U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-440/89029(DRSS)

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

Licensee: Cleveland Electric Illuminating Company
Post Office Box 5000
Cleveland, OH 44101

Facility Name: Perry Nuclear Power Plant, Unit 1

Inspection At: Perry Site, Perry, Ohio

Inspection Conducted: December 27-28, 1989, and
January 2-12, 1990

Inspector: M. A. Kunowski — Date: 2-5-90

Approved By: M. C. Schumacher, Chief
Radiological Controls and
Chemistry Section — Date: 2-5-90

Inspection Summary

Inspection on December 27-28, 1989, and January 2-12, 1990 (Report No. 50-440/89029(DRSS))

Areas Inspected: Routine, announced inspection of the operational radiation protection and radioactive waste programs (Inspection Procedures (IP) 83750 and 84750), including: audits and appraisals; changes in organization; external and internal exposure control, including ALARA considerations; control of radioactive materials and contamination, surveys, and monitoring; shipping of low-level radioactive waste for disposal; and implementation of the gaseous radioactive waste program. Also reviewed were previous inspection findings (IP 92701) and radiation protection concerns contained in an allegation.

Results: Overall, the licensee's radiation protection and gaseous radioactive waste programs are adequate. A weakness was identified in the licensee's control of access to locked high radiation areas (Section 6), and a violation was identified for a failure to follow a waste burial site requirement (Section 10). The licensee's ALARA group is experienced and competent, but is faced with high dose rates in certain areas of the plant (Section 6). In 1988 and 1989, gaseous effluents from the plant have been well within regulatory limits; however, operational problems with offgas system loop seals have occurred on several occasions resulting in small, unplanned gaseous releases (Section 11).

## DETAILS

1. Persons Contacted

+R. R. Bowers, Manager, Radiation Protection Section
R. Cochnar, Dosimetry Supervisor
+J. W. Detchemendy, Quality Assurance Engineer
+R. Dicola, Compliance Engineer, Licensing and Compliance Section
+H. L. Hegrat, Lead Engineer, Licensing and Compliance Section
G. Kindred, Health Physics Planning Supervisor
+M. D. Lyster, General Manager, Perry Plant
J. Ratchen, Radiological Effluent/Radwaste Specialist, Chemistry Unit
C. Reiter, Technical Support Supervisor, Radiation Protection Section
D. Reyes, Plant Chemist
+C. Shelton, General Supervisor, Chemistry Section
+M. Takacs, Quality Assurance Engineer
+L. C. VanDerHorst, Plant Health Physicist
S. Vodila, Radioactive Material Shipping Coordinator
F. C. Whittaker, Rad Assessor

The inspector also contacted other licensee employees.

V. R. Autry, South Carolina Department of Health and Environmental Control
P. Hiland, NRC Senior Resident Inspector
+G. F. O'Dwyer, NRC Resident Inspector

+Denotes those present at the exit meeting on January 5, 1990.

2. General

This inspection was conducted to review radiation protection and radioactive waste activities, including an allegation. The inspection included tours of onsite facilities, review of records, discussions with onsite personnel, and independent dose rate measurements.

3. Licensee Action on Previous Inspection Findings (IP 92701)

a. (Closed) Open Item No. 440/88014-02: Review changes in operating practices for the offgas and mechanical vacuum pump systems. The changes were made to reduce pump use during reactor startups and shutdowns and, consequently, reduce the amount of gaseous radioactive effluent that bypasses the offgas treatment system. According to a licensee representative, use of the mechanical vacuum pumps has been reduced. In addition, the licensee has not had a recurrence of the series of scrams that occurred in the second quarter of 1988. During

the shutdowns and startups associated with these scrams, frequent use of the mechanical vacuum pumps resulted in a relatively larger quantity of gaseous radioactive material bypassing the offgas system and being released to the environment, compared to the quantity released during normal reactor operations and normal shutdowns and startups. A recent problem with offgas system loop seals that has resulted in elevated gaseous releases is discussed in Section 11.

