

APPENDIX B

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 50-528/94-14
50-529/94-14
50-530/94-14

Licenses: NPF-41
NPF-51
NPF-74

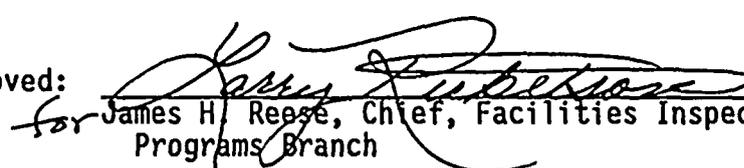
Licensee: Arizona Public Service Company
P.O. Box 53999
Phoenix, Arizona

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

Inspection At: Wintersburg, Arizona

Inspection Conducted: May 2-6, 1994

Inspector: Anthony D. Gaines
Facilities Inspection Programs Branch

Approved: 
for James H. Reese, Chief, Facilities Inspection
Programs Branch

5-14-94
Date

Inspection Summary

Areas Inspected (Units 1, 2, and 3): Routine, announced inspection of the radiation protection program, including audits and appraisals; changes; planning and preparation; training and qualifications of personnel; external exposure control; internal exposure control; control of radioactive materials and contamination, surveys, and monitoring; and maintaining occupational exposure ALARA.

Results:

- Good audits and monitors were performed by qualified individuals (Section 1.1).
- A violation was identified for the failure of individuals to adhere to the entry requirements of high radiation areas (Section 1.1).
- A weakness was identified in that the licensee could not verify alarming dosimeter usage in high radiation areas (Section 1.1).



- The radiation protection organization has gone through a realignment since the last inspection of this area (Section 1.2).
- Management performed a good job of preparing for the Refueling Outage U3R4 (Section 1.3).
- Contract radiation protection technicians were qualified and trained (Section 1.4).
- External radiation exposure controls were good (Section 1.5).
- Good internal exposure controls were implemented (Section 1.6).
- Controls of radioactive materials and contamination, surveys, and monitoring were good (Section 1.7).
- Two weaknesses were identified. One was poor housekeeping of tools in Unit 3 containment, and the other was poor radiation work practices associated with reaching into a hot particle zone (Section 1.7).
- Good ALARA planning and preparation were performed for the refueling outage (Section 1.8).
- Personnel exposure during the refueling outage was currently below the licensee's goal (Section 1.8).
- The ALARA suggestion program was not very active (Section 1.8).

Inspection Finding:

Violation 528/9414-01; 529/9414-01; 530/9414-01 was opened (Section 1.1).

Attachment:

Attachment - Persons Contacted and Exit Meeting



DETAILS

1 OCCUPATIONAL RADIATION EXPOSURE (83750 and 83729)

The licensee's program was inspected to determine compliance with Units 1, 2, and 3 Technical Specifications; the requirements of 10 CFR Part 20; and agreement with the commitments in the Updated Safety Analysis Reports for Units 1, 2, and 3.

1.1 Audits and Appraisals

The inspector noted that radiation protection Quality Assurance Audit 92-003 was performed from April 6 through May 8, 1992, and issued June 5, 1992. The inspector reviewed Revision 0 of the Audit Schedule dated January 27, 1994, and noted that the radiation protection audit is performed on a 24-month frequency. The schedule indicated that tentatively, the radiation protection audit would be performed by July 1994. The licensee performed Audit 93-018 from November 1-11, 1993, to assess their ability to meet the implementation of new 10 CFR Part 20 and to review the near-overexposure event in Unit 1 on October 25, 1993. This audit was comprehensive and performed by qualified personnel. The audit identified pertinent issues and the issues were tracked to ensure timely responses. The inspector reviewed 23 quality assurance monitors that were performed from November 1993 to April 1994. The monitors were reviewed and were of good quality. Qualified personnel performed the monitors.

