the resins were disposed as waste. The uncontaminated effluent from resin regeneration was transferred to the retention basin for sampling and analysis prior to discharge to the evaporation pond. Contaminated high TDS waste were transferred to the liquid radwaste system evaporator. The licensee's procedure 74CH-9ZZ04, System Chemistry Specification, provides system operating, makeup, standby and layup parameters for the following systems:

Reactor Coolant
Steam Generators
Feedwater
Condensate
Auxiliary Steam Boiler
Spent Fuel Pool
Flush Water Criteria
Inhibited Water
Closed Cooling Systems
Circulating Water
Essential Spray Pond
Storage Tanks and Miscellaneous Systems

No violations or deviations were identified.

3. LWR Water Chemistry Control and Chemical Analysis - Units 1 and 2 (79701)

Audits and Appraisals

The only audit in the Chemistry area, Audit No. 86-013, "PVNGS Plant Chemistry," is addressed in report Section 8. During 1986 a total of 129 Monitoring Reports were generated by the Quality Audit's and Monitoring staff in the area of chemistry. A random sample of 25 Unit 1 and 20 Unit 2 Monitoring Reports were examined. The topics addressed included:

Unit	Topic
1/2	Waste Gas Decay Tank Curie Content
1	Effluent Monitoring Daily Surveillance Test
1/2	Liquid Holdup Tank Surveillance Test
1	Reactor Coolant System Chloride Analysis
1	Backup PASS Functional Test
1	Diesel Fire Pump Fuel Oil
1/2	Refueling Water Storage Tank Boron Surveillance Test
1	Spent Fuel Pool Boron
1/2	Reactor Coolant System Specific Activity
1/2	Reactor Coolant System Chemistry

1/2	Chemical Waste Neutralization Tank Surveillance Test
1	Safety Injection Tank Boron Surveillance Test
1/2	Secondary System Activity Surveillance Test
2	Effluent Monitor Monthly Source Check
2	Liquid Radwaste System Monitor Tank Surveillance Test
2	Diesel Generator Fuel Oil
2	ECCS-TSP Surveillance Test
2	Liquid Radwaste System Recycle Monitor Tank Surveillance Test

Changes

The licensee reported that the Steam Generator Owners Group (SGOG) and Combustion Engineering (CE) guidance on chemistry had been incorporated into procedure 74AC-9ZZ04, Systems Chemistry Specifications. Guidance provided by CE's document CENPD-28 was being augmented with applicable portions of EPRI guidance on water chemistry.

Implementation of the Quality Assurance Program for Chemical Measurements

This topic is addressed in Report Section 8.

No violations or deviations were identified.

4. Occupational Exposure During Extended Outages - Units 1 and 2 (83729)

Facility Tours

During the inspection both Units 1 and 2 were engaged in outage activities, Unit 1 in steam generator eddy current testing, tube staking and plugging and Unit 2 was in a 55-day maintenance/surveillance outage. As a result of the Unit 1 steam generator tube failure and eddy current findings, precautionary steam generator eddy current testing, tube staking and plugging were also performed at Unit 2. During the inspection, one inspector toured Units 1 and 2 extensively, February 2-4, 1987. During the tours, surveys were performed using an ion chamber survey meter, NRC-009154, due for calibration on March 18, 1987. No significant differences between the licensee's survey instrument readings and the NRC instrument were noted.

Observations During Facility Tours

During a tour of the Unit 1 containment on February 2, 1987, the inspector found a High Radiation Area posting (sign) lying face down at the entrance to the pressurizer cubicle on the 120 ft. elevation level. Tape used to secure a rope with this posting attached across the entrance had come loose from the wall. The inspector did not enter the cubicle to make radiation measurements due to RWP restrictions. The licensee was unable to immediately present the inspector with a recent survey of the cubicle. However, a licensee survey of the cubicle on February 3, 1987, indicated that the maximum whole body dose in the cubicle was 65 mR/hr with hot spots up to 160 mR/hr. The dose rates in the cubicle were less

than 100 mR/hr, therefore, nullifying a potential violation of TS 6.12.1 "High Radiation Area." In this case, the containment posting "Radiation Area" satisfied the posting requirements.

The inspector also noted that a High Radiation Area posting attached to the door of the regenerative heat exchanger room door was almost down. The tape securing this posting on the door was coming loose.

The inspector expressed concerns to the licensee on the use of tape for securing postings. The licensee acknowledged the inspector's concerns and agreed to find a better method for securing postings of plant areas.

Unit 2 Tours

During a tour of the Unit 2 Auxiliary Building on February 3, 1987, it was observed that the local audible high and low flow alarm speaker on RU-003, Essential Cooling Water (ECW) Radiation Monitor - Train "B", was covered over with a sticky-backed wipe pad. The inspector removed the wipe pad and heard the audible alarm signal. The inspector placed the wipe pad back over the alarm speaker. The inspector discussed this matter with a cognizant licensee's representative, who stated that, the flow alarms were actuated when the respective ECW trains were placed on line and must be reset with a portable alarm reset instrument. The alarm reset function was performed by the Radiation Protection (RP) department upon notification from the control room when ECW trains were placed on line. However, in this case the RP department had not been notified when the ECW "B" Train was placed on line, and apparently no one was aware that the alarm was signalling due to the wipe pad covering the alarm speaker.

This matter was discussed with the control room foreman on February 4, 1987. The inspector's expressed concerns on the licensee resorting to covering up the speaker to silence the local flow alarms. Covering up the alarm speaker would negate their purpose during normal operations if the speaker were covered. The control room foreman stated that he would expedite a change to procedure 420P-2SI01, Shutdown Cooling Initiation, to ensure that the RP department would be informed when an ECW train was placed in service so that the system radiation monitor flow alarms could be reset in a timely manner.

Step-off pads were properly utilized, personnel contamination and survey instruments were working properly and the instruments displayed current calibration dates. Workers were observed to be properly dressed in protective clothing, and equipped with required personnel monitoring devices.

