

U.S. NUCLEAR REGULATORY COMMISSION
Region I

Report No. 84-29
Docket No. 50-277
License No. DPR-44 Priority -- Category C
Licensee: Philadelphia Electric Company
2301 Market Street
Philadelphia, Pennsylvania 19101

Facility Name: Peach Bottom Atomic Power Station Unit 2

Inspection At: Delta, Pennsylvania

Inspection Conducted: August 20 and 21, 1984

Inspector: H. J. Bicehouse 9/10/84
H. J. Bicehouse, Radiation Specialist date

Approved By: W. J. Pasciak 9/10/84
W. J. Pasciak, Chief, BWR date
Radiation Safety Section, DETP

Inspection Summary: Inspection on August 20 and 21, 1984 (Report Number 50-277/84-29)

Areas Inspected: Special unannounced inspection to review a report of radiation exposures to 3 workers exceeding station administrative limits on August 14, 1984 and the radiological controls instituted by the licensee in response to unexpectedly high radiation levels in the Unit 2 drywell following chemical decontamination of the recirculation piping. The inspection involved 22 hours onsite by a regionally based inspector and the Chief, BWR Radiation Safety Section.

Results: Two violations were noted. However, each met the tests for licensee identified items (See Details 5.1 and 5.2) described in 10 CFR 2, Appendix C, Section IV.A. No Notice of Violation is issued.

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DETAILS

1. Persons Contacted

During the course of this special inspection, the following personnel were contacted or interviewed:

1.1 Licensee Personnel

- * Mr. D. C. Smith, Assistant Station Superintendent (PECO)
- * Mr. A. E. Hilsmeir, Senior Health Physicist (PECO)
- * Mr. N. F. Gazda, Applied Health Physicist - Supervising (PECO)
- Mr. C. S. Nelson, Support Health Physicist (PECO)
- Mr. F. Hoelzle, Project Engineer - Piping Replacement (PECO)
- * Dr. G. Englesson, Piping Replacement ALARA Coordinator (General Electric Company)
- Mr. W. Rogers, Senior Health Physics Technician (Bartlett Nuclear Corporation)
- Mr. T. Stafford, ALARA Engineer (Bartlett Nuclear Corporation)
- Mr. M. Gradkowski, ALARA Administrator (Chicago Bridge and Iron Company)

Other licensee and contractor employees were also contacted or interviewed during this inspection.

1.2 NRC Personnel

- * Mr. A. R. Blough, Senior Resident Inspector
- *Attended the exit interview on August 21, 1984.

2. Purpose

The purpose of this special inspection was to review a report of radiation exposures to three workers exceeding plant administrative limits on August 14, 1984 and the radiological controls instituted by the licensee in response to unexpectedly high radiation levels in the Unit 2 drywell following chemical decontamination of the recirculation piping.

3. Description and Summary of Events

On August 8, 1984, the licensee completed chemical decontamination of the Unit 2 recirculation piping to reduce ambient drywell radiation levels during pipe replacement. From August 8, 1984 until August 14, 1984, preparations were made for beginning the pipe removal phase of the Unit 2 piping replacement project.

On August 14, 1984, 3 employees of the piping replacement contractor entered the Unit 2 drywell at approximately 0130 to set a pipe cutting lathe on the "A" recirculation pump suction inlet. In addition to other protective clothing and equipment, these individuals wore thermoluminescent dosimeters

(TLD) and self-reading pocket dosimeters (SRD) at the forehead level and an audible-alarm dosimeter at the shoulder level. During the course of the work, the audible-alarm dosimeter alarmed indicating that it had received a radiation exposure in excess of its setpoint of 256 millirem (mrem). The individual whose audible-alarm dosimeter had alarmed, remained in the work area in an attempt to complete the job. A piping contractor field engineer, noting the alarm, went to the work area and instructed the worker to leave. The workers exited the work area and reported to the Unit 2 drywell health physics control point.

Initial estimates of the workers' radiation exposures by the licensee showed that the Station's daily administrative limit of 300 mrem had been exceeded. However, the workers' radiation exposures had not exceeded the radiation dose standards in 10 CFR 20.101.

The licensee restricted access to the Unit 2 drywell to prevent additional exposures, evaluate apparent changes in radiological conditions and investigate the circumstances associated with this event under Station Procedure No. A-86, "Administrative Procedure for Corrective Action".

