

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

Region I

Report No. 50-277/79-29
50-278/79-32
Docket No. 50-277
50-278
License No. DPR-44
DPR-56 Priority -- Category C
C

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

Facility Name: Peach Bottom Atomic Power Station Units 2 and 3

Inspection at: Delta and Philadelphia, Pennsylvania

Inspection conducted: November 1 - November 30, 1979

Inspectors: E. G. Greenman 1-31-80
E. G. Greenman, Resident Reactor Inspector date signed

date signed

date signed

Approved by: E. C. McCabe, Jr. 2/6/80
E. C. McCabe, Jr., Chief, Reactor Projects date signed
Section No. 2, RO&NS Branch

Inspection Summary:

Inspection on November 1 - November 30, 1979 (Combined Inspection Report Nos. 50-277/79-29 and 50-278/79-32)

Areas Inspected: Routine, onsite and corporate office regular and backshift inspections by the resident inspector (45 hours Unit 2; 46 hours Unit 3). Areas inspected included system restoration from a refueling outage, startup, shutdown margin testing, accessible portions of the Unit 2 and Unit 3 facilities, radiation protection, maintenance activities, physical security, plant operations, facility tours, control room inspections, housekeeping, LER review onsite and in-office, followup on previously identified items, review of periodic and special reports, and IE Bulletin followup.

Results: Noncompliances - None in 14 areas, two in two areas (Infraction - failure to adhere to Radiation Work Permit (RWP) requirements, Detail 6, and Infraction - failure to maintain a fire and penetration seal barrier, Detail 3).

DETAILS

1. Persons Contacted

- C. E. Andersen, Operations Engineer
- W. M. Alden, Nuclear Section
- J. W. Austin, Project Engineer - Construction Division
- W. H. Barley, Health Physics Supervisor
- B. L. Clark, Engineer - Electric Production
- M. J. Cooney, Superintendent-Generation Division
- * R. S. Fleischmann, Assistant Station Superintendent
- S. R. Roberts, Results Engineer
- J. W. Spencer, Maintenance Engineer
- R. J. Scholz, Chemistry Supervisor
- * W. T. Ullrich, Station Superintendent

Other licensee employees were contacted during the inspection. These included engineering personnel, administrative personnel, reactor operators, shift supervision, maintenance personnel, contractor personnel, health physics and security personnel.

- * denotes those present at exit interviews on site and for summation of preliminary inspection findings.

2. Previous Inspection Item Update

(Closed) Inspector Followup Item (79-11-07 and 79-12-08) - Review of changes and or additions to procedures assuring prompt notification to NRC within a one hour time frame. The inspector reviewed Procedure No. A-31, "Procedure for Prompt Notification to the NRC", revision 2, dated August 14, 1979. Changes implemented require the Shift Supervisor to utilize the NRC hot line phone to contact the NRC duty officer for: indication of a LOCA, indication of a main steam line break, indication of a rod drop accident, indication of a refueling accident, plant or site radiation emergencies, and excessive gaseous or liquid releases. Additionally, one hour notification is required by A-31 for exceeding or potentially exceeding a safety limit, exceeding or reaching a limiting safety system setting without the specified action being accomplished, exceeding a limiting condition for operation (LCO) during operation without the specified action being taken, and exceeding an LCO during shutdown if the ability to cool the core is jeopardized. The inspector had no further questions regarding this matter. Subsequent changes based on issuance of new guidance and clarifications will be reviewed as they occur.

(Closed) Inspector Followup Item (78-25-03 and 78-30-03) - Potential Explosive Gas Mixture Accumulations Associated with BWR Off-Gas System Operations. Reference NUREG/CR-07-27 and Detail 4.

