

U.S. NUCLEAR REGULATORY COMMISSION

REGION V

Report: 50-528, 50-529, and 50-530/93-52  
Licenses: NPF-41, NPF-51, NPF-74  
Licensee: Arizona Public Service Company.  
P. O. Box 53999, Sta. 9012  
Phoenix, Arizona 85072-3999  
Facility: Palo Verde Nuclear Generating Station  
Units 1, 2, and 3  
Inspection Location: Wintersburg, Arizona  
Inspection Duration: November 29 through December 3, 1993

Inspected by:

*for H. Ch...*  
M. Cillis, Senior Radiation Specialist

*1/9/94*  
Date Signed

*R. K. Brew...*  
K. Brewer, Radiation Specialist

*12-28-93*  
Date Signed

Approved by:

*for H. Ch...*  
James H. Reese, Chief  
Facilities Radiological Protection Branch

*1/9/94*  
Date Signed

Summary:

Areas Inspected: Routine announced inspection of followup items, external exposure controls, planning and preparation, training, and facility inspections. Inspection Procedures 92701 and 83750 were used.

Results: Two violations involving the contamination incident during the Unit 1 charging pump discharge dampener bladder replacement were identified (see Section 3.C(3)). One open item involving exposure controls for steam generator work was identified (see Section 3.C(4)).

With the exception of the two violations, the licensee's program for occupational radiation exposure control, in the aspects reviewed, appeared adequate to meet its safety objectives.



## DETAILS

### 1. Persons Contacted

#### Licensee

- \*G. Mobbs, Technical Specialist III, Quality Auditing & Monitoring.
- \*K. Akers, Technical Specialist III, Quality Auditing & Monitoring
- \*R. Stevens, Director, Regulatory and Industry Affairs
- \*D. Kanitz, Senior Engineer, Nuclear Regulatory Affairs
- \*T. Gray, Supervisor, Radiation Protection Technical Services
- \*S. Lantz, Senior Radiation Protection Technician, Unit 1 Radiation Protection
- \*J. Levine, Vice President, Nuclear Production
- \*M. Lantz, Dosimetry Supervisor, Radiation Protection  
J. Steward, Supervisor, Central ALARA Planning
- \*W. Hoey, Manager, Radiation Protection Technical Services
- \*A. Ogurek, Consultant, Nuclear Oversight
- \*C. Podgurski, Supervisor, Radiation Protection
- \*M. Shea, General Manager, Radiation Protection
- \*M. Wagner, Manager, Unit 3 Radiation Protection
- \*J. Gaffney, Manager, Unit 2 Radiation Protection
- \*B. Sneed, Manager, Unit 1 Radiation Protection
- \*B. Major, Radiation Protection Technician, Unit 1 Radiation Protection
- \*L. Grusecki, Supervisor, Unit 2 Radiation Protection
- \*W. McMurry, Supervisor, Unit 1 Radiation Protection
- \*D. Hettick, Supervisor, Station Operating Experience

#### NRC

- J. Sloan, Senior Resident Inspector
- H. Freeman, Resident Inspector
- \*T. Alley, DOE/NRC Resident Intern

\*Denotes the individuals that attended the exit meeting held December 3, 1993. The inspectors met and held discussions with additional members of the licensee's staff during the inspection.

### 2. Followup (92701)

- a. Item 50-528/93-037-01 (Closed): This unresolved item concerned a hot particle contamination incident involving two Maintenance Technicians, which occurred on July 22, 1993, during a charging pump discharge dampener bladder replacement at Unit 1. The inspectors reviewed the licensee's Incident Investigation Report No. 1-3-0375, summary of the Organizational and Programmatic (O & P) Assessment Report of the Radiation Protection (RP) Department and applicable records, and conducted further interviews with licensee personnel. This unresolved item is considered closed. Refer to Section 3.C(3) of this report for a discussion of the inspectors' findings. This item resulted in two violations. (50-528/93-52-01 and 50-528/93-52-02)



