

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report Nos. 50-528/90-13, 50-529/90-13 and 50-530/90-13

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

Licensee: Arizona Public Service Company
P. O. Box 52034
Phoenix, Arizona 85072-2034

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

Inspection at: Wintersburg, Arizona

Inspection conducted: February 28, 1990 through March 2, 1990, and March 5, 1990 through March 9, 1990

Inspection by: M. Cillis 3/20/90
Date Signed
M. Cillis, Senior Radiation Specialist

Approved by: F. A. Wenslawski 3/20/90
Date Signed
F. A. Wenslawski, Chief
Facilities Radiological Protection Section

Summary:

Inspection on February 28, 1990 through March 2, 1990, and March 5, 1990 through March 9, 1990 (Report Nos. 50-528/90-13, 50-529/90-13 and 50-530/90-13)

Areas Inspected:

Routine unannounced inspection by a regionally based inspector of a nonroutine event; occupational exposures during extended outages; facilities and equipment; ALARA; in-office review of special reports and a tour of the licensee's facilities. Inspection procedures 30703, 93702 83727, 83729, 83728 and 90712 were addressed.

Results:

In the six areas addressed, one apparent violation was identified involving the failure to properly control access to locked high radiation areas (LHRA) (considered a repetitive violation) and another apparent violation was identified for failure to adhere to the LHRA key control procedure (see Section 2). A concern related to the venting of the Unit 2 pressurizer steam space into containment while workers were present is discussed in Section 4.E. In the areas addressed, the licensee's programs appeared adequate to accomplish their safety objectives, although repetitive occurrences of inadequate access control to locked high radiation areas infers a problem with timeliness and effectiveness of corrective actions.



DETAILS

1. Persons Contacted

W. F. Conway, Executive Vice President
*J. M. Levine, Vice President, Nuclear Production
*W. C. Marsh, Plant Director
*P. W. Hughes, Radiation Protection & Chemistry Manager
*R. J. Adney, Plant Manager, Unit 3
J. Y. Ong, Radiological Engineering Supervisor
*T. R. Bradish, Compliance Manager
*K. Oberdorf, Radiation Protection Manager, Unit 1
*A. G. Ogurek, Radiation Protection Manager, Unit 2
*W. E. Sneed, Radiation Protection Manager, Unit 3
*J. M. Sills, Radiation Protection Standards Supervisor
*D. R. Heinicke, Plant Manager, Unit 2
*R. J. Rouse, Compliance Supervisor
*D. A. Wanslee, Radiation Protection Supervisor, Unit 3
P. A. Lovelett, Lead Radiation Protection Technician
T. Hier, Lead Radiation Protection Technician
*W. K. Linares, Lead Radiation Protection Technician
*C. T. Seliga, Quality Assurance Auditor
*A. D. Jackson, Radiation Protection Supervisor, Unit 2
*C. A. Rogers, Licensing Manager
M. C. Moore, Senior Radiation Protection Technician
G. Weiman, Investigator
N. O'Connor, Chief Investigator
C. M. Spell, Standards Engineer
P. V. Rannel, Training Supervisor
G. F. Maxwell, Auxiliary Operator

b. NRC

*D. Coe, Resident Inspector
*G. P. Yuhas, Chief, Emergency Preparedness and Radiological Protection Branch

*Denotes those personnel in attendance at the exit interview held on February 9, 1990.

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

2. MC 93702 - Onsite Followup of Events at Operating Power Reactors

A. Scope

An examination was conducted of an event involving a locked high radiation area (LHRA) in Unit 3 which was found to be open, unoccupied and unguarded by the licensee's radiation protection staff on February 22, 1990.



The licensee's staff reported that gate (A-B07) providing access into the Auxiliary Building's "A" shutdown cooling heat exchanger room was found in a fully open position several hours after the key to the room was determined to be missing. The key was found inserted in the gate's lockset with the gate opened up against a wall. A chain and padlock, which was being used as a backup to the gate's locking mechanism, was found wrapped around the upper door frame with the padlock installed in the locked position. The licensee stated that, as found the gate could not have been fully closed without first removing the chain and padlock. The licensee added that the individual(s) who opened the LHRA gate were not identified. The highest radiation measurement in the room at the time the gate was discovered to be open was 2200 mrem/hr in a localized area at 18 inches from the heat exchanger. A licensee review of personnel exposure records indicated that no unusual exposures had been recorded.

