

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-315/89017(DRSS); 50-316/89016(DRSS)

Docket Nos. 50-315; 50-316

Licenses No. DPR-58; DPR-74

Licensee: Indiana Michigan Power Company
1 Riverside Plaza
Columbus, OH 43216

Facility Name: D. C. Cook Nuclear Plant, Units 1 and 2

Inspection At: D. C. Cook Site, Bridgman, Michigan

Inspection Conducted: April 17-21, and May 18, 1989

Inspectors: *R. A. Paul*
R. A. Paul

6/12/89

Date

D. E. Miller
D. E. Miller

6/12/89

Date

Approved By: *M. Schumacher*
M. Schumacher, Chief
Radiological Controls
and Chemistry Section

6/12/89

Date

Inspection Summary

Inspection on April 17-21, and May 18, 1989 (Reports No. 50-315/89017(DRSS); No. 50-316/89016(DRSS))

Areas Inspected: Routine unannounced inspection of the licensee's radiation protection program during outage, including organization and management controls (IP 83750; 83729); external and internal exposure controls (IP 83729); training and qualifications (IP 83720); radiological controls (IP 83729); ALARA, planning, and preparation (IP 83729); and plant tours (IP 83729). Also reviewed were previous inspection items (IP 92701), and a Unit 2 reactor cavity pit entry event (IP 93702).

Results: The licensee's radiation protection program continues to improve, and adequately protects the health and safety of workers. Implementation of the radiological controls program for the Unit 2 SGRP was generally good; one violation was identified concerning failure to perform a survey and evaluation to determine radiological conditions (Section 11).

DETAILS

1. Persons Contacted

- D. Allen, Health Physicist
- *J. Fryer, Radiation Material Control Supervisor
- *L. Gibson, Assistant Plant Manager, Technical Support
- *M. Gumms, Administrative Compliance Coordinator
- *P. Holland, Radiation Protection Supervisor
- *M. Horvath, AEPSC Site QA Supervisor
- *S. Lehrer, Radiation Protection Supervisor
- *D. Loope, Plant Radiation Protection Supervisor
- *J. Rutkowski, Assistant Plant Manager
- *W. Smith, Plant Manager
- *H. Springer, ALARA Supervisor
- *B. Svensson, Licensing Activity Coordinator
- *D. Williams, Health Physicist
- *J. Wojcik, Technical Superintendent, Physical Sciences

- *B. Jorgenson, NRC Senior Resident Inspector
- *D. Passehl, NRC Resident Inspector

*Denotes those attending the exit meeting on April 21, 1989.

The inspectors contacted several other licensee and contractor personnel during the inspection.

2. General

This inspection was conducted to review the licensee's radiation protection program during a refueling and maintenance outage. Also reviewed were licensee actions on previous inspection items and a Unit 2 reactor cavity pit entry event. The inspectors toured licensee facilities to review posting, labeling, access controls, and work in progress. Cleanliness and posting problems are discussed in several sections of this report.

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

(Closed) Open Item (315/88011-12; 316/88013-12): Method of posting High Radiation Areas (HRAs) in containment. The licensee has since altered their HRA posting policy for containment areas during refueling and maintenance outages. The licensee now posts individual HRAs within containment instead of posting the entire containment as a HRA. No further problems were noted.

(Closed) Open Item (315/86001-06; 316/86001-06): Evaluate the potential for unconditional release of contaminated materials and equipment from the secondary side of the plant. As a result of their evaluation, the licensee has increased radiation protection oversight of work on potentially contaminated systems on the secondary side of the plant. Enhanced outage and maintenance planning meetings provide better communications which help ensure radiological work has adequate health

physics coverage and that radioactive materials are properly controlled. Also, the requirements for surveying equipment and materials leaving the restricted area have been strengthened.

(Open) Open Item (315/88011-01; 316/88013-01): Desirable to augment the assigned plant RPM with a person well qualified as an RPM while the plant RPM gains experience. During a meeting at the Region III office on March 10, 1989, between D. C. Cook and Region III representatives, failure to procure the committed assistance in a timely manner was discussed. It was agreed that such assistance could be provided by corporate health physics personnel within a structured program. The licensee personnel committed to implement this program immediately.

