February 10, 2004

Mr. William R. Kanda
Vice President - Nuclear, Perry
FirstEnergy Nuclear Operating Company
P. O. Box 97, A210
10 Center Road
Perry, OH 44081

SUBJECT: PERRY NUCLEAR POWER PLANT, UNIT 1
NRC SUPPLEMENTAL INSPECTION REPORT 05000440/2004004(DRS)

Dear Mr. Kanda:

On January 16, 2004, the U.S. Nuclear Regulatory Commission (NRC) completed a supplemental inspection at your Perry Nuclear Power Plant. The enclosed report documents the inspection results which were discussed on January 16, 2004, with you and members of your staff.

The NRC performed this supplemental inspection as required by the NRC Action Matrix based on plant performance for the Perry Nuclear Power Plant being within the Regulatory Response column of the NRC Action Matrix due to three occurrences in the Occupational Exposure Control Effectiveness performance indicator. These three occurrences caused the performance indicator to go from GREEN to WHITE.

This supplemental inspection was an examination of activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. Within these areas, the inspection consisted of a selective examination of procedures and representative records, and interviews with personnel. Specifically, this inspection focused on your assessment of the root causes and corrective actions associated with the WHITE performance indicator. Based on the results of this inspection, the inspector determined that adequate root cause evaluations had been completed, and no findings of significance were identified.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

/RA By Roy Caniano Acting for/

Cynthia D. Pederson, Director
Division of Reactor Safety

Enclosure: Perry Supplemental Inspection
Report 05000440/2004004(DRS)

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

cc w/encl: G. Leidich, President - FENOC
K. Cimorelli, Acting Director,
Maintenance Department
V. Higaki, Manager, Regulatory Affairs
J. Messina, Director, Nuclear
Services Department
T. Lentz, Director, Nuclear
Engineering Department
T. Rausch, Plant Manager,
Nuclear Power Plant Department
M. O'Reilly, Attorney, First Energy
Public Utilities Commission of Ohio
Ohio State Liaison Officer
R. Owen, Ohio Department of Health

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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

Report No: 05000440/2004004(DRS)

Licensee: FirstEnergy Nuclear Operating Company (FENOC)

Facility: Perry Nuclear Power Plant, Unit 1

Location: P.O. Box 97 A200
Perry, OH 44081

Dates: January 12 through 16, 2004

Inspector: J. House, Senior Radiation Specialist

Approved by: Kenneth R. Riemer, Chief
Plant Support Branch
Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000440/2004004(DRS); 01/12/2004 - 01/16/2004; Perry Nuclear Power Plant; Supplemental Inspection IP 95001 Occupational Radiation Safety Cornerstone.

This supplemental inspection was performed by a regional inspector. No findings of significance were identified. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3 dated July 2000.

Cornerstone: Radiation Safety

The U. S. Nuclear Regulatory Commission (NRC) performed this supplemental inspection to assess the licensee's root cause evaluations, extent of condition determination, and corrective actions for the WHITE Occupational Exposure Control Effectiveness performance indicator. During this supplemental inspection, performed in accordance with Inspection Procedure 95001, the inspector concluded that the licensee had developed comprehensive root cause evaluations and completed a corrective action plan to address this issues surrounding the WHITE performance indicator, as well as other potential 10 CFR Part 20 radiation protection concerns.

Given this acceptable performance in addressing the conditions surrounding the performance indicator occurrences, the performance indicator will remain White through the end of the second quarter of 2004 as provided for in Revision 2 of Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline."

A. Inspector Identified Findings

None

B. Licensee-Identified Violations

None.

REPORT DETAILS

01 INSPECTION SCOPE

The U.S. Nuclear Regulatory Commission (NRC) performed this supplemental inspection to assess the licensee's evaluation associated with a WHITE Occupational Exposure Control Effectiveness performance indicator (PI). Based on three occurrences in this PI, and the requirements in Revision 2 of Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," the licensee characterized this PI as WHITE. This PI is related to the Occupational Radiation Safety cornerstone in the radiation safety strategic performance area. The PI occurrences were:

1. On April 14, 2003, a pipe fitter received an unintended radiation exposure of more than 100 millirem while working in the reactor water cleanup heat exchanger room (RWCU room). The workers were issued telemetry dosimetry (wireless remote monitoring system) to track their dose as the licensee had determined that telemetry dosimetry would be the only method for tracking worker exposure for this job. The telemetry system failed. The licensee documented this in condition report (CR) 03-02073. Two-self revealed Non Cited Violations (GREEN findings) were associated with this occurrence and were documented in NRC Inspection Report (IR) 50-440/03-04(DRP).

