U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-440/87018(DRSS)

Docket No. 50-440 License No. NPF-58

Licensee: Cleveland Electric Illuminating Company
P. O. Box 5000
Cleveland, OH 44101

Facility Name: Perry Nuclear Power Plant, Unit 1

Inspection At: Perry Site, Perry, Ohio

Inspection Conducted: August 24-28, 1987

D. E. Miller

Inspector: D. E. Miller 9/14/87
Date

L. R. Greger

Approved By: L. R. Greger, Chief 9-14-87
Facilities Radiation Protection Section Date

Inspection Summary

Inspection on August 24-28, 1987 (Report No. 50-440/87018(DRSS))
Areas Inspected: Routine unannounced inspection of portions of the radiation protection and radwaste management programs. Also reviewed were progress made in radiation measurement and chemical and radiochemical startup tests, previous inspection findings, and facility development. A special inspection of allegations concerning the radiation protection program was also performed.
Results: No violations or deviations were identified.

DETAILS

1. Persons Contacted

*G. Anderson, Unit Lead Engineer, ICS, Perry Plant Operations Department (PPOD)
*R. Bowers, Corporate Health Physicist
*W. Coleman, General Supervising Engineer (GSE), OQS, Nuclear Quality Assurance Department
*G. Dunn, Compliance Engineer, LCS, Perry Plant Technical Department (PPTD)
*B. Ferrell, Operations Engineer, LCS, PPTD
*B. Higaki, GSE, MMQS, Quality Assurance
M. Lyster, Manager, PPOD
W. McCoy, Health Physics Supervisor, RPS, PPTD
*C. Shuster, Manager, Nuclear Engineering Department (NED)
*D. Takacs, General Supervisor, Maintenance, PPOD
J. Traverso, Health Physics Engineer, EPSS, NED
F. Stead, Manager, PPTD
*L. VanDerHorst, Plant Health Physicists, HPU, RPS, PPTD
*B. Walrath, GSE, EPSS, NED
*S. Wojton, GSE, RPS, PPTD
F. Whitaker, Senior Health Physics Supervisor, HPU, RPS, PPTD

*G. O'Dwyer, NRC Resident Inspector

The inspector also contacted several licensee technicians, specialists, consultants, and supervisors.

*Denotes those at the exit meeting.

2. General

This inspection, which began at 12:30 p.m. on August 24, 1987, was conducted to review portions of the licensee's radiation protection and radwaste management programs. Also reviewed were open items, startup tests, facility development, and a special review of allegations concerning the radiation protection program. Tours of licensee facilities were made to review implementation of radiological controls and housekeeping. Postings, controls, and housekeeping appear adequate.

3. Licensee Action on Previous Inspection Findings

(Open) Open Item (440/86031-01): Apparent need for additional health physics technicians. Since previously discussed, three additional technicians have been hired. Licensee management is considering an internal recommendation to substantially increase health physics technician staffing.

(Closed) Open Item (440/86031-03): Shortcomings in quality assurance inspection program for radioactive materials shipments and associated training of QA inspectors. On January 13-14, 1987, eleven QA personnel attended twelve hours of classroom instruction concerning regulatory and burial site requirements for radioactive materials packaging and shipping. Checklists for QA inspection of radioactive materials shipments have been developed and implemented. Corrective actions appear adequate.

(Open) Open Item (44/87006-01): Need to clarify Procedure OM3A:SOI-F42, and alter labeling on Unit Supervisor's console. Engineering Design Change (EDC) Request No. 870418 has been written to initiate labeling change and drawings update. The procedure to be changed after completion of labeling and drawing changes.

(Closed) Open Item (440/87006-02): Install dose-rate meter in IFTS valve room. Procedure OM19A:GTI-0002 has been revised to include positioning a dose-rate meter in the IFTS valve room for use during the first irradiated fuel movement through the IFTS.