- b. Item 50-528/93-018-04 (Open): This unresolved item involved the performance of an analysis by the licensee to determine the amount of radioactivity that may have been released in previous oil tanker loads released to a local recycling agency. The licensee's analysis, dated July 16, 1993, included discussions regarding the sources of oil released, potential lack of representative oil samples due to stratification, volume and count time of oil samples, and total amount of radioactivity that was released in previous oil tanker loads released to the local recycling agency. The licensee's analysis will be reviewed further by NRC to assess the results. This item will remain open.
- c. Item 50-528/93-018-06 (Closed): This item involved the need to assess whether whole body dosimetry should be relocated for workers working in the resin transfer valve galleries of all three Units due to overhead dose rates ranging from a factor of five to a factor of ten greater than chest level dose rates. Condition Report/Disposition Request (CRDR) No. 1-3-0092 discussed whether the Unit 1 resin transfer valve gallery should be posted and controlled as a locked high radiation area, however it did not address dosimetry placement for workers in that area.

The inspectors reviewed the licensee's assessment of dosimetry placement in the resin transfer valve galleries. The assessment determined that although the dose gradients exist, work is not routinely performed in these areas for extended periods of time. The licensee indicated that they would consider relocating an individual's whole body dosimetry for work performed in these areas over extended durations. The inspectors noted the licensee's assessment to be adequate. The inspectors had no further concerns in this area. This item is considered closed.

3. Occupational Radiation Exposure (92701) (83750)

The inspectors evaluated the licensee's occupational radiation protection program by conducting a review of licensee procedures, discussions with licensee staff, and observations of work in progress. Specifically, the inspectors reviewed the licensee's programs for external exposure controls, planning and preparation for extended outages, training of incoming workers, and conducted facility inspections.

a. Changes

The inspectors noted several changes within the licensee's RP organization since the previous inspection. A new General Manager of Site RP had been appointed. This individual had been acting General Manager of Site RP after the position was vacated. The Unit 3 RP Manager position was recently vacated and an acting RP Manager was filling that position. The Unit 2 RP Manager position was also being filled by an acting RP Manager. The licensee was in the process of conducting interviews to fill both the Unit 2 and Unit 3 RP Manager positions. The inspectors reviewed the qualifications of



the individuals currently occupying RP managerial positions against the requirements of Regulatory Guide 1.8, "Personnel Selection and Training," September 1975, and American National Standards Institute (ANSI) 3.1, "Selection and Training of Nuclear Power Plant Personnel," 1978. The inspectors had no concerns in this area.

b. Audits and Surveillances

The inspectors reviewed selected surveillances conducted by the licensee's Quality Assurance (QA) organization. The following surveillances were reviewed by the inspectors.

- Monitoring Report No. 93-0502, "Radwaste Storage/Control," August 6, 1993.
- Monitoring Report No. 93-0543, "Training," August 27, 1993.
- Monitoring Report No. 93-0654, "Management/Training Interface," October 26, 1993.
- Monitoring Report No. 93-0597, "Contamination Control," September 28, 1993.
- Monitoring Report No. 93-0568, "Surveys," September 14, 1993.
- Monitoring Report No. 93-0503, "Radwaste Storage and Control," August 4, 1993.
- Monitoring Report No. 93-0476, "Temporary Shielding ALARA," July 23, 1993.
- Monitoring Report No. 93-0438, "Radioactive Material Control," June 30, 1993.
- Monitoring Report No. 93-0327, "Radiological Survey Documentation," May 19, 1993.

The inspectors noted that the QA surveillances reviewed, were of sufficient scope and depth, and appeared to identify program weaknesses and track the identified weaknesses to a satisfactory conclusion. The inspectors had no concerns regarding the QA surveillances reviewed.

c. External Exposure Controls

The inspectors examined attributes of the licensee's programs for control of external radiation exposure by reviewing selected Radiation Protection (RP) procedures and documents, conducting interviews with members of the RP staff, and performing facility inspections.

