

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 88-07

Docket No. 50-388

License No. NPF-22 Category C

Licensee: Pennsylvania Power and Light
2 North Ninth Street
Allentown, PA 18101

Facility Name: Susquehanna Unit 2

Inspection At: Berwick, PA

Inspection Conducted: March 14-18, 1988

Inspectors: A. Weadock for 5/4/88
M. Markley, Radiation Specialist date

A. Weadock 5/4/88
A. Weadock, Radiation Specialist date

Approved by: M. Shanbaky 5/5/88
M. Shanbaky, Chief, Facilities Radiation Protection Section date

Inspection Summary: Routine, unannounced inspection to review implementation of the Radiation Protection Program during the Unit 2 outage. Areas reviewed included posting and labeling, internal and external exposure controls, control of radioactive materials and ALARA.

Results: No violations were identified.

DETAILS

1.0 Persons Contacted

1.1 Licensee Personnel

- *J. Blakeslee, Jr., Asst. Plant Superintendent
- *F. Butler, Supervisor of Maintenance
- *R. Byram, Plant Superintendent
- *J. Fritzen, Radiological Operations Supervisor
- D. McGarry, NQA-Operations
- *W. Morrissey, Radiological Protection Supervisor
- *H. Riley, Health Physics/Chemistry Supervisor
- M. Rochester, Health Physicist-ALARA
- *D. Roth, Senior Compliance Engineer
- K. Tuturow, Mechanical Repairs Foreman

1.2 NRC Personnel

- *F. Young, Senior Resident Inspector
- *J. Stair, Resident Inspector

*Attended the exit interview on March 18, 1988. Other licensee personnel were also contacted during the course of this inspection.

2.0 Purpose

The purpose of this routine, unannounced inspection was to review the implementation of the Radiation Protection Program during the current Unit 2 outage. The following areas were reviewed:

- status of previously identified items,
- organization and management controls,
- radioactive and contaminated material control,
- external exposure controls,
- internal exposure controls, and
- ALARA.

3.0 Status of Previously Identified Items

- 3.1 (Closed) Inspector Follow-up Item (50-387/86-03-02): Licensee to improve performance in ALARA area by providing challenging exposure goals.

The licensee's 1988 exposure goal of 640 person-rem for the two unit site compares favorably with industry averages and also reflects a challenge to performance based on comparison with the 1987 total station exposure (694 person-rem). This item is closed. Additional review in the ALARA area is discussed in section 8.0.

4.0 Management and Organizational Controls

Performance of the licensee's Radiological Controls organization was reviewed with respect to commitments made during a January 29, 1988 management meeting (Reference NRC combined Meeting Report No. 50-387/87-19; 50-388/87-19). Evaluations were based on discussions with cognizant personnel, review of documentation, and observations of inplant activities.

Inspector review noted a number of programmatic and facility improvements which were beneficial in improving radiological controls. These included the procurement of whole-body friskers and development of a Hot Particle Program (Section 6.0), provisions for real time air monitoring in the drywell (Section 7.0), and the development of specific Health Physics Instructions to control HP activities at the drywell and refueling floor control points.

Observations indicated the licensee implements a program of Health Physics Supervisory tours of the radiological work areas. Supervisory tour documentation indicated that most were completed by first-line management personnel. Some problems identified by NRC inspector tours had been previously identified and documented by the licensee (i.e. lack of snubber laydown area posting and Hot Shop contaminated material segregation; see sections 5.0 and 6.0). Licensee implementation of corrective action for these self-identified problems was considered not timely. Corrective action for weaknesses identified by the inspector was prompt and appropriate.

5.0 Radioactive and Contaminated Material Control

The inspector reviewed the licensee's program for identification and control of radioactive material by tour of the plant work areas and performance of independent radiation surveys. Personnel frisking practices were also reviewed.

Within the scope of this review, no violations were identified. The drywell personnel frisking station was redesigned to provide better HP observation of frisking practices. The inspector noted good frisking instructions to be posted at frisking stations. Frisking clocks were present at some locations. The inspector observations indicated workers were performing adequate personnel frisks.

The licensee's contaminated machine shop (Hot Shop) was identified as an area of poor contaminated material control. The following problems were noted:

- Bagged and labeled contaminated components were located on storage shelves next to, and sometimes piled on top of, clean components. No apparent efforts were being made to segregate known contaminated material from uncontaminated material on the storage shelves.

- Although several work tables in the Hot Shop were covered with yellow herculite and yellow and magenta tape to indicate contaminated material work areas, overall segregation and identification of contaminated and clean items on the work tables was poor. NRC survey of various items in the "clean" portions of the Hot Shop identified two items (a brown rag reading 3000 dpm/direct frisk and a metal clamp reading 10,000 dpm/direct frisk) that were not identified as contaminated material.

The inspector noted that an HP supervisory tour completed earlier in the week had identified the Hot Shop as an area needing attention. No subsequent actions, however, had been taken.