3. Plant Operations Review

a. Logs and Records

1. Documents Reviewed

A sampling review of logs and records was made to: identify significant changes and trends; assure that required entries were being made; to verify that operating and night orders conform to Technical Specification requirements; check correctness of communications concerning equipment operating and lock-out status; verify jumper log conformance to procedural requirements; and to verify conformance to limiting conditions for operations. Logs and records reviewed were:

- a. Shift Supervision Log, November 1-30, 1979
- b. Unit 2 Jumper Log - Current entries
- c. Unit 3 Jumper Log - Current entries
- d. Reactor Engineering Log, Unit 3 - Current entries
- e. Shutdown Margin Test Results dated November 5, 1979
- f. Reactor Operators Log Book Unit 2 - November 1-30, 1979
- g. Reactor Operators Log Book Unit 3 - November 1-30, 1979
- h. ACO Log Book - November 1-30, 1979
- i. Night Orders - Current entries
- j. Radiation Work Permits - Various in both Unit 2 and Unit 3 during November, 1979
- k. Maintenance Request Forms (MRFs) Unit 2 and Unit 3 - Sampling Audit - November, 1979
- l. Fire System Status Sheets (sample) - November, 1979
- m. Operation Work and Information Data - November, 1979
- n. Startup Check Lists - Unit 3

Control room logs were reviewed pursuant to requirements of Procedure A-7, "Shift Operations". Frequent initialing of entries by licensed operators, shift supervision, and licensee onsite management constituted evidence of licensee review. Logs were also reviewed to assure that plant conditions including abnormalities and significant operations were accurately and completely recorded. No unacceptable conditions were identified.

2. Facility Tours

During the course of this inspection which also included shift turnover, the inspector conducted daily tours and made observations of:

- Control Room - (daily)
- Turbine Building - (all levels)
- Reactor Building - (accessible areas)
- Diesel Generator Building

- Yard area and perimeter exterior to the power block, including Emergency Cooling Tower
- Security Building including CAS, Aux SAS, and control point monitoring, the SAS, power block control points, and vital area control
- Maintenance Shop - (hot area)
- Security Fencing
- Lighting
- Vehicular Control
- General Employee Training
- Portal Monitoring
- Control of Radiation and High Radiation Areas including locked door checks
- Personnel

The following observations and determinations were made by the inspector:

- Refueling Activities (Unit 3) and Facility Startup. On November 5, 1979, the resident inspector observed facility startup subsequent to refueling and shutdown margin testing. The reactor was observed to be critical at 0907 AM, November 5, in Group 2 control rod 10-23 at notch 12. The inspector observed the conduct of the shutdown margin test, ST 3.83, "Shutdown Margin Unit 3 - Cycle 4", dated October 18, 1979. Acceptance criteria for the shutdown margin of the fully loaded core with the analytically strongest rod (10-31) withdrawn is 0.38 percent delta k effective. Inspection confirmed that rod 10-31 was at position 48 (fully withdrawn). Criticality was achieved at 9:07 AM, November 5, 1979, and the reactor was on a 60 second period. The inspector reviewed all Data Analysis sheets during the course of this test and subsequent to completion. Independent confirmatory calculations were also performed. The calculated shutdown margin was determined to be 1.63 percent delta k/k. Technical Specification 4.3.A.1 Reactivity Margin - core loading states that sufficient control rods shall be withdrawn following a refuel outage when core alterations were performed to demonstrate with a margin of 0.38 percent delta k/k that the core can be made subcritical at any time in the subsequent fuel cycle with the analytically determined strongest operable control rod fully withdrawn and all other operable control rods fully inserted. No unacceptable conditions were identified.