(1) Exposure and Personnel Contamination Goals for 1993

The inspectors reviewed the licensee's exposure and personnel contamination goals for 1993 and their progress to date. The following ALARA goals were established for 1993:



- Exposure Goals:
  - \* Unit 1 - 256 person-rem
  - \* Unit 2 - 245 person-rem
  - \* Unit 3 - 26 person-rem
- Personnel Contamination Goals:
  - \* Unit 1 - 98 events
  - \* Unit 2 - 90 events
  - \* Unit 3 - 20 events

At the time of this inspection, the licensee was just below or slightly exceeding these goals.

The inspectors noted the licensee's ALARA efforts, in the areas reviewed, to be effective in trying to meet their established goals. The inspectors identified no concerns in this area.

(2) Release of Radiological Controlled Areas (RCA) of the Unit 2 Turbine Building

Due to the Unit 2 steam generator tube leak event which occurred on March 14, 1993, the Unit 2 Turbine Building and North Yard area, including the blowdown demineralizer area, were being controlled as a RCA and a radioactive materials (RMA) area requiring Radiation Exposure Permit (REP) sign-in for entry.

On November 20, 1993, after decontamination and cleanup, the licensee released several areas within the Unit 2 Turbine Building from RCA, RMA, and REP controls. The areas released were as follows:

- 240 ft. elevation of the Turbine Building;
- 100 ft. to 140 ft. elevation breezeway and elevator;
- 140 ft. elevation of the Turbine Building, except the flash tank area and columns;
- 176 ft. elevation of the Turbine Building;
- 120 ft. elevation of the Turbine Building, except the platform area containing valve SGN-FV-122; and
- Main Steam Supply System, all areas except the 120 ft. elevation feedwater valves and the 100 ft. elevation containing valve SGA-UV-500S.

The 100 ft. elevation Turbine Building and North Yard, including the blowdown demineralizer area and the exceptions noted above, will remain RCA/RMA controlled areas requiring REP sign-in for entry. The inspectors identified no concerns in this area.



(3) Hot Particle Exposure Incident During The Unit 1 Charging Pump Discharge Dampener Bladder Replacement

(a) Background

The licensee frequently performs routine maintenance on the charging pumps at all three Units. Annually, a standing REP is written to cover the routine work to be performed on the charging pumps throughout the year. Prior to this event, the licensee had a separate REP writing organization for each Unit. Thus, a separate standing REP would be written to cover similar charging pump work at each Unit. Bladder replacements had been performed numerous times at all three units, which allowed the licensee to accumulate extensive job history information regarding the radiological and mechanical aspects of this evolution.

(b) Sequence of Events

On July 22, 1993, the licensee performed a routine maintenance evolution on the "E" charging pump at Unit 1. The maintenance involved dampener bladder replacements on both the suction and discharge sides of the charging pump. The work was performed on standing REP 1-93-0109-A, "Aux: Charging Pump 'A', 'B', and 'E' Maintenance and Associated Work (Unit 1)," which allowed for this type of routine maintenance. The REP called for "Intermittent" RP coverage and RP coverage during system opening. The REP also required a Particulate/Gaseous and Iodine air sample when the system was breached.

On the morning of July 22, 1993, two Maintenance Technicians (MTs) and one RP Technician (RPT) began work on the suction side of the "E" charging pump. By noon, the MTs were nearly completed with the suction side and broke for lunch. During the morning, the RPT provided coverage as required by REP 1-93-0109-A and no abnormal conditions were detected.

At 1:00 pm, the MTs and the RPT resumed work on the suction side of the "E" charging pump. Upon completion of work on the suction side, and prior to working on the discharge side, the MTs completely reassembled the suction side of the system.

The MTs experienced a problem with the chain fall rigging as work began on the discharge side of the system. While the MTs were attempting to fix the problem with the chain fall, the RPT left the "E" charging pump room to perform surveys for another work group. While the RPT was gone, the MTs fixed the chain fall and began disassembling the



discharge side of the "E" charging pump.

