

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report Nos. 50-528/89-15, 50-529/89-15 and 50-530/89-15

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: March 20-30, 1989

Inspection by: M. Cillis  
M. Cillis, Senior Radiation Specialist

5/10/89  
Date Signed

M. Cillis for  
G. R. Cicotte, Radiation Specialist

5/10/89  
Date Signed

Approved by: E. M. Garcia for  
E. M. Garcia, Acting Chief  
Facilities Radiological Protection Section

5/16/89  
Date Signed

Summary:

Areas Inspected:

Routine unannounced inspection by two regionally based inspectors involving occupational exposures during extended outages; including external exposure control, surveys and monitoring, contamination control; maintaining occupational exposures ALARA, radioactive waste systems; water chemistry, review of allegation RV-88-A-0055, followup of a Unit 1 event, onsite followup of reports of nonroutine events at operating reactors, followup on items of noncompliance/deviations, and facility tours. Inspection procedures 30703, 83728, 83729, 83750, 84750, 93702, 92702 and 90712 were addressed.

Results:

No violations of NRC requirements or deviations were identified in the six areas inspected. Several concerns related to maintenance of the Radiation Monitoring System (RMS) and the contamination of the demineralized water system (paragraphs 3, 5, 6 and 7) were identified. The licensee's program generally appeared capable of meeting its safety objectives.

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## DETAILS

### 1. Persons Contacted

#### a. Licensee

- \*D. B. Karner, Executive Vice President
- \*J. G. Haynes, Vice President, Nuclear Production
- \*W. C. Marsh, Plant Director
- \*J. E. Kirby, Nuclear Production Support Director
- \*R. M. Butler, Standards and Technical Support Director
- \*W. E. Ide, Plant Manager, Unit 1
- D. Heincke, Plant Manager, Unit 2
- \*P. Hughes, Radiation Protection and Chemistry Manager (RP&CM)
- \*W. F. Quinn, Director Nuclear Safety and Licensing
- \*L. G. Papworth, Director Quality Assurance
- \*T. D. Shriver, Compliance Manager
- \*M. F. Fernow, Training Manager
- \*L. A. Souza, Quality Audits and Monitoring Manager
- \*J. R. Mann, Central Radiation Protection Manager
- \*K. R. Oberdorf, Radiation Protection Manager, Unit 1
- \*A. G. Ogurek, Radiation Protection Manager, Unit 2
- \*W. E. Sneed, Radiation Protection Manager, Unit 3

#### b. NRC

- T. Polich, Senior Resident Inspector
- \*D. Coe, Resident Inspector

\*Denotes personnel present at the exit interview held on March 30, 1989.

In addition, the inspector met and held discussions with other licensee and contractor personnel.

### 2. Occupational Exposure, Shipping, and Transportation (83728, 83729, 83750)

Shipping and Transportation were examined in a previous inspection (see Region V Inspection Reports 50-528/88-42, 50-529/88-41 and 50-530/88-40).

#### A. Audits

No audits of this program area by the licensee were reviewed within the scope of this inspection.

#### B. Changes

No major changes to the licensee's organization and equipment had been made since the last inspection of this program area, with the exception of the licensee's program for maintaining radiation exposures as low as reasonably achievable (ALARA). See paragraph 2.G, below.



C. Planning and Preparation

The licensee stated they had experienced difficulty recruiting sufficient contractor radiation protection technicians (RPT), due in part to a reported large number of concurrent refueling outages in progress at other nuclear power plant sites. Depending upon projected delays in the commencement of the Unit 1 outage, the licensee stated that they may be able to reassign RPTs from Unit 3 during those periods with a greater workload. The licensee expects that additional resources would become more readily available starting on or about April 1, 1989.

The licensee announced that the start of the Unit 1 refueling outage would be delayed approximately two to four weeks. The delay is expected to provide the licensee with the time required to acquire the additional contractor RPT's needed.

The inspector verified that ALARA reviews of Unit 1 outage work packages were being performed in accordance with the revised ALARA program procedures.

The licensee had assigned two experienced RP personnel at Unit 3, one of whom was a Health Physicist certified by the American Board of Health Physics (ABHP), to 24-hour oversight of refueling work. Scheduling of work appeared to be occurring in an efficient manner.

A review of the status of high exposure jobs performed to date at Unit 3, such as steam generator and reactor coolant pump work, indicates that the work will probably be accomplished for much less than the ALARA person-rem estimates that were projected.

D. Training and Qualifications of New Personnel

Representative records of training provided to new personnel, particularly contractor personnel hired for outage work, were reviewed. Resumes of contractor RPTs hired for the outage at Unit 1 were reviewed. The review disclosed that the RPTs selected met the qualifications prescribed in ANSI/ANS 3.1-1978, American National Standard for Selection and Training of Nuclear Power Plant Personnel.

