

U. S. NUCLEAR REGULATORY COMMISSION  
REGION I

DOCKET/REPORT NOS. 50-277/95-25, 50-278/95-25  
LICENSE NOS. DPR-44, DPR-56  
LICENSEE: Philadelphia Electric Company  
Correspondence Control Desk  
P.O. Box 195  
Wayne, PA 19087-0195  
FACILITY: Peach Bottom Atomic Power Station, Units 2 and 3  
INSPECTION AT: Delta, Pennsylvania  
INSPECTION DATES: October 2-6, 1995

INSPECTOR: RL Nimitz 10/20/95  
Ronald L. Nimitz, CHP  
Senior Radiation Specialist  
Radiation Safety Branch  
Division of Reactor Safety  
Date

APPROVED BY: [Signature] 10/20/95  
John R. White, Chief  
Radiation Safety Branch  
Division of Reactor Safety  
Date

**Areas Inspected:** Areas reviewed included organization and staffing; training and qualifications; program oversight activities; maintenance of personnel occupational radiation exposure as low as is reasonably achievable (ALARA); external and internal exposure controls; radioactive material and contamination controls; instrument calibration and functional testing; monitoring of effluents from the hot shop; and general plant tour observations.

**Results:** No violations were identified. The overall radiological controls for the Unit 3 outage were very effective and the programs to reduce occupational exposure as low as is reasonably achievable (ALARA) were very good. The radioactive material and contamination control programs were effective. Immediate and interim corrective actions were taken by station management following the TIP shield event.

## DETAILS

### 1.0 INDIVIDUALS CONTACTED DURING THE INSPECTION

#### 1.1 Licensee Personnel

- \* S. Baker, Manager, Radioactive Waste
- \* M. Dedrich, HP Supervisor
- \* D. DiCello, Radiation Protection Manager (RPM)
- W. Downey, Radiation Protection Supervisor
- \* D. Drotty, Radiological Engineer
- \* G. Edwards, Plant Manager
- \* R. Farrell, Radiological Engineering Manager
- \* A. Fulvio, Manager, Peach Bottom Quality Assurance
- \* G. Gellrich, Senior Manager, Operations
- \* G. Johnston, Director-Maintenance
- \* S. McCartyney, Instructor-Health Physics
- \* J. McElwain, Director-Outages and Projects
- \* T. Mitchell, Director-Site Engineering
- \* D. Odell, Chemistry Manager
- \* G. Rainey, Vice President, Peach Bottom Atomic Power Station
- \* R. Smith, Licensing Engineer
- \* J. Stankiewicz, Director-Training
- \* H. Trimble, Manager, Health Physics Support
- \* B. Wargo, Nuclear Quality Assurance (NQA) Assessor
- \* M. Warner, Senior Manager-Outages

Other licensee personnel were contacted during the inspection.

\* Denotes attendance at the exit meeting on October 6, 1995.

#### 1.2 OTHERS

- \* H. Abendroth, Atlantic Electric
- \* R. Krieriem, Delmarva Power

\* Denotes attendance at the exit meeting on October 6, 1995.

#### 1.3 NRC Personnel

- P. Bonnet, Resident Inspector
- R. Lawron, Resident Inspector
- \* W. Schmidt, Senior Resident Inspector

\* Denotes attendance at the exit meeting on October 6, 1995.

## 2.0 PURPOSE AND SCOPE OF INSPECTION

The inspection was an announced inspection of the radiological controls program. The following areas were reviewed during the inspection.

- organization and staffing
- training and qualifications
- program oversight activities
- maintenance of personnel occupational radiation exposure as low as is reasonably achievable (ALARA)
- external and internal exposure controls
- radioactive material and contamination controls
- instrument calibration and functional testing
- monitoring of effluents from the hot shop
- general plant tour observations

## 3.0 ORGANIZATION AND STAFFING/TRAINING AND QUALIFICATIONS

The inspector selectively reviewed the licensee's radiological controls organization and staffing for the Unit 3 outage. The inspector also reviewed the training and qualifications of selected contracted radiological controls personnel observed by the inspector to be providing direct oversight of on-going radiologically significant work activities. Further, the inspector selectively reviewed the training of radiation workers including those identified to have worn respiratory protective equipment. The review was against criteria contained in Technical Specifications, commitments made in the Updated Final Safety Analysis Report, applicable licensee procedures, 10 CFR Part 19, and 10 CFR 50.120.