When the RPT returned, approximately a half hour later, the discharge side had been disassembled and the discharge dampener bladder removed. No air sample was performed during the breach of the discharge side of the system. However, the RPT did perform a contamination survey of the bladder. The RPT's survey results indicated contamination levels of  $1.5E6$  disintegrations per 100 square centimeters ( $dpm/100\text{ cm}^2$ ). Fifteen minutes later, the RPT left the "E" charging pump room to document several surveys prior to the end of shift. At the RP control point, the RPT informed the senior RPT on shift that work on REP 1-93-0109-A was still in progress and recommended a general smear survey of the "E" charging pump room.

The MTs continued to work on the discharge side of the system for more than one hour and fifteen minutes. The licensee's investigation revealed that while trying to install the new bladder, the MTs experienced difficulties due to the fact that a bladder installation tool, normally used for this job, was not available prior to starting the job. Also, the bladder housing was suspended vertically without the use of a containment device, which was normal practice for this evolution. The licensee's investigation also revealed that the MTs discovered that they were missing a part required to reassemble the system, and attempted to exit the RCA to get the missing part.

Upon exiting the RCA, the MTs alarmed the personnel contamination monitors (PCMs). Two RPTs at the RCA control point frisked the MTs and discovered seven discrete radioactive particles on MT A, the MT performing most of the work, and two discrete radioactive particles and two distributed contamination areas on MT B, the MT assisting with the work. The MTs were decontaminated by RP personnel, passed the PCMs, and were subsequently released by RP. The most radioactive hot particle, reading 400,000 dpm, was removed from the back of MT A's left thigh.

RP initiated dose evaluations for both MTs that evening, the results of which estimated MT A's dose to be 2,400 millirem to the skin of the wholebody and MT B's dose to be 170 millirem to the skin of the wholebody. The dose estimates were left on the Unit 1 RP Supervisor's desk and remained there for two weeks, unreviewed by RP supervision.

(c) Subsequent Events

On July 23, 1993, the licensee discovered that no air



sample had been taken during the opening and subsequent disassembly of the discharge side of the system, thus, RP initiated internal dose assessments for MT A and MT B. The results of the assessments indicated that the workers did not have an uptake of radioactive material. Also, RP performed an isotopic analysis of the 400,000 dpm hot particle removed from the left thigh of MT A. The results of the Isotopic analysis indicated the particle to be 0.91 microcuries or about 2E6 dpm.

On August 6, 1993, two weeks after the incident, RP supervision became aware of the skin dose estimates, at which time a more thorough dose calculation was performed. The results of this evaluation indicated that MT A's skin dose was actually 6,330 millirem, which was below the 10 CFR 20.101(a) limit of 7,500 millirem per calendar quarter. The MTs' dose estimates were entered into the Radiological Records and Access Control System (RRACS).

On August 12, 1993, MT A's RCA access was suspended, three weeks after the incident had occurred, pending RP management review.

On August 13, 1993, CRDR No. 1-3-0375 was elevated to a level 3 investigation and licensee Incident Investigation Report No. 1-3-0375 was initiated.

(d) NRC Evaluation of Incident

(1) Pre-planning and REP Preparation

In discussions with the REP preparer, it was stated that standing REP 1-93-0109-A was prepared on January 4, 1993, to cover routine maintenance work on Unit 1 charging pumps. Information existed in the job history files which indicated past contamination levels on the discharge side of the charging pumps of 1E6 dpm/100 cm<sup>2</sup> and higher. Also, information from the job history files indicated that containment devices were used during previous bladder replacements to prevent the spread of contamination and hot particles, bladder replacement tools were used to ease the installation of the replacement bladder, and hot particle controls were established during similar evolutions at the other Units (e.g. establishing a hot particle contamination area and providing RP hot particle checks every twenty-five to thirty minutes).

The previous standing REP for Unit 1 charging pump routine maintenance in 1992, REP 1-92-0185-B, contained precautionary statements regarding hot



particle controls and also contained a statement regarding greater than 5E6 dpm/100 cm<sup>2</sup> contamination levels during previous charging pump discharge dampener bladder replacement work. The standing REPs for Units 2 and 3 also contained statements regarding greater than 1E6 dpm/100 cm<sup>2</sup> contamination levels on the discharge side of the charging pumps. The REP preparer could not give a reason why no consideration was given to past job history or the previous standing REP 1-92-0185-B, "Aux: Charging Pump "A", "B", and "E" Maintenance and Associated Work (Unit 1)," while preparing REP 1-93-0109-A, to aid the RPT covering the job and the MTs performing the work.