In addition to the above observations, the inspector observed that all radiation and high radiation areas were posted as required by 10 CFR Part 20 and that access controls were consistent with TS, Section 6.12, and licensee procedures.

Audits and Appraisals

Three Monitoring Reports related to outage activities were examined:

- SM-87-0311, Unit 1, conducted January 29-February 18, 1987, addressed radiation protection and ALARA activities. Specific topics included Reg. Guide 8.8 (ALARA), preparation of ALARA reports and radiation exposure permits. Dose assessment surveys and steam generator surveys were also reviewed. No deficiencies were identified.

- SM-87-0169, Unit 1, conducted January 29, 1987, addressed radiation protection, ALARA, nuclear and operation's engineering in the areas of radiation protection, contamination control, housekeeping and REPs. A total of 36 items were examined. No deficiencies were identified.

- Monitor Report in the review cycle, no number assigned, Unit 1, conducted February 13-16, 1987. A 24 item checklist, cross-referenced to procedures, addressed Reg. Guide 8.8 (ALARA) associated with steam generator work. One unsatisfactory item was noted; failure to coordinate air samples with steam generator jumps prior to February 10, 1987. Subsequently, an air sample was collected during each jump. Whole body counts were to be performed on all individuals performing jumps prior to February 10, 1987.

Training and Qualification

The inspector observed the facilities for training steam generator jumpers. A mockup was used which provided for training and qualification of all jumpers. Training included use of protective clothing and equipment, tube staking and plug welding and weld certification.

External Exposure Control

The licensee reported that beta exposure was the controlling factor in steam generator work due to the high energy Antimony (Sb)-122 and SB-124 beta component. The initial beta to gamma dose rate ratios observed were 5.5 or 6 to 1. The lens of the eye was considered to be the critical organ and special studies were performed to identify the required protective clothing and equipment shielding. TLDs and a steam generator diaphram were used in the study. TLDs were exposed to the unscattered radiation from the diaphram with various combinations of shielding materials including, cloth and plastic protective clothing, full face respirators, bubble hood, and glasses. The milligrams/square centimeter (mg/cm^2) for the various materials was determined, the dose delivered to a TLD from the source to the TLD through various combinations of shielding materials was determined and the results were plotted, dose vs. shielding. The licensee found that beyond 672 mg/cm^2 no significant reduction in dose resulted with increasing shielding. The licensee included the 18 mg/cm^2 covering on element 1 of the Panasonic TLD and the 300 mg/cm^2 water content of the eye between the surface of the eye and the crystalline lens of the eye in the determination (as represented by TLD element 2 which provided 300 mg/cm^2 filtration). The licensee noted that the best TLD was a compromise for shallow, 7 mg/cm^2, measurements (ANSI 13.11-1983) since the minimum filtration

on TLD element 1 was 18 mg/cm^2. The required lens of the eye shielding was achieved either with glasses (300 mg/cm^2) and bubble hood (72 mg/cm^2) or for welders a full face welding respirator. The water layer to the lens of the eye (300 mg/cm^2) was also included as a constant part of the shielding.

During the outage, the licensee's dosimetry group provided 12 hour turn around TLD data to management and working groups, in spite of the fact that a computer based dose tracking system was not in use. Special dosimetry packets for jumpers and platform workers were prepared by the dosimetry group. Special, individual dosimetry log sheets were prepared and used for jumpers and platform workers. The licensee found that the thighs or upper arms generally received the highest exposures since much of the work was concentrated in the corners of the steam generators.

A listing of personnel with greater than 1000 mrem whole body or 2000 mrem skin exposures (total 64) was provided by the licensee. Records for 6 randomly selected individuals were examined. No discrepancies were identified.

Additional aspects of this inspection procedure will be examined during a subsequent inspection (50-528/87-03-02, 50-529/87-04-01).

No violations or deviations were identified.

5. Solid Wastes - Unit 1 (84722)

Audits and Appraisals

Audit No. 86-014, Process Control Program (Radioactive Waste Management), dated April 7-24, 1986, was reviewed and discussed in Inspection Report No. 50-528/86-13. No other licensee audits in this area had been conducted. Quality Monitoring Report SM-87-0323, of February 11-20, 1987, documented a licensee review of the contractor provided bitumen solidification activity. The report addressed contractor conformance to ANPP controlled documents and Quality Control (QC) check points, Process Control Program (PCP) adherence, and compliance with 10 CFR 61.55 and 61.56 and IE Information Notice 87-07. Two licensee documentation related and one QC program related discrepancies were identified. Proposed corrective actions and planned but uncompleted followup verifications were identified.

Changes

The licensee stated that no significant changes had been made in the installed system. Contracts exist with two contractors, one providing onsite dewatering and solidification of liquids and evaporator concentrates in bitumen and the other providing both cement solidification or dewatering of resins. Both vendors use mobile systems. The bitumen system provides a 5.6/1 volume reduction compared to cement solidification of evaporator bottoms. Resin dewatering provides a 2/1 volume reduction over cement

solidification. The cement solidification process uses the approved site PCP. Proposed changes to include Envirostone had been submitted to the Plant Review Board (PRB) in December 1986; however, the revised PCP had not yet been approved. The vendor supplied bitumen solidification PCP and a 10 CFR 50.59 were reviewed and approved by the licensee. The vendor staff operates the bitumen solidification system. The operators meet ANPP qualification standards and ANSI-3.1 requirements.