(Closed) Open Item (315/88011-02; 316/88013-02): The condition reporting system needs alteration to better address radiological concerns. Procedure PMI-7030, Condition Reports and Plant Reporting, has been revised to more adequately involve the radiation protection staff in investigation of radiological concerns and their corrective actions. Also, the procedure now includes cause and preventative action codes to permit tracking and trending of data for use in determining programmatic adequacy and needs. Adequacy of implementation of the revised procedure as it concerns radiological matters will be reviewed as part of future routine inspections.

(Closed) Open Item (315/88011-03; 316/88013-03): Abandonment of the one-hour training course for radiation workers concerning portable radiation survey instrument use (NGET provides inadequate training concerning portable survey instrument use). The licensee has since enhanced video and lecture training of portable survey instrument use during NGET, and added practical factor training and verification checksheets.

(Closed) Open Item (315/88011-04; 316/88013-04): Need to implement the proposed two-day radiation worker training course. During the period July through December 1988, ten radiation worker seminars were presented; each seminar was 16 hours in duration, eight hours each of classroom and laboratory training. One hundred and ninety-two personnel attended the seminars. The attendees were mainly permanent plant and long-term contractor radiation workers. The classroom training included dose, contamination, and airborne radioactivity controls. The laboratory training involved a ten-station exercise; each station represented a mock controlled area with varying conditions, controls, and tasks. Students participated in RWP evaluations, work preparation including dress-out in protective clothing, area entry and task simulation, use of containment devices, area egress, and group critiques. Contamination was simulated with fluorescent powder and a black light. The licensee plans to continue the seminars during 1989.

(Closed) Open Item (315/88011-06; 316/88013-06): No acceptable error evaluation is established for "fastscan" whole body counting system calibration results. Licensee Procedure 12 THP 6010 Rad.468 was revised to establish an acceptable error band for fastscan calibration results, and to require review of these results by a health physicist or radiation protection supervisor. No further problems were noted.

(Closed) Open Item (315/88011-07; 316/88013-07): Weaknesses concerning respirator accountability, practical training, and formalization of use of engineering controls. The licensee has initiated or revised five station procedures to address the noted weaknesses. The inspectors cursorily reviewed the changes, additions, and corrections made to the procedures; the inspectors have no further questions or comments at this time.

(Closed) Open Item (315/88011-08; 316/88013-08): Additional written guidance needed for persons who activate portal monitor or whole body frisker alarms. The licensee has revised procedure 12 THP 6010 RPP.703, Personnel Contamination, to include a requirement to whole body count persons who cause a portal monitor or whole body frisker alarm but for whom no contamination can be identified when surveyed with a pancake probe frisker in an area with a background of less than 300 counts per minute. The inspectors have no further questions at this time.

(Closed) Open Item (315/88011-09; 316/88013-09): Written procedures for release of equipment and materials from restricted areas need revision. Licensee procedures PMI-6010, Radiation Protection Plan, and 12 PMP-6010.RPP.301, Control of Equipment and Material in a Restricted Area, have been revised to clarify requirements for monitoring equipment and materials before they leave a restricted area. No further problems were noted.

(Closed) Open Item (315/88011-10; 316/88013-10): Need to develop a specific hot particle program. Procedure 12 THP 6010.RPP.304, Radioactive Particle Surveys, Detection, Analyses, and Documentation, has since been developed and was implemented on January 3, 1989. The inspectors noted no additional problems.

(Open) Open Item (315/88011-11; 316/88013-11): Weaknesses associated with the May 15-17, 1988, facility and personal contamination incidents. The licensee's engineering department reviewed operation of the containment supply and exhaust system and provided guidelines for their operation during periods when containment is open (various combinations of openings). According to a licensee representative, the committee, formed to establish corrective actions, plans to soon recommend development of a formal procedure for containment ventilation system operations. Verbal instructions have been provided to operations and radiation protection personnel to preclude reoccurrence before the procedure is issued. Final corrective actions will be reviewed during a future inspection.

