

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 85-36

Docket No. 50-278

License No. DPR-56

Priority -

Category C

Licensee: Philadelphia Electric Company
2301 Market Street
Philadelphia, Pennsylvania 19101

Facility Name: Peach Bottom Atomic Power Station, Unit 3

Inspection At: Delta, Pennsylvania

Inspection Conducted: October 8-11, 1985

Inspectors: H. J. Bicehouse
H. J. Bicehouse, Radiation Specialist

10/23/85
date

Approved by: W. J. Pasciak
W. J. Pasciak, Chief, BWR Radiological
Protection Section

10/23/85
date

Inspection Summary:

Inspection on October 8-11, 1985 (Inspection Report Number 50-278/85-36)

Areas Inspected: Routine unannounced inspection of the licensee's radiological controls program during core spray sparger repairs on Unit 3 and radiological controls for the licensee's low-level radioactive waste storage facility. The inspection involved 28 hours onsite by a regionally-based inspector.

Results: Of the areas inspected, an unresolved item was identified relating to the adequacy of the licensee's safety evaluation of the low-level radioactive waste storage facility (Detail 7). The licensee's radiological controls program during core spray sparger work was adequate.

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DETAILS

1. Persons Contacted

During the course of this routine inspection, the following personnel were contacted or interviewed.

1.1 Licensee Personnel

Mr. B. Adams, Engineer
Mr. N. Alexakos, Maintenance Engineer
Mr. A. Beward, Physicist
*Mr. R. Fleischmann, Manager, Peach Bottom Atomic Power Station
*Mr. N. Gazda, ALARA Health Physicist
*Mr. A. Hilsmeir, Senior Health Physicist (RPM)
*Mr. W. Lorenz, Senior Health Physicist
*Mr. J. McElwain, Electric Production Quality Control
*Mr. S. Nelson, Applied Health Physicist
Ms. H. Paust, Physicist
Mr. R. Scholz, Engineer
*Mr. J. Wilson, Quality Assurance Site Supervisor

Other licensee personnel were contacted or interviewed during the course of this inspection.

1.2 Contractor Personnel

Mr. C. Burger, Field Engineer, General Electric Company
Mr. G. Costomiris, Engineering Manager for Design, Gilbert Commonwealth Inc.
Mr. T. MacKay, Project Engineer, Gilbert Commonwealth Inc.
Mr. C. Noonan, Field Engineer, General Electric Company

Other contractor personnel were contacted or interviewed during the course of this inspection.

1.3 NRC Personnel

Mr. T. Johnson, Senior Resident Inspector
*Mr. J. Williams, Resident Inspector

*Attended the exit interview on October 11, 1985.

2. Purpose

The purpose of this routine inspection was to review the licensee's radiological controls during core spray sparger repairs with respect to the following elements:

- Planning/Preparations for the repairs;
- External Exposure Control during the repairs;
- Internal Exposure Control during the repairs; and the
- As Low As Reasonably Achievable (ALARA) Program.

In addition, the licensee's low-level radioactive waste storage facility was reviewed to determine if:

- quality assurance plans, instructions and procedures had been established;
- licensee's commitments and guidance provided in Generic Letter 81-38 were being met; and
- completed construction of the facility was consistent with NRC requirements, guidance in the generic letter and licensee commitments.

The licensee's outage radiation protection program was reviewed during Inspection Nos. 50-277/85-28; 50-278/85-26.

3. Planning/Preparation For Core Spray Sparger Repair

In late August 1985, the licensee discovered cracks on the 240 degree azimuth core spray sparger "T" box in Unit No. 3 during routine inservice inspections. An air test of the header on August 28, 1985 confirmed a through-wall crack. The licensee decided to repair the core spray sparger "T" boxes at the 120 and 240 degree azimuths in-vessel. Planning and preparation for the repair were reviewed relative to guidance provided in Regulatory Guide 8.8, "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As Is Reasonably Achievable," and NUREG-0761, "Radiation Protection Plans for Nuclear Power Reactor Licensees."