B. Controlling Documents

Applicable documents for controlling LHRA are as follows:

- (1). Technical Specifications, Section 6.12.2 states in part: "In addition to the requirements of Specification 6.12.1, areas accessible to personnel with radiation levels such that a major portion of the body could receive in 1 hour a dose greater than 1000 mrem shall be provided with locked doors to prevent unauthorized entry, and keys shall be maintained under the administrative control of the shift supervisor on duty and/or radiation protection supervision. Doors shall remain locked except during periods of access by personnel under an approved REP..."
- (2). Technical Specifications, Section 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."
- (3). Licensee procedure 75RP-90P02, "Control of Locked High Radiation Areas", was initially issued on October 31, 1989. Revision #1 to this procedure was issued on January 31, 1990, to reflect enhancements considered necessary after two locked high radiation areas were found to be unlocked in November 1989 (see Inspection Reports 50-528/89-51 and 50-528/90-04). Part of the revision included a requirement for dual verification that gates are properly secured at completion of work. A Unit 3 Night Order, issued on April 1, 1989, originally established the need for dual verification, but the night order only applied to that Unit. The night order had been implemented because a LHRA in Unit 3 was found ajar. Procedure 75RP-90P02 states in part:

"Section 4.1 - The Unit Radiation Protection Manager (RPM), RP



Supervisor or alternate (designated in writing) shall be responsible for the following:

"Section 4.1.1 - Ensure that Radiation Protection LHRA keys are controlled using this procedure.

"Section 4.2 - The RP Lead shall be responsible for the following:

"Section 4.2.1 - Maintain control of Radiation Protection LHRA keys and LHRA Key Locker Key.

"Section 4.2.2 - Ensure that the LHRA Key Control Log is maintained.

"Section 4.3 - The RP Technician shall be responsible for the following:

"Section 4.3.2 - Maintain control of all LHRA keys assigned.

"6.5 - Performing the Job

"6.5.9 - Physically verify that the door is locked shut.

"6.5.9.1 - A person other than the RP Technician who performed step 6.3.9, shall verify that the door is locked shut.

"6.5.10 - Return the key to the RP Shift Lead using Section 7.

"6.5.11 - The RP Technician who performed step 6.5.9 shall initial the LHRA SECURED block of the LHRA Key Control Log.

"6.5.12 - The person who performed step 6.5.9.1 shall initial the LHRA VERIFIED BY block of the LHRA Key Control Log.

"7.0, Instructions for Locked High Radiation Area Key Control"

"7.1.1 - LHRA keys shall be labeled as such and kept in a lockable key locker.

"7.1.4 - The key to the LHRA Key Locker shall remain in the custody of the RP Shift Lead.

"7.1.7 - LHRA keys shall not be removed from, or returned to, the LHRA Key Locker without the appropriate LHRA Key Control entries.

"7.2 - LHRA Key Issue

"7.2.1 - The RP Shift Lead shall ensure that a LHRA Key Control Log entry is made.

"7.3 LHRA Key Return



"7.3.1 - Return the LHRA key to the RP Shift Lead.

"7.3.2 - The same RP Technician to whom the key was issued, shall return the key.

"7.3.3 - The RP Shift Lead shall make a LHRA Key Control Log entry for receipt of the LHRA key.

"Appendix C - LHRA KEY CONTROL LOG (i.e., Footnote - \$) The RP Person issued the LHRA key shall physically verify that the access door/gate is properly secured upon exit from the LHRA and shall initial the "LHRA SECURED" block signifying that the access door/gate is properly secured. A second person shall initial the "VERIFIED BY" block signifying that the access door/gate is properly secured."

