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REGION III

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Report Nos: 50-456/98013(DRS); 50-457/98013(DRS)

Licensee: Commonwealth Edison Company

Facility: Braidwood Generating Station, Units 1 and 2

Location: RR #1, Box 84
Braceville, IL 60407

Inspection Dates: August 10-14, 1998

Inspectors: D. Nissen, Radiation Specialist
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EXECUTIVE SUMMARY

Braidwood Generating Station, Units 1 & 2
NRC Inspection Reports 50-456/98013; 50-457/98013

This inspection included an announced review of the chemistry and radiation protection programs. Specifically, the inspection focused on the chemistry program as well as the radiological controls for the steam generator replacement project.

Plant Support

- The radiation protection and chemistry planning for the steam generator replacement project appropriately considered the radiological hazards associated with the project. Good communication and coordination was noted between the station radiation protection group and the contract radiation protection personnel. (Section R1.1)
- The water chemistry of primary and secondary systems was well maintained and monitored. Levels of corrosive impurities were maintained at or below industry guidelines. Good coordination and communication between the chemistry department and plant staff ensured awareness of chemistry program performance. (Section R1.2)
- The quality control of laboratory instruments ensured the overall accuracy of required analyses. No problems were observed with the radiological and the non-radiological comparison programs, demonstrating that the licensee was accurately performing chemical and radiological analyses. The post accident sampling comparisons were completed as required and the results indicated that the post accident samples were consistent with the reactor coolant chemistry. (Section R1.3)
- In general, chemistry technician performance was excellent, with workers exhibiting a comprehensive knowledge of station procedures and chemistry sampling and analysis techniques. (Section R4.1)
- The computer based training for radiation workers was reviewed and found to be consistent with class room training provided in the past. (Section R5.2)
- Chemistry program self assessments were probing and identified problems which were resolved in a timely manner. (Section R7.1)

Report Details

IV. Plant Support

R1 Radiological Protection and Chemistry (RP&C) Controls

R1.1 Unit 1 Steam Generator Replacement Project (SGRP) Planning

a. Inspection Scope (IP 83729)

The inspectors reviewed the radiation protection and chemistry staff's advance planning and preparation for the fall 1998 Unit 1 SGRP, including: staff qualifications, training, as-low-as-is-reasonably-achievable (ALARA) planning, work planning, lessons learned, and dose estimates for several activities. The inspectors also performed walkdowns of the containment access facility built for the project as well as the mockups for training workers.

b. Observations and Findings

A station health physicist was assigned as the SGRP radiation protection (RP) coordinator having the responsibility for directing RP activities associated with the SGRP. The staff planned to have radiation protection coverage provided by contractors, with twelve site radiation protection technicians (RPTs) working at access control and available to help in other areas. Good communication and coordination was noted between the station RP group and the contract RP personnel. The contractor RPTs were selected based on the three-year experience criteria of ANS 3.1-1978, "Selection and Training of Nuclear Power Personnel" and previous SGRP experience. All but one supervisor for the RPTs and about 50% of the contract RPTs had experience from the Byron station SGRP. The RPTs were provided radiation worker training, confined space training, high radiation area control training, conservative decision making training, job specific training, and closed circuit television system training. In addition, a week long training class on a variety of areas was provided if they had not had it within the past few years.

Dedicated ALARA planners were named to prepare ALARA plans and radiation work permits (RWPs). Several mockups such as the pipe end decontamination, temporary lead shielding, and reactor coolant system nozzle cover installation were created to familiarize workers with the job methodologies and thus reduce worker exposure.

The inspectors reviewed the radiological plans for several of the higher dose jobs. The ALARA planners had established the dose estimates based on Byron Station lessons learned and on known or estimated dose rates in containment. The dose estimate for the SGRP was approximately 179 rem. Some of the radiological work packages reviewed included the pipe end decontamination effort estimated to receive 4.5 rem, and the reactor coolant system pipe end cutting and welding, estimated to receive 33.5 rem. The licensee effectively addressed radiological concerns and the inspectors noted that the proposed doses estimates were

appropriate. Evolutions that had a high probability of creating an airborne radiological hazard were identified by the licensee and addressed to ensure workers safety.

The chemistry staff were prepared for the shutdown of Unit 1 and had addressed several lessons learned from industry SGRPs and Byron Station's Unit 2, 1998 outage. The station planned to use the routine shutdown template with 10 additional hours of acid reduction to minimize source term. Several procedures were revised to incorporate lessons learned from Byron to ensure that maximum letdown flow was used during the shutdown.

c. Conclusions

The inspectors concluded that the radiation protection and chemistry planning for the SGRP appropriately considered the radiological hazards associated with the project. Good communication and coordination was noted between the station RP group and the contract RP personnel

R1.2 Plant Water Chemistry Control

a. Inspection Scope (IP 84750)

The inspectors reviewed the licensee's management of primary and secondary water chemistry including the program to mitigate impurities in the systems. Included was a review of the licensee's trending and analysis of chemistry parameters for the period of January 1997 through July 1998 and a review of various procedures.