Technical Specification (TS) 6.11.1 states, "Procedures for personnel radiation protection shall be prepared consistent with the requirements of 10 CFR part 20 and shall be approved, maintained, and adhered to for all operations involving personnel radiation exposure."

Licensee Procedure 75RP-9RP02, Revision 2.04, "Radiation Exposure Permits," contains instructions for the preparation of Radiation Exposure Permits (REP). Section 3.2, "REP Preparation," states the following:

### 3.2 REP Preparation

The following information shall be identified on the REP....

#### 3.2.18.2 Special hazards, restrictions, and precautions.

Contrary to the above, on January 5, 1993, REP 1-93-0109-A, "Aux: Charging Pump 'A' 'B' & 'E' Maintenance and Associated Work," was issued for use without providing specific instructions regarding elevated contamination levels within the discharge side of the charging pumps and the precautions necessary while working on the discharge side of the charging pumps.

Failure to adhere to radiation protection procedures is a violation of TS 6.11.1. (VIO 50-528/93-52-01)

Prior to the incident which took place on July 22, 1993, during the Unit 1 "E" charging pump discharge dampener bladder replacement, no discussions were held regarding the work to be performed. The RPT stated that it was assumed the workers were experienced at this job and that they knew what they



could do and what they could not do without RP coverage. The inspectors noted the inadequate communication between the RPT covering the job and the workers performing the work to be a contributing factor in this incident.

(2) RP Job Coverage and Job Performance

Requirements were written into the REP to provide guidance for performing radiological work safely and in compliance with station procedures and regulatory requirements. RPT duties were listed in REP 1-93-0109-A, including the duty to provide "coverage during system opening."

However, on July 22, 1993, RP coverage was not adequately provided during the opening and disassembly of the discharge side of charging pump work "E". Specifically, after the suction side of the charging pump had been closed up, the RPT left the work area to perform unrelated tasks in an adjacent room. While the RPT was gone from the area, the MTs proceeded to reopen the system and removed the discharge dampener bladder. In interviews, the RPT stated that it was assumed the chain fall problem would take a while to correct. It was the RPT's intention, upon leaving the "E" charging pump room to assist the other work group, to return prior to the MTs having opened the discharge side of the system. The RPT also failed to provide the MTs with specific instructions not to open the system without a RPT being present to assess the radiological conditions in the discharge side when the system was opened. The inspectors noted the use of radiological hold points, in the manner described in Procedure 75RP-9RP02, "Radiation Exposure Permits," Revision 2.04, Section 3.2.18, to be inadequate.

10 CFR 20.201(b) requires that each licensee make such surveys as may be necessary to comply with the requirements of Part 20 and which are reasonable under the circumstances to evaluate the extent of radiation hazards that may be present.

As defined in 10 CFR 20.201(a), "survey" means an evaluation of the radiation hazards incident to the production, use, release, disposal, or presence of radioactive materials or other sources of radiation under a specific set of conditions.

Contrary to the above, as of July 22, 1993, the licensee failed to adequately evaluate the airborne



radiological hazards to ensure compliance with the limits of 10 CFR 20.103(a)(1) for the intake of radioactive materials. Specifically, during the opening of the discharge side of the charging pump, and the subsequent removal of the dampener bladder, the airborne radiation hazards were not evaluated. This is a violation of 10 CFR 20.201(b). (VIO 50-528/93-52-02)

Licensee Procedure 75RP-9RP02, Revision 2.04; "Radiation Exposure Permits," contains the following statement regarding stop work authority:

- 4.1.12 Stop Work Authority - the authority to temporarily stop work in order to evaluate conditions.