Lesson plans and examinations for the newly developed training program provided to contractor Senior Radiation Protection Technician (SRPT) staff were reviewed. In addition the inspector held discussions with contractor SRPTs who had attended the course and also audited a training course that was in progress at the time of the inspection. - Lesson plans reviewed were:

- o RP Contractor Training - Objectives
- o RP Contractor Training - Hot Particle Information
- o RP Contractor Training - RP Procedures

The licensee had initiated an advanced radiation worker (ARW) class, which many licensee and contractor personnel had been required to



attend. The inspector audited the advanced radiation worker training course that was in progress during the inspection.

The inspector concluded that the training programs for contractor SRPT's and ARW had been greatly improved from the training provided during the 1988 refueling outage at Unit 2. This observation was brought to the licensee's attention at the exit interview.

E. External Exposure Control

Representative radiation exposure records were reviewed. No licensee personnel were observed to have exceeded the licensee's administrative dose limits, although extensions of allowable dose had been granted to some personnel who had arrived with previous accumulated quarterly radiation exposures.

Numerous personnel were observed entering the Unit 3 reactor containment building (RB) in protective clothing (PC). The inspectors noted that some personnel wore their dosimetry inside their PCs, while some wore their dosimetry in plastic bags on their torso where it would be visible. No RPTs were observed to be challenging personnel whose dosimetry was not visible. The inspectors informed the licensee of the potential for unmonitored personnel entering the RB. The licensee acknowledged the inspector's observations by assigning individuals to verify personnel entering the RB were equipped with proper dosimetry.

F. Internal Exposure Control

Representative records of air samples collected, whole body counting (WBC), bioassay, and calculations of airborne radioactivity concentrations, were reviewed. No concerns were identified.

G. Maintaining Radiation Exposures ALARA

The licensee's ALARA program had been revised and RP management reassigned, as committed to by the licensee, and as described in Inspection Report (IR) 50-528/89-07, 50-529/89-07, 50-530/89-07. The licensee had assigned ALARA personnel for 24-hour oversight of refueling operations. A Health Physicist certified by the ABHP was also assigned to provide an overview of refueling activities at Unit 1.

The extent of management and supervisory tours was examined, to determine if sufficient management oversight was being provided by the licensee's staff for actual work in progress. It was noted that, since the start of 1989, a minimum of 12 management, supervisory and staff personnel having direct oversight responsibility for radiological work had made no RCA entries in any of the three units. Some RP management and supervisory personnel had



made regular but rather brief entries to the RCA. This observation was discussed at the exit interview.

Radiological postings were observed to be consistent with 10 CFR 20.203, Caution signs, labels, signals and controls, and licensee procedures. However, on March 20, 1989, some concerns were identified in Unit 3:

- o A rope and sign which read, "Caution-High Radiation Area", located near a small area within the 130' elevation make up valve gallery in the auxiliary building (AUX), had fallen from one side such that the rope did not provide a barricade and the sign could not be read. A licensee survey, conducted by an RPT to whom the inspector pointed out the sign, revealed that the maximum accessible whole body dose rate measured less than 100 mr/hr, and thus the area was not actually a high radiation area.
- o The inspector noted that the Reactor Drain Tank (RDT) room in the RB was accessible from inside the biological shield, via a labyrinth passage, without having to unlock the gate controlling access. The RDT room was posted with a sign which read, "Caution-High Radiation Area - Greater than 1000 mrem/hr - Dose Rate Meter Required for Entry-Contact RP Prior to Entry", and flashing lights. Technical Specification (TS) 6.12., states in part that for areas with whole body accessible dose rates of greater than 1000 mrem/hr (at 18" from the source), the area must be locked or guarded, unless no reasonable enclosure can be constructed. The inspectors reminded the licensee that although the RB overall would be a large area, the labyrinth provided sufficient opportunity to construct a reasonable enclosure. A joint survey by licensee and NRC, however, revealed maximum radiation dose rates of about 800 mrem/hr at 18" from the source.
- o A pipe chase on the 120' elevation of the Auxiliary Building was observed to have flashing lights and postings similar to the RDT, noted above. The locking type gate had no lock. A review of recent licensee survey records revealed that the accessible whole body dose rates in the area were as much as 45 rem/hr. However, the licensee had already initiated a work request (WR) to have the locks installed, as a result of their survey. The WR was verified to have been completed on March 21, 1989.