Once identified to licensee supervision, immediate corrective actions were taken in response to the above concerns. These included segregating material on storage shelves, expanding and clearly posting contaminated area work tables in the Hot Shop, and survey of the area to insure all contaminated material was identified. The licensee indicated additional supervisory attention would be directed towards this area in the future.

An additional concern relative to the responsiveness of Health Physics (HP) technicians to identify concerns was discussed with the licensee as follows:

- The deficiencies in posting of contaminated material in the Hot Shop was brought to the attention of a HP technician in the area. No immediate action was taken by the technician to correct the situation.
- On two separate occasions the inspector identified water leaks in the drywell to HP technicians. The leaks posed a potential contamination control concern. No apparent action was taken to preclude entry to the areas.

The licensee indicated these matters would be reviewed.

6.0 External Exposure Control

The inspector reviewed the following elements of the external exposure control program:

- adequacy and implementation of radiation work permits;
- adequacy of radiation surveys to support work activities;
- use and placement of personnel dosimetry devices;
- adequacy and implementation of high radiation area access controls;
- posting of radiation and high radiation areas.

Evaluation of licensee performance in this area was based on:

- performance of independent surveys;
- review of station procedures;
- review of selected Radiation Work Permits (RWP) and associated worker sign-in sheets and radiological surveys.

Within the scope of this review, no violations were identified. Specific areas for improvement were noted, however, and are discussed below.

During a tour of the drywell, a posted high radiation area, the inspector noted a snubber work crew waiting in the drywell for contamination survey results. Non-productive waiting in radiation or high radiation areas constitutes a poor ALARA practice. This was brought to the attention of an area HP technician, who subsequently sent the work crew to wait at the low dose rate drywell access. Licensee management stated that waiting in radiation or high radiation areas was not an acceptable practice at Susquehanna and that the situation would be evaluated.

The licensee has upgraded its procedures for High Radiation Area (HRA) access key control. These changes provide improved key control measures over the previous procedure revision. Key control logbooks were complete and all in-use keys were accountable. However, a concern with in plant access control implementation was identified. The inspector found the door to the Unit 2 749 ft. elevation RWCU Penetration Room open. This room was posted as a HRA and was typically maintained by the licensee in a locked condition. At the time of inspection, survey documentation indicated general area dose rates up to 400 mR/hr in the room which was below dose rates requiring locking of the area (required locking at and above 1 R/hr). The licensee indicated that failure of the door to close after the work party exited may have been due to a mechanical problem with the lock. However, the inspector observed this door to close and lock adequately. The unlocked door appeared to result in part, from inattention to detail, in that the RWCU Penetration Room door is located approximately ten feet from the HP control point and was easily observable to the inspector. The licensee indicated this matter would be reviewed.

The inspector noted that personnel access to the drywell was adequately controlled during fuel movement. Inspector tours indicated access to the upper drywell during fuel movement was controlled by warning lights, posting and locked barricades. Review of operations procedure (GO-100-006) verified health physics notification requirements prior to fuel movement. The cavity has a permanent shielding modification, which was installed prior to licensing, to reduce exposure in the upper drywell.

The licensee has established a Hot Particle Action plan. At the time of inspection, major portions of the program were complete. The licensee has established an adequate skin dose assessment procedure (HP-TP-510) for evaluating hot particle skin exposures.



The licensee has obtained ten portal-type whole body frisker contamination monitors. These instruments are capable of detecting hot particles as well as low levels of contamination on personnel. The licensee has identified and performed dose assessments for individuals contaminated with hot particles. No exposures in excess of regulatory requirements were identified. The inspector will continue to evaluate this area as the program is completed.

The following instances of poor radiological posting practices were noted during the inspection and were immediately corrected by the licensee:

- Temporary work areas on both the Unit 2 refueling floor and the Hot Shop were noted to be inconsistently posted at the different barriers to the area. Specifically, both areas were posted as "Contaminated Area" only on one placard and "Contaminated Area" and "Respiratory Protection Required" on the other placard.
- An HP technician exiting the equipment pit on the Unit 2 refueling floor failed to replace the "Respiratory Protection Required" sign after exiting.
- The snubber laydown area, adjacent to the snubber test trailers, was incompletely posted. The area had been identified with a step-off pad and yellow and magenta tape on the floor; no barrier rope or "Contaminated Area" signs had been placed around the area. NRC review indicated that a licensee supervisory tour had identified the lack of a barrier rope and signs around the snubber lay down area earlier in the week. The licensee indicated this was not corrected at the time due to a lack of stanchions to post the area.

Review of external exposure records indicated no exposures in excess of regulatory requirements. Observation of workers indicated correct use of personnel dosimetry. The licensee has demonstrated good initiative in issuing alarming dosimeters to each individual entering the drywell. The inspector noted, however, that the drywell HP Control Point would occasionally run out of alarming dosimeters.

Inspector review of selected radiation protection instrumentation found all instruments to be appropriately calibrated with sources traceable to the National Bureau of Standards. The licensee maintains daily quality control charts for source and background checks.