4. Organization and Management Controls (IP 83729)

The inspectors reviewed the licensee's organization and management controls for the radiation protection program including changes in the organizational structure and staffing, effectiveness of procedures and other management techniques used to implement these programs, and experience concerning self-identification and correction of program implementation weaknesses.

Health physics (HP) group staffing remains stable. The staff consists of 32 house radiation protection technicians (RPTs), five supervisors, five health physicists, ALARA personnel, 38 non-outage contract RPTs, and about 60 permanent contract decontamination and laundry workers. The technical HP staff meets ANSI qualifications and staffing appears sufficient to implement the radiation protection program. During this outage, 14 station senior RPTs were acting as supervisors and were responsible for radiological controls over outage activities.

No violations or deviations were identified.

5. External Exposure Control and Personal Dosimetry (IP 83750; 83729)

The inspectors reviewed changes made to the licensee's external exposure control and personal dosimetry programs since last reviewed (Inspection Reports No. 50-315/88011; 50-316/88013). The changes are discussed below.

The licensee established a NVLAP certified, self-implemented, TLD personnel monitoring system for the Steam Generator Replacement Project (SGRP); other licensee and contractor personnel at the station continued to be monitored by vendor supplied and processed TLDs. After SGRP completion, the self-implemented TLD system was adapted for station use, and, on February 1, 1989, became the official primary dosimetry method for the station. The inspectors cursorily reviewed the quality assurance testing on the TLD system performed to maintain NVLAP certification; no problems were noted.

The licensee planned to use the PRISM computer system which was used by the SGRP to generate dose history records, regulatory dose distribution reports, and termination letters. However, according to licensee representatives, the PRISM system did not provide a complete program and would require a significant amount of manual manipulation of numbers as does the present REM system. The licensee plans to develop a computerized system which integrates the TLD, dose recording and reporting, and dose control systems.

The whole body dose received for the SGRP in 1988 was about 542 person-rem. The dose for the remainder of the station for 1988 was about 324 person-rem.

No violations or deviations were identified.

6. Internal Exposure Control and Assessment (IP 83729)

The inspectors reviewed selected aspects of the licensee's internal exposure control and assessment programs, including: determination whether engineering controls, respiratory equipment and assessment of intakes meet regulatory requirements, and planning and preparation for maintenance tasks includes ALARA consideration.

The licensee's whole-body count and calibration program is discussed in Inspection Report No. 50-315/87002; 50-316/87002; no significant changes have been made to the program. Review of licensee records indicated that no intakes in excess of the 40 MPC-hour control measure occurred in 1988 or 1989 to date.

The licensee's program for controlling internal exposures during this outage includes the use of protective clothing, respirators, portable ventilation equipment, and control of surface and airborne radioactivity. The inspectors selectively reviewed the licensee's job related air sample and survey program; it appears that sufficient air samples and smears are collected and analyzed to establish RWP requirements for use of respirators and protective clothing.

During this inspection it was noted that the licensee's procedure for calculating MPC and organ dose using whole-body count data after an acute uptake of iodine-131 is based primarily on ICRP-2 methodology and consequently attempts to utilize models derived for chronic intakes to estimate actual acute intakes. As a result, lower MPC-hours are estimated than would be estimated using ICRP-30 methodology.

The ICRP-30 methodology is more appropriate for predicting acute internal exposures and is acceptable for determining compliance with NRC regulatory requirements. This matter was discussed with the licensee.

A cursory check of respirators that were ready for use showed that respirator inspection, storage, and maintenance was adequate. Selectively reviewed RWPs appeared to adequately reflect the respiratory requirements for the jobs. Provisions are made for MPC accountability when respirators are used.

No violations or deviations were identified.

7. Training and Qualifications (IP 83729)

The inspectors reviewed the licensee's methods of selecting contract radiation protection technicians (RPTs) and orienting them to methods, techniques, and procedures used at the station.