Processing and Storage

Compacted dry radioactive waste was stored inside the Radwaste Building and larger containers were stored in a fenced, posted area inside the protected area. The licensee stated that an onsite waste storage facility was being constructed with completion expected in November 1987. The facility was to be used for the storage of low level dry active waste. The licensee plans to ship all higher level waste for disposal. The licensee's Semiannual Radioactive Effluent Release Reports for the last half of 1985 and all of 1986 were reviewed. The monthly Radwaste Group reports for 1986 and early 1987 were examined. A December 5, 1986, memo to "All Radioactive Materials Control Employees," stated the licensee's radwaste corporate goals for 1987 were as follow: Unit 1, 397 M^3, Unit 2, 397 M^3 and Unit 3, 42.5 M^3. The licensee's representative stated that waste site allocations to the middle of 1988 had been used. A short fall of disposal capacity of 40,000 ft^3 by 1991 was projected, including volume reductions expected due to the use of bitumen solidification and a super compactor.

Disposal of Low-Level Waste

Licensee procedures required to implement the requirements of 10 CFR 61.55 and 61.56 and 10 CFR 20.311 were examined and documented in Inspection Report No. 50-528/86-36.

No violations or deviations were identified.

6. Liquids and Liquid Wastes Unit 1 (84723)

Audits and Appraisals

No audits in the area of liquid wastes were identified. A total of 129 monitoring reports were generated by the ANPP Quality Audits and Monitoring Department in the areas of chemistry and radiation protection during 1986. A random sample of 25 monitoring reports of surveillance tests for Unit 1 were examined. Of the total, 2 were related to the liquid waste system. Monitor report numbers ST86-0527, Chemical Waste Neutralization Tank Surveillance Test, and ST86-1122, Liquid Holdup Tank Surveillance Test, addressed conformance with surveillance test requirements. Report number ST86-0527 was identified as unsatisfactory because of an administrative problem which was subsequently resolved.

Changes

The licensee stated that no changes had been made in the liquid radwaste system (LRS). Distillate from the LRS evaporator was transferred to the refueling, makeup or CVCS holdup tanks. From the CVCS holdup tank, liquid could be transferred to the boric acid evaporator. Steam, discharged from the boric acid evaporator, could be discharged to the Radwaste Building vent to dispose of tritiated water. During 1986, 1.212E6 gallons of water were disposed in this fashion at Unit 1. It was reported that this volume of water represented only 1/15 of the potential maximum capacity of this disposal mode. During 1986, the licensee identified a dead leg at the base of the plant vent. Water which had accumulated was drained and collected. Analysis of the water established that it was not contaminated. The licensee stated that construction of a second evaporation pond will start shortly.

A new training program for radwaste personnel was being developed in preparation for INPO accreditation. The radwaste and training staffs coordinated in the development of the program.

Effluents

Technical Specification, Section 3.11.1.1, limits discharges from the secondary system to the evaporation pond to the lower limit of detectability (LLD) defined as 5×10^{-7} microcuries per milliliter (μCi/ml) for the principal gamma emitters or 1×10^{-6} μCi/ml for I-131. The licensee imposed a limit on tritium discharges to the evaporation pond equal to the EPA drinking water standard. Since the Technical Specifications were silent with respect to tritium and noble gas releases to the evaporation pond, the licensee was considering requesting an amendment to the Technical Specification clarifying this matter. Evaporation pond tritium concentrations and losses due to evaporation and the dose calculations associated with this mode of release were tracked by the licensee's corporate office staff. Data generated by the corporate office was provided to the site staff for inclusion in the Semiannual Radioactive Effluent Release Reports. The corporate office program for accounting for tritium released due to evaporation and calculation of doses was not examined. These matters will be examined during a subsequent inspection (50-528/87-03-01). The Semiannual Radioactive Effluent Release Reports for July-December 1985 and all of 1986 were examined. The licensee reported that no liquid radioactive materials were discharged from the site.

Instrumentation

The facility had no liquid effluent monitors. The liquid process monitors were not specifically identified in the Technical Specifications. Such monitors were entered in the Preventive Maintenance schedule and calibrated and maintained in accordance with that schedule. No records of calibration or testing of these monitors were examined during this inspection.

Reactor Coolant and Secondary Water

Chemistry limits for the primary system were specified in Technical Specification, Table 3.4-2, and surveillance requirements in Table 4.4-3. Primary system activity limits were specified in Technical Specification, Section 3.4.7. Based on an examination of licensee records primary system chemical and radiochemical conditions met the Technical Specification limits. Limitations on discharges from the secondary system to the evaporation ponds will be examined during a subsequent inspection (50-528/87-03-01).

No violations or deviations were identified.

7. Gaseous Waste System - Unit 1 (84724)

Audits and Appraisals

No audits of the gaseous waste system operation had been completed. Randomly selected surveillance test monitoring reports prepared by ANPP Quality Audits and Monitoring Department related to the gaseous waste system were examined.

Waste Gas Decay Tank Curie Content

Monitoring Report No.	Date	Findings
ST-86-0122	January 15, 1986	Satisfactory
ST-86-0131	January 16, 1986	Satisfactory
ST-86-0509	February 15, 1986	Satisfactory
ST-86-0820	March 14, 1986	Satisfactory

Effluent Monitor Daily Surveillance Test

Monitoring Report No.	Date	Findings
ST-86-0265	January 24, 1986	Unsatisfactory
ST-86-0310	January 29, 1986	Unsatisfactory
ST-86-0312	January 30, 1986	Unsatisfactory
ST-86-0339	January 30, 1986	Unsatisfactory
ST-86-0380	February 5, 1986	Satisfactory
ST-86-1123	April 4, 1986	Satisfactory
ST-86-1186	April 11, 1986	Satisfactory
ST-86-1955	June 9, 1986	Satisfactory
ST-86-2755	September 5, 1986	Satisfactory

The four unsatisfactory findings were related to problems in documentation. The problems were corrected.

Changes

The licensee stated that the only changes consisted of the addition of some drain lines and collection pots to the hydrogen-oxygen analyzer and waste gas compressor systems. It was reported that in spite of the additions some water was still observed in the hydrogen-oxygen analyzer lines when the gas stripper was operated.