Additionally, RPTs are empowered with the authority to stop work as follows:

- 4.1.12.1 This authority will be exercised by qualified RP representatives when radiological conditions and job practices could endanger the workers or could violate NRC regulations, station procedures, or ALARA controls for the job.

Contrary to the above, on July 22, 1993, the RPT assigned to provide coverage of the "E" charging pump work failed to exercise stop work authority when unexpected radiation hazards were recognized, while performing the discharge dampener bladder replacement work authorized by REP 1-93-0109-A, which could have violated station procedures and NRC regulations. Specifically, the RPT did not stop work when measured radiation contamination readings from the discharge dampener bladder were significantly higher than expected.

This is another example of failure to follow RP procedures as required by TS 6.11.1. (VIO 50-528/93-52-01)

(3) Dose Assessment and Tracking

Subsequent to the contamination incident, the licensee focused on the potential intake of radioactive materials by the MTs. However, the skin exposures received by the MTs were not reviewed by RP supervision for two weeks.



Licensee Procedure 75RP-9RP04, Revision 1.02, "Personnel Decontamination," Section 3.6.6 provides guidance for entering the estimated skin dose for the affected individual into RRACS. Additionally, Section 3.8 "Document Review and Routing," provides guidance for RP Supervisory review of exposure estimates of affected individuals

However, the Unit 1 RP Supervisor was not aware of the MTs' exposure estimates until August 6, 1993, and the lack of timely RP Supervisory review prevented the MTs' exposure records from being updated for two weeks after the contamination incident. The inspectors noted the Unit 1 RP Supervisor's lack of knowledge regarding the MTs' exposure estimates to be indicative of inadequate management oversight.

Licensee Procedure 75RP-9RP04, Revision 1.02, "Personnel Decontamination," Section 3.6, also contains guidance regarding restricting an individual's RCA access after a contamination incident as follows:

- 3.6.5 If the calculated skin dose is greater than 750 millirem for this incident, or greater than 5,000 millirem for the current calendar quarter, restrict the individual from RCA access pending RP management review.

MT A's skin dose was initially estimated on July 23, 1993, to be 2,400 millirem, but was subsequently determined to be 6,330 millirem. However, the licensee did not restrict MT A's RCA access until August 12, 1993.

Two weeks had passed before MT A's exposure records were updated and three weeks had passed prior to MT A's RCA access being suspended. The inspectors noted the licensee's performance in controlling MT A's exposure to be inadequate.

(e) Licensee Evaluation of Incident

The licensee completed their investigation of this incident on September 21, 1993, and documented their findings in Incident Investigation Report No. 1-3-0375, "Unit 1 Personnel Contamination and Significant Skin Exposure During a Charging Pump Discharge Dampener Bladder Replacement." The inspectors reviewed the licensee's investigation report. Specific items noted from the report included:



- The scope and depth of the report appeared to be appropriate.
- The presentational format was slightly cumbersome.
- The licensee identified the root cause of the incident to be personnel error involving RP coverage of the job.
- The important issues raised in the investigation report generally agreed with the inspectors' independent findings.
- The licensee's assessment of the dose received by the MTs appeared valid.
- The corrective actions implemented and the corrective actions proposed for the future appeared to properly address the root cause of the incident and the contributing causal factors.

(f) Conclusions

The inspectors concurred with the findings identified in the licensee's investigation report. Specifically, the inspectors concluded that inadequate RP coverage was the most significant factor which contributed to the occurrence of this incident. The inspectors noted several inadequacies in RP job coverage, some of which the licensee's investigation identified, as follows:

- Failure to stop work when radiological conditions changed significantly.
- Not being present when the system was reopened (i.e. opening the discharge side) to perform the necessary surveys.
- Leaving the job in-progress to complete paper work prior to end of shift.
- Not informing the lead RPT on shift of the change in radiological conditions.
- Being driven by the work schedule to get the charging pump back on line and sacrificing job duties in order to avoid missing the van pool.
- Not adequately briefing the workers regarding expectations during the course of the job and specific radiological hold points.



- Not specifying the need for a containment device while opening the system and removing the bladder.