In the first two matters, licensee RP personnel stated that dose rates fluctuate above and below 100 mr/hr and 1000 mr/hr, respectively. The inspectors noted that prompt action to restore the posting and construct an RDT enclosure were conducted. Similar action to construct enclosures at Unit 1 and 2 RDT rooms had also been initiated.

On March 29, 1989, the inspector noted that only one modified RO-2 (RO-2M) ion chamber survey instrument, used for monitoring for



highly radioactive "hot" particles, was available for use in the Unit 3 RB. The one RO-2M was being shared by RPTs providing surveillance over steam generator and reactor coolant pump work at four different locations. The inspector reminded the licensee that having only one instrument would make it difficult to perform surveys in all areas at the frequency required by PPM 75RP-9ZZ83. The licensee placed three more RO-2Ms in the Unit 3 RB when this was brought to their attention.

On March 27, 1989, the licensee informed the inspectors that a Main Steam Safety Relief Valve (MSSRV) had inadvertently been removed from the Unit 3 RCA, without a survey prior to release for unrestricted use. The valve had been taken to the north annex area of the site. Subsequent surveys on the MSSRV and on some of the high pressure turbine blades, indicated that they were contaminated to about 3000 disintegrations per minute by direct frisk (dpm/frisk), with no measurable loose contamination. The material had not actually been removed from licensee control. The licensee stated that they would control equipment removal more carefully to prevent recurrence.

H. Control of Radioactive Materials and Contamination, Surveys, and Monitoring

During an entry into an area known to be contaminated with highly radioactive ("hot") particles in the Unit 1 containment, a Radiation Protection Technician (RPT) was observed using survey techniques which were inconsistent with the configuration of the survey instrument, an RO-2M. When the matter was brought to the attention of the Unit 1 and Unit 2 Radiation Protection Managers (RPM), the licensee conducted a review with several RPTs. The RPMs determined that for those RPTs who had been trained to use the instrument, many were not fully aware of the limits imposed by the procedure, 75RP-9ZZ83, Hot Particle Control, or else demonstrated inadequate technique. The licensee immediately briefed RPTs having responsibility for work in Hot Particle Control Areas (HPCA) on RO-2M use, and no further examples of inconsistent survey technique were observed. RPTs in Unit 3, with whom RO-2M survey techniques were discussed, appeared cognizant of the correct monitoring methods.

On April 4, 1989, a worker exited the Unit 3 containment as directed by a contract RPT after conducting work in and around the open steam generator manways, an HPCA. The licensee had placed a whole-body portal frisking monitor near the exit. The licensee stated that when the monitor alarmed, the RPT at the containment exit conducted a brief survey and escorted the individual out of the area for decontamination. Initial dose estimates by the licensee indicated a potential skin dose of near the limit of 7.5 rem, to a small area. Subsequent time and motion studies, along with recovery and assessment of the hot particle by the licensee, resulted in revised estimates of less than 1 rem skin dose. The licensee's methodology was reviewed and no concerns with respect to the licensee's calculations were identified. The licensee stated in a telephone



conversation to Region V on April 5, 1989, that further quantification by exoelectron dosimetric methods were to be conducted by a contractor having expertise in that area.

An NRC inspector was at the work site, when a contract RPT found that a worker was contaminated on his right ankle. The RPT used some good radiological work practices to minimize the individual's exposure by having the worker remove his protective clothing at the job site. The RPT was able to determine that the contamination was on the external surfaces of the protective clothing worn by the worker. This observation was brought to the licensee's attention during the inspection and at the exit interview. The RPT was commended for his actions by the licensee's staff.

Overall, the licensee's radiation protection program established for the outages appeared capable of meeting its safety objectives.

No violations or deviations were identified.

3. Radioactive Waste Systems; Water Chemistry; Confirmatory Measurements and Radiological Environmental Monitoring (84750)

A. Audits

Audit 88-006, Gaseous Effluents, Process Control Program (Solid), and Liquid Radwaste Program, dated April 13, 1988, was reviewed. The licensee stated that no other audits of this program area had been conducted since that time, although the area was scheduled for a re-audit in April, 1989. The audit resulted in the identification of several procedural deficiencies, and a lack of programmatic review for the process control program (PCP). The procedures were corrected, in most cases, in a timely manner, although some required extensions of time to respond. In one case, the auditors found that radwaste operations personnel had circumvented the procedure for release of the contents of a waste gas decay tank (WGDT) without approval of a temporary procedure change. Licensee records and sampling at the time of the release indicated that no radioactivity release or release rate limits were exceeded. The licensee took action to prevent recurrence, and revised their methodology. Overall, the audit was observed to address the applicable sections of the TS. All findings had been addressed at the time of the inspection.