C. Sequence of Events and Other Inspection Findings

Discussions were held with involved personnel and the licensee's staff that was assigned to investigate the event. Applicable procedures, Unit 1, 2 and 3 LHRA Key Control Logs, personnel statements and other pertinent documents were reviewed. Additionally, a physical inspection of the affected area was conducted. The following is the sequence of events that occurred:

- (1). On February 22, 1990, lead radiation protection technician (LRPT)-A was considered the radiation protection technician on shift and had responsibility for key control as defined in Section 4.2 of procedure 75RP-OP02.
- (2). At 12:50 p.m. MST, February 22, 1990, another Unit 3 LRPT-B and a senior radiation protection technician (SRPT) were assigned to perform a pre-job survey in the "A" shutdown cooling heat exchanger room. The room was being controlled as a LHRA in accordance with procedure 75RP-90P02. The SRPT was assigned to assist the LRPT perform the survey and to perform the second verification required by the procedure to ensure the LHRA gate was properly secured.
- (3). The LRPT-B assigned to perform the survey obtained the key to the LHRA key locker. LRPT-B stated that LRPT-A kept the key for the LHRA key locker on a clip that was located under LRPT-A's desk (Note, Section 4.2.1 of procedure 75RP-90P02 requires the key to be controlled, but does not specify the degree of control). LRPT-B stated he obtained the key for opening the key locker without informing LRPT-A and signed the Key Control Log to indicate that he had removed the key that was required for performing the survey. LRPT-B stated that he did not see LRPT-A around the desk area when he obtained the key. LRPT-B added that he and other technicians had used this practice previously. He further stated that some LRPTs that are responsible for controlling the issue of LHRA keys keep the LHRA key locker key on their person.



- (4). LRPT-B stated that after obtaining the key, he and the SRPT performed the required surveys. Upon completing the survey LRPT-B stated he closed the gate verifying that the gate was locked shut and then he installed the chain and padlock around the upper portion of the door. The SRPT stated he observed LRPT-B securing the gate and testing to see if it had locked shut. SRPT said that he did not physically test the gate's normal locking mechanism. SRPT added that he had seen LRPT-B install the chain and padlock around the upper portion of the gate and door frame; however, he did not see LRPT snap the padlock shut. SRPT stated that he had not performed a physical verification to ensure the gate was properly secured.
- (5). LRPT-B stated that he had exited from the RCA at about 1:30 p.m. and dropped the key off at LRPT-A's desk. LRPT-B stated that LRPT-A was not around when he dropped the keys off nor could he recall if anyone was sitting at the desk. Both LRPT-B and the SRPT stated that they had failed to initial the Appendix C (i.e., Key Control Log) "LHRA SECURED" and "VERIFIED BY" blocks as required by procedure 75RP-90P02.
- (6). LRPT-A stated that he conducted an inventory of the LHRA keys at approximately 6:30 p.m. at which time he discovered the applicable key was missing. LRPT-A noted who had signed for the keys and informed his relief, LRPT-C, about the status of the LHRA key accountability. LRPT-A assumed that LRPT-B took the key home. LRPT-C agreed to call LRPT-B after the shift turnover was completed. LRPT-A stated that he had tidied up around his desk area on two occasions between 4:30 p.m. and 6:30 p.m. and not seen the key which was specially identified with a yellow and magenta label plate.
- (7). LRPT-C called LRPT-B at approximately 7:30 p.m. to determine if LRPT-B had taken the key home. LRPT-B was not home when the call was received; however, he called LRPT-C after returning at approximately 10:00 p.m. LRPT-B informed LRPT-C that he felt certain that he locked the room and had returned the key to LRPT-A's desk. LRPT-C subsequently sent a contractor SRPT to inspect the "A" shut down cooling heat exchanger room at which time the gate was found fully opened. LRPT-C instructed the SRPT to inspect the area and to secure it in accordance with procedure 75RP-90P02.

D. Additional Information

The following additional observations were made by the inspector:

- (1). LRPT-B and the involved SRPT stated that they were familiar with the requirements prescribed in procedure 75RP-90P02. Each stated that they had failed to comply with the procedure. LRPT-B was reasonably certain that he had locked the LHRA gate and the SRPT said that he did not perform an adequate second verification by not physically checking that the door was properly secured.