The inspector's review indicated the licensee appropriately augmented the radiological controls organization with trained and qualified radiological controls personnel. Radiation workers were provided appropriate training. The inspector's selective review of personnel use of respiratory protection equipment (e.g., control rod drive removal) indicated that proper training for use of respiratory protective equipment was provided. The inspector also noted that the licensee provided a periodic radiation protection newsletter to the work force to make workers aware of emerging radiation protection issues and management expectations. The inspector further noted that the licensee developed and provided a radworker outage handbook to workers and provided special training for incoming radiation workers to make them aware of management expectations in the area of radiation protection.

The following observations were brought to the licensee's attention for review and evaluation.

- The licensee established a required reading program (Procedure HP-C-107, Revision 0) for radiological controls personnel in order to make personnel aware of important procedure changes or other information in a timely manner. The licensee developed a personnel list that was

periodically reviewed to ensure all personnel have read and signed appropriate required reading items. The inspector's review identified that chemistry personnel, acting in the capacity of junior radiological controls technicians, were not included on the required reading list.

The licensee's cognizant personnel indicated this was an oversight, immediately added the names to the personnel list, and placed access holds on the individuals to ensure the individuals reviewed and signed-off applicable required reading items prior to entering the radiological controlled area. The inspector's discussions indicated that the individuals had been previously briefed on the required reading items. However, outside of the required reading list, there were no clearly defined methods for assuring all appropriate personnel were cognizant of safety significant (high priority) required reading material prior to performing tasks associated with the material. The licensee indicated this matter would be reviewed.

- The inspector's review indicated that the license provided specific training of radiological controls personnel on the detection and measurement of hard-to-detect contamination (zinc-65) at the Peach Bottom station. Workers were also provided training on this matter via the aforementioned radiation protection newsletter. The licensee also developed special instructions and guidance associated with operating activities that could adversely impact the radiological environment at the station. These were considered very good initiatives. The inspector noted, that there was no specific training provide to in-coming contracted radiological controls personnel on systems, components, or operating activities that present, at the Peach Bottom station, particularly significant potential radiological controls hazards. Also, radiation protection personnel from the Limerick station were not provided training on the licensee's job standards. The licensee's representatives indicated the Limerick personnel did not use the standards. The licensee indicated these matters would be reviewed.

- Although a defined outage radiological controls organization was established and personnel assignments to various areas within the station identified, there were no well defined specific responsibilities or management expectations for personnel manning radiological control points throughout the station. The licensee indicated this matter would be reviewed.

- The inspector noted that the licensee implemented on-the job (task qualification) training for in-coming contracted radiation protection personnel. The personnel were evaluated relative to their ability to discuss proposed radiological controls for hypothetical work scenarios. The inspector noted that the scenarios, and the expected responses thereto, were apparently not standardized. Consequently, the inspector questioned the consistency of the evaluation of candidates by different on-the-job training evaluators. The licensee indicated this matter would be reviewed.

- The inspector noted one central point monitor indicated workers were permitted to self-survey themselves after identifying that they were contaminated. The individual was re-instructed by radiation protection personnel that workers would re-survey themselves under the direction/observation of radiation protection personnel.

No violations were identified.

#### 4.0 UNIT 3 OUTAGE ALARA PROGRAM PERFORMANCE

The inspector selectively reviewed the implementation and adequacy of the licensee's program to reduce personnel occupational radiation exposure to as low as is reasonably achievable (ALARA) during the Unit 3 refueling outage. The evaluation of the licensee's performance was based on discussions with cognizant personnel, review of documentation, and inspector observations during tours of the station. The inspector selectively reviewed ALARA planning and performance for the following work activities.

- reactor refueling
- reactor cavity work activities
- control rod drive removal and replacement
- feedwater nozzle decontamination and non-destructive examination
- inspection of the torus
- mainsteam isolation valve work
- residual heat removal system work
- main condenser work activities.