b. Observations and Findings

The licensee's procedures were consistent with the industry guidelines in minimizing the concentration of corrosive agents and radiation source term buildup. For example, the licensee utilized all-volatile treatments chemistry in the secondary system to reduce oxygen concentrations and iron transport and to control pH, via addition of hydrazine and methoxypropyl amine. The licensee continued to observe a decrease in feedwater iron concentration. The iron concentrations in Units 1 and 2 were approximately 1.5 and 2 parts per billion (ppb), respectively. To mitigate the effects of caustic crevice corrosion in Unit 1, the licensee practiced "Molar Ratio Control" to reduce the caustic nature of sodium in the steam generator crevices with chloride. The inspectors noted that the licensee maintained effective control over the sodium-to-chloride ratio in the steam generators. The inspectors also noted that the current Unit 1 boric acid program and molar ratio control program would cease following the steam generator replacement project scheduled for the fall of 1998.

The licensee maintained excellent control of primary and secondary water chemistry in both units. The concentrations of chloride and fluoride in the primary systems were typically maintained at less than 3 ppb. The levels of impurities in the secondary system were also well maintained.

The inspectors observed good monitoring of fuel integrity, and no fuel integrity problems were identified since January 1997 (documented in NRC Inspection Reports 50-456/97003 and 50-457/97003(DRS)). The inspectors noted that the chemistry department personnel provided chemistry information to plant management several times a week, and discussed trends with both system and nuclear engineers at the station, indicating good coordination between departments.

c. Conclusions

The water chemistry of primary and secondary systems was well maintained and monitored. Levels of corrosive impurities were maintained at or below industry guidelines. Good coordination and communication between the chemistry department and plant staff ensured awareness of chemistry program performance.

R1.3 Chemistry Laboratory and Post Accident Sampling Quality Control

a. Inspection Scope (IP 84750)

The inspectors reviewed the licensee's quality control program for laboratory instruments and reviewed the licensee's maintenance of instrument control charts. The inspectors also reviewed the licensee's laboratory testing programs and the post accident sampling comparison process.

b. Observations and Findings

The inspectors inspected the laboratory standards and did not identify any problems with respect to labeling or shelf life. The inspectors also determined that laboratory instrument performance checks were performed in accordance with procedures. Quality control charts were maintained for laboratory instrument analyses in the analytical and counting labs and instrument biases were identified and resolved in a timely manner.

The inspectors reviewed the licensee's laboratory intercomparison programs. For the analytical lab, the licensee used samples prepared by the licensee's corporate laboratory. These samples were compared to the actual concentrations to determine Braidwood Station's sampling accuracy. The inspectors reviewed the results for 1997 and 1998 and noted that there were, in general, good agreements. The inspectors also reviewed the counting laboratory intercomparison program. The licensee analyzed vendor prepared samples in counting laboratory instruments. Again, the inspectors noted good agreement. Finally, the inspectors reviewed the licensee's technician testing program. The technicians were given several samples to analyze, and were expected to have results within a certain margin, depending on the instrument used and the sample analyzed. The technicians were given two chances, and if agreement was not found, the technician was removed from that particular instrument until further training could be provided. The inspectors noted that in general the technician results were excellent. No problems were observed with any of the comparison programs.

The inspectors reviewed the post accident sampling system quality control program. Since 1997 the licensee compared the post accident samples to reactor coolant samples to ensure that a representative sample was obtained. The inspectors noted that the licensee completed these comparisons as required and the results indicated that the post accident samples were consistent with the reactor coolant chemistry. No problems were noted in this area.

c. Conclusions

The quality control of laboratory instruments ensured the overall accuracy of required analyses. No problems were observed with the radiological and the non-radiological comparison programs, demonstrating that the licensee was accurately performing chemical and radiological analyses. The post accident sampling comparisons were completed as required and the results indicated that the post accident samples were consistent with the reactor coolant chemistry.

R4 Staff Knowledge and Performance in RP&C

R4.1 Sampling and Analysis of Primary Coolant (IP 84750)

The inspectors observed a chemistry technician and a chemistry trainee sample primary coolant and obtain strip gas samples. The technician demonstrated good analytical techniques and knowledge of procedure requirements and references. The technician was also knowledgeable of the expected concentrations found in the coolant and the licensee's limits for a variety of specific analyses. The technician properly used an ion chamber to monitor the ambient radiation dose rates in the sampling room and the dose rates of samples. The technician demonstrated acceptable contamination control practices with some minor exceptions.

While the technician was adequately able to obtain the required samples, the inspectors noted that the configuration of the room created a challenging radiation worker scenario. In order to obtain various samples from the high radiation sampling station panel, chemistry technicians were required to manipulate numerous valves located in both contaminated and non-contaminated areas. To reduce the number of contaminated square feet in the facility, the licensee had moved the contaminated area boundary to a position where the sampling sink and valves directly above it were the only contaminated components in the sampling room. In order to appropriately obtain a sample, a technician had to don and remove protective clothing numerous times for each sample (in one observation, the inspectors noted that the workers changed gloves greater than ten times). While the technicians were very cognizant of the appropriate contamination control practices, the pauses in the procedure lengthened the amount of time necessary to obtain the samples. The inspectors noted that the minor exceptions to the observed technicians good contamination control practices appeared to be due to the configuration of the contamination control boundaries in the sampling room.