The licensee's performance relative to the guidance was assessed by:

- discussions with cognizant representatives of the repair contractor and the licensee's health physics staff;
- review of dose projections, mock-up training, special procedures for controlling the work, engineering controls and mitigating measures employed or considered; and
- observation of repairs in progress from the Unit No. 3 refueling floor on October 8-9, 1985.

Within the scope of this review, the inspector noted:

- personnel doses associated with feedwater sparger modifications on Unit No. 2 (1980) and Unit No. 3 (1981) provided the initial basis for dose projections for the repairs;
- additional underwater radiation measurements were made;
- mitigating measures including decontamination of the vessel walls and pipes, construction of a shielded work station and provision of auxiliary ventilation were planned and evaluated;

- a special mock-up was used to train repair workers and assess times and locations for personnel dose estimates;
- an administrative hold was placed on initiation of repair activities until a complete review by the Station ALARA Committee was conducted; and
- special work instructions were provided to health physics personnel to control radiological hazards associated with the work and identified during the licensee's pre-job assessment process.

Within the scope of the review, the licensee conducted an adequate and generally effective pre-job planning and preparation phase to assess and control personnel doses associated with the repairs.

4. External Exposure Controls During Core Spray Sparger Repair

The licensee's implementation of external exposure controls during the repair was reviewed against criteria provided in:

- 10 CFR 20.101, 20.102, 20.104, 20.105, 20.201, 20.203, 20.204 and 20.401;
- Technical Specification 6.11, "Radiation Protection Program";
- Technical Specification 6.13, "High Radiation Area";
- Health Physics Operating/Chemistry Operating Procedure (HPO/CO)-4, "Radiation Work Permits," Revision 25 (8/16/85);
- HPO/CO-100, "Health Physics Guides in the Control of Exposure to Radioactive Material," Revision 19 (9/12/85);
- HPO/CO-101, "Control Point Operating Procedure," Revision 0 (7/20/82);
- HPO/CO-1, "Radiation Dose Rate Survey Techniques," Revision 6 (8/4/84); and
- HPO/CO-68, "Field Use of Alarming Digital Dosimeters," Revision 5 (8/9/85).

The licensee's performance relative to these criteria was determined by:

- interviews and discussions with the Applied Health Physicist and members of his staff;
- review of instructions and records relating to personnel/dosimetry surveys, radiation work permits for in-cavity and in-vessel work and refueling floor and drywell control point operations; and
- observation of repair work in progress.

Within the scope of this review, no violations were noted. External exposure controls for the repair operation appeared to be well organized and adequately controlled.

5. Internal Exposure Controls During Core Spray Sparger Repair

The licensee's implementation of internal exposure controls during the repairs was reviewed against criteria provided in:

- 10 CFR 20.103;
- Technical Specification 6.11, "Radiation Protection Program";
- HPO/CO-2, "Contamination Survey Techniques and Evaluations," Revision 3 (9/30/82);
- HPO/CO-3, "Airborne Activity Survey Techniques," Revision 7 (10/30/84);
- HPO/CO-4, "Radiation Work Permits," Revision 25 (8/16/85);
- HPO/CO-5, "Selection and Use of Anticontamination Clothing," Revision 6 (4/30/80);
- HPO/CO-6, "Personnel Contamination Survey Techniques," Revision 5 (3/6/84);
- HPO/CO-9, "Respiratory Protection Program," Revision 10 (4/21/83); and
- HPO/CO-100, "Health Physics Guides Used in the Control of Exposure to Radioactive Material," Revision 19 (9/12/85).

The licensee's performance relative to these criteria was determined by:

- review of installed auxiliary ventilation used to limit airborne radioactivity, respiratory protection practices, radiation work permits and supporting surveys for in-vessel, in-cavity and drywell operations and training/fitting records for radiation workers assigned to the repair;
- discussions with workers and health physics personnel; and
- observations during tours of the refueling floor.