The inspector reviewed selected condition reports/disposition reports from a list of radiation protection condition reports/disposition reports for the last 12 months. The condition reports/disposition reports were handled appropriately. The inspector reviewed the licensee's investigation of condition report/disposition report 340190. The investigation looked at a licensee identified event that occurred April 12, 1994. The licensee identified two teams of two contract welders each that violated high radiation area entry requirements of the Unit 3, 77-foot West Piping Penetration Room in that they did not have alarming dosimeters, a portable survey instrument, or radiation protection technician coverage when they entered the high radiation area. The licensee identified in each incident that:

- The high radiation area was properly posted with head and waist high barriers.
- The access had appropriate visual and physical controls.
- The individuals had received adequate prejob briefings.
- The individuals were experienced radiation workers.
- The individuals were aware of entry requirements for high radiation areas.



- The individuals entered the high radiation areas without notifying radiation protection personnel.

The investigation indicated that the root cause of the incident was personal error with contributory causes of inattention to detail and lack of personal accountability. The licensee's immediate corrective actions included:

- The Unit 3 plant manager immediately stopped all work in Unit 3 radiological controlled area except critical path work which was provided continuous radiation protection coverage.
- Personnel were briefed on the incident and given a review of management's expectations regarding radiation worker responsibilities and practices by a management team.
- The following day a multidiscipline team interviewed a random sample of radiation workers inside the Unit 3 radiological controlled area. The radiation workers were questioned about their general knowledge of basic requirements and responsibilities of their radiation exposure permits. Workers who failed to answer all the questions correctly were directed to leave the radiological controlled area and report to their supervisors. Their access to the radiological controlled area was barred until they were briefed by their work supervisor and a radiation protection supervisor.
- A Category 3 Incident Investigation Team was assembled to investigate the event.

Additional corrective actions by the licensee included:

- All four contract individuals involved in the high radiation area incident were terminated.
- A multidiscipline management team headed by the Director of Radiation Protection will, at a minimum, participate in two unannounced field audits a month of radiological controlled area workers performance, specific knowledge, and understanding of work area radiological conditions and controls. The results will be reviewed each month with the Vice President of Nuclear Production to determine if any additional actions are warranted.
- Radiological controlled area workers and their management will be held accountable through the positive discipline program when warranted.
- The licensee will be reviewing their computer based radiation worker requalification training to determine the training method's effectiveness.

The inspector's review of the investigation indicated that the licensee's investigation was good, and the corrective actions were good and appropriate.



The inspector reviewed previous NRC Inspection Reports and noted that a violation was identified by the NRC in Inspection Report 50-528/92-26; 50-529/92-26; 50-530/92-26 for three instances of the failure of workers to adhere to high radiation area entry requirements. The workers did not have alarming dosimeters, a portable survey instrument, or radiation protection technician coverage. The inspection was conducted July 20-24, 1992.

Technical Specification 6.12.1 for Units 1, 2, and 3 requires, in part, that each high radiation area in which the intensity of radiation is greater than 100 mrem/hr but less than 1000 mrem/hr shall be barricaded and conspicuously posted as a high radiation area and entrance thereto shall be controlled by requiring issuance of a Radiation Exposure Permit. Any individual or group of individuals permitted to enter such areas shall be provided with or accompanied by one or more of the following:

- A radiation monitoring device which continuously indicates the radiation dose rate in the area.
- A radiation monitoring device which continuously integrates the radiation dose rate in the area and alarms when a preset integrated dose is received. Entry into such areas with this monitoring device may be made after the dose rate level in the area has been established and personnel have been made knowledgeable of them.
- A radiation protection qualified individual with a radiation dose rate monitoring device who is responsible for providing positive control over the activities within the area and shall perform periodic radiation surveillance at the frequency specified by the facility Radiation Protection Supervisor or his designated alternate in the Radiation Exposure Permit.

On April 12, 1994, the licensee identified individuals who failed to have alarming dosimeters, a portable survey meter, or radiation protection technician coverage when they entered the Unit 3, 77-foot West Piping Penetration Room which was posted as a high radiation area. The failure to adhere to the entry requirements for a high radiation area is considered a violation of Technical Specification 6.12.1 (528/9414-01; 529/9414-01; 530/9414-01). Because the licensee's immediate and additional corrective actions are an adequate response to the violation, a written response is not required.