2. On April 18, 2003, an engineer received an unintended radiation exposure of more than 100 millirem while working in the RWCU room. The exposure resulted from an uptake of radioactive material that the licensee had not planned for. There were no violations associated with this but the unplanned dose of more than 100 millirem did count as a PI occurrence. This was documented by the licensee in CR 03-02201.

3. On April 9, 2003, a radiation worker received an unexpected dose rate alarm while in an upper level of the drywell near the safety relief valves while performing a walkdown in preparation for safety relief valve work. The licensee had not fully surveyed the area of the drywell that the worker was in. Follow up surveys revealed an area near nozzle N6A on an E12 line that was reading 6 rem/hour on contact and 2.5 rem/hour at 30 cm. The licensee documented this in CR 03-01877. One NRC identified Non Cited Violation (GREEN finding) was associated with this occurrence and was documented in NRC IR 50-440/03-04(DRP)

02 EVALUATION OF INSPECTION REQUIREMENTS

02.01 Problem Identification

a. Determine that the evaluation identifies who (i.e., licensee, self-revealing, or NRC), and under what conditions the issue was identified.

The three PI events occurred during refueling outage 9 (RFO9). Two of these had associated violations and were documented in IR 50-440/2003-04. The PI involving the

worker uptake did not involve any regulatory issues and therefore was not documented in an IR by the NRC. The licensee notified the NRC of the radiological uptake event and that it would be reported as a PI occurrence based on guidance from the Nuclear Energy Institute. The licensee documented these PI occurrences in condition reports. In addition a separate CR was written by the Quality Assurance (QA) organization (CR 03-02086) to initiate a general work stoppage in the radiologically restricted area following the worker's failed telemetry event. The licensee determined that the three events were PI occurrences and that the PI was WHITE. The inspector determined that the licensee appropriately identified who and under what conditions the issues were identified.

b. Determine that the evaluation documents how long the issue existed, and prior opportunities for identification.

Root Cause Analysis Report (RCAR) CR 03-02086 reviewed the effects of deficiencies in radiation protection (RP) staffing and performance. The licensee's evaluation identified that, several weeks prior to the start of RFO9, the senior management team including RP management was aware that there would be a shortage of RP technicians for RFO9. The shortage was caused by the number of plants in outages as well as the inability of the other two FENOC plants to provide additional RP support due to their own outages. Following the April 14 stand-down, senior management became increasingly involved in obtaining RP technicians from other utilities and a vendor.

The evaluation documented that senior management was aware of the problem prior to the start of RFO9 and provided additional support in obtaining external RP support after the QA organization's imposed stand-down.

c. Determine that the evaluation documents the plant specific risk consequences (as applicable) and compliance concerns associated with the issue.

The risk consequences of the Occupational Exposure Control Effectiveness PI involved the control of locked high radiation areas (LHRA), very high radiation areas and the unnecessary or unplanned radiological exposure to workers. The root cause and other evaluations addressed the issues surrounding use of telemetry and video monitoring of workers in high dose rate areas, performing adequate surveys prior to sending workers into an area and the impact of less than adequate RP coverage including the absence of "rover" RP technicians due to the shortage of RP personnel.

The WHITE PI was declared by the licensee in response to the three occurrences. The licensee also wrote CR 03-04678, "White Performance Indicator For Occupational Exposure Cornerstone," to use the corrective action program to assess the causes for each PI and establish commonalities and plant response. Based upon the licensee's actions, the inspector concluded that the licensee appropriately addressed the risk consequences and compliance concerns associated with the issue.

02.02 Root Cause and Extent of Condition Evaluation

a. Determine that the problem was evaluated using a systematic method(s) to identify root cause(s) and contributing cause(s).

In RCARs CR 03-02086 and CR 03-02073, the licensee used TapRoot analysis along with SnapChart time-line and causal factor charting. Report 03-02086 performed an overall evaluation of the radiation protection department's performance during RFO9 and evaluated conditions that led to RP program concerns. This report identified the root cause for RP performance deficiencies during RFO9 as Oversight Needs Improvement. Six contributing causes were identified:

Scheduling needs improvement;
Trending needs improvement;
Corrective action needs improvement;
SPAC (standards, policies and administrative controls) were not strict enough;
Shortage of RP technicians; and
Plant dose rates were higher than expected.