4. Licensee's Exposure Estimate

The inspector reviewed the licensee's radiation exposure estimates with respect to the following:

- Technical Specification 6.11, "Radiation Protection Program";
- Licensee's Procedure No. HPO/CO-13C, "Management of Lost Direct Reading Pocket Dosimeter and Abnormal (Off-Scale) Reading On Direct Pocket Dosimeter"; and
- 10 CFR 20.101.

The licensee uses several methods for monitoring personnel radiation exposure. A vendor-supplied (Eberline) thermoluminescent dosimeter (TLD) is worn by each radiation worker (for an entire month) and provides the individual's permanent radiation exposure results. A licensee-supplied (Harshaw) TLD is worn in conjunction with the vendor TLD. The Harshaw TLD is read at the end of each work day to provide daily exposure accumulation.

Self-reading pocket dosimeters (SRD) are also worn to provide immediate exposure information for each task performed in radiation areas. This exposure information is recorded by the worker on the assigned Radiation Work Permit (RWP) for estimating personnel exposure for each job. The SRD also provides a means for estimating total accumulated dose (in man-rem) for the "As Low As Reasonably Achievable (ALARA)" program administered for the licensee by the piping replacement contractor.

The inspector reviewed the results of area radiation surveys made by the licensee on August 10, 1984 and immediately following the event on August 14, 1984 and compared those dose rates with the exposure estimates recorded by

the licensee for the various monitoring methods employed. The following table summarizes the results of this comparison (all exposures in mrem):

Table 1

<u>Worker</u>	<u>SRD</u>	<u>Harshaw TLD</u>	<u>Exposure from Survey Estimates</u>
A	375*	380*	500-600
B	"off scale" (>500)	515	500-600
C	"off scale" (>500)	563	500-600

* Worker A left his TLD and SRD on 116 foot elevation during his exit. The dosimeters were recovered by fellow workers and may not be indicative of actual exposure received.

In reviewing the survey results for this comparison, the inspector noted that the radiation levels associated with the "A" recirculation pump had approximately doubled on August 14, 1984 since the previous recorded survey on August 10, 1984. (See related item under Detail 5.1).

Within the scope of this review, no violations were identified.

5. High Radiation Area Controls

Audible-alarm dosimeters were used by the licensee to control radiation exposures in the high radiation areas (as defined in 10 CFR 20.202) associated with this event. Audible-alarm dosimeters are electronic dosimeters which alarm when a preset integrated radiation exposure is reached. The inspector noted that effective dose rates at the head level in the area of the "A" recirculation pump were approximately 750 mrem/hour on August 14, 1984 during the entry of the 3 workers.

The inspector reviewed the licensee's high radiation area controls against criteria provided in Technical Specification 6.13, "High Radiation Area". Under Technical Specification 6.13, audible-alarm dosimeters may be substituted for a survey meter in high radiation areas after dose rates have been measured and the workers have been informed of the measured dose rates.

5.1 Surveys of the Work Area

Surveys of the "A" recirculation pump work area were reviewed against criteria provided in 10 CFR 20.201, 10 CFR 20.401 and Technical Specification 6.11. Survey requirements for the installation of the pipe cutting lathe were provided by reference to the Unit 2 drywell area survey RWP (RWP No. 2-01-0543). The area survey RWP required weekly surveys.

A detailed survey of the "A" and "B" recirculation pumps was conducted on August 10, 1984 (Survey No. 188, RWP No. 2-01-0543). No additional

surveys of the "A" recirculation pump work area were recorded until August 14, 1984 at approximately 0400 (Survey No. 191, RWP No. 2-01-0543).

10 CFR 20.201(b) requires that each licensee make such surveys as may be necessary to comply with all sections of Part 20. As defined in 10 CFR 20.201(a), a survey means an evaluation of the radiation hazards incident, among other things, to the presence of radioactive materials under a specific set of conditions.

Discussions with representatives of the licensee's health physics staff and piping replacement contractors indicated that a general presumption of stability in Unit 2 drywell radiological conditions was made following the detailed surveys taken between August 8, 1984 and August 10, 1984. Routine checks of radiation levels in the drywell were made each shift by Unit 2 drywell health physics technicians. However, these checks were not recorded if the area radiation levels appeared to be unchanged since the latest recorded survey. The inspector noted that the routine health physics surveillance RWP recorded entries into the drywell during each shift for "surveys".