Effluents

The licensee's Semiannual Radioactive Effluent Release Reports for the second half of 1985 and all of 1986 were examined. No obvious mistakes or anomalous measurements were identified. The trends in fission and activation gases, particulates with half-life values greater than 8 days and iodines were reflective of the operating status of the reactor. The tritium released following fourth quarter 1985 has shown a continuing upward trend reflective of both increasing tritium concentrations and the licensee's practice of disposing of steam from the boric acid evaporator to the Radwaste Building ventilation system.

Procedure 75RP-9ZZ92, Revision 4, Gaseous Radioactive Release Permits and Offsite Dose Assessment, was used to generate gaseous release permits. The permits were numbered in serial fashion without regard to the source of the gaseous release. Gaseous release permits were retained by the Radiation Protection Effluents Group for approximately six months prior to transfer to permanent storage. Selected reports prepared for releases from the Fuel Building, condenser off gas, plant vent, NSCP (nonstandard containment purge-pressure relief) and waste gas decay tanks during the period July 1 through November 25, 1986, were examined. The release permit packages were legible, complete and included the results of beta-gamma air dose, organ dose and whole body, skin and organ dose rate calculations.

The inspector calculated the total gamma and beta air doses for Release Permit 861224, waste gas decay tank, using ODCM, Revision 1, September 20, 1985. No discrepancies were identified. No concerns in the use or maintenance of the gaseous or particulate process systems were noted.

On January 17, 1987, a steam generator tube failure occurred. The event was documented in a memorandum to file dated January 20, 1987, "Gaseous Effluent Release Associated with #1 S/G Tube Leak in Unit 1," File 87-004-419.5. The memorandum provided a sequence of events for the period 1715 hours on January 17, 1987, through 0918 hours on January 20, 1987. Two effluent release reports 871013 and 871014 were generated to account for the initial release and dose and dose rate data. The total gamma, beta and organ doses attributed to the early portion of the event, 3.43E-3, 2.14E-3 and 3.38E-5 mrem respectively, were small fractions of the Technical specification quarterly limit. Two additional release permits were generated, 871019 and 871026, to account for releases resulting from condenser flushing activities. The doses attributable to these additional releases were a small fraction of those calculated for the initial release.

For the period July 1985, through December 1986, effluents were within Appendix I, 10 CFR 50 design objectives and were, therefore, ALARA.

Instrumentation

Technical Specification, Section 3.3.3.9, identifies gaseous effluent monitors and in Table 4.3-8 specifies the frequency for the performance of channel checks, source checks, channel calibrations and channel functional tests. Surveillance test procedures specific to the monitors had been prepared, were implemented and maintained. The surveillance tests applicable to channel calibrations and functional tests were performed by the I&C Radiation Monitoring System (RMS) maintenance engineering staff. The surveillance tests applicable to channel and source checks were performed by a Unit 1 shift radiation protection technician. Records showing the completion of channel calibrations and functional tests for monitors RU-12, 141, 142, 143, 144, 145 and 146 were examined for 1986. No discrepancies were identified. The performance of channel and source check surveillance tests were discussed with a duty radiation protection technician. Records of recently performed channel and source checks were examined. No discrepancies were identified. When the applicable surveillance tests have been completed, reviewed and approved, the complete surveillance test packages were submitted to the licensee's Corporate Document Management (CDM) group for archival storage.

Air Cleaning Systems

The licensee had established an onsite capability for the performance of tests of air cleaning systems including in place testing of HEPA filters and charcoal absorbers which is addressed in report Section 2 (50-530/86-16-05). The licensee had adopted a system designation coding for HVAC systems:

For Technical Specification identified systems the coding was:

- HJ - Control Room Essential Ventilation System
- HF - Fuel Building Essential Ventilation System

Surveillance tests for these systems were designated:

- 73 ST-9 (System Coding Designation) (numerical designation of the specific test).

For the systems not identified in the Technical Specifications; the system coding was:

- AR - Condenser Air Removal
- CP - Containment Purge
- HC - Containment Filtration
- HA - Auxiliary Building Normal Ventilation
- HR - Radwaste Building

- HS - Unit 1 Laundry Facility Ventilation
- HN - EOF and TSC (considered part of Unit 1).

Testing of these systems was performed using Generic Test Instructions.

The tests on the essential systems included:

- 73ST-9 HJ or HF01, Building Pressure and Airflow Verification Test
- 73ST-9 HJ or HF02, HEPA In-place Test
- 73ST-9 HJ or HF03, Charcoal In-place Test
- 73ST-9 HJ or HF04, "A" Train Charcoal Laboratory Analysis
- 73ST-9 HJ or HF05, "B" Train Charcoal Laboratory Analysis

For the HP System the tests included:

- 73ST-9 ZZ14, System Performance Test and Airflow Verification (includes HEPA and Charcoal)
- 73ST-9 ZZ15, Heater Performance Test
- 73ST-9 HP01, Charcoal Laboratory Analysis

The Test Instructions (TI) provide the same scope of coverage for the non-Technical Specification systems. With respect to Unit 1, the only required tests at the time of the inspection, were the charcoal laboratory analysis on the HF, HJ and HP systems. The inspector verified that the tests were performed. In addition, the inspector reviewed the licensee's schedule for performing Surveillance Tests and Test Instructions on the various systems.

No violations or deviations were identfied.

8. Quality Assurance and Confirmatory Measurements for In-Plant Radiochemical Analysis - Units 1 and 2 (84725)

Audits and Appraisals

Quality Assurance Audit Report - Audit No. 86-013, "PVNGS Plant Chemistry," conducted May 5-23, 1986, applicable to Units 1 and 2, was reviewed.

The audit addressed:

- Laboratory Analytical Control Program
- PASS

- Secondary Water Chemistry
- Training and Qualifications
- Corrective Actions for LERs
- Interface Requirements between Chemistry, Operations and Radiation Protection
- Primary Chemistry (Technical Specifications, Sections 3/4.4.6 and 3/4.4.7)
- Laboratory and Warehouse Control of Chemicals and Reagents

The audit appeared to be both thorough and extensive, including examination of multiple examples under each topic.