- Monitoring Instrumentation. The inspector frequently confirmed that selected instruments were operational and indicated values were within Technical Specification limits. On a daily basis when the inspector was on site, ECCS switch positioning and valve lineups and breakers for injection valves were reviewed based on control room indications, in-plant checks, and observations to confirm operability. Additionally, at Unit 3 prior to startup, the inspector confirmed status of Engineered Safety Features and safety-related breaker positions. In-plant instrumentation was frequently verified. Examples of instrumentation observed included flow setpoints, ARMs, breaker positions, PCIS status, level instrumentation, inerting requirements, diesel generator operability, SBLC parameters, HPCI, RCIC, RHR, ADS, and Core Spray. No unacceptable conditions were identified in this area of inspection.
- Valve Positioning. The inspector independently verified that valves and breakers in safety-related systems were maintained locked as required by the licensee's system and were being properly maintained. Particular emphasis was placed upon potential for mispositioning of safety-related breakers. No unacceptable or undefined conditions were identified.
- Plant Housekeeping and Fire Protection. The inspector observed housekeeping conditions, fire hose station and equipment status, and observed the licensee's fire protection procedures and practices as well as the usage of fire watches. The licensee's adherence to "no smoking" areas was also examined. Previous inspection identified negative housekeeping aspects attributed to the Unit 3 outage and the number of contractor personnel on site. During this inspection, the inspector was accompanied during various tours to examine housekeeping and cleanliness by operations supervision and by maintenance supervision. Findings and inspector concerns were acted upon promptly by licensee management. Unacceptable conditions included trash, litter, and debris in various areas of the plant, open cabinets, protective clothing and supplies inadequately stored, contaminated areas and bagged materials which required disposal, safety guards missing, drums and equipment located in proximity to safety instrumentation, missing and/or loose cable tray covers, and newspapers and trash located near change areas. As an example of the types of problems encountered during the inspection, a cable tray penetration was identified by the inspector on November 8, 1979 located in the Unit 2 Reactor Building 135 foot elevation with a broken seal, which compromised integrity and fire protection capability. Additionally, the broken seal

enclosure was found to contain trash and debris. Subsequent to followup and review of Penetration Seal Log Sheet CDIP-16, revision 5, and cable tray data for the involved cable tray ZB2MV180, disclosed that the penetration contained a safety-related cable and had last been inspected on April 23, 1979. This failure to maintain penetration seal integrity is contrary to 10CFR50 Appendix B, Criterion XVI, which requires in part that measures shall be established to assure that conditions adverse to quality are promptly identified and corrected, and constitutes an infraction level item of noncompliance (79-29-01). The penetration was promptly resealed by the licensee and re-inspected by the licensee and the inspector on November 9, 1979.

- Piping Vibration. No significant piping vibration or unusual conditions were identified.
- Anchor plates, bolts, and seismic restraints as well as inspections conducted pursuant to IE Bulletins were observed. No unusual or unreported conditions were observed.
- Fluid Leaks. No significant fluid leaks were identified which had not also been identified by the licensee. The inspector also observed sump status, alarms, pump-out rates, and held discussions with licensed personnel. Feedwater pump seal leakage and vibration problems existed at Unit 3. Discussions were held with the licensee regarding feedwater capacity and availability with respect to continued operation. This topical area has been forwarded to NRC management.
- Off Normal Alarms. Selected annunciators were discussed with control room operators to verify that operators as well as supervision were knowledgeable of plant conditions and that corrective action, if required, was being taken.
- Control Room Manning. On frequent occasions during this inspection, the inspector confirmed that requirements of 10CFR50.54(k) and Technical Specifications for minimum staffing requirements were satisfied. No unacceptable conditions were identified.

b. Reactor Water Chemistry

1. Primary Coolant Sampling and Chemical Analysis

The following surveillance tests for the periods as indicated were reviewed by the inspector to assure that Technical Specification limits were being satisfied.

2. Conductivity and Chloride Ion Content in Primary Coolant During Normal Operation

Surveillance Test 7.2.3.A and Peach Bottom Daily BWR Chemistry Analysis - October 29 - November 11, 1979. Inspection at Unit 2 confirmed that conductivity was being maintained within a range of 0.15 to 0.27 micromhos/cm at 25°C. Technical Specification 3.6.B.2a requires conductivity to be maintained within a 5.0 micromhos/cm limit. Inspection at Unit 3 confirmed that conductivity was being maintained within a range of 0.30 and 1.30 micromhos/cm for the period of startup and operations (October 31 - November 11) following the refueling outage. Chlorides parts per billion (ppb) for the time frames as referenced were verified less than 20 ppb at both Units 2 and 3. Technical Specification limits are 0.2 parts per million.