Root Cause Analysis Report CR 03-02073 evaluated the events surrounding the unintended exposure for RWCU room work, and identified three root causes and a number of contributing causes. These root causes were responsible for the failure to provide effective continuous monitoring of an individual in a LHRA with greater than 3000 millirem per hour dose rates at 30 centimeters as required by plant Technical Specifications and procedures. The three root causes were:

Performance: This was the failure to take responsibilities for effective continuous monitoring of radiation workers by the RP staff involved. Monitoring of individuals was by exception rather by direct knowledge of workers in the area. Positive control of names and numbers of individuals were not known and were not validated against the personnel in the area, by RP personnel controlling remote monitoring and by the guard for LHRA entries.

Programmatic: This was the failure of the RP program to provide for workers to self monitor their dose. The electronic self reading dosimeters were placed inside the workers protective clothing where they were not available to the workers.

Operating Experience: This was the failure to effectively incorporate existing plant and industry operating experience for dosimetry usage in high noise areas or in LHRAs, into the licensee's radiological protection program. Reliance was also placed on telemetry use alone, and did not provide for redundant safeguards for continuous monitoring such as stay time calculations, effective video monitoring and individual telecommunication, for entries into LHRAs having known dose gradients.

The report identified the following contributing causes:

Management oversight and accountability;
Failure to recognize the need for mockup training;

Lack of a program for functional testing of (new) equipment;
Feedback by individuals for unusual occurrences during work evolutions needs improvement;
Use of accurate instead of conservative dose rates for dose control stay times; and
Surveys were not performed in front of radiation workers to establish dose fields.

The report also identified the following deficiencies:

Weaknesses in the As-Low-As-Is-Reasonably-Achievable briefing checklist and in the radiation work permit preparation desk guide;
Team membership had changed. New team members had critical jobs that impacted performance;
Plans developed and successfully implemented on previous shift were not documented and modified during this event;
Procedure was not developed for camera requirements for LHRA entries and usage;
Failure to provide all workers with effective telecommunications and provide for video monitoring when working in LHRAs; and
Electronic Dosimeter source checks were not performed on a daily basis prior to use in LHRAs.

Based upon the breadth, depth and conclusions of the root cause analysis reports, the inspector determined that the methods used to evaluate the root and contributing causes were adequate.

b. Determine that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.

The problems identified during the investigation were grouped into four categories.

Resources: The RP resource shortage was recognized several weeks prior to the beginning of RFO9 but there was an insufficient evaluation of the impact that this would have on the outage. The corrective action could not overcome the subsequent RP program implementation problems.

Radworker Practices: The report identified that standards needed to be established the first week of the outage by a presence of RP technicians and line supervisors. The report noted that radworker poor practices were related to lack of awareness, compliance, and accountability instead of a lack of training.

Dose Control: The exposure event revealed a weakness in implementing new technology (teledosimetry) and also relying on this new technology as a substitute for individual self-monitoring and stay-time calculations. The assignment of clear roles and responsibilities for RP technicians as well as RP oversight in general were flawed in the exposure event. The report also identified scheduling as having an impact on dose control as evidenced by schedule related decisions that were made in order to achieve milestones; the reactor head lift and reactor cavity

decontamination termination. Shielding packages were not always installed prior to work start up on jobs that needed the shielding in place to control dose.

Monitoring and Corrective Action: The report identified that while condition reports were written for RP program deficiencies, active binning and prompt corrective action were not being implemented. The CRs were to be used for a post-outage review and would not influence the course of RFO9. Additionally, there were no RP related outage goals (number of personnel contaminations and dosimetry usage) for the site population other than the dose goal and individual project dose allotments. The unexpected dose accumulation from the higher than expected dose rates also required a more aggressive management to reevaluate shielding, work crew optimization and project scope before being prompted by the stop work order. The report also noted that the type of radworker performance deficiencies identified in the investigation were not atypical for plants in outages, and it is the frequency of occurrence that determines program effectiveness. When judged separately from the exposure event, the radworker deficiencies did not constitute a breakdown, however they were indicators that prompt actions to improve performance were warranted.

The two root cause analysis reports, taken together, provide the overall assessment of the problems that the RP organization encountered during RFO9, and the specific evaluation of problems encountered during work in the RWCU room. Section 02.02 (a) above, describes the root and contributing causes. Findings from both root cause assessments were input into the corrective action program for resolution. The inspector concluded that the root cause evaluations were sufficiently self-critical and were conducted to a level of detail commensurate with the significance of the problem.

c. Determine that the root cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience.