On August 14, 1984, the control point health physics technician did not require an additional survey of the "A" recirculation pump work area prior to or during the entry of the 3 workers to set the pipe cutting lathe. Surveys taken subsequent to this entry, (e.g. Survey No. 191, RWP No. 2-01-0543, recorded 0400 on August 14, 1984), showed that the radiation field had doubled and increased further from August 14, 1984 through August 17, 1984. The presumptions of stability in the radiological conditions prior to the entry by the 3 workers was wrong.

The inspector reviewed the licensee's Discrepancy Report No. 84-112 (under Licensee's Procedure No. A-86) to assess the licensee's identification and correction of the apparent violation of 10 CFR 20.201(b). Discrepancy Report No. 84-112 met the 5 tests for a licensee-identified item under 10 CFR 2, Appendix C, Item IV.A. The completion of corrective actions identified in Discrepancy Report No. 84-112 will be reviewed in a subsequent inspection. (50-277/84-29-01)

5.2 Instructions To Workers

The inspector reviewed the licensee's instructions to the 3 workers assigned to the cutting lathe installation against criteria provided in 10 CFR 19.12 and the licensee's Procedure No. API-2, "Specific Program Instruction For Maintaining Occupational Exposure To Radiation As Low As Is Reasonably Achievable (ALARA)."

Under Procedure No. API-2, worker briefings by job supervision and radiological controls personnel are required. 10 CFR 19.12 requires,

among other things, instruction in the appropriate response to warnings made in the event of any unusual occurrence or malfunction that may involve exposure to radiation.

ALARA pre-job briefing records showed that 2 of the 3 workers involved in the cutting lathe installation were not listed as attending the pre-job briefing for that work activity. In an August 15, 1984 letter from the piping replacement contractor site manager to the station superintendent, the manager indicated that pre-job briefings by the work foreman had occurred.

In an August 15, 1984 letter from the contractor health physics supervisor to the station superintendent, the supervisor indicated that the workers may not have been briefed on the work area dose rates. Discussions with health physics technicians indicated that drywell workers were generally made aware of the high radiation area and increasing dose rates overhead associated with the "A" and "B" recirculation pumps.

When the audible-alarming dosimeter alarmed, at least one of the workers failed to exit the area promptly. He remained in an attempt to complete the work and left only when instructed to do so by the piping contractor field engineer.

The inspector reviewed Discrepancy Reports (Numbered 84-111 and 84-112) to assess the licensee's identification and correction of the violation of 10 CFR 19.12 when the worker failed to exit the work area following the alarm of his audible-alarming dosimeter. Discrepancy Report No. 84-111 met the 5 tests for a licensee identified item under 10 CFR 2, Appendix C, Item IV.A. The completion of the corrective actions identified in that discrepancy report will be reviewed in a subsequent inspection. (50-277/84-29-02)

6. Radiological Controls

The radiological controls instituted by the licensee in response to unexpectedly high and changing radiation levels in the Unit 2 drywell from August 14, 1984 through August 20, 1984 were reviewed against criteria provided in:

- Technical Specification 6.11, "Radiation Protection Program;"
- Technical Specification 6.13, "High Radiation Area;"
- Licensee's Procedure No. HPO/CO-4, "Radiation Work Permits;"
- Licensee's Procedure No. HPO/CO-11, "Establishing and Posting Radiologically Controlled Areas;" and
- Licensee's Procedure No. HPO/CO-101, "Control Point Operating Procedure."

The licensee's controls relative to these criteria were examined by:

- Review of 5 radiation work permits for Unit 2 drywell work;
- Discussions and interviews with cognizant health physics and piping replacement contractor personnel; and
- Direct observation of operations at the Unit 2 drywell control point.

The licensee restricted access to the 116 foot elevation (area adjacent and below the "A" and "B" recirculation pumps) on August 14, 1984. Replacement piping activities below the 135 foot elevation were suspended as well. Access to those lower elevations of the Unit 2 drywell required a health physics escort. However, active radiation work permits at the Unit 2 drywell control point had not been amended on August 20, 1984 to require health physics escorts.

At the exit interview on August 21, 1984, the licensee stated that the radiation work permits at the Unit 2 drywell control point would be amended to require a health physics escort for work below the 135 foot elevation. This item will be reviewed in a subsequent inspection. (50-277/84-29-03)

7. Exit Interview

The inspector met with the licensee's representative (denoted in Section 1.1.) at the conclusion of the inspection on August 21, 1984. The inspector summarized the purpose and scope of the inspection and identified findings as described in this report.

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