(Closed) Open Item (440/87006-03): Expedite construction of tool decontamination facility and review need for dedicated contaminated tool/equipment storage areas. The tool decontamination facility is under construction. The licensee has no immediate plans for contaminated materials storage areas/facilities except for considerations being given to construction of a radwaste storage building, a portion of which would be used for storage of reusable contaminated equipment and materials.

4. External Exposure Control and Personal Dosimetry

The inspector reviewed the licensee's external exposure control and personal dosimetry programs, including: changes in facilities, equipment, personnel, and procedures; adequacy of the dosimetry program to meet routine needs; required records, reports, and notifications; and effectiveness of management techniques used to implement these programs.

The inspector reviewed the licensee's program for determining past exposures to newly hired personnel, recording the exposures on forms NRC-4, and maintenance of such records/forms. Also reviewed were maintenance of forms NRC-5. No significant problems were noted. Record maintenance appears good.

The inspector specifically reviewed dosimetry and monitoring for entry into neutron exposure rate areas in the drywell and containment. For entry into such areas, the neutron exposure rates are measured with a PNR-4 instrument and dose to individuals are conservatively estimated by time-keeping. Individuals entering these areas are provided and wear albedo dosimeters. The licensee maintains records of both the time-keeping dose estimates and the albedo dosimeter analyses results; these numbers are compared. The albedo dosimeter results are normally considered the official dose; the albedo results are normally lower than the conservatively estimated time-keeping numbers. At the request of the Plant Health Physicist, a Health Physics Engineer assigned to the Nuclear Engineering Department

reviewed the acceptability of use of the albedo neutron dose as the official record; he concluded that the use of the albedo results as the official dose was proper. The inspector agrees with the conclusion. A neutron spectra study, being performed onsite by a contractor, could alter the conclusion. The study is described below.

A contractor is onsite to characterize the neutron energies and exposure rates in the drywell. The purpose is to determine changes within the drywell and response of instrumentation and dosimetry to the energies and energy changes. Several instrument and dosimetry types are being tested to determine response; the dosimeters are mounted on water filled phantoms. The contractor is to provide to the licensee a formal report of the study results. The licensee will then determine adequacy of neutron monitoring programs and make necessary changes/improvements.

The inspector reviewed the licensee's method of control of access to neutron exposure areas in the containment. During operations, the licensee posts and zones neutron exposure rate areas at 0.5 mrem/hr. Persons entering the posted/zoned area must follow radiation work permit requirements, be time-kept, and wear prescribed dosimetry. As discussed in Section II, the licensee plans to reduce or eliminate the neutron exposure areas in containment by addition of shielding to the streaming areas.

No violations or deviations were identified.

5. Internal Exposure Control and Assessment

The inspector reviewed the licensee's internal exposure control and assessment programs, including: changes in facilities, equipment, personnel, and procedures affecting internal exposure control and personal assessment; determination whether engineering controls, respiratory equipment, and assessment of individual intakes meet regulatory requirements; required records, reports, and notifications; and effectiveness of management techniques used to implement these programs.

The licensee has two stand-up whole body counters (Nuclear Data "People Mover") and a chair type counter (Canberra). The chair counter and one stand-up counter are located in the Technical Support Center (TSC), and one stand-up counter is located in the training building. The stand-up counter in the TSC, and the dosimetry issue and records program, will be moved into a building being constructed near the Service Building. The move will be made to consolidate services and reduce congestion in the access control area.

The licensee is developing a quality control program for whole body counter operation to assure that the counters are operated within acceptable parameters. This program supplements routine calibrations being performed. The inspector cursorily reviewed records of whole body

counts performed and methods of record maintenance. Also reviewed were respiratory medical authorizations, respiratory equipment cleaning and storage, and respiratory issue procedures. No problems were noted.

No violations or deviations were identified.

