

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-461/93028(DRSS)

Docket No. 50-461

License No. NPF-62

Licensee: Illinois Power Company
500 South 27th Street
Decatur, IL 62525

Facility Name: Clinton Power Station

Inspection At: Clinton Site, Clinton, Illinois

Inspection Conducted: January 3 through 12, 1994

Inspectors:

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2/1/94
Date

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Date

Inspection Summary

Inspection on January 3 through 12, 1994 (Report No. 50-461/93028(DRSS))

Areas Inspected: Routine announced inspection of the radiation protection (RP) program, including: maintaining occupational exposures ALARA during Refueling Outage 4 (RF-4) (Inspection Procedure (IP) 83750); a chemistry record falsification incident (IP 84750); and, onsite radioactive waste storage plans (IP 83750). Also included in this inspection was a review of the actions taken to resolve two inspection followup items (IFI) (IP 83750).

Results: The radiation protection and ALARA programs appeared to have been generally effective in controlling radiological work during RF-4, and in protecting the public health and safety. However, licensee management was concerned with the outage dose and was reviewing outage work as an initiative to improve the effectiveness of the ALARA program. Plans for an onsite radioactive waste storage facility are being developed and construction is scheduled to begin in the spring. Several examples of licensee documented poor radiological work practices were noted. No violations were identified.

DETAILS

1. Persons Contacted

- * W. Bousquet, Director, Plant Support Services
- # C. Calhoun, Supervisor, Quality Systems
- * W. Clark, Director, Plant Maintenance
- ** J. Cook, Vice-President and Manager, Clinton Power Station
- * M. Dodds, Supervisor, Radiological Operations
- * C. Elsasser, Director, Planning and Scheduling
- * L. Everman, Director, Radiation Protection
- * K. Graf, Director, Engineering Projects
- * G. Hall, Alara Coordinator
- * G. Kephart, Supervisor, Radiological Support
- * S. Klein, Assistant Supervisor, Chemistry
- * D. Korneman, Director, Systems Engineering NSED
- * J. Langley, Director, Design and Analysis Engineering, NSED
- * J. Lewis, Nuclear Projects Analysis Group
- * M. Lewis, Dosimetry Supervisor
- # P. Mergen, Supervisor, Chemistry
- * D. Miller, Chief Radiological Scientist
- * J. Miller, Manager, Nuclear Station Engineering
- ** K. Moore, Director, Plant Technical
- # D. Morris, Director, Nuclear Assessment
- * A. Mueller, Director, Maintenance and Technical Training
- * J. Niswander, Supervisor, Radiological Environmental
- * J. Palciak, Manager, Nuclear Support Services
- * S. Parr, Director, Engineering and Operations, Soyland Power Cooperative
- ** S. Perry, Senior Vice-President
- ** R. Phares, Director, Licensing
- * J. Pruitt, Nuclear Programs Assessor
- * J. Ramanuja, Supervisor, Radiological Engineering
- ** M. Reandeau, Licensing Specialist
- * P. Scardigno, Nuclear Programs Assessor
- ** J. Sipek, Supervisor, Regional Regulatory Interface
- * F. Spangenberg, Nuclear Program Strategic Change Leader
- * J. Taylor, Director, Administration
- * D. Thompson, Manager, Nuclear Training
- * D. Waddell, Director, Programs and Administration, NSED
- * R. Weedon, Assistant Director, Radiation Protection
- * C. Williams, Radiological Engineer
- ** R. Wyatt, Manager, Nuclear Assessment
- * P. Yocum, Director, Plant Operations

- * P. Brochman, Senior Resident Inspector, NRC
- * F. Brush, Resident Inspector, NRC

The inspectors also interviewed other licensee and contractor personnel during the course of the inspection.