b. (Closed) Open Item No. 440/89008-01: Review post-outage staffing level of the ALARA group. With the completion of the first refueling outage, the licensee permanently assigned four experienced Health Physics (HP) technicians to the ALARA group and retained, at least until mid-1990, an experienced contractor ALARA analyst from the outage. These five individuals are supervised by the individual who previously acted at Perry as the ALARA Coordinator. In addition, the duties of the ALARA group have been broadened to include writing all Radiation Work Permits (RWPs), conducting pre-RWP surveys, and participation in the station's quarterly work schedule group.

c. (Closed) Violation No. 440/89008-02: Contaminated clothing was unconditionally released from the radiologically controlled area (RCA), contrary to procedure. The licensee has reemphasized to the health physics technicians the procedural requirements on release of contaminated material. A similar problem has not reoccurred.

d. (Closed) Violation No. 440/89016-01: No survey was made of a work area prior to an initial entry by workers, and inadequate surveys were made prior to several subsequent entries. The licensee met with all HP technicians to emphasize the need for complete surveys. In addition, the RWP procedure and an HP procedure on survey techniques were revised to provide additional guidance.

e. (Closed) Violation No. 440/89016-03: Failure to follow procedures for installation of temporary shielding and generation of radiological occurrence reports (RORs). The licensee met with all HP technicians to emphasize the need for strictly adhering to the temporary shielding procedure. The ROR procedure was revised to clarify requirements for ROR generation, and a review during this inspection indicated that more effort is being spent by the licensee in documenting and reviewing RORs.

f. (Closed) Violation No. 440/89016-04: Failure to follow 10 CFR 20.202(a)(3), the requirement to supply appropriate personnel monitoring equipment to each individual who enters a high radiation area. The licensee met with all HP technicians to emphasize the regulatory requirement, and revised the RWP procedure to specify that significant increases in dose rates may require dosimetry different from that specified on the existing RWP.

4. Audits and Appraisals (IP 84750)

The inspector reviewed the summary of an audit performed early in 1989 by the quality assurance group of Perry's use of the Offsite Dose Calculation Manual and related effluent monitoring activities. The audit appeared to be an indepth review of the area. According to the audit, the station's efforts in this area were good, with only one finding identified by the auditors, regarding documentation of the setpoint for the offgas pretreatment radiation monitor. The finding was subsequently corrected by the station.

No deviations or violations of NRC requirements were identified by the NRC inspector.

5. Changes in Organization (IP 83750 and 84750)

In late 1989, the licensee moved the radiation protection and chemistry groups from the Perry Plant Technical Department to the Operations Department, with the manager of the two groups reporting to the General Manager of the Operations Department. The General Manager is also the plant manager. In addition, the corporate health physicist has been delegated, for one year, as manager of the Radiation Protection Section, which includes radiation protection and chemistry. Although radiation protection groups at nuclear power plants typically do not report to the operations groups, in order to preclude power production goals superseding radiation protection concerns, the appointment of the corporate health physicist, who is professionally certified in health physics and is a vigorous proponent of radiation protection, alleviates immediate NRC concerns in this regard.

Another change in organization was the elimination of a supervisory position between the radiation protection manager (RPM), who reports to the section manager, and the first-line supervisors of the HP technicians. The six supervisors now report directly to the RPM. During discussions with the inspector, the licensee stated that the first-line supervisors would be expected to assume more responsibility and make more decisions than were necessary with the previous supervisory structure. The licensee also stated that the former supervisory position may have to be reestablished if the expectations for the first-line supervisors are not met and the RPM becomes overloaded with day-to-day radiation protection matters.

No deviations or violations were identified. The effects of the changes in organization will be reviewed during future inspections.

6. External Exposure Control (IP 83750)

The inspector reviewed aspects of the licensee's implementation of the external exposure control and personal dosimetry program, including identification and correction of program weaknesses, planning and preparation including ALARA considerations, and records.