R5 Staff Training And Qualification In RP&C

R5.1 Post Accident Sampling System Training (IP 84750)

The inspectors reviewed chemistry technician post accident sampling training plans and test results for 1997 and 1998. The training appeared comprehensive and the results from a recent emergency drill indicated that the training was effective. The radiation protection department provided a technician to perform radiological surveys during the drill sample acquisition. From discussions with radiation protection and chemistry staff, it appeared that this coordination and support expedited the sample acquisition time. The inspectors noted that this was an example of good coordination between the departments. From interviews with various chemistry technicians and chemists, the inspectors noted that there was a good knowledge of the post accident sampling system.

R5.2 Computer Based Training

a. Inspection Scope (IP 83729)

The inspectors reviewed the implementation of the computer based training (CBT). Pass and failure ratios were reviewed and the inspectors reviewed portions of the tutorial and completed an exam to observe the program.

b. Observations and Findings

The CBT began with a required computer tutorial which discussed various aspects of radiation worker training in detail. When the worker had completed the tutorial (approximately 8-10 hours) the exam proctor entered a password to enable the worker to start the test. The exam questions were the same questions that had been used before the implementation of CBT. After completing the exam, the computer immediately graded it and provided the worker and proctors with the results. If the worker failed the exam it could be taken a second time after additional studying. If the exam was failed twice, for workers with existing access, the proctor would notify security as well as the other Commonwealth Edison stations and the workers radworkers access was revoked. The worker would be able to retake the exam the following quarter.

The graphics were helpful in providing visual examples of radworker instructions and hazards that a worker could encounter in the field. Additionally, the tutorial prompted the worker to answer multiple choice questions during each review section. The directions were easy to follow and proctors helped workers get started. Industry events were included in the study guide handed out to the workers and were appropriate.

c. Conclusions

The computer based training for radiation workers was reviewed and found to be consistent with class room training provided in the past.

R7 Quality Assurance In RP&C Activities

R7.1 Chemistry Program Self Assessments (IP 84750)

The inspectors reviewed numerous self assessments conducted by the chemistry staff in 1997 and 1998. While the older assessments were somewhat vague in their documentation, the issues indicated a probing look into the chemistry program. More recent audits were more clearly documented and continued to address valid issues.

The inspectors reviewed the licensee's corrective actions to audit findings and noted that the licensee responded to these findings in an expedited manner while adequately addressing the nuances of the findings.

R8 Miscellaneous RP&C Issues

R8.1 (Closed) Inspection Follow-up Item (IFI) 50-455/98006-01 and 50-457/98006-01:

Problems with the adhesive holding up radiological postings and barriers were addressed by replacing the regular adhesive with an epoxy. The inspectors observed no new examples of barriers or postings having fallen due to loosened adhesive. This item is closed.

R8.2 (Closed) IFI 50-456/97017-03 and 50-457/97017-03:

Radiation worker problems had been identified which affected the adequacy of radiological postings. Corrective actions to address these problems included taping swing gates to the floor, and attaching a sign to the base of the high radiation area swing gates instructing workers not to move them. High radiation area swing gates in high traffic areas had buzzers on them, the workers indicated to RP that this became annoying for people in the work area. RP indicated that they will evaluate removing buzzers from these high use gates. Additionally, more responsibility had been directed to other work groups through incentive programs and changes in the problem identification program. No new incidents had occurred since the implementation of these corrective actions. This item is closed.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on August 14, 1998. The licensee acknowledged the findings presented. No proprietary information was identified.

PARTIAL LIST OF PERSONS CONTACTED

M. Cassidy, Regulatory Assurance
M. Sayers, SGRP Radiation Protection Supervisor
B. Schramer, Chemistry Manager
G. K. Schwartz, Plant Manager
R. Thacker, Lead Health Physicist

INSPECTION PROCEDURES USED

IP 83729 Occupational Exposure During Extended Outages
IP 84750 Radioactive Waste Treatment, and Effluent and Environmental Monitoring
IP 92904 Followup - Plant Support

ITEMS OPEN, CLOSED, AND DISCUSSED

Closed

50-456/457-98006-01	IFI	Several problems with postings falling down.
50-456/457-97017-03	IFI	Radiation worker problems affecting the adequacy of radiological postings.

LIST OF ACRONYMS USED

ALARA	As-Low-As-Reasonably Achievable
CBT	Computer Based Training
IFI	Inspection Follow-up Item
IP	Inspection Procedure
ppb	Parts Per Billion
RP	Radiation Protection
RPT	Radiation Protection Technician
SGRP	Steam Generator Replacement Project
TS	Technical Specifications

LIST OF DOCUMENTS REVIEWED

ComEd Nuclear General Employee Training Study Guide

SGRP Radiation Protection Plan

SGRP Interface Agreement

Chemistry control charts January 1997- present

Chemistry Technician Training Results 1997, 1998

Chemistry Self Assessments 1997, 1998

RWPs: 984317, 984318, 984314, 984306