* Denotes those present at the exit meeting on January 7, 1994
Denotes those present at the exit meeting on January 12, 1994

2. General

This inspection was conducted to review selected parts of the licensee's radiation protection (RP) program, the licensee's evaluation of radiological controls for Refueling Outage 4 (RF-4) and a chemistry record falsification incident. The inspection included a tour of radiation controlled areas (RCA) including the auxiliary, turbine and radwaste buildings. The inspectors observed licensee activities, reviewed representative records and held discussions with licensee personnel.

3. Licensee Action on Previous Inspection Findings (IP 83750)

- a. (Closed) Inspection Followup Item No. 50-461/92021-01: The inspectors reviewed radiation worker concerns about the licensee's administrative policy of assigning a dose of 0 millirem (mrem), (0 microSieverts (0 μ Sv)) for thermoluminescent dosimeter (TLD) readings of less than 10 mrem (100 μ Sv), and how multibadge dosimetry results are added to radiation worker dose records. A licensee representative stated that the lowest level of radiation that TLDs can record is 5-10 mrem (50-100 μ Sv) due to the signal to noise ratio of the instrumentation. When the background reading is subtracted from a TLD reading less than 10 mrem, (100 μ Sv) the result can be less than zero. Based on this, the licensee considers a TLD reading of 10 mrem (100 μ Sv) or above meaningful while a reading below 10 is not. Dosimetry is currently changed out monthly, however, for routine work (low dose), the measurement period will be changed to quarterly. Since the dose will accrue over a longer period, the measurement will be more accurate, and, low exposure rates (in the 10 mrem (100 μ Sv) range) can be better quantified. Workers in high dose rate areas may have their TLDs changed out more frequently.

Multipak dosimetry records are tracked by the dosimetry supervisor who reviews all dosimeter data and assigns the appropriate dose to the radiation worker's monthly records. For multiple whole body dosimeters, the highest reading is added to the workers monthly records and for extremity dosimetry, the highest reading is also assigned. A licensee representative stated that less multibadging was needed during the recent outage due to enhanced surveys. This item is closed.

- b. (Closed) Inspection Followup Item No. 50-461/93025-01: Workers needed additional instruction in the various alarm functions of electronic dosimeters. A licensee training session was attended on the use of electronic dosimeters which included: purpose and modes of operation, wearing the electronic dosimeter, alarm modes and personnel action, use and care of electronic dosimetry, and an industrial event involving electronic dosimetry. The training was

well presented, the instructor was knowledgeable of the dosimeter model in use and the presentation could be easily understood. An exam was conducted at the end of the session. This training is required of personnel having dosimetry, and those not completing the training by February 28, 1994 will lose their dosimetry. This item is closed.

4. Maintaining Occupational Exposure ALARA (IP 83750)

The inspectors reviewed the licensee's program for maintaining occupational exposures As Low As Reasonably Achievable (ALARA) during Refueling Outage 4 (RF-4), including the ALARA policy and procedures, outage planning and preparation, and worker awareness and involvement.

a. **ALARA Program/Organization**

Corporate ALARA policy was defined in procedures CNP 5.01 "Radiological Control Program" and 5.02 "Radiological Control Organization and Administration," and implemented via station administrative procedure CPS 1024.05 "ALARA Program Elements". ALARA responsibility was shared between the RP group and the station ALARA committee, whose membership included the directors of the major plant groups.

ALARA oversight was accomplished through the establishment of station and departmental goals followed by periodic reviews of performance. A cost benefit ratio of \$10,000 per person-rem (\$1,000 per person-millisievert (Msv)) was used during planning. During the outage, the Director of the RP program was temporarily assigned to an Outage Shift Manager Position; his previous duties were assumed by the assistant director. Three RP Shift Supervisors (RPSSs) were on duty each shift; two were assigned as outage area coordinators and the third to the RP office. Approximately 72 contract RP technicians (CRPTs) augmented work coverage efforts. The CRPTs shared the same responsibilities as the site RPTs and reported to licensee management.