The inspector's review of radiation exposure permits to verify the use of alarming dosimeters for high radiation areas indicated a weakness. The inspector selected radiation work permits that indicated work in high radiation areas. The inspector obtained a list of individuals that entered the radiological controlled area on the radiation exposure permits and asked the licensee's staff how he could verify that they had been issued an alarming dosimeter. The inspector was informed that when the dosimetry technician at the radiation protection island issued an alarming dosimeter to an individual that the technician entered it on the computer in the Radiological Records and Access Control System. The log in screen for the Radiological Records and



Access Control System did not contain a specific field for the issuance of an alarming dosimeter so the technician put the information in the comments section. During the inspector's review of the radiation exposure permits, the inspector found instances on Radiation Exposure Permits 3-94-3026-A and 3-94-3305-A where the issuance of an alarming dosimeter could not be verified by Radiological Records and Access Control System. One radiation exposure permit stated an alarming dosimeter was required only if the individual entered a high radiation area on this permit, and the other indicated an alarming dosimeter was required only if the individual entered a high radiation area and was not accompanied by radiation protection technician with a survey meter. Therefore, there was some doubt about whether the individuals identified by the inspector had entered a high radiation area or were accompanied by a radiation protection technician with a survey meter when they entered a high radiation area. Further discussions with the licensee's staff indicated that the logging in of alarming dosimeters on Radiological Records and Access Control System was not proceduralized. Furthermore, the inspector was informed that in some instances dosimetry technicians may not always log the alarming dosimeter on Radiological Records and Access Control System. Subsequent reviews of radiation exposure permits by the inspector indicated instances on Radiation Exposure Permits 3-94-1000-A and 3-94-1004-A where the Radiological Records and Access Control System computer system had no indication of the individuals being issued an alarming dosimeter. However, both of these permits required the use of alarming dosimeters with no exceptions. The inspector discussed with the Director of Radiation Protection that there was a weakness in their ability to be able to verify compliance with the use of alarming dosimeters in high radiation areas when called for by the radiation exposure permit. The director understood the inspector's concern and indicated that the matter would be reviewed.

1.2 Changes

The radiation protection organization has been going through a major realignment since it was reviewed in NRC Inspection Report 50-528/93-52; 50-529/93-52; 50-530/93-52. The realignment was instituted in response to the licensee's internal Organization and Programmatic Assessment that was performed for the radiation protection organization. The realignment is designed to have the organization go from what was seen as three separate unit radiation protection organizations to one centralized organization. The realignment was expected to be completed by the end of the Refueling Outage U3R4. The completed realignment will be reviewed during a future inspection of this area. The changes reviewed during this inspection did not adversely affect the radiation protection program.

The licensee acquired the following equipment: robots for certain radiation surveys, additional teledosimeters, a tool contamination monitor, a new wireless communications system, and PCM2 personnel contamination monitors for release of personnel that have radon contamination.



1.3 Planning and Preparation

The licensee supplemented the permanent radiation protection staff with approximately 58 senior radiation protection technicians, 22 junior radiation protection technicians, 3 coordinators, 4 senior dosimetry technicians, 4 junior dosimetry technicians, and 6 helpers for the Refueling Outage U3R4. The licensee also supplemented the radwaste, laundry, and decon groups with additional contract technicians. Contract technicians were brought onsite early enough to complete onsite training. The contract force included a large number of persons who had worked previous outages at Palo Verde.

The inspector determined that the licensee had ample supplies of temporary shielding, radiation detection instrumentation, air monitoring equipment, portable ventilation, and protective clothing to support outage activities.

Management performed a good job of planning for the Refueling Outage U3R4. The scope of Refueling Outage U3R4 was defined early enough prior to the start of the outage to allow adequate time for review by all departments. Radiological controls reviews of outage related activities were performed.