A review of RORs written in 1989 indicated a recurrent problem with unsecured doors to high radiation areas requiring locked doors, several problems with operators entering high radiation areas but not adhering to requirements, and several problems with control of keys to locked high radiation areas. Although exposures resulting from these problems have been low, and corrective actions were taken for each problem, the repetitive nature of the problems indicate that the corrective actions have not been properly focused or stringent enough. According to licensee personnel, additional corrective actions are planned. Overall, the repetitive problems represent a weakness in the licensee's control of locked high radiation areas. The effectiveness of the licensee's additional actions will be reviewed at a future inspection (Open Item No. 440/89029-01).

The station dose total for 1989 is approximately 774 person-rem, with approximately 700 person-rem attributed to the outage completed in August. The licensee acknowledged that the outage dose was high compared to doses for first refuel outages at similar design plants and above the 450 person-rem projected for the outage. As discussed in a previous NRC inspection report (Report No. 440/890008), the licensee's ALARA preparations for the outage appeared to have been organized and thorough. During the current inspection, a review of records and discussions with the licensee indicated that pre-planned ALARA may have been good, but emergent work caused an almost two-fold increase in outage duration; and together with higher than anticipated dose rates in certain areas of the drywell, resulted in the higher doses realized.

Efforts by the licensee to limit future doses include installation of a zinc-injection system (installed in early December 1989); participation of the ALARA group in the station's snubber reduction program; development of a formal training program for installation and removal of temporary shielding; and writing of bid specifications requiring the vendor to supply control rod drive shields and mockup training facilities for the fall 1990 outage. In addition, the station recently participated in a study on radionuclide buildup in recirculation piping (results documented in NUREG/CR-5483), sponsored a recent periodic meeting of Region III power plant ALARA coordinators, and is represented on industry research working and review groups for evaluating alternate hard-facing alloys. These efforts and the increase in size and expansion of the duties of the ALARA staff (Section 3) should help minimize future dose totals.

A weakness was identified with control of access to locked high radiation areas.

No deviations or violations were identified.

7. Internal Exposure Control and Assessment (IP 83750)

A review of selected licensee documents and discussions with the licensee indicated that no individuals had been exposed in 1989 to airborne radioactivity greater than the 40 MPC-hour regulatory investigation level, with the highest body burden attributed to an exposure of less than 1 MPC-hour of Co-60. Results of an allegation followup regarding the internal exposure control and assessment program are discussed below.

No deviations or violations were identified.

8. Allegation Followup

(Closed) Allegation AMS No. RIII-89-A-0124: Discussed below is an allegation received by the NRC Resident Inspector's Office at Perry, relating to whole-body counting, which was evaluated during this inspection.

Allegation: Fourteen security guards were laid-off without receiving a whole-body count.

Discussion: Discussions with the licensee and a review of records indicated that 8 of 14 security guards/fire and safety technicians who were laid-off on the date mentioned in the allegation received a whole-body count (WBC) on that date. The other six individuals were not counted originally but returned to the site and received a WBC within several days of the layoff. The licensee stated that the six workers were not counted at termination because of an administrative error.

The inspector noted that the licensee is not required by regulation or procedure to give WBCs to all workers who are leaving the site. When a worker leaves the site without receiving a WBC, the licensee attempts to have the individual return for the WBC. If the worker does not return, the licensee reviews the RWPs under which the person had worked to evaluate the possible internal exposure of the worker. Such a situation occurred in mid-1989, when several workers, who were onsite sludge lancing condenser tubes, left the site after completion of the job without receiving a WBC. Most of the workers returned for a WBC, but three did not. The licensee subsequently evaluated the work activities of the three workers and placed a record of the results of the evaluation in the dosimetry files of the workers. The inspector reviewed the records. No problems were identified.

Findings: The allegation was not substantiated. The fourteen individuals received WBCs after their layoff. Although the WBC's were delayed for six of the individuals, no regulatory or procedural requirements were violated.

No deviations or violations of NRC requirements were identified.

9. Control of Radioactive Materials and Contamination, Surveys, and Monitoring (IP 83750)

A review of RORs for 1989 indicated recurrent problems with magneta-colored tools found outside of the RCA. The licensee limits the use of magenta-colored tools, which may have fixed contamination, to the RCA. Of the tools found outside the RCA, only two tools were found to be contaminated. The contamination was low-level and restricted to a small area of the tools. In response to these events, the licensee has increased the survey frequency in non-RCA areas, reminded plant staff of the restriction on the use of these tools, and has highlighted the subject in general employee training. The effectiveness of the licensee's corrective actions will be reviewed at a future inspection.