Within the scope of this review, no violations were noted. The licensee appeared to be implementing an adequate program to control contamination and prevent internal exposures to workers assigned to core spray sparger "T" box repairs.

6. Implementation of the ALARA Program During Repair Operations

The licensee's implementation of the Station ALARA Program during core spray sparger repairs was examined against criteria contained in:

- Regulatory Guide 8.8;
- Administrative Procedure (A)-83, "ALARA Program Administrative Procedure," Revision 3 (1/4/85);
- HPO/CO-500, "ALARA Travellers," Revision 4, (7/8/85);
- HPO/CO-501, "Request for ALARA Review," Revision 1 (4/26/84);
- HPO/CO-502, "Station ALARA Review Committee," Revision 2 (7/19/85);
- HPO/CO-503, "ALARA Pre-Job Review," Revision 2 (5/24/85); and
- HPO/CO-504, "ALARA Post-Job Review," Revision 2 (8/2/85).

The licensee's performance relative to these criteria was determined by interviewing the ALARA Health Physicist and a member of his staff, reviewing ALARA input to two Maintenance Request Forms and associated radiation work permits related to the repair and observation of work in progress on the refueling floor.

Within the scope of this review, it was determined that the licensee had implemented a generally effective ALARA program to control exposures associated with repair activities and provide records for use in possible future work on Unit No. 2.

7. Low-Level Radioactive Waste Storage Facility (Modification 693)

The licensee designed and constructed a low-level on-site radioactive waste storage facility sized to accommodate approximately 2.5 years of solid radioactive waste (including dry active waste and dewatered resins) resulting from the operation of Units 2 and 3. The purpose of the modification was to provide a temporary radioactive waste storage site beyond January 1986 when shipments to existing low-level burial sites could be curtailed by the individual states. The modification entailed a modular design with the capacity for expansion to store all the low-level radioactive waste for duration of plant life.

The design, construction, testing and operation of the low-level radioactive storage facility was reviewed against criteria and guidance provided in:

- 10 CFR 20, "Standards for Protection Against Radiation";
- 10 CFR 50.59, "Changes, Tests and Experiments";
- 10 CFR 100, "Reactor Site Criteria," (as modified in Generic Letter 81-38);
- 10 CFR 50, Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low as is Reasonably Achievable' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents";
- 40 CFR 190, "Environmental Dose Standard"; and
- NRC-NRR Generic Letter 81-38 and its enclosure entitled "Radiological Safety Guidance for Onsite Contingency Storage Capacity."

Selected documents related to Modification 693 were reviewed and discussed with the licensee and the licensee's contractor and the facility was toured to determine the licensee's compliance with the criteria and guidance above. The following aspects of the design, testing and operation of the facility were reviewed:

- projected off-site doses from normal operations and postulated accidents;
- compatibility of stored waste forms and their containers;
- potential gas generation from radiolytic/chemical decomposition of stored resins;
- physical security and personnel protection at the facility;
- radiological monitoring of potential release pathways;
- completion of facilities, equipment and preoperational tests of facility/equipment capabilities;

- administrative controls for facility operation including inventory controls/limits and operating procedures; and
- oversight of facility operations and inventories by the licensee.

The inspector noted that the licensee's Plant Operations Review Committee (PORC) had reviewed the safety evaluation for the facility and concluded that the modification did not create an unreviewed safety question as defined in 10 CFR 50.59 and did not involve a change to the licensee's Technical Specifications (PORC Minutes 83-148).

Within the scope of the inspector's review, the following items were noted:

- The enclosure to Generic Letter 81-38 suggests, in part, that facility design and operation should assure that radiological consequences of design basis events (i.e., fire, tornado, seismic event and flood) should not exceed a small fraction (10%) of 10 CFR Part 100, i.e., no more than a few rems whole body dose. The licensee's safety evaluation report ("Safety Evaluation for the Construction of a Low-Level Radwaste Storage Facility, Mod. 693," Revision 1, 11/15/83) failed to provide an analysis of the consequences of a fire in a storage cell. Each storage cell was designed for the storage of up to 360 polyethylene "High Integrity Containers" (HICs). Each HIC could contain up to approximately 43.5 curies (Reactor Water Clean-Up resin) providing a potential radioactive source term up to 15,660 curies.