The inspectors also noted the lack of attention to detail and the lack of first line supervisory involvement associated with routine work as other contributing factors to this incident. Management expectations did not appear to be adequately communicated to and understood by the workers in the field.

The inspectors noted REP 1-93-0109-A, under which this job was authorized to be performed, to be incomplete, due to the extensive amount of job history information which was not utilized in preparing the REP. Also, the previous Unit 1 REP and REPs from the other Units contained information which may have aided the RPT covering the charging pump work. The lack of job history information in REP 1-93-0109-A was viewed by the inspectors to be another contributing factor in this incident.

The inspectors noted the inadequate RP job coverage in this incident to be similar to the December 12, 1992, High Integrity Container (HIC) overexposure event. Specifically, the failure to stop work upon identifying significant changes in radiological conditions was noted. The inspectors had concerns whether the licensee's implementation of the corrective actions resulting from the aforementioned HIC overexposure was broad enough in scope to prevent similar incidents from occurring during routine work evolutions.

(g) Licensee Corrective Actions

Incident Investigation Report No. 1-3-0375 outlined a series of corrective actions that addressed the root cause and various causal factors identified in the charging pump hot particle contamination event. A list of the most significant corrective actions follows:

- The RP staff has attended re-training regarding managements expectations, the circumstances surrounding this incident, and the importance of procedural adherence.
- Many procedures will be simplified, and guidance which is in many places will be centralized into one simple document.
- The REP writing organization will be restructured and centralized such that there is no longer three independent REP groups for the separate Units.



- The REP writing process will be enhanced such that job history information files and previous REPs from all three Units are readily available.

Licensee memorandum, ID #218-01379-MDS, "Corrective Action Plan for 9/93 RP Organization and Programmatic Assessment, CRDR 0-8-0269, Action 01," dated December 2, 1993, outlines several programmatic corrective actions, including those presented above.

(4) Steam Generator Platform Exposure Controls

The inspectors reviewed the circumstances surrounding a possible administrative wholebody overexposure incident, which occurred on October 25, 1993, during various reach-in tasks on the Unit 1 steam generator (S/G) number one hot leg platform.

(a) Summary of Events

On the night shift of October 24-25, 1993, a worker performing various reach-in tasks on the number one S/G hot leg platform at Unit 1, exited the platform area with a sacrificial self indicating dosimeter (SID) reading of 550 millirem. Prior to beginning this work, the worker had 306 millirem of the quarterly administrative dose limit remaining. The RPT on the platform, upon reading the worker's sacrificial SID, immediately contacted the RP Supervisor on shift and informed the RP Supervisor that the worker appeared to have exceeded his quarterly administrative dose limit.

The work was immediately stopped by the RP Supervisor and the work crews relieved of duty. The RP Supervisor initiated an investigation into the incident which was documented in CRDR No. 1-3-0609.

(b) Licensee Investigation

During the course of S/G work, it is the responsibility of the RP Lead to request sacrificial SID reading for S/G workers. The RP Lead is the individual who sits at a remote viewing station and tracks the S/G worker's stay time. By periodically reading the worker's SIDs and maintaining close watch over the worker, the RPTs covering the work can prevent the worker from receiving too much dose. However, during the S/G work which occurred on October 24-25, 1993, the RP Lead failed to request the worker's sacrificial SID readings for more than one hour, during which time the worker had made three S/G reach-ins. It wasn't until the worker was required by procedure to exit the RCA, due to his being in Anti-C's for four hours,



that the SIDs were read and indicated a possible administrative overexposure.

The RP lead, RPT manning the platform, and the S/G worker were given a Pre-Job Briefing regarding the work to take place and their responsibilities while work was in progress. The RP lead had no explanation for why he failed to request sacrificial SID readings during the course of work.

The S/G worker's thermoluminescent dosimetry (TLD) was subsequently read, indicating a dose of 241 millirem for this work. Thus, an administrative overexposure had not actually occurred.