Tours by the inspector of the RCA and non-RCA areas identified no problems with control of magenta-colored tools or with housekeeping in general. In the radwaste truckbay, the inspector observed that a large number of bags of contaminated trash were being stored. The licensee stated that the bags had not been shipped for disposal because of reduced staff during the holidays, but would soon be shipped. The inspector also noted that the boundary of the RCA is posted as a radiation area and that within the RCA, the licensee has also posted certain areas as radiation areas. The licensee stated that the additional postings within the RCA designate areas with dose rates higher than general RCA dose rates. This distinction, however, is not stated in the licensee's procedures. The licensee indicated that the posting policy was being evaluated and may change. This matter will be reviewed at a future inspection. Independent dose rate measurements made by the inspector identified no discrepancies between postings and regulatory requirements.

No deviations or violations were identified.

10. Transportation of Radioactive Waste (IP 83750)

The inspector reviewed the transportation of radioactive waste (radwaste). In 1988, the licensee made 42 shipments of radwaste, totaling 495 cubic meters. In 1989, the year of the refueling outage, 39 shipments of radwaste were made, totaling 897 cubic meters. The type of radwaste shipped included dry-active waste (DAW) for burial and for supercompaction, dewatered radwaste, and cement-solidified radwaste.

The licensee stated that since the previous NRC inspection of radwaste in September 1988 (Inspection Report No. 50-440/88014), only one major problem has occurred with a shipment. This involved a liner containing dewatered resin that was shipped from Perry on October 7, 1988, to the Barnwell, S.C., burial site. When examined by officials at the burial site, liquid in the liner exceeded the State's regulatory limits and burial site requirements by at least 0.4 gallons. State limits and burial site requirements reflect the limit specified in 10 CFR 61, which requires that liquid in a container of solid radwaste must not exceed 0.5% of the volume of the radwaste. In a letter dated November 1, 1988, the South Carolina Department of Health and Environmental Control cited

Perry for the violation, assessed a civil penalty of $1,000, and prohibited the receipt of additional shipments of dewatered resins. Perry paid the civil penalty and, in a letter dated January 23, 1989, the State accepted the results of Perry's investigation of the problem and the corrective actions. The prohibition on dewatered resin shipments from Perry was rescinded by the State.

The presence of liquid in the liner in excess of the disposal site requirements is a violation of Technical Specification 3.11.3, which requires that dewatered radwaste meet disposal site requirements when received at the disposal site (Violation 440/89029-02). In its investigation of the problem in late 1988, the licensee was unable to identify a root cause, but subsequently instituted tighter quality control measures to ensure proper dewatering. The licensee subsequently made 29 shipments of dewatered radwaste in liners without recurrence of the problem.

Discussions with licensee representatives about this problem and other transportation topics, and review of pertinent documents, indicated that the RP staff was very knowledgeable of radwaste shipping requirements.

One violation was identified.

11. Gaseous Radioactive Waste Program (IP 84750)

The inspector reviewed the licensee's implementation of selected portions of its gaseous radwaste program, including the Offsite Dose Calculation Manual (ODCM) and implementing procedures. No major problems were identified.

Discussions with the licensee and a review of Semi-Annual Effluent Reports for 1988 and 1989 indicated that in 1988, approximately 1258 Ci of radioactivity were released via the station's four release points. The licensee's ODCM calculations indicate that offsite doses from these releases were well within Technical Specification limits. (It was noted that the licensee conservatively calculates total body, skin, and organ doses to the maximally exposed real offsite individual by assuming 100% occupancy at the site boundary.) The maximum organ dose for 1988 was reported as 30% of the 15 mrem T/S limit, and was attributed to a series of scrams, leaky fuel, and excessive mechanical vacuum pump usage in the second quarter. A repeat of the series of scrams has not occurred, the leaky fuel was replaced during the last outage, and the mechanical vacuum pump operating practices have since been modified (Section 3). An estimate of the gaseous activity released for 1989 was not available at the conclusion of the inspection, but a review of offsite dose estimates and discussions with the licensee indicated that doses from this activity will also be well within Technical Specification limits, including the organ dose, which is estimated to be approximately 1% of the 15 mrem T/S limit.