The safety evaluation report postulated and analyzed the consequences of an "unspecified fire" in the Dry Active Waste (DAW) storage. The entire design inventory for DAW of 26 curies was assumed to be the source term (of which 1% was assumed to be airborne radioactivity contributing to the accidental release and projected potential off-site dose). The safety evaluation report concluded that this accidental release was "less than the Technical Specification limit for normal operations" and the "off-site consequences" were "well within 10 CFR 100 limitations."

PORC Minutes and other licensee records were reviewed to determine if the PORC had identified and resolved the question of a fire in the storage cell. The PORC had not apparently raised the question in its review. The inspector noted that the licensee had not stored HICs (containing resins) in the facility.

During the exit interview on October 11, 1985, the inspector discussed the apparent need for an analysis of the consequences of a fire in the storage cell with the licensee's representatives. The item was also discussed with a cognizant representative of the licensee's Engineering and Research Department during a telephone conversation on October 11, 1985 following the exit interview. The inspector stated that the adequacy of the licensee's safety review under 10 CFR 50.59 was unresolved pending evaluation of the potential consequences of a fire in a storage cell. 50-278/85-36-01

- The enclosure to Generic Letter 81-38 suggests that gas generation from organic materials in waste containers could lead to container breach and potentially flammable/explosive conditions. Unless storage containers are equipped with special vent designs which allow depressurization and do not permit the migration of radioactive materials, resins highly loaded with radioactive material (e.g., Reactor Water Clean-up System resins) should not be stored for a period in excess of approximately one year.

The inspector noted that the licensee's HICs were not equipped with special vents to allow depressurization and the licensee's safety evaluation report did not address venting the HICs. This concern was discussed with the licensee. The licensee stated that the potential problem of gas generation had been identified by the licensee's Engineering and Research Department. A vent design for the HICs had been submitted to the State of South Carolina for review. Additional analyses of gas generation rates were also being completed.

At the exit interview on October 11, 1985, the inspector stated that the licensee's analysis and resolution of potential gas generation problems with HICs in storage would be reviewed during a subsequent inspection. 50-278/85-36-02

- Regulatory Guide 1.143 ("Design Guidance for Radioactive Waste Management Systems, Structures and Components Installed in Light-Water-Cooled Nuclear Power Plants," Revision 1, October 1979) in outlining a quality assurance program for radioactive waste management systems recommends, in part, that measures be established to identify items which have satisfactorily passed required inspections and tests or to identify items of nonconformance with procurement documents or applicable codes and standards and the action taken to correct such items. The licensee's contractor provided preoperational testing for systems in the low-level radioactive waste storage facility. However, the result of those tests and dispositioning of test exceptions had not been reviewed by the PORC.

At the exit interview on October 11, 1985, PORC review of preoperational test results was discussed with the licensee's representatives and will be reviewed during a subsequent inspection. 50-278/85-36-03

- In the licensee's safety evaluation report, operating procedures for the facility were discussed. Review of existing licensee procedures and discussions with cognizant personnel indicated that operating procedures for the low-level radioactive waste storage facility had not been completed.

At the exit interview on October 11, 1985, the inspector stated that operating procedures would be reviewed during a subsequent inspection. 50-278/85-36-04

8. Exit Interview

The inspector met with the licensee's representatives, denoted in paragraph 1, on October 11, 1985 to discuss the findings of this inspection. The licensee's representatives acknowledged the inspection findings.

At no time during the inspection was written material provided to the licensee. No information exempt from disclosure under 10 CFR 2.790 was discussed in this report.