Three findings were identified, documented in Corrective Action Requests (CAR) and subsequently closed. The CARs addressed the following topics:

- CA86-0097, Hydrazine not meeting the bulk chemical specifications was accepted;
- CA86-0100, Two signatures on a Chemistry Technician qualification card were not dated; and
- CA86-0101, Chemistry personnel failed to follow procedures when transferring hydrazine.

The audit also resulted in the issuance of six Monitoring Report findings. It was verified that corrective action on five of the items had been completed at the time of the inspection. The sixth item related to "Enclosed or Confined Space Entry," training for chemistry technicians. Action had been taken to revise the technician training program; however, the item had not been closed by Quality Audits.

Changes

No significant changes in the laboratory facilities were identified. The licensee had established a laboratory, equipped as the Unit laboratories, for training purposes.

Confirmatory Measurement

Evaluation documented in Inspection Report Nos. 50-528/87-04 and 50-529/87-05.

Post Accident Sample Analysis

Three surveillance test procedures were applicable to PASS:

74ST-(U.D.*)SS02, Post Accident Sampling System Leakage Monitoring (18-month frequency);

*(U.D.) - Unit designation, e.g. 1 or 2

74ST-1SS03, Backup Post Accident Sampling System Surveillance (Unit 1, 18-month frequency)

74ST-2SS03, Post Accident Sampling System Surveillance (Unit 2, 18-month frequency)

74ST-1SS04, Backup PASS Functional Test (Unit 1, monthly frequency)

74ST-2SS04, PASS Functional Test (Unit 2, monthly frequency)

The 18-month frequency PASS sampling system surveillance called for analysis of a complete range of samples. The monthly surveillance required only boron, isotopic analysis, dissolved gas, containment hydrogen and oxygen and isotopic. Unit specific PASS procedures were used because the Unit 1 and 2 PASS systems were different and also because certain components in the individual PASS systems differ in important parameters (e.g. volume).

Procedure 74CH-9XC33, Post Accident Radioactive Sampling, Analysis and Handling, addressed analytical techniques, sample handling and transportation guidance. The licensee reported good correlation with routine samples for boron. Correlation for dissolved gas was not as good due to the sample size (40 cc) and the error of ± 11cc/kg. The Unit 1 PASS was an interim system scheduled to be replaced with a full scale system comparable to that installed in Unit 3. The samples collected for the monthly surveillance vary between Units 1 and 2:

Unit 1	Unit 2
Depressurized Liquid RCS	Same
Pressurized Liquid (Gas) RCS	Same Let down sample depressurized Let down sample pressurized (gas)
Containment Atmosphere	Same
Safety Injection Train "A"	Same Safety Injection Train "B" Auxiliary Building Radwaste Sump

During a tour of the Unit 1 chemistry laboratory, the inspector observed two technicians performing portions of the monthly PASS surveillance test, gas analysis.

Implementation of the Quality Assurance Program

The licensee had established and was implementing a laboratory analytical control program. The procedures applicable to the program included:

- 74AC-0ZZ01, Specifications for Bulk Chemicals
- 74AC-9ZZ01; Laboratory Analytical Control - defined the Laboratory Analytical Control (LAC) program (provided a systematic approach to analytical control to assure valid analytical results, made no distinction between Technical Specification required analyses and any other analysis performed by the chemistry section).
- 74AC-9ZZ02, Laboratory Operations
- 74CH-9XC10, Analytical Control Samples (described the type of analytical control samples, addressed standards, spiked samples, duplicates, replicates, blind samples, sample schedules developed by Unit laboratories).
- 74CH-9XC11, Analytical Control Chart Development
- 74CH-9XC13, Analytical Instrument Calibration Verification
- 74CH-9XC14, Reagent Preparation
- 74CH-9XC15, Sampling Instructions
- 74CH-9XC16, Sampling and Analytical Schedule (applicable to safety-related and nonsafety-related systems).

The LAC program was implemented by the Chemistry Support Group (CSG), consisting of one supervisor, five engineers and four technicians and nine contractor personnel (two CE engineers and seven technicians). The CSG had responsibility for the circulating water and spray pond systems, ordering and receiving (certification verification) bulk chemicals, escorting chemical delivery trucks and the LAC. A Ph.D., Nuclear Chemistry Process Engineer administers, coordinates and monitors the LAC program. The LAC program includes controls and verifications on balances, instrumentation and analytical techniques.

Control charts were maintained, where applicable, principally by the Unit chemistry staff. The LAC program includes both knowns and unknowns, spikes, duplicates and replicate samples. The sources of samples used include:

- NWT Corporation - supplied blind samples, distributed to the Units by and analytical results reported to NWT by the CSG. NWT provides a report of the result of comparison to the licensee. This program supports the INPO Good Practice,

CY-702, "Verification of Analytical Performance," INPO 83-107, May 1983.

- Analytics Inc. - supplies quarterly radiochemical samples including gamma, gross beta, Strontium (Sr)-89 and Sr-90, tritium (with interferences) and iodine cartridges.

- NUS Operating Systems Corporation supplies, quarterly, concentrated chemical standards which were diluted by the CSG. The analytical results were scored by the CSG.

- ERA (Environmental Resource Associates) - provides samples of the same type as NUS, but with an environmental orientation.

- Arizona Association of Certified Laboratories - sample drinking water standards provided to the site and certified laboratories in Arizona.

The LAC program requires daily verification of calibration or use of control standards on the following instruments or equipment:

Balance
Spectrophotometer
Ion Chromatograph
Specific Ion Electrodes
Titration
Atomic Absorption Spectrophotometer
Total Organic Carbon
Gas Chromatograph
Turbidimeter
pH Meter

The licensee had made several revisions to procedure 74AC-9ZZ04, System Chemistry Specifications, in that the specifications were initially too conservative. In addition, revision of the QA-QC procedures were planned, in an attempt to reduce activities which did not produce either significant information or enhanced QA-QC. Chemistry management estimated that 20-25% of the Unit laboratory time was spent on QA-QC. The goal was a less costly and more productive program.