6. Control of Radioactive Materials and Contamination

The inspector reviewed the licensee's program for control of radioactive materials and contamination, including: changes in instrumentation, equipment, and procedures; effectiveness of survey methods, practices, equipment and procedures; adequacy of review and dissemination of survey data; effectiveness of methods of control of radioactive and contaminated materials; and management techniques used to implement the program and experience concerning self-identification and correction of program implementation weaknesses.

The licensee's personal contamination monitoring program consists of friskers located at or near step-off-pads and Gamma-10 portal monitors located at the two controlled area exits and at the exit from the protected area. The portals have been changed from the walk-through mode to the "time-out" mode; in the "time-out" mode, the person being monitored must stand in the monitor for about ten seconds. By operating the monitors in the "time-out," their detection sensitivity is greatly increased. To further increase personal contamination detection capabilities, the licensee plans to purchase, install, and use PCM-1B whole body friskers, which would replace the Gamma-10 portal monitors at the two controlled area exits. Gamma-10 portal monitors would remain in use at the protected area exit.

During tours of the controlled area, posting and labeling of radioactive materials appeared proper. However, some bagged contaminated materials extended outside of boundary ropes. The inspector discussed with the licensee the desirability of improving the method of zoning contaminated materials storage areas.

The inspector reviewed records of personal contamination incidents recorded on the licensee's Personnel Contamination Survey Form. The inspector noted that the form does not require gathering of some information that would be useful if the form is to be used as a management tool for radiation protection program implementation oversight/review. Missing required information includes original method of detection (frisker, portal, and location), adequacy of protective clothing specified, and procedural adherence information. This matter was discussed at the exit meeting and will be further reviewed during a future routine inspection.

No violations or deviations were identified.

7. Facilities and Equipment

Newly constructed facilities and needs for additional facilities are discussed in Inspection Reports No. 50-440/86031 and No. 50-440/87006. The inspector cursorily reviewed progress made in construction of selected new facilities during this inspection. Construction progress for these selected facilities is described below:

- Permanent relocation of the sorting monitor to the radwaste building where the reverse osmosis equipment had been installed, has been accomplished; the monitor is in use in its new location.

- Construction of radwaste compaction facilities, which awaited relocation of the sorting monitor, is to begin soon.

- Construction of the tool decontaminations facility in the intermediate building has begun. No firm completion date is set.

- Construction of a radwaste storage facility is proposed.

- Construction of an additional machine shop is proposed; the existing machine shop would become a "hot" shop where work could be done on contaminated equipment; no "hot" shop now exists.

No violations or deviations were identified.

8. Liquid Radioactive Wastes

The inspector reviewed the licensee's liquid radwaste management program, including: determination whether changes to equipment and procedures were in accordance with 10 CFR 50.59; determination whether liquid radioactive waste effluents were in accordance with regulatory requirements; and adequacy of required records, reports, and notifications.

The inspector selectively reviewed records of liquid radwaste releases made during 1987. The requirements of 10 CFR 20 and the ODCM appear to have been met. A problem with performance of valve lineup verifications is discussed in Inspection Report No. 50-440/87012. No additional problems were identified.

No violations or deviations were identified.

9. Solid Radioactive Waste

The inspector reviewed the licensee's solid radioactive waste management program, including: determination whether changes to equipment and procedures were in accordance with 10 CFR 50.59; adequacy of implementing procedures to properly classify and characterize waste, prepare manifests, and mark packages; overall performance of the process control and quality assurance programs; and adequacy of required records, reports, and notifications.

The inspector selectively reviewed records of radwaste shipments made during 1987. Procedures to classify and characterize waste, prepare manifests, and mark packages appear adequate and are properly implemented. Records of radwaste shipments appear complete. Radwaste shipments made to date are mainly bead resins and evaporator bottoms solidified in cement in disposable liners, and compactible waste in 55-gallon drums. The quality assurance program for shipment surveillance has been implemented.

No violations or deviations were identified.