Discussions with plant workers and management indicated the ALARA policy was well understood. Monthly exposure reports were distributed to and reviewed by department heads and were used in work planning. Although area coordinators were responsible for housekeeping, weaknesses were identified in this area both by RP and by NRC inspectors; this issue had been addressed by licensee management. Also, job walkdowns performed by maintenance supervisors and their observations made during the walkdowns were not well documented. Licensee management was evaluating several possible corrective actions including improved communications among departments, procedure changes and the addition of more job history information to the computer data base. Overall, outage management appeared to be good.

b. ALARA Implementation

The outage planning and scheduling program was described in inspection report No. 50-461/93012(DRSS). Although a review of completed job packages indicated good use of job history files, plant photos, and job briefings, inaccurate man-hour estimates and radiological survey information were used for work planning. This often resulted in gross differences between estimated and actual exposure and taxed ALARA planning resources. Some examples were:

<u>RWP#</u>	<u>est (act) man-hours</u>	<u>est (act) dose¹</u>
93001486	92 (55.7)	1.11 (0.75)
93001093	18 (5)	2.70 (0.14)
93001422	54 (119)	1.08 (0.47)
93001349	1381 (500)	0.45 (3.31)
93001450	988 (335)	2.83 (4.14)

¹dose values are in person-rem (1 person-rem = 10 person-mSv)

Man-hour estimates, which were provided to RP by maintenance work planners, did not distinguish time in and out of radiation areas. The inspectors also noted that maintenance job histories did not include lessons learned. Licensee management was considering separating time in and out of the radiation area in their man-hour estimates, and adding lessons learned to the job histories. Because radiological survey information was often based on historical data for initial planning purposes, actual dose measurements were used to revise ALARA estimates as necessary.

Station outage dose was 455 person-rem (4.55 person-Sv); about 18% over the outage goal. A significant portion of the overage was attributed to planning deficiencies associated with refueling floor activities. About 60 person-rem (0.6 person-Sv) was accrued on the refuel floor compared to about 26 person-rem (0.26 person-Sv) in previous outages. Although the work scope was similar to RF-3, the number of worker-hours spent in radiation areas increased by 225%. This will be addressed by the licensee in the RF-4 critique.

Inadequate water filtration during fuel movement and nozzle flushing also contributed to refueling floor dose. Water filtration was provided by the fuel pool cooling (FPC) system owing to the chemical decontamination and subsequent repair of the reactor water cleanup (RWCU) system. A scheduled electrical bus outage intermittently removed the FPC from service during the outage, which produced an increase in radioactive particulates in the water. As no backup filtration system was available, radiation levels on the refueling floor bridge rose to 10 mrem/hr (0.1 mSv/hr) (versus typical values of 2-3 mrem/hr (0.02-0.03 mSv/hr)) requiring successive flushing of the weir wall to control crud buildup. After restoring filtration, dose rates returned to

normal. The inspectors noted to licensee representatives that the lack of an alternative filtration system for reactor water cleanup while the RWCU system was inoperable, along with depending on the FPC system for cleanup, represented a major planning weakness. Licensee representatives stated that they were developing guidance to prevent a recurrence in subsequent outages.

The original outage goal was 72 days, which was later revised to 55 days about two months prior to the outage. The actual duration of the outage was 75 days. Discussions with workers indicated that the outage goal, while achievable, did not adequately allow for emergent work. Additionally, pressure from some supervisors to adhere to the goal exacerbated recovery. This issue will also be addressed in the RF-4 critique.

c. **ALARA Initiatives**

Station management has developed a long range plan to oversee source term reduction efforts. The plan considers condensate filtration, replacement of cobalt containing components, chemical decontamination, and plant chemistry (hydrogen water chemistry, zinc injection, etc). Semi-annually, management reviews the progress towards these initiatives. To date, the plant has identified cobalt containing valves and replaced three of them during RF-4, including the feedwater regulator valve. A chemical decontamination of the RWCU system and reactor recirculation (RR) piping and a soft shutdown were performed during RF-4. Although results of the soft shutdown were still being analyzed, preliminary results of the chemical decontamination indicated that decontamination factors of 3.8 and 5.0 were achieved on the RWCU and RR piping, respectively. The licensee estimated that approximately 41 curies of radioactive material were removed from the RR and RWCU systems. Future efforts include installation of filtration vessels on the condensate system to test various filter media, between June-July 1994. Management support for source term reduction appeared very good.