The inspector's review indicated the licensee implemented effective ALARA controls for the above activities. The licensee used various combinations of ALARA methods to reduce occupational exposures including decontamination, video coverage of work, telecommunications, electronic dosimetry including teledosimetry, and shielding. The licensee appropriately evaluated the use or non-use of respiratory protective equipment relative to minimization of total effective dose equivalent (TEDE). The inspector noted that the licensee used the teledosimetry system to continuously monitor the dose rate reduction effectiveness during decontamination of the feedwater nozzles. The use of teledosimetry eliminated the need for entry into the areas by radiation protection technicians to make periodic radiation dose rate measurements. The licensee also used the teledosimetry to continuously monitor workers under the reactor vessel during control rod drive removal and exchange. In addition, the inspector noted virtual reality equipment was used during valve cleaning activities. These were considered very good initiatives.

The inspector's review indicated exposure goals were reasonable, tracked and monitored. The licensee had established a goal of 300 person-rem for the Unit 3 refueling outage. As of October 6, 1995, the licensee was under the exposure goal and expected to met the goal.

(Note: NRC Combined Inspection Report Nos. 50-277/95-23; 50-278/95-23 incorrectly indicated an outage goal of 310 person-rem. The correct goal for the Unit 3 outage was 300 person-rem)

The inspector noted that the licensee implemented a number of engineering initiatives to reduce accumulated exposure over the life of the plant (LOP). The licensee estimated that about 928 person-rem would be saved over the LOP as a result of these initiatives taken over the last several years. The initiatives included the following.

- reactor water clean-up pump replacement (300 person-rem saved over LOP)
- control rod drive flush room modifications (80 person-rem saved over LOP)
- traversing incore probe system replacement (60 person-rem saved over LOP)
- reduction of in-service inspection commitments (40 person-rem saved over LOP)

The following observations were brought to the licensee's attention for review and evaluation.

- On October 2, 1995, the inspector observed an individual searching for a pipe nozzle location within the Unit 3 drywell. The individual knew the general location of the nozzle and had been directed to go to the area by a coworker to determine if a particular pipe nozzle was appropriately marked. The inspector observed the activity and questioned the potential accumulation of unnecessary exposure searching for the nozzle. Also, it was not apparent that the worker was knowledgeable of radiation dose rates in the area although general area radiation doses rates were substantially lower than the location where the individual had been working. Also, the worker did not inform radiation protection personnel that he would be moving to a new location.

The individual left the drywell and the licensee subsequently coached the individual on the need to inform radiation protection personnel when changing work locations and the need to know radiological conditions. The licensee also discussed the observation with the worker's management and radiation protection personnel. The inspector noted that the area (drywell elevation 157') entered by the individual, exhibited varying dose rates due to miscellaneous piping in the area. The licensee indicated that an ALARA review of the area would be performed.

- During review of control rod drive transfer operations on October 3, 1995, at the 135' elevation of the Unit 3 reactor building, the inspector observed personnel loitering near the drive exchange area. The area exhibited radiation dose rates up to 35 mR/hr. The licensee subsequently instructed personnel to not loiter in the area and instructed radiation protection personnel to be alert to this matter.

Based on the above review, the inspector concluded that, overall, the licensee implemented effective controls to minimize unnecessary personnel occupational radiation exposure. No violations were identified.

## 5.0 GENERAL RADIOLOGICAL CONTROLS (EXTERNAL AND INTERNAL EXPOSURE CONTROLS)

The inspector selectively reviewed the implementation and adequacy of radiological controls at Unit 3 for on-going and previously completed work. The review was against criteria contained in applicable licensee procedures and 10 CFR Part 20, "Standards for Protection Against Radiation". The inspector reviewed and discussed radiological surveys, radiation work permits, and discussed radiological conditions and radiological controls with cognizant personnel, as appropriate. The following matters were reviewed.

- posting, barricading and access control, as appropriate, to radiation, high radiation, very high radiation, and airborne radioactivity areas
- adequacy of radiological surveys (radiation, contamination, and airborne radioactivity) to support on-going work activities including evaluation of the mix of radionuclides present
- personnel adherence to radiation protection procedures, radiation work permits, and good radiological control practices
- use of and appropriate placement of personnel dosimetry devices
- use of respiratory protection equipment, as appropriate, including air quality testing and medical certification of workers
- use of process or engineering controls to minimize airborne radioactivity including use of portable ventilation systems
- exposure records and reports
- management involvement with and oversight of ongoing radiation protection activities including first-line supervisory oversight and control of contractor activities

The inspector selectively reviewed radiological controls for the following Unit 3 outage work activities.