- (2). An auxiliary operator (AO) stated that he saw the gate was in a fully closed position with the chain and padlock installed during a tour of the Auxiliary Building that was conducted at approximately 8:55 p.m. (approximately 65 minutes before the gate was found open). The AO stated that he had not physically checked the door; but, was sure that it was closed when he walked through the area on his tour.
- (3). Units 2 and 3 established a requirement by a Night Order that a third party verification be performed by a LRPT within one hour after a LHRA is reported as being secured. This requirement was implemented after the event of February 22, 1990.
- (4). A review of completed Key Control Logs for the period of February 27, 1990, through March 7, 1990, disclosed that on at least ten occasions the Unit 2 Key Control Log "LHRA SECURED" block had been initialed by someone other than the individual to whom the LHRA key had been issued. This would indicate that there was a loss of key control after the key was issued by the responsible LRPT in as far as the LHRA Key Control Log requires that the RP Person issued the LHRA key shall initial the "LHRA SECURED" block after the door/gate has been secured. It should also be noted that Section 7.3.2 of procedure 75RP-90P02 requires that the same radiation protection technician to whom the key was issued, shall return it.
- (5). The discussions held with Unit 1, 2 and 3 radiation protection staff disclosed that all individuals were familiar with the basic instructions provided in procedure 75RP-90P02. Most individuals stated that they felt that the procedure and verbal instructions that they had received required that the second verification be performed by physically checking that doors/gates are properly secured.

The licensee assigned an Incident Investigation Team (IIT) to investigate the event. The team members consisted of personnel from the licensee's radiation protection and security organizations. The information obtained by the inspector was similar to the information obtained by the IIT. The IIT was unable to identify the person(s) who opened the gate after it was last seen closed by the AO. The IIT concluded that the most probable cause for the event was attributable to the failure of the radiation protection staff to comply with procedure 75RP-90P02 and the failure of the LRPT's to take prompt corrective actions after it was discovered that the key was missing.

D. Prior History and Corrective Action Taken

A review of the licensee's history related to controlling LHRA and the status and effectiveness of corrective actions are as follows:

- (1). On September 8, 1988, a contractor maintenance technician used a screw driver to bypass a LHRA gate's locking mechanism in Unit 3 to gain entry into the high level spent resin tank room having radiation measurements of



3000 mrem/hr at 18 inches. This event is described in Region V Inspection Report 50-530/88-33 and was part of a civil penalty issued on December 1, 1988. Corrective actions related to replacement of locking mechanisms had not been completed as of February 9, 1990. (see Region V Inspection Report 50-530/90-04).

- (2). On November 6, 1989, a Unit 3 radiation protection technician discovered that the "A" shutdown cooling heat exchanger room LHRA gate was open. The room was unoccupied and unguarded. Radiation measurements in the room ranged from less than 10 mrem/hr up to 2200 mrem/hr at 18 inches. This event is discussed in Region V Inspection Report 50-530/90-04. It should be noted that this event might have been prevented by the timely completion of the corrective actions committed to from the event discussed in Item (1), above.
- (3). On November 9, 1989, a Unit 1 radiation protection technician discovered that the LHRA gate providing access to the high level radioactive material storage area of the Radwaste Building was open. The room was unoccupied and unguarded. Radiation measurements in the room ranged from less than 10 mrem/hr up to 2000 mrem/hr at 18 inches. This event is also discussed in Region V Inspection Report 50-530/90-04. This event might also have been prevented with the timely completion of the corrective actions committed to from the event discussed in Item (1), above.

The above observations were brought to the licensee's attention during the exit interview. The inspector informed the licensee that it appeared their corrective actions for controlling LHRA have not been very effective. The inspector added that failure to maintain the door to "A" shutdown cooling heat exchanger room locked except during periods of access by personnel under an approved REP was an apparent violation (50-530/90-13-01). The inspector added that this was the third violation of a similar nature that has occurred in a short period and each might have been prevented by the implementation of effective corrective actions. The inspector also informed the licensee that failure of the radiation protection staff to comply with their LHRA key control procedure; 75RP-90P02, (e.g., improper issuance and return of the LHRA key on February 22, 1990 and ten examples of improper log entries in the Unit 2 Key Control Log) was also an apparent violation (50-530/90-13-02).

The Region V Chief, Emergency Preparedness and Radiological Protection Branch, informed the licensee that their performance in this subject area was unacceptable and needed to improve. The licensee acknowledged the comments that were made at the exit interview.