10. Transportation of Radioactive Materials

The inspector reviewed the licensee's transportation of radioactive materials program, including: determination whether written implementing procedures are adequate, maintained current, properly approved, and acceptably implemented; determination whether shipments are in compliance with NRC and DOT regulations and the licensee's quality assurance program; determination if there were any transportation incidents involving licensee shipments; and adequacy of required records, reports, shipment documentation, and notifications.

The inspector selectively reviewed records of radioactive materials shipments made during 1987. These shipments included laundry packaged in 55-gallon drums to a commercial laundry facility, radioactive samples to an analytical laboratory, and radioactive sources being returned to a vendor. The procedures designed to implement the program appear adequate; the licensee maintains current copies of NRC or Agreement State licenses for shipment consignees; shipping papers appear to be complete. There were no transportation incidents.

No violations or deviations were identified.

11. Startup Test STI-D21-002, Radiation Measurements

FSAR Section 14.2.12.2.2 states that radiation measurements will be made throughout the plant prior to fuel load, subsequent to fuel load during reactor heatup, and at nominal power levels of 20-25, 60, and 100 percent of rated power. Also, surveys are to be performed before and after Reactor Water Cleanup (RWCU) system resin transfer and during traversing of the startup neutron sources through the inclined fuel transfer system.

Radiation measurements performed through 29 percent power, and RWCU spent resin transfer and inclined fuel transfer system testing are discussed in Inspection Report No. 50-440/87006.

A fifth set of radiation measurements was performed during May 1987 with the core power at 63 percent and electrical power at 740 MWe. Gamma radiation measurements were made in general areas and at pre-established survey points; general area neutron measurements were made in containment. All areas measured were less than or equal to 0.2 mR/hr gamma and 1.0 mrem/hr neutron with the exception of RWCU Rooms "A" and "B" (25.0 and 1.0 mR/hr respectively, "B" pump tagged out for repair), the reactor sample station area (0.6 mR/hr gamma), the RCIC

pump room (6.0 mR/hr gamma), and the turbine building exhaust plenum (11.0 mR/hr gamma). The results of the general area survey measurements were compared with the maximum predicted radiation exposure rates presented in FSAR Figures 12.3-1 through 12.3-8. In all cases the measured values were below the FSAR maximum values.

The radiation measurements commitments of FSAR Section 14.2.12.2.2 have been satisfactorily completed except for future measurements to be made at 100 percent of rated power. These measurements will be reviewed during future performance of routine inspection modules.

More detailed surveys were conducted in containment to characterize neutron streaming after the 63 percent power survey discussed above. Neutron streaming was detected on the containment side of the junction between the drywell purge pipe and its drywell penetration. During operations, the drywell purge pipe itself is maintained water filled between the inboard and outboard isolation valves to preclude the pipe itself being a streaming path. The pipe is located at the 628-foot elevation. The maximum measured neutron exposure rate was 80 mrem/hr immediately adjacent to the pipe/wall junction when the core power level was 70 percent. The maximum neutron exposure field is relatively inaccessible being about 20 feet above a walkway. The maximum neutron exposure rate observed in the walkway area was 2.5 mrem/hr; this exposure rate is caused by scatter. Control of access to this area and dosimetry is discussed in Section 4. The licensee found other penetrations which permit neutron streaming to a minor extent. According to licensee representatives, formal plans to add supplemental shielding to the neutron streaming areas will be made after surveys are performed at 100 percent core power when the maximum exposure rates are expected; shielding can then be designed to reduce streaming to acceptable levels. The licensee's interim access control measures are acceptable. Neutron energy and intensity studies, being performed for the licensee by a contractor, should aid in shielding design; these studies are described in Section 4. (Open Item 440/87018-01)

No violations or deviations were identified.