B. Changes

No major equipment changes had been made by the licensee at the time of the inspection. Some instrumentation changes to the RMS are discussed in paragraph 6, below. Configuration changes to the waste evaporators appeared to have resulted in improved performance.



C. Organization and Responsibilities

The licensee's radiation protection and chemistry organizations, particularly with respect to control of effluents, was found to have been divided among several organizations, as described below.

During the review of this subject area and the review of the followup item discussed in paragraph 6, the inspectors concluded that the licensee's Radiological Effluents Program was complex. Functional responsibilities for the program, and for those responsible for assuring program implementation in accordance with the regulatory requirements, are not clearly defined below the level of the Chemistry and Radiation Protection Manager's position. This same conclusion was identified from a review of the radioeffluent program conducted by an independent group that was contracted by the licensee to review the program. The purpose and result of that review are summarized below:

a. Purpose

- o Identify programmatic deficiencies or shortcomings.
- o Evaluate the program implementation to determine "userfriendliness" and compliance with program directives.
- o Describe areas where improvements are needed and identify action necessary for resolution.

b. Findings

The independent review report concluded that the licensee's effluents program was consistent with the industry standards; however, program administration was reported to be well below the industry norm. The following weaknesses were identified:

1. The complexity of the program makes administrative review and auditing difficult except by those knowledgeable of the program. The recent reorganization was cited as the contributing cause for this observation.
2. There was a lack of formal training programs.
3. The administrative component of the effluent program is poorly defined.

The above observations were discussed with the licensee's staff and at the exit interview. Corrective actions addressing these areas are described in Attachment 3 of the licensee's response to a Notice of Violation discussed in paragraph 6 of this report. The corrective actions will be verified during a subsequent inspection under Enforcement Item No. 50-529/89-03-01, which is discussed in paragraph 6, below.



D. Implementation

The licensee utilizes a contractor for solidification of liquid wastes. See Inspection Report 50-528/89-09, 50-529/89-09, and 50-530/89-09.

The licensee's Semiannual Radioactive Effluent Release Report for the period of July 1, 1988, to December 31, 1988, was reviewed. The only errors observed were typographical, and did not affect the reported results. The report contained a major revision to the Offsite Dose Calculation Manual (ODCM), submitted pursuant to TS 6.9.1.8. The revision to the ODCM was, in part, in response to licensee audit 88-006 (see paragraph 3.A, above). ODCM calculations for Cs-134 via milk ingestion by a child were reviewed, and were consistent with Regulatory Guide (RG) 1.109, Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR50, Appendix I, Revision 1, 1977.

Representative gaseous release permits from October, 1988, to March, 1989, were reviewed. No releases in excess of TS limits were observed to have occurred. No unmonitored release paths were identified. All three units were shut down at the time of the inspection, so no assessment of the licensee's efforts to improve conditions, with respect to in-plant airborne radioactivity, could be made.

Representative ventilation/air cleaning maintenance procedures and surveillance tests (ST) were reviewed, to determine whether the licensee's equipment could perform its intended functions. No concerns were identified.

With respect to process and effluent radiation monitors, a review of representative STs revealed that the licensee had performed the STs at the required frequency. Maintenance problems and licensee efforts to address these problems are discussed in paragraph 6, below.

With the exception of the low availability level of the instrumentation, the licensee's program appeared capable of meeting the safety objectives.

E. Meteorological Instrumentation

Records associated with the surveillance channel checks and channel calibration, for the meteorological instrumentation prescribed in Technical Specifications, 4.3.3.4, were examined. The channel checks and channel calibrations prescribed in Table 4.3-5 for this instrumentation had been performed at the required frequencies. No concerns were identified in this area. The licensee's program appeared capable of meeting their safety objectives.

No violations or deviations were identified.



4. Allegation FollowupAllegation RV-88-A-0055 (Open)

This allegation refers to several of the licensee's program areas. Two specific matters, which related to radiological working conditions, were examined as part of this inspection. These were 1) that a Hotline call regarding non-performance of whole body counts prior to leaving site had not been adequately addressed and 2) that an individual (not the allegor) saw someone dumping radioactive liquid from Unit 1 into a drain. The Hotline call was not investigated because the call was made anonymously. In a telephone conversation, the allegor stated that specific individuals (B and C) had their hard hats contaminated, possibly as a result of the alleged dumping. The allegor also identified the individuals who were alleged to have terminated without WBC.

The inspector:

- Discussed the specific details of the allegation with the allegor
- Discussed the details with the individual identified by the allegor as having observed the dumping of radioactive liquids (individual A)
- Examined representative WBCs and other records and surveys
- Examined WBC data for specific individuals alleged to have been terminated (in mid-1985) without WBC
- Examined QA Hotline Reports #85-69 and 86-136
- Discussed details with those individuals (B and C) named by the allegor as having been involved in the alleged contamination incident
- Reviewed representative air sample results and operational data for 1985 and 1986.