Licensee representatives review resumes of RPTs that the contractor expects to bring to the site for outage or longer term employment. The licensee selectively reviews the content of resumes by calling previous employers to verify the accuracy of the resume. When the selected contractor RPTs arrive onsite, the contractor tests them to determine their technical competence before presenting them to the licensee for further training. The licensee instructs the RPTs in site-specific radiological procedures, equipment and techniques, and then conducts a written test; the required passing grade is 70% for junior RPTs, and 80% for senior RPTs.

For contractor technicians who remain onsite for extended periods, the licensee includes them in portions of the station RPT training and continuing training programs; the licensee may waive portions of this training based on past experience and training.

No violations or deviations were identified.

8. Radiological Controls (IP 83729)

During this outage the principal entry and exit control points to the RCA are in the RPAC. The secondary control point is still located inside the entrance to the auxiliary building. RPTs observe both control points. There are two Unit 1 containment building access and egress stations (upper and lower containment) controlled by RPTs. The flow of persons, materials and equipment is monitored by the RPTs. Personal frisking is required at both locations after removing PCs at the SOP. However, the RPTs were unable to observe the frisk at the lower containment control point because the friskers were placed downstream of the SOP owing to high background and space limitations at the SOP area.

Based on observation of selected RWP jobs, access control point activities, and review of associated radiation surveys and post-job interviews with workers, it appeared that sufficient radiation protection coverage was provided and outage activities were accomplished using prescribed special instructions and requirements. The supply of portable survey instruments, portable ventilation equipment, protective clothing, and respiratory protective equipment for the outage also appeared adequate.

9. ALARA, Planning and Preparation (IP 83729)

The inspector reviewed the outage planning and preparation performed by the licensee, including: additional staffing, special training, increased equipment supplies, and job related health physics considerations.

Health physicists were involved in planning meetings, were aware of the major jobs in advance of the outage, and conducted pre-job ALARA reviews where required. Lessons learned from previous outages were used in planning this outage. For this outage the licensee requested 67 contract radiation protection technicians (RPTs) but contracted only 47 RPTs. Also contracted were several nuclear support and dosimetry workers. During this outage, all RPTs and certain staff members were placed on six-day, 12-hour shifts to ensure sufficient health physics coverage for the outage was provided. Although the staff was operating with a reduced contract work force which cost some work delays, the inspectors found no indications that radiological controls were compromised.

During this inspection, large numbers of contractor personnel were observed working in the RCA, and on three occasions some workers were observed to be loitering. Also, the inspectors perceived weaknesses in the maintenance scheduling/planning system which resulted in insufficient pre-job notice being given to RP; therefore, adequate RP support was not available, and RP occasionally had to re-perform surveys. As a result, the licensee was requested to investigate and identify weaknesses in outage planning/scheduling and execution with respect to ALARA and exposure control; the investigation should include potential consequences

of the use of large numbers of contractor workers to compress outage duration, and the need for an enhanced radiation worker training program for persons who work in RCAs. This matter was discussed at the exit meeting. (Open Item 315/89017; 316/89016)

No violations or deviations were identified.

10. Surveillance - Plant Tours (IP 83729)

The inspectors made several plants tours of the auxiliary building and Unit-1 containment during the outage and made the following observations.

- There were no constant air monitors (CAMs) located in the Unit-1 containment, and only a few of the CAMs located in the auxiliary building were operable; the licensee stated that the inoperable CAMs were scheduled for modification. Although enough grab air samples were apparently collected in those areas to determine airborne concentrations, the use of CAMs during outage conditions is desirable to alert workers of changing conditions. This matter was discussed with the RPM.
- There appears to be extensive use of tygon tubing to transfer valve leakage to floor drains for contamination control in the auxiliary building. The extensive use of tygon tubing for leakage control increases the probability of contaminating those areas where the tubing traverse clean floors. The inspectors indicated that additional attention should be given to repair of leaking valves. This matter was discussed at the exit meeting.
- General housekeeping was adequate. However, general plant cleanliness was poor, especially in the auxiliary building. This matter was discussed at the exit meeting.
- Observations of personnel conducting personal contamination frisks with hand-held detectors indicated generally adequate performance of frisks.