1.4 Training and Qualifications of Personnel

The licensee used a screening examination to aid in the selection of contract radiation protection technicians. The inspector reviewed selected records of contract technicians and noted that the individuals had passed the screening examination.

The licensee had established procedural guidance for assessing the experience of contract personnel. The inspector reviewed selected resumes of contract radiation protection technicians and determined that they met qualification requirements.

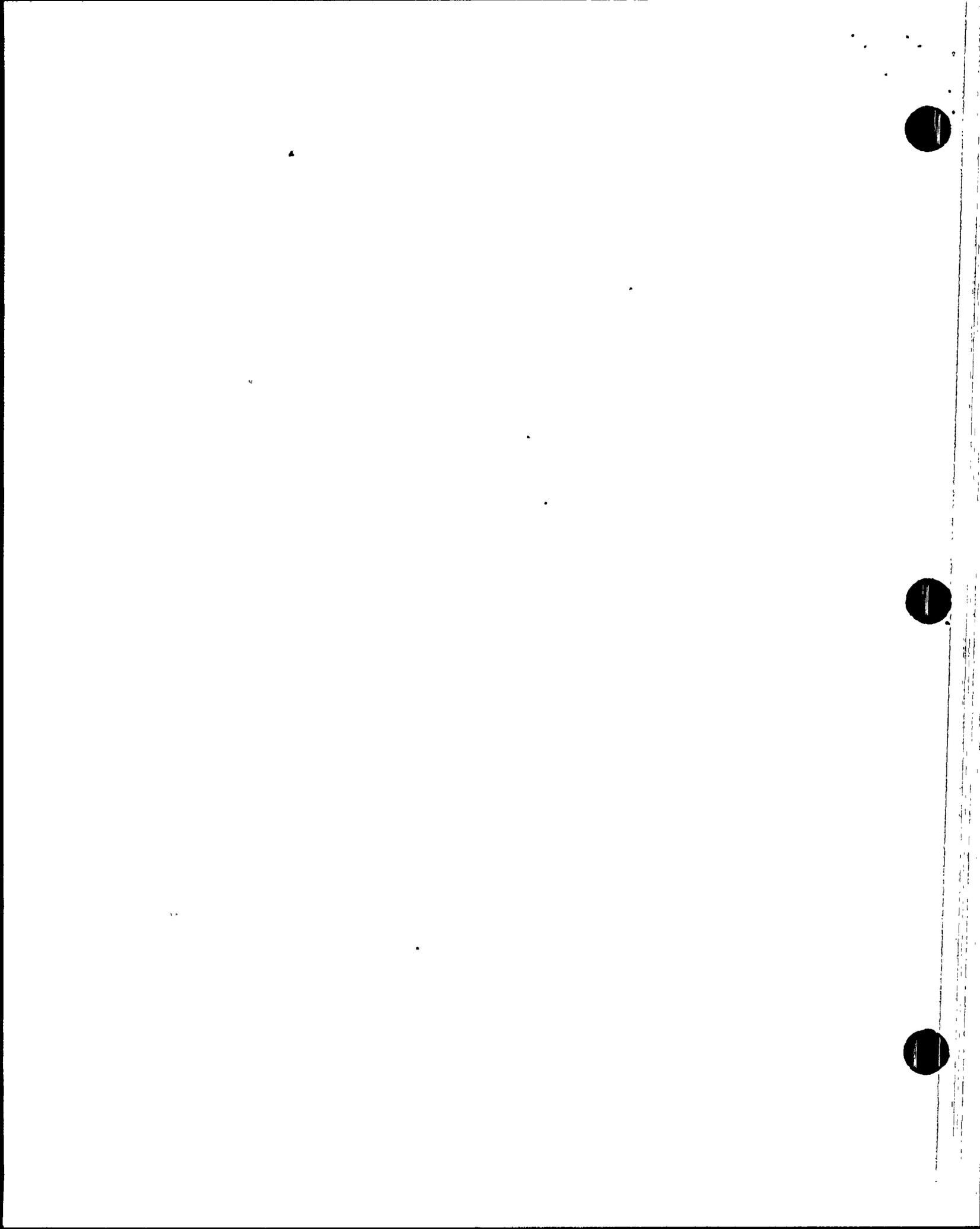
Selected training records of contract radiation protection technicians were reviewed, and the inspector noted that the individuals had been given appropriate training.

