

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report: 50-528, 529, & 530/92-29
Licenses: NPF-41, NPF-E1, & NPF-74
Licensee: Arizona Public Service Company
P. O. Box 53999, Sta. 9012
Phoenix, Arizona 85072-3999
Facility: Palo Verde Nuclear Generating Station (PVNGS), Units 1,
2, & 3
Inspection location: PVNGS Site, Wintersburg, Maricopa County, Arizona
Inspection duration: August 10 - 14, 1992
Inspected by: *[Signature]* for H. Chandy, Senior Radiation Specialist 8-8-92
Date Signed
Approved by: *[Signature]* for James M. Reese, Chief 8-28-92
Date Signed
Reactor Radiological Protection Branch

Summary:

Areas Inspected: Routine, unannounced inspection of occupational exposure controls. Inspection procedures 83724 and 83725 were used.

Results: The licensee's programs for controlling occupational radiation exposure were adequate in meeting their safety objectives. The inspectors noted that the licensee's self-initiated hot particle control zone and radiation hot spot posting was being implemented inconsistently. See Section 2.a of this report.

DETAILS

1. Persons Contacted

Licensee

P. Hughes, General Manager, Site Radiation Protection (RP)
*K. Akers, Specialist, Quality Assurance (QA)
*J. Baxter, Compliance Engineer
*R. Bernier, Supervisor, Licensing and Compliance
M. Boltz, RP Technician (RPT), Unit 3
*R. Bouquot, Supervisor, QA Audits
M. Clark, RPT, Unit 1
T. Dickinson, RPT, Transportation
J. Gaffney, Supervisor, RP Outage Planning
*W. Hoey, Manager, RP Technical Services
*H. Ingalsbe, Supervisor, RP Support Services
C. Kuki, RPT, Unit 1
*W. McMurry, Supervisor, RP Operations, Unit 1
*S. Sawtschenko, Supervisor, RP Operations, Unit 2
*W. Sneed, Manager, Radiation Protection, Unit 3

NRC

*J. Sloan, NRC Resident Inspector
*L. Beaston, NRC Intern
*L. Tran, NRC Intern

(*) Denotes some of the individuals that attended the exit meeting on August 14, 1992. The inspector met and held discussions with additional members of the licensee's staff during the inspection.

2. Occupational Exposure (83724 and 83725)

The inspector reviewed this program area by conducting facility tours, reviewing applicable procedures and records, and interviewing cognizant personnel. The inspector's evaluation focused on job related internal and external radiation exposure controls to determine the licensee's compliance with the requirements of 10 CFR Part 20, and Unit 1, 2 & 3 Technical Specifications (TSs) 6.11 and 6.12.

a. External Occupational Radiation Exposure Control

The inspector made observations in this area regarding high radiation area controls, posting and labeling, and radiation surveys. Dose rate monitoring for neutron and gamma radiation was observed and evaluated. Personnel extremity monitoring, hot particle controls, and hot particle monitoring were also observed during this inspection. Several jobs were reviewed and workers' knowledge of the RP controls were assessed.

(1) High Radiation Area Controls

The inspector toured all three units, verifying that selected

high radiation and locked high radiation area controls were effectively implemented per TS 6.12. The licensee was observed implementing positive access control over accessible areas with dose rates greater than 1,000 millirem per hour (mrem/hr) on two occasions. These were the decontamination of a radwaste container (HIC) with dose rates in excess of 3.5 roentgens per hour (R/hr) at one meter, and during the Unit 1 containment entry (at 100 percent reactor power) for the routine monthly Safety Injection Tanks sampling. Access and key controls were satisfactory.

(2) General Posting and Labeling

During facility tours, the inspector performed independent dose-rate radiation surveys using the following NRC instruments:

- Geiger-Mueller type beta-gamma survey instrument, Model Xetex 305B, Serial #36063, due for calibration January 17, 1993
- Ion chamber type beta-gamma survey instrument, Model RO-2, Serial #15844, due for calibration October 30, 1992

All areas visited in Units 1, 2, & 3, the Respiratory Protection Equipment Decontamination and Repair Facility (Building 46), and the Dry Active Waste Processing Facility appeared to be appropriately posted. Labeling of containers was extensive and accurate.

(3) Hot Spot Posting

The inspector measured the exposure rate from a small, isolated hot spot, located on the bottom of a pipe associated with the Unit 1 reactor coolant charging system. The pipe was located in the A-118 Charging Pump Valve Gallery. The hot spot exhibited contact exposure rates of approximately 50 R/hr. Exposure rates dropped off sharply within a few inches of the pipe, and at 18 inches the exposure rate was less than 0.5 R/hr. The hot spot was not located such that accessing another component would require a person to get close to the spot.

The cubicle that the pipe was located in was posted as a high radiation area. The hot spot was denoted on area surveys. The inspector noted that the hot spot sticker placed at the hot spot did not have any dose rate information annotated on it.

Inspector discussions with RP representatives (RPTs and RP Supervisors) disclosed that per Procedure 75RP-ORP01,

"Radiological Posting," Revision 3, the necessary information could be conveyed in ways other than placing the information on the hot spot sticker. In this case, the contact and 18 inch dose rates had been stated on a sign at the entrance of the area. The posting at the entrance to the cubicle stated that an 80,000 mrem/hr hot spot existed in the cubicle but did not state on which component. Several components within the cubicle were labeled with hot spot stickers. The inspector did not detect any hot spots reading greater than the one noted previously.

Further inquiry determined that the licensee had already issued Temporary Shielding Request (TSR) 1-92-55, on May 21, 1992, to have the hot spot shielded. The TSR was being evaluated by structural engineers.

At the exit interview, the inspector noted to the licensee representatives present that during tours of other units dose rate information had been observed on most radiation hot spot stickers. In addition, the inspector had noticed in QA audits and monitoring that auditors had been addressing inconsistencies between the units in implementing RP procedures.

The inspector concluded that the licensee appeared to marginally meet the requirements of 10 CFR Part 19.12, regarding keeping workers informed of radiological conditions within restricted areas.

(4) Hot Particle Controls

During inspections of the Dry Active Waste Processing (DAWP) facility and the respiratory protection equipment (RPE) Decontamination Facility, the inspectors noted that fume hoods and glove box containments were used for handling material that potentially contained hot particles. The glove boxes (2 units) in the DAWP facility were connected to the facility filtered (HEPA) exhaust ventilation system via flexible ducts. Even though the gloveboxes were posted as hot particle control zones, the inspector did not note any similar posting on the ventilation system components (ducts, access ports, etc.).

The facility supervisor stated that, since the ventilation system was an installed system (not portable), they did not require posting it. The inspector noted that any work in the DAWP Facility required workers to be on a radiation exposure permit (REP). The inspector reviewed the last work activities on the DAWP Facility ventilation system (removal of HEPA filters). REP 0-92-0014-A, "Changeout of HEPA Ventilation Exhaust Filters," did not address any hot particle concerns. The HEPA filter changeout area release survey of May 27, 1992, had not identified any significant contamination associated

with the job.

The inspector expressed to RP management his concern about possible migration of hot particles in exhaust ventilation ducts. The Manager of RP Support Services stated that the current policy would be re-evaluated based on the inspector's inquiry. At the exit interview, a licensee representative informed the inspector that, historically, hot particles had not shown an affinity for traveling very far through ventilation systems.

The licensee's inconsistent posting of radiation hot spots and hot particle control zones is considered an inspector followup item (50-528/92-29-01) for future inspections.

(5) External Dosimetry

The inspector examined the licensee's methods of determining personnel neutron exposures. The licensee used a commercially available and currently accredited (NVLAP) albedo-type neutron dosimeter, correlated with in-field area neutron dose rate surveys and day time estimates.

The inspector reviewed the licensee's performance of skin dose assessment for personnel exposed to low energy noble gases during an August 12, 1992, Unit 1 containment entry. The licensee determined dose to the skin due to noble gas using their TLD and in-field noble gas measurements. Procedure 75RP-9RP21, "Airborne Evaluation," established methods for sampling and analysis of air samples to determine exposure to various forms of airborne radioactivity.

The inspector verified the use of extremity dosimeters by a worker during decontamination and surveying of a waste container (HIC) in Unit 3. Workers were noted to be complying with all the radiological control requirements of the applicable REP (3-92-1020-A). All workers were well versed in proper exposure reduction techniques and utilized them during the high dose rate work.

(6) Radiation Surveys

The inspector reviewed recent radiation surveys of the areas being toured. Also, detailed radiation and contamination surveys taken during the below-listed jobs (listed by REP) were reviewed. The inspector observed most of the below-noted surveys being performed. All surveys were conducted in accordance with the instructions contained in procedure 75RP-9RP07, "Radiological Surveys," and standard industry practices.

(a) REP 3-92-1020-A, Survey 3-92-02844, dated August 10,

1992, "Shipping Survey of HIC #91-3-008"

The inspector observed the licensee performing surveys on this HIC and movement of the HIC between the shielded storage area and a shielded shipping cask. This HIC exhibited contact dose rates of 38 R/hr on contact and approximately 4 R/hr at 1 meter. In addition, a hot particle exhibiting approximately 1.1 rad/hr of beta/gamma activity was removed from the bottom of the container during a large area smear survey of the HIC.