No violations or deviations were identified.

9. Control of Radioactive Materials and Contamination, Surveys and Monitoring - Unit 3 (83526)

Area Radiation and Airborne Radioactivity Monitors

Monitor calibrations were addressed either by Surveillance Test (ST) procedures for Technical Specification identified monitors or preventive maintenance (PM) procedures for other monitors. The PM procedures were contained in the Station Information Management System (SIMS). The STs and PMs have essentially the same format and content; however, they were not identical since some Technical

Specification monitors have specific functions which the other monitors lack. Alarm points (alert and high) were set by radiation protection. On completion of maintenance or calibration, alarm setpoints were set at lower values until reset in the computer by the radiation protection staff. Each Unit maintained an alarm setpoint logbook which was used to update setpoints if the computer contained setpoints were lost and the default (more restrictive) values remained. Setpoints were controlled by station procedure, 75RP-9ZZ89, Revision 2, Radiation Monitor Setpoint Determination. The procedure addressed all monitors and identified specific Technical Specification monitors, limits and setpoints.

Portable Survey, Sampling and Contamination Monitoring Instruments

The inspector examined the instruments available to the radiation protection staff at Unit 3. The licensee's representative commented that not all of the instruments to be stocked in the Unit had been received from the onsite calibration facility at that time. The inventory included:

22	RM-20, Radiation monitor, GM
3	Ludlum Model 3 GM survey meters
3	Extendable probe high range survey meters
12	Staplex type, high volume air samplers
4	RO-2, Ion chamber, survey meter
4	PIC-6, Ion chamber, survey meter
4	PNR-4, Neutron monitors
3	FAG, multipurpose GM survey meters
4	AMS-3, Beta-Gamma Air Particulate Monitoring System
3	Gas air samplers

Instruments in use in the Fuel Building during fuel receipt were a SAM-2, stabilized assay meter; BC-4, beta counter; and a SAC-4, alpha counter. The licensee had installed two PCM-1A, high sensitivity, half body, gas flow proportional, frisking booths at the access control point. The inspector verified that emergency kits contained instruments and dosimeters consistent with the published inventory. The instrument calibrations were current. The licensee had a fully equipped and staffed portable instrument calibration and repair facility adjacent to Unit 1.

Protective Clothing and Equipment

Adequate supplies of appropriate types of protective clothing and equipment were available for normal and emergency operations. Procedure 75RP-0ZZ01, Radiation Protection Program, addressed the use of protective clothing and equipment.

Proper use of protective clothing and equipment was addressed in the Radiological Work Practices training required for entry into radiologically controlled access areas.

Radioactive Material and Contamination Control

The licensee had developed, implemented and maintained procedures in Units 1 and 2, applicable to Unit 3 addressing control of radioactive material and contamination control. These procedures included:

75PR-0ZZ01, Radiation Protection Program
75AC-9ZZ01, Radiation Exposure and Access Control
75AC-9ZZ03, Radioactive Contamination Control
75AC-9ZZ04, Shipment, Receipt and Storage of Radioactive Materials
75AC-9ZZ12, Radiological Controls Problem Reports
75RP-0ZZ07, Control of a Contaminated "Clean" System
75RP-9ZZ78, Decontamination

The procedures established personnel, area and equipment contamination limits and decontamination methods. The procedures provided for skin beta dose estimates at skin contamination levels of 20,000 counts per minute (cpm). The instrument type to be used for contamination measurements was specified. Evaluation by the Unit Radiation Protection Supervisor was required if the calculated skin dose exceeded 375 mrads (5% of the allowable quarterly exposure). A licensee representative stated that all personnel contamination occurrences were evaluated by the Radiation Protection Support Supervisor.

In-Plant Surveys and Monitoring

Procedures include:

- 75RP-9ZZ29, Radiological Survey Schedule, which addressed routine air, radiation and contamination surveys, assigned responsibility to the Unit Radiation Protection Supervisor and specified that high radiation area surveys are to be performed on an as-needed basis, rather than routine.

- 75RP-9ZZ46, Radiological Surveys, addressed the methods and instrument types to be used, calibration and performance testing of instruments, review of previous survey results, beta surveys and documentation of results.

- Procedure 75RP-9ZZ48, Airborne Radioactivity Sampling, addressed particulate, iodine, noble gas and tritium sampling, equipment calibration and specified a maximum flow of 4 CFM for iodine sampling.

The procedures to be used at Unit 3 had been in use at Units 1 and 2 and had been revised based on previous operating experience.

No violations or deviations were identified.

10. Maintaining Occupational Exposures ALARA - Unit 3 (83528)

Management Policy

The ANPP policy addressing ALARA was documented in Policy No. 4P411.00.00, Revision 2, Health Physics, Radiological Protection and Chemistry. The policy statement incorporates the ALARA concept and program and required support of the ALARA program by all departments.

Assignment of Responsibilities and Authorities

The ANPP Policy and Procedures manual, Procedure No. 4N411.05.00, Revision 1, ALARA Program Description, assigned individual ALARA responsibilities to all workers, documented ALARA responsibilities from the Executive Vice Presidential level to all levels of the organization and specified ALARA organizational structure, authorities and responsibilities.