With respect to the first matter, the licensee is required, in part, by 10 CFR 20.103(a)(3): "to establish and maintain a program to measure concentrations of radionuclides; in air, in bodily excretions and in the body of individuals, in any combination as necessary to adequately detect and assess individual intakes of radioactive material."

Examination of QA Hotline Report #85-69, and discussion by telephone with the allegor, revealed that the information provided by the allegor and verified by corporate QA personnel was substantially correct in that employment of numerous personnel had been terminated, in mid-1985, without termination WBC, even though the licensee's policy was that the WBC was required in order to properly terminate employment. This was determined to be at about the time of initial critical operation in Unit 1. Units 2 and 3 had not yet been completed.



A review of licensee air sample records and operational data during the mid-1985 period revealed that for the individuals named by the allegor, and for numerous personnel, WBCs would not have been specifically required in order to satisfy the requirements of 10 CFR 20.103(a)(3). Licensee records indicated that some of the specified individuals had received WBCs at the time of their termination. The licensee, in part in response to QA Hotline report #85-69, currently requires a signed statement from individuals prior to being allowed access to the RCA. This statement is to the effect that they will make themselves available for a termination WBC. A review of dosimetry records for terminated individuals revealed no recent examples of personnel terminating without a WBC. Although the allegation of missed WBCs was substantiated, the inspector concluded that the licensee's QA hotline response had adequately resolved the problem of termination WBCs not being performed.

With regard to item 2, the licensee's Final Safety Analysis Report (FSAR) and Technical Specifications (TS) describe and limit radioactive effluents. The site is not designed with a liquid effluent pathway. The inspector held discussions with individual A. It was determined that no dumping of radioactive materials had been observed by individual A. Individual A observed handling of materials labeled as radioactive, within the radiologically controlled area (RCA) in Unit 1; in the vicinity of a storm drain. Individual A stated that his major concern was that QA hotline personnel were not following up on matters brought to their attention anonymously, even though the QA hotline was advertised to workers by the licensee as confidential. Specifically, individual A stated to the inspector that his two attempts to convey the information anonymously were refused.

A review of QA Hotline Report #86-136 showed that an anonymous call was received by the QA Department at 10:00 a.m. MST, August 21, 1986. According to the hotline report, the caller identified a concern similar to that identified above, stating that he would call back within two days. A licensee investigation of the matter was started shortly after the call was received. The licensee's investigation was completed on October 13, 1986. The caller's concern was not substantiated by the licensee's QA Hotline investigation. Discussions with the QA staff disclosed that a second call related to the same matter was made sometime after the October 13th date. According to QA Hotline records:

- ° The caller reiterated his previous concern.
- ° The person receiving the second call reported to the caller that a QA Hotline investigation of the matter had been completed.
- ° The QA inspector discussed the results of their investigation and offered to send the individual a copy of QA Hotline File Report 86-136 if the caller would leave his name.
- ° The QA inspector receiving the second call stated that the individual making the call did not want to disclose his name.



The licensee stated to the inspector that the second call had not been documented as a separate concern since it was related to the initial concern documented on QA Hotline File Report 86-136.

A review of the licensee's current methods for handling calls revealed that the licensee now conducts investigations of anonymous calls when the information is sufficiently specific, and distributes the results anonymously, when requested. Although it could not be affirmatively established that the anonymous calls to the QA Hotline were those of individual A, the alleged failure to investigate anonymous QA Hotline calls could not be substantiated.

The allegor, in discussions with the inspector, had also stated a concern that a group of workers who had been in a nearby manway had had their hardhats contaminated, after work within the same area, possibly due to contamination in the storm drain.

Discussion with cognizant NRC and licensee personnel and review of applicable drawings revealed, that the manway wherein the contamination incident was alleged to have occurred, drains to the storm drain identified by individual A. The storm drains flow to a holding pond, which the licensee samples and analyzes for radioactivity prior to pumping it to the on-site evaporation pond. Discussion with individuals B and C, who were alleged to have been involved in the contamination incident, revealed that no personnel or equipment contaminations had occurred. These individuals stated to the inspector that they had taken a sample of water from inside the manway, in order to have it analyzed for radioactivity prior to work. They further stated that:

- They and their personal equipment were not contaminated in the incident, having satisfactorily performed whole body frisks.
- They were informed that the sample was radioactively contaminated.
- They took another sample, which they were informed was not contaminated.
- They were informed by Chemistry Department personnel that the first sample was contaminated because they had been erroneously given an internally contaminated sample bottle. The individuals stated they were satisfied with the resolution of the incident.

