U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos:	50-454, 50-455
Licenses No:	NPF-37, NPF-66
Reports No:	50-454/96-08, 50-455/96-08
Licensee:	Commonwealth Edison Company (ComEd)
Facility:	Byron Generating Station, Units 1 & 2
Location:	Opus West III 1400 Opus Place Downers Grove, IL 60515
Dates:	September 3 - 6, 1996
Inspectors:	S. K. Orth, Radiation Specialist D. B. Hart, Radiation Specialist
Approved by:	Thomas J. Kozak, Acting Chief Plant Support Branch 2

Report Details

IV. Plant Support

R1 Radiological Protection and Chemistry (RP&C) Controls

R1.1 Control of Radioactive Materials and Radiological Surveys

a. Inspection Scope (83750)

The inspectors reviewed the control of radioactive materials and the posting of radiological hazards within the Auxiliary Building (AB) and the Unit 2 Containment Building. The inspectors made frequent tours of the radiologically posted areas and reviewed radioactive material labelling and radiological postings.

b. Observations and Findings

During tours of the Unit 2 Containment Building, the inspectors noted good control and labelling of radioactive materials. The inspectors found high and very high radiation areas to be posted and controlled in accordance with NRC requirements.

During a tour of the AB, the inspectors identified a weakness in the control of radioactive material (RAM) and the posting of a radiation area. During a verification of radiation levels in the vicinity of a posted radiation area on the 346' level of the AB, the inspectors measured 15 mrem/hr on contact with the boundary and 8 mrem/hr at 30 cm from the boundary. Following the inspectors' observations, a radiation protection technician performed confirmatory surveys and measured about 12 - 13 mrem/hr at the boundary. The source of the radiation was primarily from the contents of a 55-gallon barrel and a vacuum cleaner which were both positioned near the boundary. The technician immediately repositioned the equipment within the area and the dose rates at 30 cm from the boundary were reduced to about 2 - 3 mrem/hr. The RP staff indicated that station personnel may have moved the barrel to obtain equipment from the storage area but failed to recognize the effect of the barrel's position on area dose rates. A problem identification form (PIF) was initiated to address the situation and develop corrective actions to prevent recurrence.

The failure to post each radiation area (an accessible area in which an individual could obtain a dose equivalent in excess of five mrem in one hour at a distance of 30 cm from the source of radiation or any surface which the radiation penetrates) with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, RADIATION AREA" is a Violation of 10 CFR 20.1902(a). (50-454/455-96008-01(DRS))

c. Conclusions

A tour of the Auxiliary Building identified that material within a posted radiation area had been moved which caused radiation levels to increase outside the area boundary. This NRC identified violation brought into question the effectiveness of the licensee's radioactive material control program.

R1.2 Unit 2 Outage Dose Control and ALARA Implementation

a. Inspection Scope (83750)

The inspectors reviewed the radiological controls implemented for the Unit 2 1996 refueling outage (B2R06), including ALARA goals and results. The following high dose jobs were observed in progress (either remotely or on location):

- resistance temperature detection (RTD) modification,
- steam generator inspections and reassembly,
- reactor coolant pump seal inspections, and
- reactor head funnel grinding and welding.

b. Observations and Findings

The Unit 2 Containment Building general area dose rates were about 50 percent higher than historically found which presented the licensee with a challenge to meet established dose goals for the outage. The dose goals were based on a ten percent reduction from historical dose performance. The inspectors observed that the RP department maintained close oversight of outage tasks and dose was effectively controlled as a result. ALARA tools implemented for the outage included the use of additional shielding and the incorporation of lessons learned from previous outages which effectively mitigated the effects of the increased dose rates.

As of September 6, 1996, over 80 percent of the steam generator and 90 percent of the RTD work scope was complete and the dose expended was about 21 and 70 rem, respectively. The licensee effectively applied lessons learned from the 1996 unit 1 RTD modification to the B2R06 modification, including improvements in communications, radiation protection technician (RPT) shift interfaces, and handling of removed piping and equipment. As a result of higher area dose rates, the licensee's current B2R06 dose exceeded the unit 1 modification dose of 69 rem. However, the implementation of lessons learned appeared to improve work efficiency by about 10 percent, mitigating the effect of higher area dose rates.

The inspectors attended pre-job briefings, which provided a good level of information. The RP staff clearly communicated RWP requirements, dose and dose rate alarms, and radiological hold points. However, the inspector identified some weaknesses concerning workers' preparation. During the ALARA meeting to discuss the repair of the fuel transfer cart, the maintenance staff did not appear prepared for the evolution and were unaware of job scope and the tools needed. As a result, the ALARA pre-job meeting was used to determine the job scope and the role of participants. The inspectors also noted that persons frequently left during meetings to pursue action items being discussed. In addition, the meeting participants had little discussion regarding work scope contingencies. The health physics support supervisor (HPSS) acknowledged the weaknesses in worker preparation and indicated that management's expectations were subsequently explained to the work groups.