Procedures and Standards

Procedures had been developed, implemented, maintained and demonstrated effective in the startup and operation of Units 1 and 2. The procedures implementing the ALARA program were reviewed:

- 75RP-9ZZ94, Revision 1, ALARA Prejob Review
- 75RP-9ZZ95, Revision 2, ALARA Inspections
- 75RP-9ZZ96, Revision 2, Exposure Tracking (ALARA)
- 75RP-9ZZ97, Revision 2, ALARA Postjob Review
- 75RP-9ZZ98, Revision 0, Preparation of ALARA Reports
- 75RP-9ZZ99, Revision 1, ALARA Design Review
- 75RP-9ZZ22, ALARA Benefit/Cost Evaluation

Indoctrination and Instruction

The Radiological Work Practices training, required for all workers entering radiologically controlled areas, incorporated an overview of the ALARA concept and program. Specific ALARA training programs had been developed and presented to site and corporate engineering and supervisory personnel. Approximately 30% of the engineers and 50-60% of the supervisors had completed the training. An ALARA for operators class had been presented to groups of 6 auxiliary operators, 6 to 7 times. Specialized training on steam generator mockups in the use of the multistud tensioner in manway removal and installation (reduces manway removal time to one hour) and the use of the reactor vessel head multistud tensioner had been developed and presented. An awards program, "Idea Line-ALARA," was being established to acknowledge new ALARA ideas and techniques. Posters

promoting ALARA were being prepared. One of the regular "Quality Talks-Safety Speaks," presentations had addressed ALARA. Prejob briefings of mechanics on steam generator manway removal, incorporated review of a video tape of an earlier manway removal. The mechanics identified methods to improve the removal procedure as a result of the viewing.

Reviews of Design and Equipment Selection

The ALARA staff had completed the Unit 3 walkdown. Problems identified were addressed on Engineering Evaluation Requests (EER) or Plant Change Request, depending on the significance of the findings. The licensee's equipment reliability group evaluations of frequency of repair data and operations engineering feedback on operating equipment were available to the ALARA group. The ALARA organization was part of the Change Control Group and must sign off on preliminary and final designs and installation if potential significant exposure could occur during installation.

The corporate ALARA function was incorporated in the corporate health physics/radiation protection organization. The corporate staff audits the site ALARA group and works with the corporate engineering staff on the design phase of long term projects. The site ALARA staff retains primary preliminary and final design review responsibility.

No violations or deviations were identified.

11. Quality Assurance and Confirmatory Measurements for In-Plant Radiochemical Analysis - Unit 3 (84525)

Facilities, Equipment and Supplies

The chemistry cold and hot laboratory facilities layout, equipment and supplies have been addressed in Inspection Report Nos. 50-530/86-16 (Section 10), 86-30 (Section 3), and 87-05 (Section 2).

Procedures

The licensee had developed, implemented and maintained normal and emergency operating procedures for Units 1 and 2. The procedures were extensive in scope and content and were generally applicable to all three Units. The procedures address laboratory operations (75AC-9ZZ02), bulk chemical specifications (74AC-0ZZ01), analytical control (74AC-9ZZ01), systems chemistry specifications (74AC-9ZZ04) and the sampling and analytical schedule (74CH-9XC16). In addition, numerous procedures address specific analyses, instrument operation, maintenance and calibration activities, system operating activities and surveillance tests. The procedures in effect at the time of the inspection had been previously used and verified during Unit 1 and 2 operations.

Confirmatory Measurements

Evaluation documented in Inspection Report No. 50-530/87-05.

Post Accident Sample Analysis

The Unit 3 PASS preoperational tests, 73TI-3SS01, PASS Performance Test for Unit 3, was starting at the time of the inspection. Unit specific procedures for leakage monitoring, surveillance testing and functional testing will be developed in conjunction with or after the preoperational testing phase is completed. Procedure 74CH-9XC33, Post Accident Radioactive Sampling, Analysis and Handling, provided detailed handling and transportation precautions for PASS samples. The results of the PASS preoperational testing and the PASS procedures for Unit 3 will be examined during a subsequent inspection (50-530/87-04-03).

Quality Assurance QA Program

The Laboratory Analytical Control (LAC) program, previously implemented at Units 1 and 2 will be implemented at Unit 3. The Unit 1 and 2 LAC program is discussed in report Section 8.

No violations or deviations were identified.

12. Transportation Incident - Unit 1 (86721)

On January 30, 1986, the NRC Region V office received a memorandum from the NRC Region III office, describing a potential violation of 49 CFR 173.425(b)(1) in regard to the shipment of a mobile radioactive waste solidification Unit (WSU) from Palo Verde to Clinton Power Station, Clinton, Illinois.

a. Details of Incident (Shipment No. 86-SH-034)

Based on documents provided by the Region III office, onsite records review and discussions with licensee's representatives; and subsequent telephone conversations with the Region III office, a representative of Associated Technologies, Inc. (ATI), a representative of Clinton Power Station and a member of the NRC's I&E staff in headquarters, the following observations were made:

(1) The WSU was operated by ATI under NRC Materials License No. 32-23067-01 (NRC Region II), Charlotte, North Carolina. ATI had been operating the WSU at the licensee's (Palo Verde) facility for several months prior to shipment on October 7, 1986. In August 1986, while operating the WSU at the licensee's facility, a flush valve failed that resulted in overflowing the WSU's catch sump from Palo Verde's concentrate monitor tank.

(2) On October 7, 1986, the licensee, via exclusive use, shipped the WSU to Clinton Station. The shipment consisted of residual contamination in and on the processing equipment. According to

the licensee's records, and through discussions with licensee's representatives and an ATI representative (onsite), the system had been properly drained and penetrations flanged. The licensee estimated that 0.124 millicuries of LSA material was being transported within the mobile unit, also considered as the transport package.

The licensee's survey records showed that radiation levels on the package surface were minimal and no loose surface contamination was detected on the day of shipment.

(3) On October 15, 1987, the shipment (WSU) arrived at Clinton Station. An initial receipt survey of the shipping package at 1:00 p.m. on October 15, 1986, confirmed that radiation levels were minimal and no loose surface contamination could be detected. However, Clinton representatives did note some apparent physical damage (loose and/or missing bolts and rivets, cracked side panel sheets and a bent left rear wheel on the trailer). The damage area was primarily localized to the rear of the trailer, on each side, and next to the WSU's processing area. Clinton Station personnel also noted that on the right side of the unit, at the damaged area, there was an appearance that some leakage had occurred; however as before no loose contamination was detected.