Routine surveys conducted by the licensee in that area showed no detectable contamination.

The specific allegation that equipment or individuals were contaminated in the RCA yard at Unit 1 could not be substantiated.

Additional information related to allegation RV-88-A-0055 is discussed in Region V Inspection Report 50-528/89-12.

No violations or deviations were identified.

5. Onsite Followup of Events at Operating Power Reactors (93702)

On March 27, 1989, while setting up equipment for decontamination of the Post Accident Sampling System (PASS) valve area on the 88' elevation of



the auxiliary building in Unit 1, the licensee discovered that a portion of the clean demineralized water system (DWS) was contaminated. The licensee had been assembling water decontamination equipment in the non-contaminated area outside the room. Individuals who had hooked up the water to the steam cleaning unit were found, upon exit from the RCA, to have contaminated shoes. No skin contaminations resulted from the incident. The licensee traced the contamination back to the work area, which was then promptly decontaminated. Subsequent sampling of the DWS by the licensee revealed that one portion of the DWS was contaminated with up to 0.01  $\mu\text{C}/\text{ml}$ . The licensee flushed the system and conducted tests to determine the source of the contamination. The contamination source was found to be a portion of the Reactor Coolant System (RCS) sample system. The following concerns were identified by the inspectors:

- o The licensee had previously modified that portion of the Unit 1 sampling system where the DWS line attached to the RCS sample system recirculation line. The DWS water is used to flush the RCS sample system recirculation line. According to the licensee, the purpose of the modification had been to prevent backflow from the RCS into the DWS. For the backflow to occur, the isolation valve, and two check valves in series with it, had had to fail. The modification apparently failed to prevent the backflow.
- o Units 2 and 3 had not been informed of the potential for generic problems, until the inspectors expressed concern in that regard. Subsequent licensee testing in Unit 2 revealed that the same portion of the DWS was contaminated, although to a lesser degree.

The inspectors expressed concern regarding the slow communication of potentially generic problems between units at the site. The licensee acknowledged the inspectors' concerns and informed the inspectors that the design of the DWS for all three Units would be evaluated. This matter will be examined in a subsequent inspection (50-528/89-15-01).

#### 6. Followup on Items of Noncompliance (92702)

(50-529/89-03-01 (Open)) This matter refers to a failure to maintain high range effluent monitoring capability for Unit 2 (see Inspection Report 50-529/89-03). The licensee was requested to include in their response a description of the actions they would take to improve the operability of the Radiation Monitoring System (RMS). The licensee's timely response dated March 27, 1989, to the Notice of Violation (NOV) was reviewed. Attachment 1 of the response addresses the corrective actions taken and/or planned to prevent a recurrence of the violation identified in the NOV. Attachment 2 of the response addresses the licensee's actions taken and/or planned to improve the operability of the RMS. Attachment 3 of the response addresses the licensee's actions taken and/or planned to improve their Radiological Effluent Program (see paragraph 3.C).

The licensee's response reiterated the information provided in Licensee Event Report (LER) #2-88-017-00. Although the licensee's response addressed some of the issues raised during previous inspections, several



NRC concerns, particularly related to recent equipment failures and problems related to personnel errors, remained.

In a meeting conducted on March 20, 1989, the inspectors expressed concern that impairment or inoperability of numerous RMS monitors could result in confusing or inconclusive information being produced by the RMS, with a consequent increase in hazards to personnel during the course of an accident. The inspectors reminded the licensee that loss of routine monitoring capability had occurred frequently. The inspectors reviewed the many past and current problems associated with the operability of the radiation monitoring system which had been reported to Region V over the past 2-3 years. In particular, the operability of Unit 2 Condenser Vacuum Pump/Gland Seal Exhaust Monitor RU-141, Plant Vent Monitor RU-143 and Fuel Building Ventilation Exhaust Monitor RU-145 were reviewed with the licensee's staff. The inspectors expressed concern that some of these monitors were inoperable for up to 50% of the time in 1987 and 1988 and had been inoperable for the first three months of 1989. The monitors had been inoperable due to personnel error and mechanical problems, such as moisture and/or electronic noise. The important function for which each monitor was designed, as described in Section 11.5.1 of the Updated Safety Analysis Report (USAR), and the need to maintain the operability of the RMS at a high performance level, were brought to the licensee's attention. The inspectors requested several licensee records in order to assess the corrective actions taken to improve the performance of the RMS.