The root cause evaluations had dedicated sections entitled, “Experience Review.” These sections considered both prior occurrences and operating experience at Perry, Davis-Besse and Beaver Valley, and the nuclear industry including the Institute For Nuclear Power Operations (INPO). The corporate data base revealed CRs identifying telemetry malfunctions and LHRA entry problems. An audit of the RP organization had recommended that an effectiveness review (not completed) be performed early in RFO9 to ensure that corrective actions for past radworker practices are successful. A recent INPO evaluation of Perry identified two areas for improvement. The first involved the effectiveness of administrative controls in controlling access to high radiation areas (HRAs). The second dealt with radioactive contamination control, the number of personnel contaminations and their control. A search of industry events was performed and revealed examples of radiological problems similar to those experienced during RFO9. These included unplanned exposures, unauthorized entry into a LHRA and weaknesses in radworker practices.

The licensee concluded that “the radiation protection program problems identified in CR 03-02086 are not unique to Perry, and some industry strengths and operating experience information were available to help improve performance and reduce the

frequency of events." Additionally, the report concluded that the responses to a recent INPO evaluation did not appear to have been fully implemented or were not fully effective. An effectiveness review recommended by the QA group to be performed early in RFO9 might have helped prompt corrective action sooner. The report also recognized the effect that water chemistry control had on dose rates and that there are unknowns in this area that need to be recognized.

The inspector concluded that the root cause evaluation performed an extensive review of prior occurrences of the problems and the knowledge base of prior operating experiences.

d. Determine that the root cause evaluation addresses the extent of condition and the extent of cause of the problem.

The licensee performed an extent of condition and extent of cause review. The report concluded that resource issues (shortage of RP techs), could affect other programs and projects but that no other significant resource problems were identified for RFO9 that would have the same significance as RP support. Most other resource problems impacted the outage schedule, but not worker protection.

The licensee identified prior similar incidents involving telemetry use, inadequate technical specification monitoring in HRAs and dosimetry failure in HRAs through the CR reporting system, and determined that previous corrective actions had not been effective. The applicability of the root cause Oversight Needs Improvement (from RCAR 03-02086) across the RP organization was shown by the contributing causes which are listed in section 02.02 (a). With the exception of plant dose rates, these issues are all a function of management oversight.

02.03 Corrective Actions

a. Determine that appropriate corrective action(s) are specified for each root/contributing cause or that there is an evaluation that no actions are necessary.

The corrective actions (CAs) appeared to be appropriate for the items addressed in both root cause evaluations. The recommended CAs for CR 03-02086, which addressed radiological control deficiencies during RFO9, provided for an oversight plan with defined RP supervisor roles during outages. There would be detailed RP management input into the outage schedule to ensure that RP resource needs are considered and priorities established pre-outage. Whenever RP resources are not at the level assumed in pre-outage planning, or whenever radiological work scope is materially increased, there would be an RP outage preparation and execution practice to re-evaluate resources against the outage schedule.

Corrective actions for the root causes identified in CR 03-02073, which evaluated the worker unintended exposure event, addressed ownership and accountability of RP responsibilities for continuous monitoring of workers in LHRAs and ensured that RP provided workers with a method for monitoring their own radiation dose. Improvements in dosimetry usage included modifications for work in high noise areas, clear direction for

the proper use of telemetry when used for continuous monitoring in LHRAs, stay time calculations, effective video monitoring and individual telecommunications.

The inspector concluded that the licensee had developed adequate corrective actions that addressed the root and contributing causes identified in both root cause analysis reports.

b. Determine that the corrective actions have been prioritized with consideration of the risk significance and regulatory compliance.

The initial response of RP to the worker exposure event was to stop work in the RWCU room. This was followed by the general stop work order from the QA group to address radiological control deficiencies that were occurring during RFO9. The licensee's immediate and long term corrective actions were prioritized based on providing increased radworker safety. This included a preliminary analysis of the worker exposure event, evaluation of missed opportunities and substandard work practices, and prioritizing work activities such that appropriate RP resources could be allocated to ensure adequate coverage. Additional RP techs were obtained to alleviate the shortage. RCAR 03-02073 directed specific CAs for improved RP job coverage including telemetry use in high dose rate areas. RCAR 03-02086 established CAs for improving RP outage management including resources, trending worker performance and overall outage job planning. These two documents taken with the licensee's immediate actions during RFO9 provided the CA prioritization that emphasized radworker safety and dose minimization. Additionally, since these issues involve 10 CFR Part 20 and Technical Specification compliance, it was implicit that regulatory compliance was considered during both development and prioritization of corrective actions.

c. Determine that a schedule has been established for implementing and completing the corrective actions.