12. Startup Test STI-P35-001, Chemical and Radiochemical

FSAR Section 14.2.12.2.1 states that various chemical and radiochemical tests will be performed prior to fuel load, prior to heatup, during heatup, and during power ascension; data is to be collected from the reactor water, condensate, feedwater, control rod drive water, condensate demineralizer, reactor water cleanup, main steam, and liquid and gaseous radwaste systems.

The purpose for testing the chemical and radiochemical parameters is to verify that chemical parameters of various fluid filled systems meet acceptable limits and to determine adequacy of plant sampling procedures and equipment, analytical procedures and equipment, and sampling and handling techniques. Additional objectives for these tests are to

evaluate fuel performance and condenser integrity, demonstrate proper steam separator-dryer operation, and to check calibration of certain process instrumentation.

Tests performed through 30 percent core power are discussed in Inspection Report No. 50-440/87006.

During June 1987, chemical and radiochemical tests were performed with the core power at 77 percent and electrical generation at 88 MWe. Appropriate chemical and radiochemical testing of the reactor water cleanup, feedwater, CRD water, condensate, off-gas, and liquid radwaste fluids were performed. All results were within specifications. No abnormalities were identified during testing.

The results of future testing during power ascension will be reviewed during later performance of routine inspection modules.

No violations or deviations were identified.

13. Allegation Followup

Discussed below are three separate allegations brought to the attention of NRC Region III. These allegations were evaluated when received to determine need for immediate onsite followup; such need was not indicated. Further reviews were performed during this inspection.

a. A worker for a firm contracted to do work at the Perry Plant informed Region III that he had not received a whole body count at the time of his termination . The caller provided his name, social security number, and date of birth so that his concern could be followed up. The subject of the call and followup discussions are presented below. (AMS No. RIII-87-A-0107(Closed))

Allegation: The worker stated that he was laid-off and sent home without receiving a termination whole body count.

Discussion: The alleger was terminated when he arrived for work at midnight. According to licensee health physics personnel, they were informed by the contractor superintendent, when he arrived on the following day shift, that the contractor had failed to assure that the alleger was whole body counted at the time of his termination, but that arrangements would be made to return the alleger to the site for counting. The alleger returned to the site and was whole body counted five days after his termination. No activity above detection limitations was found.

NRC regulations do not require that all persons who work in controlled areas receive exit whole body counts. The regulations require that sufficient bioassays be performed to assess effectiveness of protection provided. Licensee procedures also do not require that all persons who work in controlled areas receive exit whole body counts. Licensee practice, however, is to whole body count all radiation workers immediately upon termination of their employment.

In order to preclude similar future deviations from this practice, the contractor firm intends to withhold the wages of terminating workers until proof is obtained that the exit whole body count has been performed. No violations of NRC or licensee requirements or need for further followup were identified.

Finding: The allegation was substantiated in that the individual was not whole body counted immediately upon termination; however, the licensee became aware of the omission in a timely manner, provided the termination whole body count, and took appropriate corrective actions to prevent recurrence. No regulatory requirement was violated.

b. On June 4, 1987, the NRC Headquarters Duty Officer (HDO) received a telephone call from a Cleveland, Ohio newspaper concerning two telephone calls they received from Perry Plant workers who reportedly did not identify themselves. Region III was notified by the HDO on the same day. The subject of the call and followup discussions are presented below. (AMS No. RIII-87-A-0083(Closed))

Allegation: Neutron radiation is leaking from primary to secondary containment.

Discussion: This matter was reviewed as a part of the routine inspection program and is discussed in Section 11 of this inspection report.

Finding: While the allegation was substantiated, no regulatory violations occurred. Startup radiation survey measurements are conducted to identify such abnormalities so that adequate protective measures or alterations can be instituted. Licensee actions to date have been acceptable.

c. Region III received concerns pertaining to building evacuations following steam leaks and to the bioshield wall. The concerns are presented and discussed below. (AMS No. RIII-87-A-0112)

Allegation: Deficiencies in the bioshield wall caused neutrons to leak into the containment building.