3. MC 83727 - Facilities and Equipment

Tours of the licensee's facilities were conducted and discussions were held with licensee representatives for the purpose of determining what changes have been made or were being planned for facilities and equipment



that are used for radiation protection activities. The inspector was informed of the following:

- (a). The Unit 1 Laundry Facility was in the process of being modified. The licensee had removed all cleaning equipment that had been previously used for laundering protective clothing and had contracted the services of a vendor to launder all of their protective clothing.
- (b). Two radiation monitoring instruments were recently purchased to monitor laundered protective clothing. The instruments are designed to discriminate between dispersed radioactivity and hot particles. One of the new instruments was in service at the time of the inspection.
- (c). Remodeling of the site's decontamination facility located in Unit 1 was in progress during the inspection. The following modifications were being made:
 - o The installation of an liquid abrasive (glass bead and/or aluminum grit) decontamination system.
 - o The installation of a decontamination steam spray booth. The unit will be equipped with a large walk-in-chamber which can be utilized for decontaminating large pieces of equipment.
 - o The installation of a large remotely operated freon decontamination system.
 - o The installation of a new decontamination unit for decontaminating hoses and cables.
 - o A new monorail system and electronic hoist are being added in the decontamination facility.
- (d). Consideration is being given to the purchase of a liquid concentrate drying system. The system is designed to reduce concentrates by a 5 to 1 ratio. The licensee expects to receive a unit for testing in approximately two months.
- (e). The licensee has budgeted for the purchase of a reactor coolant pump mock-up for physical year 1993. The mock-up will be used for training purposes. The licensee's ALARA group made the recommendation to purchase the mock-up.
- (f). The licensee has budgeted for the modification of the Service Building during physical year 1991. The modification is expected to consolidated certain activities and provide enhancements to activities that are already being performed, such as: respirator processing, instrument calibration facility, hot tool crib, hot machine shop and a shielded storage yard. The expected 49,000 square foot addition will also provide access to the licensee's Dry Active Waste Processing Facility.



The licensee's staff expects that the above enhancements will provide them with better capabilities to support the work load in all three units and improve their radiation protection program. The inspector agreed and encouraged the staff to continue evaluating methods for maintaining state of the art facilities and equipment. The licensee's program in this subject area appeared capable of meeting their safety objectives. No violations or deviations were identified.

4. MC 83728 and 83729 Maintaining Occupational Exposure ALARA and Occupational Exposure During Extended Outages

The licensee's planning and preparation for the scheduled 100 day Unit-2 refueling outage that began on February 24, 1990, was examined.

The examination consisted of selective review of procedures and records in the subject areas identified below, discussions with licensee representatives, and observations by the inspector.

A. Audits and Appraisals

The following licensee management evaluation/audit reports were reviewed:

- o Audit No. 89-008, "Radiation Protection", dated April 14, 1989.
- o ALARA Management Evaluation, No. 038-00854-LDJ, dated September 8, 1989.

No violations were identified from the evaluation/audit conducted by the licensee's staff. Audit report 89-008 identified that vast improvements in the ALARA program were noted even though ALARA implementing procedures needed to be improved. The ALARA management evaluation report of September 8, 1989, concluded that the ALARA program had vastly improved and additional improvements were needed to integrate ALARA throughout PVNGS. Corrective actions assigned by both reports were still in progress at the time of this inspection.

The above reports appeared to provide the licensee's staff with an in-depth review of their ALARA program. The licensee's audit and monitoring personnel were observed to be qualified in accordance with Regulatory Guide 1.146, "Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plants." In the area inspected the licensee's program appeared adequate to accomplish its safety objective.

B. Changes

No major changes had been made in the licensee's occupational exposure program for extended outages since the refueling outages in Units 1 and 3 were conducted.



C. Planning and Preparation

Planning and preparation activities associated with the Unit 2 refueling outage were reviewed. Both Unit 2 Radiation Protection and Central Radiation Protection had completed approximately 90% of the ALARA reviews for all of the refueling activities that have been scheduled for the outage. Lessons learned from the completion of the recent refueling outages completed at Units 1 and 3 were factored into the ALARA reviews.

An ALARA goal of 205 man-rem had been established for the outage by the licensee's ALARA Committee during the inspection period. The licensee's staff was optimistic about meeting the refueling schedule and ALARA goals that were established.

D. Training and Qualification of New Personnel

A review of the licensee's General Employee Training (GET) program did not disclose any significant changes from what had been previously reported in Region V Inspection Reports 50-528/89-07 and 50-528/89-15. The inspector concluded that the GET program was consistent with 10 CFR Part 19.12, "Instructions To Workers."