Representative examples of the following licensee records related to corrective maintenance were reviewed:

Corrective Maintenance Work Orders (CMWO) 1987 to 1989

Radiation Protection Follow-up Log (75RP-9ZZ88 Appendix B) 1987 to 1989

Radiation Monitoring System Reliability Improvement Program Project Scope and Schedule, dated 1-13-88

From review of the above, discussion with licensee personnel responsible for maintenance and operation of the RMS, and examination of the individual monitoring units, the following observations were made:

- o Numerous failures had resulted from improper maintenance, such as broken circuit boards while installing replacement parts.
- o Many of the failures were of a recurring nature, particularly three main problems of computerized signal communication, moisture buildup, and electronic noise within the detector/discriminator circuit. The communication signal problem had recurred less frequently after the licensee performed validation and verification of their software programming, in response to NRC concerns (see IRs. 50-528/86-36, 50-528/87-40, 50-529/87-39, and 50-530/87-41). The licensee stated that many of the recent communication failures had been the result of having incompatible computer codes and improper hierarchy. The inspector concluded that such failures could result from computer program mismatch of that type. Licensee personnel



stated that program errors were eliminated as they were identified, but that a certain amount were due to the hardware itself. The original manufacturer no longer makes the equipment. The licensee stated that replacement parts are now being made by another contractor, who had purchased the assets of the original manufacturer.

At a meeting between the inspectors and key licensee personnel, on March 21, 1989, the operability of the RMS was discussed, particularly for Unit 2, where the lowest availability had been exhibited. The licensee stated that the moisture in sample lines had been addressed, and that the circuit noise problem had finally been properly diagnosed such that repairs could be effected. The licensee stated that they would have all RMS effluent monitors operable by March 25, 1989.

On March 29, 1989, the inspectors observed that the Unit 2 steam jet air ejector (SJAE) effluent monitors, RU-141/142, were not operable. Further discussion revealed that all three units' RU-141/142 monitors were inoperable, due to a remanifestation of the moisture problem. The licensee stated that they had found a buildup of several milliliters of water in the noble gas detector chamber, and as a precaution had declared all three sets of monitors inoperable.

When the inspectors asked why they were not informed that the previous statements on March 21, 1989, were no longer correct, the licensee stated that it had taken some time to make the determination that the moisture problem was potentially generic. They further stated that they had not determined the cause or generic status until about the time the inspectors became aware of the inoperability.

Representative records of the following surveillance tests were reviewed in detail:

41AL-1SQ01	<u>Radiation Monitoring System Alarm Responses</u>
75ST-9ZZ03	<u>Radioactive Gaseous Effluents and Radiation Monitoring System Surveillance</u>
36ST-9SQ09	<u>RU-141/RU-142 Calibration Test</u>
36ST-9SQ10	<u>RU-143/RU-144 Calibration Test</u>
36ST-9SQ11	<u>RU-145/RU-146 Calibration Test</u>
75ST-9ZZ07	<u>Daily Verification of Operability</u>
75ST-9ZZ08	<u>Monthly Source Checks</u>

After corrective maintenance, the licensee regularly performs all the TS-required portions of the applicable surveillance test, prior to restoration to operable status. Additional review of surveillance tests is discussed in paragraph 3.C, above.



The above observations were discussed with the licensee's staff and at the exit interview. The importance of the monitors being returned to service prior to the restart of Units 1 and 2 was noted. The Executive Vice President stated that every effort would be made to restore the monitors to full operability, provided that parts/equipment for effecting the necessary repairs were readily available. The Executive Vice President added that weekly updates of the progress in restoring the operability of the monitors would be provided to the NRC Region V and Resident staff. The Executive Vice President added that ANPP would do whatever is required to improve the reliability and performance of the RMS.

The licensee's performance in this area appears to be marginally acceptable in meeting their safety objectives. No violations or deviations were identified.

7. In-Office Review of Written Reports of Non-Routine Events (90712)

50-530/88-08-L0 (Open): This refers to a licensee-identified failure to satisfy action 40 of Technical Specification (TS) 3.3.3.8 and 4.11.2.1.2, in that condenser evacuation system low range effluent monitor (RU-141) sample results were invalid due to moisture in the sample media. The LER, #3-88-008-00, dated March 22, 1989, stated that they had determined on February 20, 1989, that the samples, which had been collected for analysis on December 5, 1988, were not valid, and that temporary modifications to the system (i.e., heat tracing of sample lines) would be incorporated into permanent modifications. At the exit interview, the licensee committed to higher prioritization of the work than was contained in the LER (see Item 50-529/89-03-01, above).