Most of the corrective actions to address the root and contributing causes were complete. Based upon a review of the root cause evaluations and the corrective action program, the CAs were properly tracked. The actions were appropriately assigned to individuals responsible for the RP program.

d. Determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence.

The inspector interviewed RP staff/management and reviewed the corrective action program to assess the progress and effectiveness of the CAs for the RCARs. The inspector also observed and participated in the revised process for radiation work permit briefings and admission to the radiologically restricted area. Quality Assurance oversight and evaluation of the corrective actions, along with recent RP performance, and the licensee's actions in monitoring the progress and effectiveness of the corrective actions that would prevent recurrence of the RP weaknesses that led to the white performance indicator appeared to be adequate.

03 MANAGEMENT MEETINGS

Exit Meeting Summary

On January 16, 2004 the inspector presented the inspection results to Mr. W. R. Kanda and other members of licensee management. The licensee acknowledged the issues presented. No proprietary information was identified.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee
R. Coad, Radiation Protection Manager
L. VanderHorst, Radiation Protection Supervisor

NRC
R. Powell, Senior Resident Inspector
J. Ellegood, Resident Inspector

LIST OF DOCUMENTS REVIEWED

The following is a list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspectors reviewed the documents in their entirety but rather that selected sections of portions of the documents were evaluated as part of the overall inspection effort.

Condition Reports Initiated as a Result of Inspection

CR 04-00195; Improvements In Radiological Surveys; dated January 15, 2004

Documents Reviewed During Inspection

Root Cause Analysis Report: Stop Work Issued To Address Radiological Control Deficiencies During RFO9: CR 03-02086; dated May 9, 2003

Root Cause Analysis Report: Unintended Exposure For RWCU Heat Exchanger Work: CR 03-02073; dated May 7, 2003

CR 03-04677; Improvement Items From RPS Self Evaluation Report; dated August 10, 2003

CR 03-04678; White Performance Indicator For Occupational Exposure Cornerstone; dated August 10, 2003

CR 03-02073; Unintended Exposure For RWCU Heat Exchanger Work; dated April 14, 2003

CR 03-02201; Positive Whole Body Counts Resulting From Jarring Insulation In The RWCU Heat Exchanger Room; dated April 18, 2003

CR 03-01877; Unexpected Dose Rate Alarm For Worker In Drywell; dated April 9, 2003

CR 03-02086; Stop Work Order Issued To Address Radiological Control Deficiencies During RFO9; dated April 14, 2003

CR 03-02216; TLD/DRD Discrepancy Noted For Unplanned Exposure In RWCU HX Room; dated April 14, 2003

CR 03-02255; Collective Review Of Telemetry Problems For The Outage; dated April 20, 2003

CR 03-02761; RFCA Process Was Not Used For Teleview 2000 Installation; dated May 1, 2003

CR 03-03013; RFA-Incorporate Enhancements Identified By CR 03-02073 Into RP Programs; dated May 7, 2003

CR 03-03405; RFO9 Outage Dose Collective Significance Review; dated May 20, 2003

CR 03-01975; Collective Significance For Radiological Control Issues For RFO9; dated April 11, 2003

CR 03-03407; RFO9 Outage Personnel Contamination Collective Significance Review; dated May 20, 2003

CR 03-03776; Collective Significance Review Of RFO9 RP Practices/Standards; dated June 7, 2003

CR 03-05616; Collective Significance Of RP Program Implementation Problems; dated October 6, 2003

LIST OF ACRONYMS USED

CA	Corrective Actions
CFR	Code of Federal Regulations
CR	Condition Report
FENOC	FirstEnergy Nuclear Operating Company
HRA	High Radiation Area
INPO	Institute of Nuclear Power Operations
IR	Inspection Report
LHRA	Locked High Radiation Ares
NRC	Nuclear Regulatory Commission
PI	Performance Indicator
QA	Quality Assurance
RCAR	Root Cause Analysis Report
RFO9	Refueling Outage Nine
RP	Radiation Protection
RWCU	Reactor Water Clean UP