3. Determination of Dose Equivalent Microcuries/Gram I-131 in the Primary Coolant

The licensee analyzes the following nuclides: I-131, I-132, I-133, I-134, and I-135. Test data reviewed dated November 20, 1979 for Unit 2 indicated a total microcuries/ml I-131 equivalence of 2.00×10^{-3} . Test data reviewed dated November 15, 1979 for Unit 3 indicated a total microcuries/ml I-131 equivalence of 9.75×10^{-4} . The Technical Specification limit is 2.0 microcuries per gram. The prescribed surveillance test frequency is monthly under normal conditions, but weekly when off-gas release rate at the steam air ejector exceeds 75,000 microcuries per second. The licensee's means of determining when to implement the weekly requirement is being examined and will be addressed during a subsequent inspection.

4. Analysis of the Time Reactor Water Chloride and Conductivity are Above Specified Limits

Inspection of Peach Bottom Daily BWR Chemistry Analysis for Unit 2 indicated that there were no hours that the reactor water conductivity exceeded one or five micromhos for the interval October 29 - November 11. Unit 3 exceeded one micromho for a total of 35 hours, November 6 and 7, but did not exceed the Technical Specification limit of 5.0 micromhos/cm. The maximum chart recorder reading was 2.45 micromhos/cm. No unacceptable conditions were identified.

4. IE Bulletin/Circular/Information Notice Followup

IE Bulletin 78-03, "Potential Explosive Mixture Accumulations Associated With BWR Off-Gas System Operations"

The NRC staff evaluation has been completed (reference NUREG/CR-07-27), Boiling Water Reactor Off-Gas Systems Evaluation. The basis for evaluation of the off-gas system consists of the following five criteria.

Criterion 1: Precautionary Procedures

Certain maintenance operations, such as welding, and system operations, such as switching recombiners, can involve potential ignition sources that could inadvertently ignite off-gas mixtures. To minimize the probability of these occurrences, these and similar operations should be controlled by written procedures. Procedure OT-11, "Explosion - Air Ejector Discharge" and Procedure A-12, "Ignition Source Control" were reviewed by the inspector to verify measures were in effect to minimize potential for and mitigate consequences of any explosion. (Reference - IE Combined Inspection 50-277/78-25 and 50-278/78-25).

Criterion 2: Operation of Off-Gas System Within Design Parameters

Operating procedures related to the off-gas system should identify the design parameters within which safe operation of the off-gas system can be assured. (Reference NUREG/CR-07-27 and licensee response to IEB 78-03).

Criterion 3: Procedure on Corrective Actions

Operating and emergency procedures should be established to control reactor operations in the event of an off-gas detonation or burn. (Reference NUREG/CR-07-27 and licensee response to IEB 78-03).

Criterion 4: Ventilation of Contiguous Areas

Adequate ventilation should be provided in the contiguous areas through which off-gas system piping containing explosive mixtures of gases pass, such that possible leakage of off-gas will not result in the accumulation of a detonable gas mixture. (Reference NUREG/CR-07-27 and licensee response to IEB 78-03).

Criterion 5: Prevention of Continuous Off-Gas Leakage

The following features should be provided to minimize the possibility of an external hydrogen explosion due to continuous off-gas leakage following a pressure transient inside the off-gas system.

5.1 Explosive Mixture Regions

This section applies to portions of the off-gas system where: (a) explosive mixtures of hydrogen exist during normal operations, or (b) explosive mixtures are present due to bypassing parts of the normal off-gas system, e.g., bypass of the re-combiner and use of the 30-minute delay line. Non-resealing seals, such as loop seals which do not automatically isolate or refill, or rupture discs, should be vented to the main condenser or other portions of the system where addition of this stream would not substantially increase the probability of an internal explosion or burn. Self-actuating positive seals, such as relief valves, should either meet the above venting criteria, or vent to another area if sufficient air flow exists to ensure an explosive mixture does not form.