Various ALARA tools including teledosimetry and mockups were used during the outage. Additional efforts included the purchase of digital imaging equipment and enhanced computer equipment for archiving of old survey data and post job histories. This archive will eventually be merged with the plant component photo library for access by any worker via a station local area network.

Overall, the licensees preparation and planning for the outage appeared good. The ambitious schedule and filtration problems associated with refueling activities were, in part, responsible for the actual dose exceeding the projected dose. Inaccurate manhour estimates and radiological survey data taxed ALARA planning resources, and were being addressed by station management.

No violations or deviations were identified.

5. Chemistry Record Falsification (IP 84750)

Chemistry Condition Report 1-94-01-003 identified a suspected quality assurance (QA) record falsification. The licensee's investigation of the analyses of the fourth quarter (1993) nonradiological chemistry crosscheck unknowns indicated a chemistry technician (CT) had submitted a result for chromium when the sample assigned to that CT had been found in the chemistry laboratory, intact and unopened. The analysis of chromium on a filter requires that the filter be digested (destroyed) and the resulting solution be analyzed by atomic absorption spectrophotometry. Procedure 6000.01, Quality of Chemistry Activities, defines the chemistry interlaboratory crosscheck program in which CTs are required to analyze vendor supplied unknowns in order to determine their analytical proficiency. As the procedure does not require CTs to analyze a specific number or kinds of unknowns each quarter, there was no procedure violation when the CT in question did not analyze the chromium sample. In addition, this was not an NRC required record. The inspectors' review of the licensee's investigation of this incident showed that:

- * This unknown was a QA sample and there were no indications that any plant sample results or other analyses required by technical specifications (T/S) were falsified.
- * Each chromium filter was contained in a plastic planchet which was sealed in a plastic bag with a vendor assigned number affixed to the bag.
- * The QA Supervisor placed the unknowns in plastic bags, and distributed these bags to the CTs. The fourth quarter samples consisted of a solution in a plastic bottle and the sealed bag containing the chromium filter.
- * The QA Supervisor assigned a specific sealed and numbered chromium filter unknown to each CT.
- * All of the filters were accounted for using vendor records, technician analysis results and extra filters which were sealed in the numbered bags.
- * The CT did not record his assigned filter number on the unknown data report form.
- * The CT did not record the required quality assurance (QA) data for the atomic absorption spectrophotometric analysis required for chromium in the instrument logbook.
- * When interviewed, the CT in question stated that he had analyzed everything in his sample bag including a chromium filter unknown.

- * The CT also stated that when performing the chromium analysis, he did not record the QC check sample results in the instrument log book.
- * The CT was suspended during the licensee's investigation and following the licensee's determination that the data had been falsified, the CT was terminated.
- * Chemistry management is reviewing the past six months analyses performed by the CT in question. QA tests performed by the CT while working for a test group during the recent refueling outage have been reviewed and no indications of record falsification were found. In process tests conducted during the outage by the CT were reviewed by supervisors and there were no indications of any record falsifications. In addition, these supervisors stated that the performance of the CT while in their group was very good.

The inspectors interviewed chemistry managers, technicians (including three senior technicians), the terminated CT, plant management, and other supervisors who had contact with chemistry technicians during the recent refueling outage. During these discussions, a weakness in the chemistry crosscheck program was identified. The chemistry QA supervisor stated that CTs did not always record their sample numbers on the unknown report form. The inspectors then reviewed the fourth quarter crosscheck data and determined that of 12 CTs performing the chromium analyses, four (including the CT in question) did not record their filter ID numbers. Although the CTs are not required by procedure to record their sample ID numbers on the data form, the inspectors noted to licensee representatives that this was an example of inadequate record keeping and represented a weakness in the crosscheck program. Chemistry managers stated that they were aware of this situation and were working on program improvements to eliminate this problem.