- control rod drive replacement
- reactor refueling
- control rod blade change out
- main condenser work
- non-destructive examination of reactor internals
- reactor water clean-up system valve work
- outboard main steam isolation valve work
- residual heat removal pump and valve work
- grit blasting of turbine rotors

The inspector's review indicated that, overall, the licensee provided effective external and internal exposure controls for on-going outage work activities. There were no significant external or internal exposures of personnel and no unplanned exposures occurred. The licensee completed and maintained appropriate exposure records. The inspector's observations indicated the licensee repositioned dosimetry, as appropriate, to ensure proper measurement of point of highest dose locations. There was very good supervisor oversight of work activities. Radiation protection management exhibited a good understanding of on-going work activities and concerns or issues. The licensee augmented the oversight of station activities by use of corporate personnel and independent assessment by outside parties.

The inspector noted that the licensee took a number of aggressive immediate and interim corrective actions following identification of a contamination event (traversing incore probe event) discussed in NRC Combined Inspection Report Nos. 50-277/95-23; 50-278/95-23. The actions included enhancement of radiation work permit instructions, training of personnel, application of disciplinary action, installation of a real-time air monitor, and development of a special posting and a material receipt and control log. The licensee was continuing to evaluate the need for long-term corrective actions.

The following observation was brought to the licensee's attention for review and evaluation.

- On October 3, 1995, the inspector observed personnel in the upper elevations of the Unit 3 drywell preparing feedwater nozzles for non-destructive examination. The inspector noted that the personnel had passed beyond a sign which indicated "Do not enter fuel movement in progress". The inspector discussed this matter with licensee radiation protection personnel and noted that personnel had verbally coordinated entry with personnel on the refueling floor and no fuel movement was in progress. The inspector indicated it did not appear to be a good practice to allow personnel to routinely enter beyond such signs. The licensee agreed and setup a cover sheet for the signs, to place over them, when fuel movement was not in progress and workers were beyond the area (feedwater nozzle area) controlled by the signs. The signs would be uncovered when fuel movement resumed.
- The inspector's discussions with technicians monitoring grit blasting operations indicated that the portable air samplers used in the blast tents periodically became dust loaded and could only be run for short periods of time. Also, it was not apparent that the samples were representative of actual air concentrations in the blast areas. The inspector noted that blast hoods, with high protection factors, were used by the workers in the tents and no significant airborne radioactivity was evident or subject to inhalation by workers. The licensee indicated that use of a special filter head has addressed this observation but indicated the collection capabilities of the head would be reviewed.
- The inspector noted that breathing air for air-supplied respiratory protection equipment is provided by oil-less compressors and sampled prior to use. The licensee has continuous carbon monoxide monitors for the air supply. The inspector noted that there was no identified re-test frequency for re-testing, as appropriate, of the breathing air quality when the breathing air system (service air system) was in continual use. The licensee indicated this matter would be reviewed.

The inspector's review indicated generally very effective radiological controls were implemented. No violations were identified.



## 6.0 RADIOACTIVE MATERIAL CONTROL AND CONTAMINATION CONTROL

The inspector reviewed the adequacy and effectiveness of radioactive material, contaminated material, and contamination controls at Units 2 and 3. The inspector principally focused on review of the following matters.

- personnel frisking practices
- posting and labeling (as appropriate) of contaminated and radioactive material
- surveying and monitoring of material and equipment removed from the radiological controlled area (RCA) including evaluation of the mix of radionuclides present
- hot particle controls
- personnel contamination reports

The evaluation of the licensee's performance in this area was based on independent observations by the inspector, discussions with cognizant personnel, and review of documentation.

The inspector's review indicated that the licensee implemented an enhanced contamination monitoring program following identification of elevated levels of zinc-65 in selected areas within Unit 2 and 3. The licensee indicated approximately 20 areas exhibited higher levels of zinc-65 (a hard to detect radionuclide by conventional frisking techniques). Licensee analysis of the radionuclide mix in areas with the maximum concentrations of zinc-65 indicated zinc-65 represented approximately 90% of the radionuclide mix. The licensee provided special controls to access and remove material from these areas including enhanced monitoring of material removed from these areas. The licensee prohibited advanced radiation workers from monitoring material removed from these locations. The licensee also notified the station work force of the issues via publication of the changes in the licensee's employee newsletter.