1.5 External Exposure Control

The inspector observed individuals entering the radiological controlled area and noted that they wore appropriate personnel monitoring devices. A review of records indicated that personnel who were required to use multibadging during the refueling outage were issued multiple dosimeters.

Radiological exposure permits provided good guidance to individuals working in the radiological controlled area. Worker compliance with radiation exposure permit requirements was good, except as noted in Section 1.1.

The inspector made several tours of the radiological controlled areas, including Units 2 and 3 auxiliary building and Unit 3 containment, and observed that areas were properly posted and controlled.



The inspector attended the prejob briefing for Radiation Exposure Permit 3-94-3010 for the Unit 3 reactor upper guide support lift and set. The prejob briefing was good and included good discussions among the persons involved. The inspector observed part of the work for this evolution. The inspector noted that proper dosimetry was used, and exposure of the individuals was properly controlled by the radiation protection technicians.

1.6 Internal Exposure Control

The inspector reviewed respiratory protection equipment issue records and verified that the individuals who were issued respiratory protection equipment met qualification requirements and that they received equipment of the proper size. The inspector reviewed selected records and noted that the respirators that were issued had been inspected at the required frequency.

The licensee used portable ventilation units with high efficiency particulate filters where practical as a means of reducing airborne contamination. The inspector noted that the licensee had reduced the use of respirators during outages. The licensee performed appropriate ALARA evaluations for the use of respirators. Bubble suits were used for steam generator entries during the refueling outage.

The inspector noted that individuals identified with facial contamination were routinely whole-body counted to determine if internal exposure resulted. Licensee representatives performed reviews of whole-body counts of individuals that indicated possible internal intake.

1.7 Controls of Radioactive Materials and Contamination, Surveys, and Monitoring

The inspector observed entrance and exit access controls at the radiological controlled areas and found them to be good. Housekeeping within the radiological controlled areas of the Units 2 and 3 auxiliary buildings was good. However, the housekeeping of tools in the Unit 3 containment was identified as a weakness to the licensee. The radiation protection director informed operations of the weakness and the director noted an improvement in this area on a subsequent tour.

The inspector reviewed selected survey records and determined that the licensee had implemented a good radiation area survey program. Survey results were documented properly. Independent surveys performed by the inspector were in good agreement with surveys performed by the licensee. The licensee had a good supply of calibrated radiation survey instruments.

During the observation of radiation protection technician work activities for the Unit 3 reactor upper guide support lift and set, the inspector noted a weakness in the radiation work practices of some radiation protection technicians. The inspector noted that some radiation protection technicians who reached in the posted hot particle control zone to help an individual in the zone did not don surgical gloves or did not immediately survey their hands when finished helping the individual. This was brought to the attention of the radiation protection supervisor who was with the inspector. Subsequent



discussions of the inspector's observations with the outage radiation protection manager indicated that what the inspector observed was not consistent with radiation protection managements expectations of the radiation work practices that should have been used. Expectations of radiation protection management of radiation work practices for reaching into hot particle control zones were reinforced, after the weakness was pointed out, at a safety standdown meeting of radiation protection personnel.

Individuals exiting the radiological controlled area were required to pass through both gamma and beta sensitive personnel contamination monitors. Individuals were required to survey their hardhats before entering the contamination monitors. Radiation protection personnel surveyed handcarried items for contamination prior to release.

Licensee representatives had identified 76 personnel contaminations as of May 6, 1994. This was above the licensee's goal of 70 personnel contaminations for that time period.

Surveys, monitoring, and releases of potentially contaminated material to unrestricted areas observed by the inspector were appropriate.