Discussion: As noted in Section 4 above, a neutron energy and dose rate characterization study within the drywell is currently underway. No significant problems have been identified to date concerning bioshield wall problems causing excessive drywell neutron dose rates. It is possible that the alleger is referring to neutron leakage from the drywell to secondary containment inasmuch as neutron dose rates are expected within the drywell (and no significant abnormalities concerning these dose rates have been found). As discussed in Section 11 above, abnormal neutron leakage into the Perry secondary containment has been detected due to insufficient shielding surrounding the drywell purge pipe at its drywell penetration (rather than due to bioshield problems).

Finding: While abnormal neutron dose rates have been identified in the secondary containment, licensee actions to control access to the affected areas pending resolution of the problem are acceptable, and no regulatory requirements have been violated.

Allegation: Buildings were evacuated during steam leaks; personnel were ordered back into the buildings before the buildings were checked for radiation.

Discussion: Because no dates or locations were provided, the inspector obtained information concerning all building evacuations that occurred during 1987 and attempted to identify circumstances that may have caused the concern. Containment was evacuated six times as a precautionary measure following reactor scram, safety relief valve (SRV) lifting events, or prior to certain system testing. Adequate surveys were performed before entries were permitted after the evacuations. These evacuations did not involve steam leaks and therefore do not appear to be the questioned evacuations.

Four evacuations of the off-gas building (one included the turbine building) occurred during the period. These evacuations were initiated because of an "Alert" alarm on monitor D17-K760 located in the off-gas building ventilation exhaust system. The off-gas building ventilation exhaust system exhausts air from certain equipment rooms in the turbine, turbine power, and off-gas buildings. Procedure ONI-D17 and associated Alarm Response Instructions (ARIs) require evacuation of the affected areas upon receipt of an "Alert" alarm; the reactor operator initiates the evacuation in accordance with the ARI.

During the first such evacuation which occurred on April 29, 1987, health physics unit personnel identified the source of radioactivity to be a leak in a steam jet air ejector (SJAE) room in the turbine building. Such leakage does not enter the building atmosphere since the SJAE room is exhausted directly to the ventilation system. During conduct of surveys to identify the source, the licensee found that the leakage source area could be quickly identified by using a frisker to survey ventilation ductwork leading from the ventilated rooms/areas. Subsequent D17-K760 "Alert" alarms and evacuations occurred on May 21, May 31, and June 4, 1987. The source of the "Alert" alarms was blown loop seals in the same SJAE room. Health physics unit personnel used the frisking technique to quickly locate the source area and then sample for radioactivity in adjacent general access areas; the SJAE room is not a general access area. Consequently, the evacuations were of short duration (30 minutes or less) and may have led someone to believe that radioactivity levels in the affected buildings were not checked. The checks performed were adequate and proper.

Because the "Alert" alarms on the ventilation system monitor are conservatively set (one MPC-hour for noble gas and four MPC-hours for halogens), the licensee has initiated a change to the ARI which would direct the reactor operator to consult with the senior health

physics unit member onsite before evacuating personnel upon receipt of a D17-K760 "Alert" alarm. Evacuation would be required upon receipt of a "High" alarm; the "High" alarms are set at 10 MPC-hours.

No violations of NRC requirements or need for further followup were identified.

Finding: The allegation was not substantiated. Adequate evaluations were made before reentries were made after building evacuations.

14. Exit Meeting

The inspecto. met with Messrs. Stead and Lyster on August 23, 1987, and with licensee representatives (denoted in Section 1) at the conclusion of the inspection on August 24, 1987. The inspectors also discussed the likely informational content of the inspection report with regard to documents and processes reviewed by the licensee during the inspection. The licensee identified no such documents/processes as proprietary. In response to an item discussed by the inspector, the licensee acknowledged the inspector's comment about the apparent need to improve personal contamination incident documentation. (Section 6)