The inspector noted overall excellent efforts to contain contamination. The inspector noted that the station contaminated floor space (based on licensee records) averaged between 3% and 5% over the past year. In addition, the inspector's review indicated that no personnel contaminations during the outage resulted in any significant personnel exposures.

The licensee initiated a number of actions in 1995 to reduce radioactive dry active waste (DAW) volume including limitation of use of tape and plastic sheeting, elimination of use of plastic bags, and reduction in use of wood scaffolding. The licensee generated about 80,000 cubic feet of DAW in 1994 and has a goal of 50,000 cubic feet for 1995. The licensee is well under the 1995 goal.

The following observations were brought to the licensee's attention for review and evaluation.

- On October, 3, 1995, the inspector observed one worker moving control rod drives on the 165' elevation of the reactor building, to throw his potentially contaminated gloves onto a non-contaminated floor. The licensee retrieved the gloves, surveyed the area, and placed a container at the location for future glove changes. The licensee also informed workers to use the container.
- The licensee considers the control room to be a non-contaminated area (although still within the radiological controlled area). Currently the licensee performs contamination monitoring of personnel by use of beta radiation sensitive personnel contamination monitors. The licensee is evaluating the need to perform contamination monitoring of personnel by use of gamma radiation sensitive personnel contamination monitoring in light of the presence of zinc-65 in selected areas of the station.
- There was no apparent program to certify leak tightness of portable vacuum cleaners or special requirements to survey the exhaust systems of the cleaners for contamination breakthrough when using the systems in high contamination areas. The licensee indicated these matters would be reviewed.

The inspector's review indicated the licensee implemented overall effective control of radioactive and contaminated material. No violations were identified.

#### 7.0 INSTRUMENT CALIBRATIONS

The inspector selectively reviewed the calibration and periodic checking of radiation protection instrumentation including survey meters and personnel contamination monitoring devices. The inspector also reviewed the calibration and functional testing of the Unit 3 reactor building ventilation exhaust monitor, the Unit 3 refuel floor vent exhaust radiation monitor, the control room intake monitor, and various refueling floor area radiation monitors. The review was against applicable requirements contained within Technical Specifications, national standards, and licensee procedures.

No violations were identified.

#### 8.0 MONITORING OF THE HOT SHOP EXHAUST VENTILATION

During tours of the licensee's hot shop, located on the ground floor of the "original" administrative building, the inspector noted that two ventilation systems took a suction on various contaminated areas within the hot shop including decontamination and grit blasting areas. The inspector walked down the ventilation systems and noted that the exhaust ventilation from the hot shop passes through two separate (one for each side of the hot shop) high-efficiency particulate air filter trains and discharges the exhaust to the roof area above the hot shop. The inspector noted that the licensee collected general area air samples within the hot shop in accordance with Technical

Specifications as a means of evaluating potential effluent release concerns. The inspector discussed this sampling with the licensee and questioned whether this sampling method ensured representative samples of the effluent from the discharge. The licensee was not able to provide data indicating whether the HEPA filters were periodically serviced and tested (if appropriate).

The licensee subsequently entered onto the roof top areas to survey the inside of the exhaust ducts and survey the rooftop areas below the discharge points. No radioactive contamination was identified. This area will be reviewed during a subsequent inspection. No violations were identified.

#### **9.0 GENERAL PLANT TOUR OBSERVATIONS**

The inspector toured the station periodically during the inspection. The inspector noted that general housekeeping appeared very good throughout the station including the drywall. The following observation was brought to the licensee's attention for review and evaluation.

- During tours of the moisture separator mezzanine (135'), the inspector observed a drum to apparently be leaking oil. The licensee initiated an immediate review of this matter.

#### **10.0 EXIT MEETING**

The inspector met with licensee representatives (denoted in Section 1.0) on October 6, 1995. The inspector summarized the purpose, scope and findings of the inspection. The licensee acknowledged the findings.