7.0 Internal Exposure Controls

The licensee's program for identifying and controlling exposure to airborne radioactive material was evaluated by the following methods:

- review of air-sampling records,
- observation of respirator issue and use,
- cross-check of respirator issue records against worker qualification logs,



- review of selected Whole Body Count (WBC) results, including WBC records associated with an intake occurring on March 11, 1988,
- discussion with cognizant personnel, and
- review of selected station procedures.

Within the scope of this review, no violations were identified. Adequate air-sampling was being completed to support on-going activities. Review of air-sample results indicated relatively few examples of above normal airborne activity; an observation supported, in part, by the low incidence of positive whole body counts. Portable ventilation was noted to be used in a number of work situations to reduce airborne activity.

In response to NRC concerns raised during a previous inspection (see Report No. 50-387/87-19), the licensee has placed three AMS-3 continuous air monitors inside the drywell to provide a real-time airborne radioactivity monitoring capability and early indication of increased airborne radioactivity. Job-specific air-sampling is also being conducted in the drywell.

The inspector reviewed licensee WBC results for two workers contaminated on March 11, 1988. The workers were contaminated while working on underwater lights that had been removed from the reactor cavity pool. Both workers were identified to have facial contamination; subsequent nasal swabs and WBC results were also positive.

The licensee conducted an investigation into the circumstances leading to the worker contamination during the week of the inspection. The inspector reviewed the licensee's actions to assess exposure to the two workers. The licensee performed follow-up WBCs and conservatively estimated exposure to the workers as approximately 1.4 and 4.1 MPC-hours, respectively. The workers exposures were well below the regulatory limit (520 MPC-hr per calendar quarter).

The licensee's evaluation of circumstances leading to the personnel contaminations was incomplete at the conclusion of this inspection and will be reviewed during a subsequent inspection.

8.0 ALARA

The program for maintaining occupational exposure ALARA was evaluated by the following methods:

- discussion with cognizant personnel,
- observation of ongoing work activities,
- review of the following documentation:
 - outage RWP man-rem/man-hour summary,
 - selected ALARA pre-job reviews,
 - procedure HP-AL-400, "RWP ALARA Reviews and Evaluations,"



- procedure NSI-2.1.4, "Development of Annual Man-Rem Estimate and Goal,"
- selected ALARA In-Progress Reviews.

Within the scope of the above review, no violations were identified. The licensee's ALARA goal for 1988 is 640 person-rem for both units; this was noted to be challenging when compared to 1987 total exposure (694 person-rem). The ALARA exposure goal for the current Unit 2 outage was set at 414 person-rem; as of March 14, cumulative Unit 2 outage exposure totaled 54 person-rem.

The following examples of strong performance were noted during the above review:

- Daily tracking and review of accumulating exposure was being performed by the ALARA staff.
- The licensee's computerized dosimetry system provides flexibility in the generation and analysis of accruing exposure.
- The inspector noted good organization and exposure reduction techniques (mockup training, CCTV, CRD flange shield) being used in association with CRD work.
- Radio headsets were used to maintain good communication between drywell technicians and the control point.

Several areas for improvement were noted and include the following:

- Poor ALARA practice noted during snubber removal operations (see Section 6.0).
- RWPs for Appendix R modifications (88-027, 88-028) did not have the associated ALARA pre-job review (No. 87-098) included with the RWP in the HP office file or at all control points where the RWPs were being worked.

The licensee indicated the above was an oversight and immediately included the ALARA review with the office file and field copies of the RWPs.

- Licensee procedure HP-AL-400 requires that ALARA pre-job reviews be performed for jobs estimated at greater than 1.0 person-rem. Inspector review identified that work had been performed on the two following RWPs prior to the performance of an ALARA review:
 - RWP 88-101, "Decon Reactor Cavity and Equipment Pit," estimated at 1.5 Rem,
 - RWP 88-102, "Refuel Floor General Work," estimated at 3.5 Rem.

The licensee stated that only minor decon work had been done on RWP 88-101, and that an ALARA review would be performed prior to the cavity decon at the end of refueling. The licensee also stated that since RWP 88-102 was a general work RWP, specific ALARA control measures were not generally applicable. Consequently, a high priority was not placed on completing the review. An ALARA review for this work was completed March 14, 1988.

The inspector indicated that the above findings may indicate a need for additional attention to the area of completion of reviews prior to commencement of work. The licensee indicated additional attention would be directed to this area.

- Licensee effort has been expended during the current outage towards having responsible work group supervisors perform ALARA in-progress work reviews. The licensee indicated during previous outages the performance of these in-progress reviews was principally the responsibility of the HP/ALARA staff. The inspector examined work reviews completed as of March 17, 1988 and noted that all had been completed by interview of work group supervisors, i.e. none had been documented by the ALARA staff. The inspector stated that although increasing the responsibility of the work group supervisors in ALARA tasks is a positive initiative, in-progress reviews should also be performed by ALARA staff as well.

Licensee efforts in the ALARA area will continue to be reviewed during subsequent inspections.

9.0 Exit Meeting

A meeting was held with the personnel identified in Section 1.0 on March 18, 1988. During this meeting, the inspector summarized the purpose, scope, and findings of the inspection.