After the initial receipt survey, the WSU was moved and parked on an incline at the Clinton Station facility, outside of the controlled area. At about 1:30 p.m. on October 15, 1986, after being parked on an incline, Clinton Station representatives observed liquid leaking from the WSU (also the shipping package) at the damaged areas. Based on a telephone conversation with a Clinton Station representative on March 18, 1987, review of Clinton's survey data and Region III Inspection Report No. 50-461/86068(DRSS), it was noted that:

- 2400 disintegrations per minute (dpm) of loose contamination was detected at a bolt hole, an area of less than 100 cm^2.
- 1000 to 1200 dpm/100cm^2 from about 900 cm^2 area on each side of the unit.
- About one pint of liquid leaked from the unit, with sample analysis indicating cesium-137 activity of 2E-6 µCi/cc.
- Direct scan surveys of the tractor/trailer route from Clinton's northgate to the receiving area indicated less than 1000 dpm/probe area (thin window pancake detector).
- Surveys of the asphalt where the liquid had leaked, after the WSU was moved into the protected area, less than 1000 dpm/probe area by direct scans and less than 1000 dpm/100 cm^2 on wipes.

(4) During a telephone conversation with an ATI representative (Manager, Design Engineering) on March 4, 1987, who was also at Clinton Station when the WSU arrived, the inspector was informed that the apparent damage, excluding the bent wheel, had occurred due to strains and flexing during normal highway travel. The damage to the wheel occurred at a weigh station in route to Clinton Station. The WSU is on a 10 ft wide trailer which is too wide for most weigh stations. The ATI representative also stated that the problem at the weigh station only resulted in a bent wheel and some reflectors being knocked off. The damage at the weigh station was not the cause of the broken bolts, loose rivets and parting at the seams, where the leakage occurred. The inspector was also informed that when the side panels of the WSU were subsequently removed at Clinton Station, liquid was found trapped in the space between the panel wall and the process area catch basin walls. According to the ATI representative, the overflow from the flush valve failure in August 1986, resulted in entrapment of liquid in this area. It was the ATI representative's opinion that the liquid was not from intrusion of rainwater during transport. The inspector was also informed of improvements made in sealing of the catch basin and outside wall panels, and other modifications to strengthen the WSU in order to minimize flexing and strains encountered during transport. This information was also documented in a memorandum dated December 29, 1986, from R. Ferrar, ATI, to D. Sykes, Illinois Power Co.

(5) 49 CFR 173.425, "Transport requirements for low specific (LSA) radioactive materials," requires in part (b)(1), that materials must be packaged in strong, tight packages so that there will be no leakage of radioactive material under conditions normally incident to transportation.

Based on all of the above observations, either from entrapment of radioactive liquid from the August 1986 overflow or intrusion from rainwater during transport, leakage did occur from the transport package (WSU) under conditions normally incident to transportation. Regardless of the fact that the low levels of loose surface contamination and low concentration of the leaking liquid, the fact that leakage occurred negated the WSU as a strong, tight package in this particular case. Since Palo Verde acted as the shipper in this case, the licensee's failure to provide a strong, tight package for shipment of LSA material was identified as an apparent violation of 49 CFR 173.425(b)(1), (50-528/87-03-03).

It should also be noted that had ATI acted as the shipper, this matter would have been referred to the NRC Region II office for enforcement considerations.

49 CFR 173.443 states, in part, that for packages transported as exclusive use shipments, the removable radioactive contamination on any package at any time during transport shall not exceed ten times the levels prescribed in paragraph (a) of this section (2200 dpm/100 cm^2 for beta-gamma emitting radionuclides). The contamination levels identified

at Clinton Station did not exceed this limit. It can be safely assumed that any leakage that may have occurred in route to Clinton Station would not represent a hazard to the general public, based on the sample analysis of the leaking liquid at Clinton Station which indicated a very low level of activity (2E-6 µCi/cc of cesium-137).

One apparent violation was identified in this area.

13. Exit Interview

The scope and findings of the inspection were discussed with the individuals denoted in report section one. The licensee's representatives were informed that no violations or deviations had been identified. The licensee was informed that one matter relating to the ATI transportation incident did hold the potential for a violation and that if a violation was identified, the licensee would be informed by telephone. Mr. T. Shriver of the licensee's staff was informed by telephone on April 2, 1987 that a violation had been identified with respect to the ATI matter.

Because of the extended length of the inspection, two exit interviews were held as noted in report section one.

The licensee's staff was informed that two areas of possible licensing concern had been addressed.

The first matter related to the availability of carbon reactor coolant pump bearings and the possibility that the antimony-carbon bearings in Unit 3 might be replaced prior to initial criticality. This matter was discussed with representatives of NRR who stated that they would discuss ANPP's plans in this regard with ANPP licensing.

The second matter was related to the concerns identified with respect to the HVAC systems of all units. This matter concerned the apparent potential for migration of airborne activity from the lower elevations of the Auxiliary Building to the 140 ft elevation. This matter was also discussed with representative of NRR, who were informed that ANPP would rather address this problem in the form of a commitment rather than a Unit 3 license condition since planning for corrective action was in a formative stage.

The licensee was informed that two matters had been proposed to the NRC Regional office staff for consideration concerning Unit 3 readiness for operation.

It was proposed that a Unit 3 license be conditioned to require an operable PASS prior to exceeding 5% power as was done on the Unit 2 license. Second, although the RMS was expected to be fully operable by the date of license issuance, it was recommended that NRR require a Justification for Interim Operation prior to license issuance in the event that the RMS was not fully operable as expected.

The inspector's concerns related to the use of an adhesive smear pad to silence the monitor audible alarm and the methods used to attach radiation/high radiation area signs were also identified.