The licensee identified the root cause to be poor work practices in that the responsible individuals failed to evaluate the S/G worker's cumulative exposure by reading his SIDs. Four additional causal factors were identified as follows:

- No RP Supervision at job site or briefing.
- No hold points were established in the REP to read the worker's SIDs.
- The REP checklist was ineffective in that it did not specify hold points to read the worker's SIDs.
- The RPTs did not establish hold points to read the S/G worker's SIDs.

(c) NRC Assessment

The inspectors noted the licensee's investigation to be thorough. The inspectors' findings agreed with those of the licensee. The inspectors concurred with the licensee's findings in that personnel error was the primary root cause. However, the inspectors also expressed concern regarding the licensee's lack of formal procedural guidance on the monitoring of S/G workers' exposure. The primary guidance provided to the RPTs covering the S/G work was expressed in the Pre-Job Briefing. Additional guidance was also provided in generic documents, which were lacking specific instructions for the use of sacrificial SIDs and stay times for monitoring S/G workers' doses.

The inspectors noted that the insufficient use of radiological hold points was also evident in both the December 21, 1993, HIC overexposure event and the July 22,



1993, hot particle exposure incident. The inspectors noted the lack of hold points as a significant contributing factor.

(d) Conclusions

The inspectors noted the licensee's assessment of the S/G worker's dose to be valid and recognized that an administrative overexposure had not occurred. However, the inspectors expressed concern regarding the informal guidance provided to RPTs for S/G work exposure control and the licensee's use of radiological hold points. This is considered an inspection followup item. The licensee's methods for S/G work exposure control and performance during future S/G work will be evaluated in a future inspection. (50-528/93-52-03)

Two violations of NRC requirements (Section 3.C.3) and one open item (Section 3.C.4) were identified.

d. Planning and Preparations

Activities associated with the planning and preparation for the upcoming Unit 2 midcycle outage (U2M5), scheduled to start on January 8, 1994, were examined. The examination included a review of the "Unit 2 Midcycle Outage Revision 'B' Outage Schedule," applicable procedures and documents, facility tours, and discussions with the licensee's staff.

The examination disclosed the following:

- An ALARA goal of 45 person-rem has been established.
- A goal of 75 personnel contaminations has been established.
- Staffing needs have been established.
- ALARA reviews of the individual work packages was in progress.
- The major evolutions to take place during the outage include extensive eddy current testing on the steam generators, chemical cleanup of the secondary side of the steam generators, and some undetermined pressurizer work, possibly a pressurizer heater replacement.

The licensee's ALARA goals may be modified depending on the scope of work to be done on the pressurizer and the developments which arise due to the licensee's lack of experience with chemical cleanup processes.

The inspectors concluded that the licensee's planning and preparation for the U2M5 outage, in the aspects reviewed, was adequate in protecting the health and safety of licensee employees.



e. Training

The inspectors examined the licensee's General Employee Training (GET) through a review of course handouts and video presentations, participation in computer based training (CBT), and discussions with licensee personnel. The inspectors noted the new 10 CFR Part 20 CBT given to incoming workers for the upcoming Unit 2 midcycle outage to be adequate.

f. Facility Inspections

The inspectors performed independent beta-gamma and gamma radiation measurements and conducted inspections of selected areas of the licensee's RCA. The following observations were noted:

- Bulletin boards located at entrances to buildings contained all the necessary postings as required by 10 CFR 19.
- All radiological posting and labeling in the RCA was consistent with licensee procedures and NRC requirements as confirmed by independent measurements performed by the inspectors.
- High radiation area and locked high radiation area controls were maintained in accordance with licensee procedures, technical specifications, and NRC requirements.
- General housekeeping was well maintained.

With the exception of the two violations identified in Section 3.C(3), and the open item associated with steam generator platform work identified in Section 3.C(4), the inspectors noted the licensee's program for controlling occupational radiation exposure to be adequate for accomplishing its safety objectives.

4. Exit Interview

The inspectors met with the individuals denoted in Section 1 at the conclusion of the onsite inspection on December 3, 1993. The scope and findings of the inspection were summarized. The licensee acknowledged the inspectors' observations. The licensee did not identify as proprietary, any of the information provided to the inspectors during the inspection.



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