Since September 1988, the licensee has had periodic problems with the offgas and steam jet air ejector (SJAE) systems. On September 4 and 16, 1988, a hydrogen fire occurred in the offgas system charcoal adsorbers. On October 14, November 19, December 21, 1988, February 2 and 14, October 16, and December 7, 28, and 29, 1989, and on January 1 and 7, 1990, total or partial loop seal failures in the offgas or SJAE systems resulted in ventilation system or release point radiation monitor alarms. These events, except for the one on January 7, have been described in previous Inspection Reports (Nos. 440/88015, 440/88016, 440/88017, 440/88020, 440/89002, 440/89026, and 440/89028).

The January 7, 1990, event occurred several hours after a reactor trip when the mechanical vacuum pump was placed in service to maintain condenser vacuum after process steam pressure became too low. An improperly seated drain valve on the SJAE intercondenser loop seal had allowed the loop seal to drain. With the loop seal drained, the mechanical vacuum pump drew gas back from the offgas treatment system and released it via the offgas building vent pipe. Plant operators were able to reseat the drain valve, terminating the backflow from the offgas treatment system; however, elevated releases continued to occur due to activity in the condenser as operators cycled the mechanical vacuum pump to maintain condenser vacuum and reactor cooldown. The licensee's dose calculations for January 7, 1990 releases associated with the use of the mechanical vacuum pump and an earlier, unrelated release because of a problem with backwashing of the reactor water cleanup system, indicated a whole body dose of less than 0.1 mrem. This dose and the instantaneous dose rate for the release were well within regulatory limits. These calculations were reviewed by the NRC staff shortly after the releases.

Although the offsite dose consequences of these offgas system problems have been minimal, the recurrence of the problems is a distraction to control room personnel, who must contend with the radiation monitor annunciators, and to the chemistry staff, who must take grab samples from the release points, analyze the samples, and calculate the dose rate and doses for the releases. Furthermore, several of these loop seal problems have caused elevated airborne activity in the offgas and/or turbine buildings, resulting in temporary evacuation of these buildings, and personnel contaminations from the short-lived particulate daughters of noble gases. The licensee has undertaken various corrective actions to eliminate offgas system problems, although not all appear to have been effective. The licensee's corrective actions are being tracked as Open Item 440/88020-04(DRP).

Licensee representatives stated that dose information from these releases has been incorporated into the Semiannual Effluent Reports. However, the inspector's review indicated that these releases have not been specifically described as abnormal releases in the reports. Licensee representatives stated to the inspector that the releases were not considered abnormal because they were of relatively short duration and were through monitored release paths. However, the definition of abnormal release in the station procedure, CHI-54, "Radiological Effluent Data Reduction," is not entirely consistent with the licensee's stated position. During the inspection, the licensee agreed to clarify their procedure. The procedure change will be reviewed at a future inspection (Open Item 440/89029-03).

No deviations or violations of NRC requirements were identified.

12. Exit Meeting (IP 30703)

The inspector met licensee representatives (denoted in Section 1) at the conclusion of the onsite inspection activities on January 5, 1990, and summarized the scope and tentative findings of the inspection. Specifically, the following items were discussed.

a. A no-response Notice of Violation would probably be issued for the problem with the radwaste shipment in October 1988 (Section 10).

b. A recurrent problem with locked high radiation areas and the likely request for a written response describing corrective actions (Section 6).

c. The initial concerns over the reorganization of the radiation protection group (Section 5).

d. ALARA efforts and the relatively high dose total for 1989 (Section 6).

e. The allegation on whole-body counting (Section 7).

f. The need to clarify the definition of abnormal release in station procedure, CHI-54 (Section 11).

g. Initial findings that dose rates and doses from elevated releases because of loop seal failures were within regulatory limits and of minor radiological significance.