The resumes of contractor radiation protection personnel who had been selected to support the refueling outage were reviewed. The training program and the criteria used for selecting qualified personnel were examined. The examination disclosed that selected contractor senior radiation protection technicians (SRPT) met the qualifications prescribed in ANSI/ANS 3.1-1978, "American National Standard for Selection and Training of Nuclear Power Plant Personnel." The licensee selected those individuals that were able to successfully pass a comprehensive pre-employment examination and written examinations of a site specific training program that was administered to the individuals that were selected from the pre-employment screening process. The inspector noted that four contractor individuals who were selected to fill engineering and /or supervisory positions during the outage did not attend the site specific training that was provided to the contractor SRPTs. This observation was discussed with the licensee's staff.

The inspector observed a steam generator mock-up training session that was in progress during the inspection period. Additional training established for the refueling outage included a video presentation that was provided to workers involved in reactor coolant pump repairs and a new course that is designed to train utility workers in decontamination techniques.

The licensee's program in this subject area appeared capable of meeting its safety objectives. No violations or deviations were identified.



E. External Exposure Control

On February 28, 1990, the NRC Senior Resident Inspector (SRI) at Palo Verde notified the Region V staff of a noble gas release that was vented from the pressurizer directly into the Unit 2 Containment Building. The SRI stated that at 1:00 a.m., February 28, 1990, the Unit 2 staff had started to vent approximately 26 curies of noble gas (principally xenon-133) from the pressurizer steam space into the Containment Building while personnel were performing various tasks in support of meeting the refueling outage schedule. Measured concentrations of noble gas inside Containment during the venting was reported as 47.5 MPCs of noble gas. No particulate activity or iodine were reported. The licensee's preparation and planning for conducting the release was examined by an NRC Region V inspector. The inspector held discussions with involved personnel, reviewed logs and other documents such as survey records and the refueling outage schedule. The examination revealed the following information:

- (1) The Unit was in Mode 5 at 140 degrees F with the pressurizer steam space of approximately 1600 cubic feet under a 270 psia nitrogen blanket and the reactor drain tank (RDT) was at about 9 psi.
- (2) The refueling outage schedule estimated that the pressurizer depressurization would take about four hours by venting via the normal pathway of the RDT and then to the gaseous radwaste system for processing.
- (3) During the afternoon of February 27, 1990, operators attempted to vent the pressurizer to the RDT but were unsuccessful when the outlets isolated automatically when pressure in the RDT rose to 9.5 psig. Operators subsequently determined that, due to the limited rate at which the waste gas system (WGS) could process RDT gas, it would take five days to complete the depressurization. The lengthy delay prompted the operations supervisor to recommend venting of the pressurizer directly to the containment after discussing his recommendation with his staff and other groups, such as chemistry, chemistry standards, and radiation protection.
- (4) The operations supervisor asked the chemistry group to take samples of the pressurizer steam space and requested the radiation protection group to perform an assessment of the radiological consequences involved.
- (5) Chemistry's analysis of a grab sample taken in the steam space showed concentration levels of approximately $3.2E-2$ microcuries per milliliter (uCi/ml) of xenon-133. The total activity to be released was calculated as 26.1 curies. The calculation showed that the Maximum Permissible Concentration (MPC) of xenon-133 to be expected inside the Containment Building during the venting would be approximately 50.6 times higher than the MPC value for xenon-133 which is set at $1E-5$ uCi/ml for a 40 hour



week. No particulate activity or iodine was reported from the licensee's analysis. The chemistry staff reported their results to the radiation protection group.