The inspectors observed good radiation worker (radworker) practices. Personnel properly donned and removed protective clothing and demonstrated a good knowledge of electronic dosimetry alarm setpoints. The licensee provided additional support at the Containment Building step-off-pads which were effective in improving worker performance and correcting errors. Workers demonstrated good awareness of radiological conditions and appropriate use of low dose waiting areas.

c. Conclusions

The licensee's control of Unit 2 outage dose was a strength. The licensee effectively used past outage work critiques to apply lessons learned to existing work. Although pre-job ALARA meetings ensured workers were aware of radiological requirements, weaknesses in worker preparation and a lack of identifying work contingencies was evident. During outage work evolutions, workers demonstrated good radiological practices.

R1.3 Source Term Reduction

a. Inspection Scope (83750)

The inspectors reviewed the licensee's efforts to reduce the radiological source term. The inspectors reviewed the licensee's cobalt reduction and hot spot reduction programs. In addition, the inspectors reviewed the licensee's efforts in reducing dose for the 1996 Unit 2 re-fueling outage through pH control and shutdown chemistry.

b. Observations and Findings

Communications between RP and operations staff was effective in maintaining radiological impediments to a minimum and reducing general area dose rates. Based on the identification of these impediments, the licensee developed effective initiatives to reduce source term. During plant shutdowns, the licensee routinely flushed specific system piping in containment to reduce general area dose rates. In addition, the RTD modification (Section R1.2) removed a significant amount of corrosion product traps, which reduced general area dose rates in the Containment Building.

Good teamwork between chemistry and radiation protection was also successful in mitigating the effects of the May 1996 Unit 2 shutdown. Following the May 1996 Unit 2 reactor shutdown, the licensee observed significantly higher dose rates in the chemical and volume control system (CVCS) letdown piping. The licensee's chemistry and RP department reviewed industry data and identified a relationship between end of cycle boron concentration, pH, and dose rates on the CVCS letdown system. Prior to the August 1996 Unit 2 shutdown, the licensee maintained the reactor coolant system (RCS) pH at about 6.95 and monitored the dose rates on the CVCS piping with electronic personal dosimeters (EPDs). The dose rates on the CVCS remained constant, indicating a decrease in the transport of corrosion products from the core and in the deposition of the deposits on out-of-core systems.

The RP, chemistry, and operations departments also demonstrated good teamwork in controlling shutdown chemistry. Boric acid was added early in the shutdown and this was followed with hydrogen peroxide addition. A significant amount of cobalt was removed from the reactor incore surfaces as result. During the last three Unit 2 refueling outages, the licensee removed an average of about 1200 curies (Ci) of Co-58 and 16 Ci of Co-60 during this process.

c. Conclusions

Teamwork between radiation protection, chemistry, and operations staff has been effective in reducing source term. Shutdown chemistry control and system flushing have had positive effects.

V. Management Meetings

X1 Exit Meeting Summary

On September 6, 1996, the inspectors presented the inspection results to licensee management. The licensee acknowledged the findings presented.

The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

PARTIAL LIST OF PERSONS CONTACTED

K. Kofron, Station Manager
T. Gierich, Operations Manager
P. Johnson, Technical Service Superintendent
E. Campbell, Maintenance Superintendent
D. Brindle, Regulatory Assurance Supervisor
W. McNeil, Radiation Protection
D. Goldsmith, Health Physics Supervisor
W. Grundmann, Chemistry Supervisor

INSPECTION PROCEDURES USED

IP 83750: Occupational Radiation Exposure

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-454-96008-01 VIO inadequate posting of a radiation area

Closed

None.

Discussed

None.

LIST OF ACRONYMS USED

AB	Auxiliary Building
ALARA	As-Low-As-is-Reasonably-Achievable
CFR	Code of Federal Regulations
Ci	Curies
CVCS	Chemical and Volume Control System
EPD	Electronic Personal Dosimeter
HPSS	Health Physics Support Supervisor
ODCM	Off-site Dose Calculation Model
PIF	Problem Identification Form
RA	Radiation Area
RCS	Reactor Coolant System
RP	Radiation Protection
RPT	Radiation Protection Technician
RP&C	Radiation Protection and Chemistry
RTD	Resistance Temperature Detector
RWP	Radiation Work Permit
SG	Steam Generator
TS	Technical Specification

Documents Reviewed

Licensee listing of "Hot Spots" (August 1996).

Licensee trends of Cobalt-60 and Cobalt-58 concentrations during B2R04, B2R05, and B2R06.

"CVCS/Letdown System End of Cycle Dose Rate Excursions," David Kozin, June 11, 1996 (Presentation to NEI Health Physics Forum, Dallas, Texas).

RWP Estimated and Actual Totals: Year to date Totals.

RTD Bypass Elimination Project: ALARA Post Job Report B1R07.