5.2 Normally Non-Explosive Mixture Regions

Portions of the system will be considered normally non-explosive if the following conditions are met and procedures exist for prompt correction of any situation causing explosive mixtures in this section. If these conditions are met, there are no restrictions on any potential opening. Two areas are considered.

Upstream of the Recombiner - This section is considered non-explosive if a control room alarm for low dilution flow rate is provided.

Downstream of the Recombiner - This section is considered non-explosive if control room alarms from the downstream hydrogen analyzer and one of the following indicate abnormal operation:

- a. recombining outlet temperature,
- b. recombining flow rate, or
- c. hydrogen analyzer downstream of each non-resealing seal.

The Peach Bottom Atomic Power Station system meets Criterion 5 in conjunction with procedural controls. The AOG system contains three loop seals, recombiner outlet temperature is monitored, and the recombiner can not be readily bypassed.

The licensee has also taken steps to identify specific hazards associated with the off-gas system (signs). The inspector had no further questions with respect to this Bulletin.

5. Non-Routine Event Review

The inspector reviewed the following non-routine event on site and in the NRC site office for safety significance, circumstance, and relationship to Technical Specification protective limits. The licensee's PORC review, evaluation, and corrective action were also verified.

LER Number

Title

3-79-36/3L

TIP Valve Guide Tube Assembly
Installed Reversed

The Unit 3 TIP valve guide tube assembly was found installed reversed. This problem was identified during an inspection of the Unit 3 TIP room. Inspection indicated that this reversal had been known but was not considered significant because the ball valve is qualified in both directions. The reverse installation, as a unit including the shear valve, had not been qualified as a boundary for primary containment. The problem is unique to Unit 3 and was attributed to misinstallation during construction. The entire valve assembly is not symmetrical, therefore, to place the shear valve in proper orientation, the valve was removed and turned 180 degrees. The ball valve assembly normally installed nearest the reactor is used to isolate the TIP tubing and close automatically under an isolation signal. In the event of a ball valve failure, an explosive shear valve is installed to close off the TIP tubing. Since the original design only qualified the shear valve in one direction and only with the TIP cable in the tubing, with a reverse installation, the shear valve could only be used if the TIP had been run into the core. The shear valve has subsequently been qualified without the cable through the tubing. Thus, if the shear valve had been required to operate, the charge would have fired and sealed off the TIP tubing. No data is available to substantiate the leakage that would have been present in the event of a ball valve failure and a TIP tubing leak. The ball valves were leak checked and operability confirmed. The subject shear valves are manufactured by Consolidated Controls. All Unit 3 shear valves were removed and then re-installed in the correct orientation.

LER NumberTitle

2-79-49/1P and 2-79-49/1T

Seismic Support Deficiency for Four (4)
Supports Associated with One Inch Control
Rod Drive Piping

The inspection program associated with IE Bulletin 79-02 identified four of six anchor bolts on four seismic supports associated with one inch control rod drive piping in which safety factors were determined to be between one and two. The inspector reviewed a General Electric safety evaluation and reviewed P&IDs and schematics associated with CRD withdrawal and insert functions to determine that a postulated failure would not result in a loss of scram capability. Discussions were also held at the corporate office concerning this subject. The inspector also reviewed an evaluation prepared by the A.E. based upon their review of the CRD insert and withdrawal line support system design which indicated that system operability would not be affected by an overstress condition. The basis for this evaluation was that deformation of any strut would result in load distribution to the other hanger members and that no drive insert and/or withdrawal line would fail under a seismic event. Corrective action including a re-design was achieved and implemented within seven days. The inspector additionally reviewed the new design and supporting Quality Control documentation regarding Q-listed piping supports. Final torquing was completed on November 9, 1979.