- (6) Two options for venting the pressurizer were discussed. These options included to either continue venting through the normal flow path or to connect a tygon tubing from the pressurizer vent to the containment purge exhaust. The first option was ruled out because it would have taken too long to complete and the second option was ruled out because the licensee's effluent group felt that the venting would cause the Containment Building vent monitor to alarm resulting in an Notification of an Unusual Event. The decision was made to vent to Containment while personnel assigned to work critical jobs continued working provided that the radiological assessment indicated that it could be accomplished safely. The individual from Chemistry Standards recommended that the Containment Building be evacuated during the venting. The onshift chemistry staff informed operations that the preferred method of venting the the pressurizer was to the WGS for holdup and decay prior to release out the plant vent.
- (7) Calculations performed by the radiation protection group disclosed that personnel working inside the Containment would be exposed to a skin dose rate of 19.7 mrem/hour during the release. The radiation protection group estimated that personnel would receive exposures of approximately 10 to 80 mrem skin dose from the 1-4 hour venting operation. Based on their technical assessment, the radiation protection group informed the operations supervisor the venting could be performed safely. The radiation protection staff stated that they had determined that the health and safety issues were not significant based on their technical assessment.
- (8) The power access purge system was the only system that was available for use during the venting. This system only provides between 2000-3000 cfm of exhaust flow. Several staff members suggested that the refueling purge system which has a total capacity of 30,000 cfm exhaust flow be used; however, the refueling schedule indicated that it would not be available for sometime. It should be noted that this system was subsequently activated to expedite decreasing the Containment Building's concentration level after the venting operation had been completed.
- (9) The shift supervisor called the plant manager at 9:00 p.m. on February 27, 1990, to discuss the proposal for venting the pressurizer directly to the containment building atmosphere. The plant manager approved with the proposal that was made but he was not informed that personnel would be working in the Containment Building.
- (10) The operations supervisor subsequently decided to proceed with his proposal to vent the pressurizer directly to the



Containment Building. Both the chemistry and radiation protection groups agreed to support the operation without notifying their respective managers, the site chemistry and radiation protection manager or the site ALARA group. A modified release permit was initiated by the chemistry group and the permit was approved by the shift supervisor. The radiation protection staff recommended that they obtain a gas grab sample and air sample during the initial ten minutes of venting to reconfirm their earlier assessment. Personnel time tracking was initiated by the radiation protection group in accordance with established procedures to aid in determining the skin dose that would be received by personnel working inside the Containment Building during the venting operation. It was also agreed that personnel already inside the Containment Building would be notified via the public address system that the pressurizer was being vented. The radiation protection group was asked to brief personnel entering the Containment Building after the venting had started.

- (11) Twenty-six individuals were inside the Containment Building when the venting started at approximately 1:15 a.m. on the morning of February 28, 1990. The initial gas grab sample and an iodine/particulate sample was obtained by the radiation protection staff as originally planned. The air sample did not show any particulates or iodines and the measured noble gas concentration inside containment was at 47.5 MPC. The activity measured was principally xenon-133. Radiation protection recommended that the venting could continue since the assessment was consistent with their earlier calculations. Approximately twenty additional workers entered the containment building after the venting started. The operations group made three public address announcements after the initial venting started. Several personnel inside Containment stated that the quality of the announcements and briefing was poor.
- (12) Radiation Monitoring System monitors RU-1, Containment Building Atmosphere Monitor, RU-34, Containment Building Refueling Purge Monitor and RU-145, Fuel Building Exhaust Monitor were used to evaluate the release. Monitor readings confirmed the conditions, as expected.
- (13) None of forty-six individuals who were inside the Containment Building during the venting operation were able clear the PCM-1B personnel monitor at the completion of their shift. Subsequently most individuals were able to clear the PCM-1B personnel monitor after showering or waiting for decay. About twenty-two individuals were given whole body counts (WBC). Xenon-133 was detected on all individuals that were given whole body counts. No other contamination was detected in any of the individuals.
- (14) Personnel exposure tracking records that were maintained showed that the skin doses received by affected personnel ranged from 9 to 70 mrem.



- (15) During day shift, February 28, 1990, the concentration of noble gas gradually decreased through decay and the effects of the 2000-3000 cfm power access purge system. The 33,000 refueling purge system was subsequently activated which resulted in a rapid decrease in the concentration of noble gases to less than 1 MPC.

Discussion held with the plant manager and Unit-2 radiation protection manager and a review of procedures 420P-2ZZ06, "Mode 5 Operations" and 420P-2RC04, "Reactor Coolant Gas Vent System (RCGVS)" revealed the following:

- (1) The plant manager and radiation protection manager stated that they would have recommended that personnel be evacuated from the containment had they been properly consulted prior to starting the operation.
- (2) The procedures allowed the venting of the pressurizer to the Containment Building; however, the inspector noted that they did not include specific precautions prior to venting the pressurizer to the containment other than to notify radiation protection.
- (3) The operations supervisor stated the four hours allocated by the planning and scheduling group for performing the evolution was not reasonable based on the licensee's past experience during the performance of similar operations.