During interviews with chemistry personnel, a training issue was raised. In order for a CT to become qualified to perform a particular procedure, the CT needing the training had to seek out a qualified CT and arrange for the qualified CT to provide the necessary assistance. The inspectors noted to licensee representatives that laboratory supervisors should be aware of training needs and assign qualified CTs to perform the training when needed. Licensee representatives stated that they had been advised of this difficulty by chemistry personnel, that the situation was under review and that program enhancements would be made. Improvements in the CT testing and training programs will be monitored in Inspection Followup Item No. 50-461/93028-01.

No violations or deviations were identified.

6. Plant Tours (IP 83750)

The inspectors toured the turbine, auxiliary and radwaste buildings. Radiological controls appeared to be good. Housekeeping was improved from the outage inspection (Inspection Report No. 50-461/93023 (DRSS)).

Contamination zones were well defined with nothing extending across the boundaries. A number of licensee identified radiation protection (RP) issues had been documented in condition reports (CR). In one instance (CR 1-94-01-001) a number of bags containing contaminated equipment located in a cage had been cut open. A licensee representative stated that it appeared to have been done by a worker(s) searching for a critical part for a turbine pump as the plant was coming out of the outage. The worker(s) responsible could not be found, however, there were no additional examples of bags having been cut open and no malicious intent was suspected. The area was immediately surveyed, posted as a contamination zone and the bags resealed. CR 1-94-01-004 identified two radiation workers who had violated the dress out requirements of their RWP while drawing an oil sample. The licensee took immediate corrective action including disciplining the workers. CR 1-93-11-074 identified evidence of smoking in the RCA. Although smoking materials were found in several locations, no individuals were actually observed to be smoking. Although the licensee was aggressive in identifying and documenting these incidents, and applying corrective measures when possible, these occurrences are continuing examples of poor radiological work practices. Licensee documentation and corrective actions taken to improve radiological work practices will be reviewed in subsequent inspections.

No violations or deviations were identified.

7. Onsite Storage Facility (IP 83750)

The licensee is developing a plan for on site storage of low level radioactive wastes. The plan would be implemented if the present vendor for off site storage closes and the State of Illinois has not provided an off site facility. The projected on site facility would be located on licensee property outside of the protected area south of the plant. A pad, 170 feet by 210 feet would be constructed by excavating to a depth of 2 feet and backfilling with gravel which would then be compacted. The area would be sloped for drainage.

Concrete modules would be constructed to hold radioactive waste. Higher activity waste such as resin sludges and evaporator bottoms (solidified in liners) would go into round modules 9 feet in diameter by 9 feet high. Lower level waste such as compacted or incinerated dry active waste would go into B-25 steel containers which would be contained in square concrete modules 20 feet long by 10 feet wide and 10 feet high. The round modules containing the higher activity waste would be located in the center of the pad with the square modules around the perimeter and would serve as shielding. The licensee has projected that the facility could accommodate low level radioactive waste generated at the site over a five year period.

Construction of the storage facility had not started, however, the area was cleared and leveled according to a licensee representative who stated that construction would begin in the spring of 1994. Progress in this area will be monitored in future inspections.

No violations or deviations were identified.

8. Exit Interview

The inspectors met with licensee representatives (Section 1) at the conclusion of the inspection on January 7 and 12, 1994, to discuss the scope and range of the inspection.

During the exit interview, the inspectors discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspectors during the inspection. Licensee representatives did not identify any such documents or processes as proprietary. The following areas were discussed at the exit meeting.

- a. Radiation protection performance, dose projections, accumulated dose and the effectiveness of the ALARA program during RF-4.
- b. The Inspection Followup Items concerning dosimetry records and training discussed in Section 3.
- c. