	U.S.	NUCLEAR REGULATORY COMMIS REGION I	SION
Report No.	50-272/85-05 50-311/85-05		
Docket No.	50-272 50-311		
License No.	DPR-70 DPR-75	Priority	Category
Licensee: Public Service Electric & Gas Company			
	80 Park Place		
	Newark, New Jers	sey 07101	
Facility Na	me: <u>Salem Nucle</u>	ear Generating Station, Un	it 1 & 2
Inspection	At: Hancocks Br	ridge, New Jersey	
Inspection	Conducted: Febr	ruary 22, 1985	
Inspectors:	John R. White, Radiation Spec	Senior cialist	3/15/85 date
Approved by	M. M. Shanbak PWR Radiation	Ky, Chief, Safety Section	3/26/85 date
Inspection Inspection 50-311/85-0	Summary: of February 25, 5)	1985 (Combined Inspectio	n Report Ncs. 50-272/85-05;

<u>Areas Inspected</u>: Special unannounced inspection to review concerns expressed by workers relative to, 1) the licensees handling of a highly radioactive piece of material found while decontaminating the reactor cavity, and 2) the exposure of personnel to concentrations of noble gas in the reactor containment, and subsequent contamination with rubidium-88 -

Results: No violations were identified.

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## Details

### 1.0 Persons Contacted

- \*J. Zupko, Jr., General Manager-Salem Operations
- M. LeFevere, Health Physics Operations Supervisor
- E. Katzman, ALARA Supervisor
- W. Hunkele, Health Physics Supervisor
- R. Keyes, Health Physics Technician
- T. Jones, ALARA Staff
- E. Reese. Crewleader
- J. Frick, Crewleader
- M. Clary, ALARA Staff
- L. Nolan, ALARA Staff
- H. Cruickshank, ALARA Staff

\*denotes attendance at the exit interview on February 22, 1985.

#### 2.0 Purpose

The purpose of this inspection was to review certain concerns expressed by workers relative to the licensee's implementation of the radiological controls program in respect to:

- the alleged mishandling of a piece of highly radioactive material inconsistent with good radiological controls and ALARA concepts, and the failure to evaluate the significance of the piece; and,
- the exposure received by workers as a result of entries made into the containment at power relative to the noble gas environment and subsequent contamination with rubidium-88.

### 3.0 Allegation No. RI-85-A-0017

#### 3.1 Allegation

On February 6, 1985, an anonymous individual called the NRC to express concern that the licensee did not properly recover a piece of highly radioactive material discovered while decontaminating the Unit 2 reactor cavity, with respect to proper radiological controls and ALARA practices; and, that the licensee did not remove the head from the vessel in order to determine the source of the piece.

# 3.2 Finding

In an effort to restore the Unit 2 reactor cavity following refueling, the licensee initiated the decontamination of cavity and refueling canal surfaces in accordance with procedure RP 7.024, "Decontamination of All Refueling Canal Surfaces and Equipment" Revision 2, dated November 30, 1984. Prior to work, planning meetings were held with all personnel who were expected to be involved in the decontamination including crew leaders, workers, health physics personnel and supervisors. The planning meetings were for the purpose of detailing the method and sequence for the work and to identify the radiological controls to be employed.

The work was initiated on January 18, 1985, in accordance with Radiation Exposure Permit (REP) 85-2-0124, "Set up job; Decon of Rx cavity and transfer canal to include hydrolyzing and 'hand' decon; Remove and maintenance of the Rx cavity drain filters, set up of Rx cavity filter; Breakdown of cavity equipment; Removal of High Rad trash and filters; Support work." Protective requirements included plastic wet suits, air supplied "bubble-hoods" and high-range dosimetry for workers. A health physics technician accompanied each work party and performed radiological surveys prior to each decontamination effort.

During this procedure, on February 1, 1985, a highly radioactive irradiated chip was found by the attending health physics technician while performing a radiation survey of the canal area to support hydrolyzing efforts. The chip, a piece of metal ( $\sim$ 1.5" x 0.5") was sufficiently radio-active to cause the technician's survey instrument (a Teletector) to range off-scale at 1000 R/hr, contact. Subsequently, the operation was terminated and a planning meeting was held with ALARA engineering to discuss the removal of the chip. Following, another survey was performed with a high range instrument (a Dositec) which ranged off-scale at 5000 R/hr, contact, but indicated  $\sim$ 30 R/hr at 3 feet.

From this information, on February 2, 1984, the ALARA engineering group devised a technique, supported by a man-rem estimate, to remove the chip. Special tooling and planning were used to maintain exposures ALARA. As executed, the technique involved using a 15 foot pole attached to a sheet metal scoop to place the chip in a large bucket of water that was lowered from the 130' elevation. Radiation surveys indicated 100 R/hr at contact and 30 R/hr at 3 feet from the bucket.

Following, a perforated stainless steel quart size pig was lowered next to the bucket. Using Westinghouse supplied air-operated vice-grips, the chip was transferred from the bucket to the pig. The pig was then raised by a long handled aluminum pole and transported to the 130' airlock, to the Fuel Handling Building and lowered underwater into the transfer canal. The area was surveyed and posted.

Total man rem for this evolution was 0.330. Since all operations were done remotely extremity dosimetry was not needed, but all personnel did use high-range whole body monitoring devices. All necessary radiological surveys were performed and evaluated sufficiently to support the evolution.

The licensee's efforts were found to be consistent with the requirements of 10 CFR 20 and good radiological control practices.

The licensee's reactor operations management were informed and knowledgeable of the discovery of the chip and its appearance. Previous fuel bundle inspections prior to refueling did not identify any structural deficiency according to operations personnel. Consequently, the licensee does not believe that the chip discovery will interfere with normal reactor operations. Further details on this evaluation appear in NRC Inspection Report 50-272/85-03; 50-311/85-03.

#### 3.3 Conclusions

The allegation of improper or inadequate radiological controls and ALARA practices relative to this event are unsubstantiated.

#### 4.0 Concern Expressed By Workers

On January 24, 1985, NRC Region I received a written concern, previously submitted to NIOSH on December 3, 1984, from the International Brotherhood of Electrical Workers (IBEW), Local 1576. The IBEW did not allege any wrongful action on the part of the licensee but rather requested information relative to personnel exposure to noble gases (principally, xenon) and subsequent contamination with rubidium-88 (Rb-88) for entries made into the containment at power. The IBEW was also concerned that respiratory protective equipment was not being used for such entries.

#### 4.1 Finding

From a review of the licensee's records for the period between 1984 and 1985 it was apparent that several personnel had made entries into both containments at power. All entries were made in accordance with an Radiation Exposure Permit, i.e., REP-0001 or REP-0002 for Units 1 and 2, respectively. Such REPs permit entry only outside of the bioshield for the purpose of conducting activities such as inspection, valve line-ups, sampling system checks, routine surveillance and radiography.

The REPs were established in accordance with procedure RP 1.013, "Radiation Exposure Permit/Extended Radiation Exposure Permit", Revision 9, dated March 2, 1984, which included an ALARA evaluation.

Entries at power were made pursuant to procedure RP 1.011, "Containment Power Entries" Revision 4, dated December 1, 1983. This procedure details the precautions and prerequisites required for such entries and the radiological survey specifications.

Selected samples of the radiological survey data used to support entries during 1984 were reviewed. Particulate and halogen radioactive airborne surveys typically indicated that the concentrations would result in less than 25% of the Quarterly Limits of 10 CFR 20, Appendix B when the relatively short stay time in the area was considered. Exposure to noble gas in the containment is controlled by the licensee as whole body and skin dose due to submersion, which is consistent with the regulations. Whole body dose is measured directly from personnel dosimetry, while skin dose is calculated based on noble gas concentration. Typically, such skin dose has been calculated as high as 0.16 millirad per minute, which yields generally about 20 millirad skin exposure per entry.

The licensee's calculational method is incorporated into the computer program of the multi-channel gamma spectrometer used for sample analysis. The basis for the calculation will be reviewed in a subsequent inspection. (50-272/50-311/85-05-01)

Dose rates in the areas outside of the bioshield were typically less than 20 mR/hr, gamma; less than 5 mRem/hr, neutron. Loose surface contamination levels generally ranged between 1000 to 10,000 dpm/100cm<sup>2</sup>.

According to licensee personnel, known leaks in the pressurizer gas space, particularly in Unit-2, have caused chronic occurrences of noble gas in the containment atmosphere. Accordingly, personnel skin exposure is determined for each individual entry in accordance with procedure RP 1.017, "REP Administrative Procedure", Revision 5, dated August 3, 1984. Such exposure is assigned to the individual as part of the personnel exposure record.

Due to the chronic noble gas problem in containment, several personnel have been subject to contamination by short-lived isotopes. Such occurrences are not unusual and are the result of noble gases such as Kr-88 or Xe-138 decaying into short-lived particulate daughters, Rb-88 and Cs-138 having half-lives of 18 minutes and 32 minutes, respectively. These particulate daughters have a static electric affinity for surfaces such as hair or certain synthetic materials. The usual decontamination practice used by the licensee, once it is determined that the contamination is not long-lived particulates, is to have the individual wait at the control point until the activity decays sufficiently to allow whole body frisking, usually 20 to 40 minutes. The activity usually experienced, i.e., 2000 - 6000 cpm by frisker, is not a biological hazard and is not manifested as an internal deposition.

Since exposure to the noble gas atmosphere in containment is controlled by the licensee as a whole body and skin dose which is consistent with regulatory requirements; and the concentrations of other radionuclides is usually negligable, respiratory protective devices are generally not required.

The licensee currently maintains records of such contamination instances in accordance with procedure RP 1.006, "Decontamination of Personnel," Revision 1, dated March 11, 1982. The record generated by this procedure, documents the occurrence and the method used for decontamination. A "Lapse of Radiological Controls" (LRC) record is generally not generated for these types of occurrences which is consistent with the licensee's procedure RP 1.025, "Procedures for Processing of LRC", Revision 2, dated October 5, 1984, as clarified by the licensee internal memorandum #1346 to all radiation protection personnel dated November 23, 1983.

## 4.2 Conclusion

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The licensee is adhering to procedures and practices that are consistent with the regulatory requirements of 10 CFR 20.

### Exit Interview

The inspector met with the licensee management representatives (denoted in Section 1.1) at the conclusion of this inspection on February 22, 1985 to discuss the scope and findings of the inspection as detailed in this report.

At no time during this inspection effort was written material provided to the licensee by the NRC inspector.

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