The inspector concluded that the licensee's planning process did not correctly account for the time required to conduct the planned evolution. The inspector also concluded that the licensee did not adequately evaluate other possible options so as to minimize the consequences of releasing activity to the containment, such as:

- (1) Evacuating personnel.
- (2) The availability of and timeliness of activating the 33,000 cfm refueling purge system.
- (3) Throttling the purge directly to the containment purge exhaust in a manner to preclude alarming the effluent purge monitor.

The above observations were brought to the licensee's attention at the exit interview. The inspector emphasized that there were some lessons to be learned which may need to be considered for future operations of a similar nature. These are as follows:

- o Improvements in planning and scheduling.
- o Improvements in communications to workers and notifications to management.
- o Improvements in procedures.



- Maximum utilization of other engineering controls recommended by 10 CFR 20.103.
- Involvement of both the Unit and Central ALARA groups.

The licensee's staff acknowledged the inspector's comments. No violations or deviations were identified.

F. Internal Exposure Control

The licensee's internal exposure control and dosimetry program, including airborne radioactivity monitoring/sampling and the respiratory protection program were examined. Representative personnel exposure records were reviewed. The review included an examination of the respiratory protection training program and a verification that the recommendations prescribed in Regulatory Guide 8.15 and NUREG 0041 were implemented. No concerns were identified in this area.

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

Representative survey records of work activities performed in all three units were reviewed. No concerns were identified in this area.

H. Maintaining Occupational Exposures ALARA

The licensee had completed a chemical plant cleanup (e.g., antimony removal operation) following the shutdown of Unit 2 in preparation for accomplishing the Unit 2 refueling outage in accordance with the ALARA concept prescribed in 10 CFR Part 20.1(c). The licensee's staff stated that the chemical cleanup process appeared to be very successful in the removal of large quantities of long-lived activity and expects to see significant results in the reduction of personnel exposures during the refueling outage. The staff stated that post chemical decontamination surveys showed a significant decrease of radiation levels in the Containment Building. Radiation levels were stated to be lower than what was experienced after the previous refueling outage. Approximately 1200 curies of long-lived activity was removed during the chemical cleanup operation.

Work activities observed during the inspection period were consistent with the licensee's ALARA program implementing procedures and applicable REPs. The inspector noted that copies of REPs were maintained at the entry point to the radiological controlled area (RCA) and at the applicable work site. It was also noted that certain REPs require that workers receive job-specific and "hot particle" pre-work briefings.

The licensee's program in this subject area appeared capable of meeting its safety objectives.



5. MC 90712 In-office of Written Reports of Non-Routine Events at Power Reactor Facilities

(Closed) Special Report: The following Licensee Event Report (LER) and Special Report were reviewed in-office.

LER: Unit 1: 1-89-006-L0

SPECIAL REPORTS: Unit 3: 3-SR-90-001

The licensee's program in this subject area appeared capable of meeting their safety objectives. No violations or deviations were identified.

6. Facility Tours

Tours of all three Units were conducted during the inspection period. The Radwaste and Auxiliary Buildings of each Unit were included in the tours. Independent radiation measurements were made using an Eberline ion chamber survey instrument, Model RO-2, Serial Number 2694, due for calibration on April 5, 1990. The following observations were made:

- Posting and labeling practices were consistent with 10 CFR Parts 19.11 and 20.203.
- All portable instruments observed were in current calibration.
- Cleanliness in all areas that were toured was excellent.
- Work practices appeared to be consistent with established radiological exposure permits and the ALARA concept.
- All personnel observed were equipped with proper dosimetry.

The inspector held discussions with several workers that were encountered during the tours. The workers had an awareness of the licensee's ALARA program. The licensee's program in this subject area seemed capable of meeting their safety objectives. No violations or deviations were identified.

7. MC 30703 - Exit Interview

The inspectors met with the licensee representatives, denoted in Section 1, at the conclusion of the onsite inspection on March 9, 1990. The scope and findings of the inspection were summarized.

The repetitive violations discussed in Section 2 and the concerns discussed in Section 4.E involving the venting of the Unit 2 pressurizer's steam space to containment while personnel were working were brought to the licensee's attention.