The licensee placed the HIC in a shielded shipping container and was preparing a work plan for decontaminating the HIC to suitable levels for shipment. The licensee's exposure controls, surveys, and monitoring techniques appeared suitable. Wastes were properly bagged and labeled.

(b) REP 1-92-0018-A, "Sample Safety Injection Tanks in Containment, Modes 1-4"

- Survey 1-92-11200, dated August 12, 1992, "100-Foot Elevation of Containment," for radiation, hot particles, and surface contamination

- Airborne radioactivity surveys:

• 1-92-10503, "100-Foot Elevation of Containment O/S Bioshield @ 190 degrees, Noble Gas"

• 1-92-10504, "100-Foot Elevation of Containment O/S Bioshield @ 330 degrees, Noble Gas"

• 1-92-10509, "100-Foot Elevation of Containment, North, Tritium"

(c) REP 1-92-0019-A, "Valve Alignments & Inspections in Containment, All Elevations, Outside Bioshield & Inside Pressurizer Above 120-Foot"

- Survey 1-92-11199, dated August 12, 1992, "80-Foot Elevation of Containment," for radiation, hot particles, and surface contamination

- Survey 1-92-11198, dated August 12, 1992, "90-Foot Elevation of Containment with Lines and Valves," for radiation and contamination related to work on valve V-204

- Airborne radioactivity surveys:

- 1-92-10506, "80-Foot Elevation of Containment, North, Noble Gas"
- 1-92-10507, "80-Foot Elevation of Containment, South, Noble Gas"
- 1-92-10508, "90-Foot Elevation of Containment, Southwest, Particulate and Iodine"
- 1-92-10510, "90-Foot Elevation of Containment, Southwest, Tritium"

- (d) Eight Neutron Dose Calculation Sheets (Procedure 75RP-9RP16, "Special Dosimetry") for personnel making containment entry at power

A review of these surveys identified several errors of minor significance. One error dealt with an NRC inspector's neutron dose calculation (based on portable neutron dose rate instrument measurements and stay times) which used a stay time value of about half the actual stay time incurred by the inspector. Another involved the analysis of the tritium air sample, in which the counting efficiency factor used was more than 10 percent below the appropriate value. Due to the low exposures and concentrations involved, neither error resulted in a change to the original (null) values. Other errors were similarly minor, but indicated that more attention to detail was needed by RPTs and survey reviewers.

The licensee acknowledged the inspector's findings and stated that the surveys would be corrected. The inspector noted that recent QA audits and monitoring had also been identifying problems with RP surveys involving level of detail and accuracy.

The inspector concluded that surveys, in general, had been performed in an efficient and deliberate manner following licensee procedures.

b. Internal Exposure Control

The inspector examined the licensee's respiratory protection equipment decontamination, repair, and inspection facility. This facility also provided Grade D air for filling of station self-contained-breathing-apparatus (SCBA) bottles. The inspector reviewed records and held discussions with PVNGS maintenance personnel concerning the periodic preventative maintenance and repair history of the breathing air compressor. The licensee

appeared to be maintaining the compressor in accordance with vendor guidance.

The inspector evaluated the licensee's methods for measuring concentrations of radioactive materials (iodine, particulate, and noble gases, and tritium) in air, as required by 10 CFR 20.103(a)(3).

The inspector reviewed the licensee's procedures for obtaining and evaluating air samples, including count-room practices. The inspector reviewed the licensee's methods for determining the need for respiratory protection during the power entry into the Unit 1 reactor containment. The cognizant RPT informed the inspector that respiratory protection would be based on a review of previous entry conditions and current containment airborne radioactivity monitor (RU-1) readings.

The inspector reviewed recent RU-1 10-minute and hourly trends of particulate, iodine, and noble gas concentrations for the containment atmosphere. Subsequent airborne radioactivity samples showed little or no tritium, particulate, noble gas, or iodine radioactivity in the Unit 1 atmosphere during the entry on August 12, 1992. Sample results agreed with RU-1 readings.

The Unit 2 RP Refueling Outage Coordinator informed the inspector that during the upcoming Unit 3 outage (scheduled to start in mid September 1992) respiratory protection use would be scaled back in accordance with the licensee's newly implemented ALARA plan for reducing overall individual exposures.

The inspector concluded that internal exposure controls appeared adequate in the areas reviewed.

3. Industrial Safety

The inspector noted that industrial safety was discussed at the briefing for the Unit-1 containment entry. Confined area entry and heat stress were discussed by a site safety representative. Both teams carried oxygen and heat stress monitors.

4. Exit Interview

The inspector met with members of licensee management at the conclusion of the inspection on August 14, 1992. The scope and findings of the inspection were summarized. The licensee acknowledged the inspector's observations.