No violations or deviations were identified.

11. Unit-2 Reactor Cavity Pit Entry Incident (IP 92701)

General

On November 24, 1988, entry to the Unit 2 reactor cavity pit was attempted with the incore thimbles withdrawn. The hatch to the pit was improperly posted and controlled with a High Radiation Area (HRA) sign and a R-8 (HRA) lock; Steam Generator Repair Project (SGRP) procedure RPAP-10, "Radiological Posting" required posting of the hatch with a "Caution Extreme High Radiation Area" sign and locking with an R-7 (Extreme HRA) lock. The RPT, who preceded others in the entry, observed that radiation levels indicated by his hand held survey instruments rose sharply as he was descending the ladder toward the pit; he stopped the entry, quickly climbed back out, and contacted his supervisor. The RPT received less than 80 mrem whole-body dose for the entry.

Incident Details

After Unit 2 shutdown for the SGRP on May 6, 1988, the incore monitoring system thimbles were withdrawn, the access hatch was appropriately locked with an R-7 lock, and the hatch posted with a Extreme High Radiation Area (EHRA) sign in accordance with procedures.

On June 20, 1988, responsibility for radiation protection activities within Unit-2 containment was turned over to the SGRP including routine surveys and radiological postings. Special radiation protection and ALARA procedures were written for the project. Station radiation protection (RP) personnel were not responsible for support of work performed as part of the SGRP, but they did provide support for station personnel making entries into the Unit-2 containment.

At about 0230 hours on November 24, 1988, licensee station quality control (QC) department personnel contacted the station Job Coverage Coordinator (JCC) at access control to arrange for a walkdown of Unit-2 reactor coolant system valves and piping; the walkdown was part of a ten-year in-service inspection. The QC personnel stated that the work would necessitate entry to lower containment and the reactor cavity pit.

The JCC assigned an RPT to accompany QC personnel into the reactor cavity pit even though there were no specific requirements to do so because on that date (November 24, 1988), the pit was posted as an HRA. The JCC provided direct RPT coverage because he had been trained in the inherent dangers associated with reactor cavity pit entries, and because providing coverage into those areas was an unwritten standard operating procedure.

When the RPT reached the hatch to the reactor cavity pit, he found it posted as a HRA and locked with a B-8 lock appropriate to that posting. The RPT unlocked the hatch and started down the ladder into the reactor cavity pit carrying two portable survey meters. As he descended (about 1/3 of the distance to the pit floor) the RPT noted that the radiation level was rising rapidly; he quickly went back up the ladder and notified the JCC. The RPT received less than 80 mrem during this aborted entry.

The JCC proceeded to the reactor cavity pit hatch, verified the RPT's finding that there was an elevated exposure rate in the pit, and then posted the hatch as an EHRA and replaced the R-8 lock with a R-7 lock. The R-7 lock is required for all areas posted and controlled as EHRAs. No further entries were attempted by any plant personnel. The JCC contacted the Plant Radiation Protection Supervisor (PRPS) of the event; the PRPS began an investigation.

Licensee Investigation

The licensee's investigation is documented in Condition Report No. 2-11-88-1626 and Problem Report 88-849. The licensee concluded that the improper posting of the reactor cavity pit was done by SGRP radiation protection personnel; the investigation report stated

that no specific cause was found, but that the SGRP was completed and no further investigation was needed. The investigation report stated that the immediate corrective actions to properly post and lock the hatch were proper and adequate, and that plant procedures were adequate to preclude recurrence.

After completion of their investigation and condition and problem reports, the licensee initiated procedure PMP 6010.RAD.003, High/Extreme High Radiation Area Access; this procedure enhances requirements for reactor cavity pit access controls and prohibits entry when the thimbles are withdrawn.