50-529/88-13-L0 (Open): This refers to Licensee Event Report (LER #2-88-013) which identified a loss of alternate sampling capability with the main plant vent radiation monitor, RU-143, inoperable. The licensee's timely report, dated September 23, 1988, stated that on August 24, 1988, the circuit breaker in the electrical supply for the alternate air sampling monitor had tripped, leaving the monitor inoperable for up to 90 minutes. The licensee report contained the line item information required in 10 CFR 50.73(b), although some concerns were identified (see item 50-528/89-03-L0, below).

50-528/89-03-L0 (Open): This refers to a licensee identified loss of alternate sampling capability with the fuel building exhaust radiation monitor, RU-145, inoperable. The licensee's timely LER, #1-89-003, dated March 20, 1989, stated that on February 17, 1989, the circuit breaker for the alternate sampling monitor had tripped. LER #1-89-003 contained the information required by 10 CFR 50.73(b), although some concerns were identified with respect to this LER and LER 2-88-013 (see item 50-529/88-13-L0, above):

- o 10 CFR 50.73(b) requires that the narrative description of the event include sufficient information to evaluate failure mode. Both LERs stated that the root cause was: "...temporary and permanent electrical loads in excess of circuit capacity," without additional information to support that conclusion, except the fact of the circuit breaker trip itself. LER #1-89-003 stated that an "informal"



review of available electrical outlets had determined that the circuits were loaded to near capacity.

- LER 2-88-013 stated that an Engineering Evaluation Request (EER) had been issued to evaluate the feasibility of alternate power for the sampling monitor. LER 1-89-003 stated that the event described in LER 2-88-013 was similar, but that the EER noted in that LER: "had progressed to the point of a conceptual study," and thus did not prevent the second event. The inspector observed that nearly six months had transpired between events, with progression of the EER from feasibility evaluation to conceptual study. Neither LER included a projected date of completion for the evaluation/study.
- In both events, the licensee reported that the inoperable status of the alternate sampling monitor was discovered while preparing to restore the normal monitor to operability. This would not necessarily occur during long-term inoperability periods, as experienced by the licensee (see paragraph 6 above). Flow is required by TS 3.3.3.8 to be checked every four hours. Licensee records indicate that in practice they check flow every two hours. TS 3.3.3.8, and TS Table 3.3-12, Action 40, require that samples be continuously collected when the low range gaseous effluent radiation monitors are inoperable. In both events, the auxiliary sampling equipment was de-energized for less than three hours.

The inspectors concluded that the above observations were indicative of the relatively low priority the licensee had placed on corrective maintenance of the RMS.

The licensee's performance in this area appears to be acceptable in meeting its safety objective. No violations or deviations were identified.

## 8. Facility Tours

All three units were toured extensively, including Unit 1 and Unit 3 containment buildings. Independent radiation measurements were made using NRC ion chamber survey instruments Model #RO-2, Serial #008915, due for calibration on May 8, 1989, and Model #36100, Serial #008917, due for calibration on April 26, 1989. The following observations were made:

- In general, material condition/housekeeping had continued to receive attention, and Unit 3 containment work areas, though somewhat cluttered outside the Hot Particle Control Areas (HPCA), were being periodically cleared of extraneous material and equipment.
- In several work areas which were posted as being radioactively contaminated, face shields were observed lying on surfaces such as floors and tables. The inspectors discussed, with the licensee, the potential for facial contamination, should the face shields be reused without some type of administrative control to have them monitored or decontaminated between uses.
- Radiation monitoring equipment was in current calibration.



- Work practices appeared to be consistent with the ALARA concept.
- Posting and labeling practices were consistent with 10 CFR 19.11 and 20.203.
- All personnel observed on tours were wearing proper dosimetry.

Overall, the licensee's program appeared capable of meeting its safety objectives.

No violations or deviations were identified.

9. Exit Interview

The inspectors met with the individuals denoted in paragraph 1 at the conclusion of the inspection on March 30, 1989. The scope and findings of the inspection were summarized. The licensee was informed that no violations or deviations were identified.

The inspectors discussed the observations regarding the: (1) Radiological Effluents Program described in paragraph 3.C, (2) the contaminated demineralizer water system described in paragraph 5 and (3) the Radiation Monitoring System described in paragraphs 6 and 7.

The inspectors observations were acknowledged by the Executive Vice President. Commitments were made to:

- a. Evaluate the adequacy of the Radiological Effluent Program organization as described in the licensee letter referenced in paragraph 6 (e.g. Attachment 3).
- b. Evaluate the design of the DWS (see paragraph 5).
- c. To provide the NRC's Region V and Resident staff weekly updates of the progress that is made in restoring full operability to portions of the RMS required by Units 1, 2 and 3 Technical Specifications. The Executive Vice President stated that this matter would be given the highest priority.
- d. To assess the operational status of Non-TS portions of the RMS, and to provide the results of that assessment to Region V.