1.8 Maintaining Occupational Exposure ALARA

The inspector noted that good ALARA planning and preparation was performed for the work scheduled for Refueling Outage U3R4. The inspector reviewed selected ALARA packages for jobs performed during the Refueling Outage U3R4 and noted that they were of good quality and included adequate checklists, estimates of projected man-hours, radiation survey information, and radiation exposure projections.

A goal of 234 person-Rem was set for Refueling Outage U3R4. As of May 5, 1994, thermoluminescent dosimeter and self-indicating dosimeter results indicated an expenditure of approximately 202 person-Rem. The licensee stated that they should be able to achieve their goal of 234 person-Rem, if there are no more problems associated with the steam generators. Some techniques and devices employed to reduce radiation exposure included: mock-up training, video cameras, telemetric dosimetry, temporary shielding to reduce radiation levels, hot spot flushing, and the decreased use of respirators.

The inspector reviewed the ALARA suggestion program and noted that only four suggestions were received last year, and no suggestions had been received so far this year. The inspector discussed with the licensee that the low number of suggestions may indicate low worker involvement in the ALARA program. The inspector was informed that there was good worker involvement in the ALARA program but that it was sometimes on a more informal level. The licensee stated that workers would inform radiation protection verbally of ALARA problems that needed fixed and radiation protection would act on the problem. The Director of Radiation Protection agreed with the inspector that the formal ALARA suggestion program was not very active and indicated that they had planned to review the function of the ALARA suggestion program at a later date.



1.9 Conclusions

Good radiological control audits and monitors were performed by qualified individuals. A violation was identified for the failure of individuals to adhere to the entry requirements of a high radiation area. A weakness was identified in that the licensee could not verify alarming dosimeter usage in high radiation areas. The radiation protection organization has gone through a realignment since the last inspection of this area.

The licensee properly prepared for the Refueling Outage U3R4 by supplementing radiation protection staff with qualified contract personnel and ensuring that sufficient quantities of equipment used by the radiation protection organization were available. Management performed a good job of preparing for the Refueling Outage U3R4.

External radiation exposure controls were good. Good internal radiation exposure controls in the form of respiratory protection, air monitoring, and whole-body counting were implemented.

Controls of radioactive materials and contamination, surveys, and monitoring were good. Two weaknesses were identified. One was poor housekeeping of tools in Unit 3 containment, and the other was poor radiation work practices associated with workers reaching into a hot particle zone.

Good ALARA planning and preparation was performed for Refueling Outage U3R4. Exposures were below the licensee's goals for the Refueling Outage U3R4. The ALARA suggestion program was not very active.



ATTACHMENT

1 PERSONS CONTACTED

1.1 Licensee Personnel

- *K. Akers, Quality Assurance Monitor
- *R. Bernier, Supervisor, Nuclear Regulatory Affairs
- *J. Draper, Site Representative, Southern California Edison
- *M. Fladager, Supervisor, Radiation Protection Support Services
- *R. Fountain, Supervisor, Quality Audits and Monitoring
- *J. Gaffney, Manager, Radiation Protection
- *F. Gowers, Site Representative, El Paso Electric
- *A. Haugen, Quality Assurance Monitor
- *R. Henry, Site Representative, Salt River Project
- *D. Kanitz, Senior Engineer, Nuclear Regulatory Affairs
- *S. Kanter, Technical Advisor, Radiation Protection
- *A. Krainik, Manager, Nuclear Regulatory Affairs
- *K. Linares, Supervisor, Radiation Protection
- *M. Shea, Director, Radiation Protection
- *W. Sneed, Manager, Radiation Protection
- *J. Steward, Manager, Radiation Protection Technical Services
- *B. Whitney, Quality Assurance Auditor

1.2 NRC Personnel

- *A. MacDougall, Resident Inspector

*Denotes personnel that attended the exit meeting. In addition to the personnel listed, the inspector contacted other personnel during the inspection.

2 EXIT MEETING

An exit meeting was conducted on May 6, 1994. During this meeting, the inspector reviewed the scope and findings of the report. The licensee did not identify as proprietary, any information provided to, or reviewed by the inspector.