Inspector Followup

During the onsite portion of this inspection, the inspectors reviewed the licensee's investigation conclusions and corrective actions, observed controls for entry into the Unit-1 reactor cavity pit, reviewed training of RPTs about reactor cavity hazards including events at other stations, and reviewed licensee responses to IE Information Notices on the subject. This review resulted in the following observations:

- Licensee procedures did not require direct RP coverage for entry into the reactor cavity pit when posted as a HRA; instead the QC personnel could have been directed to perform their own entry survey. The potential conflict of roles for the QC personnel, whose function would not be assessment of radiological conditions, could have resulted in significant exposure under the EHR conditions that actually existed. The practice of allowing personnel to enter an area that is known to have a high potential for extremely high radiological conditions without stronger radiological controls is a poor health physics and ALARA practice. It is noteworthy that the self initiated actions taken by the JCC may have prevented significant radiation exposures.
- The SGRP had no special procedures for reactor cavity pit entries. According to the licensee, the SGRP had no plans for pit entry; therefore, no special procedures were developed. Specific SGRP procedures concerning reactor cavity radiological control and pit entry may have prevented the removal of the EHRA posted controls at the hatch of the reactor cavity pit. In any case the licensee's failure to perform an adequate evaluation of the radiation hazards present in the reactor cavity pit before removing the radiological controls designated for an EHRA and replacing them with improper radiological controls is a violation of 10 CFR 20.201(b)(2) (Violation 315/89017-02; 316/89016-02). Licensee corrective actions, specified below, appear sufficient to preclude recurrence. This matter will be reviewed at a future inspection.
- Even though it appears the radiological controls at the reactor cavity entrance were changed during the SGRP, the primary investigation of this event was conducted by plant staff; no formal investigation was performed by SGRP.

Although the licensee performed an adequate evaluation of the incident, it does not appear the long-term corrective actions initially proposed were adequate. Also, the Condition Report which documented the investigation indicated the incident was not a significant event; as such, no further review was required. The NRC believes that any incident which involves degraded radiological controls for an area with the potential for serious radiation injury with just a few minutes exposure should be designated as a significant event.

Because of unresolved matters and remaining inspector concerns after completion of the onsite position of the inspection, Region III conducted a management meeting with the licensee to further address this matter.

Management Meeting

A meeting was held at D. C. Cook on May 18, 1989, to discuss Region III's concerns about the circumstances surrounding this incident, the results of the licensee's investigation, their corrective actions to prevent recurrence, and associated programmatic weaknesses. In attendance was L. R. Greger, Chief, Reactor Programs Branch, RIII; L. S. Gibson, Assistant Plant Manager, Technical Support, D. C. Cook; members of their respective staffs, and AEP corporate personnel.

The licensee acknowledged Region III's concerns. After introductory discussions, the licensee described the following initial long-term corrective actions which have been initiated: (1) The Problem and Condition Reports about this incident had been reopened and reclassified as significant; information from the SGRP radiation protection personnel will be used as part of closeout; (2) the reactor cavity pit area is to be permanently designated as an EHRA, and a special unique key will be assigned to this area; procedure 12PMP 6010 RPP.003 will be revised to reflect this change.

Region III representatives stated that the licensee's implementation of the corrective actions would be reviewed during future inspections.

One violation was identified.

12. Exit Meeting (IP 30703)

The inspectors met with licensee representatives (denoted in Section 1) at the conclusion of the site inspection on April 21, 1989 to summarize the scope and findings of the inspection; an additional management meeting concerning an incident involving entry into an EHRA was held with Mr. Gibson on May 18, 1989. The inspectors also discussed the likely information content of the inspection report with regard to documents or processes reviewed by the inspectors during the inspection. The licensee identified no such documents/processes as proprietary. The following matters were discussed specifically by the inspectors.

- a. The potential violation and weaknesses associated with the event involving entry into an EHRA (Section 11).

- b. The need for the licensee to identify weaknesses in their outage planning/scheduling program and make improvements where necessary (Section 9).
- c. Desirability of reducing the use of tygon tubing in the valve leak reduction program (Section 10).