6. Radiation Protection

The inspector reviewed work in progress throughout the Unit 2 and Unit 3 facilities during the month related to Health Physics control, badging, usage of protective clothing, Health Physics adherence to RWP requirements, surveys, trash removal, and handling of potentially contaminated equipment and materials. Additionally, observations were made of usage of friskers and portal monitors on exiting various RWP areas, the power block, and the licensee's final exit point. In excess of 30 people were observed during the month. The inspector also assessed the adequacy and proximity of friskers in relationship to work areas in the plant. The licensee's control of radiation areas and high radiation doors including key control was reviewed. No high radiation area doors required to be locked were found unsecured. On November 8, 1979, while investigating a turbine leak at Unit 3 and while in the process of signing in on the appropriate RWP, the inspector determined that a member of the operations staff had entered the Unit 3 165 foot turbine and turbine hall area without signing in or providing the appropriate data required by RWP 3-I-5 dated January 3, 1979. The inspector determined that an ion chamber was available for use as required. This failure to comply with RWP requirements and Health Physics Procedure HPO/CO-4, "Radiation Work Permits", revision 13, dated March 20, 1979, constitutes an infraction level item of noncompliance (79-29-02 and 79-32-01). This item is recurrent in that an item of a similar nature was identified in a previous inspection. (Reference - IE Combined Inspection Report 50-277/79-23 and 50-278/79-25).

7. Training

The inspector attended General Employee Training (GET) to satisfy licensee requirements and to determine that new and existing employees (refresher training) were being instructed in administrative controls and procedures, radiological health and safety, industrial safety, controlled access and security procedures, emergency plans, and quality assurance as required by the licensee's program. The inspector also verified by questioning and observation of female employee training that instructions are provided regarding prenatal radiation exposure. Female employees are also provided with the applicable Regulatory Guide covering this subject. The inspector also confirmed by direct questioning that fire brigade and craft training was being provided. The licensee's General Employee Training examination was completed. Discussions and a formal critique of the training program was provided to licensee management. The inspector questioned certain comments related to radiation exposures and also noted that slides related to protected area fencing were out of date. The licensee stated that these areas would be updated. This area will be examined further during a subsequent inspection (79-29-03 and 79-32-02).

8. Control Rod Drive (CRD) Rerouting

By submittal dated August 27, 1979, the licensee advised the NRC that the Unit 3 control rod drive return line would be cut and capped at Unit 3. The CRD hydraulic system is not an engineered safety feature. This work was completed at Unit 3 during the 1979 fall refueling outage (cutting and capping). The entire modification for Unit 2 is scheduled for the 1980 refueling outage which is projected for March, 1980. The NRC issued on September 19, 1979, amendments No. 60 and 60 to the Operating License Nos. DPR-44 and DPR-56. These amendments revised the table of primary containment isolation valves to reflect rerouting in Technical Specification Table 3.7.1. The inspector also confirmed that the Technical Specifications were changed to delete snubbers which were removed as a result of this modification. The inspector had no further questions regarding administrative changes to the Technical Specifications (79-SC-08 and 79-SC-08).

9. In-Office Review of Monthly Operating Reports

The following licensee reports were reviewed in the NRC office on site. Peach Bottom Atomic Power Station Monthly Operating Report for:

October, 1979 dated November 9, 1979

This report was reviewed pursuant to Technical Specifications and verified to determine that operating statistics had been accurately reported and that narrative summaries of the month's operating experience were contained therein. No unacceptable conditions were identified.

10. NRR/Licensee Meeting

On November 30, 1979, the inspector participated in a NRR meeting to discuss the licensee's Emergency Planning and Emergency Plan in Bethesda, Maryland.

11. Presentation of Preliminary Findings

During the period of the inspection, licensee management was periodically notified of the preliminary findings by the resident inspector (see Detail 1). A summary was also provided at the conclusion of the inspection and prior to report issuance.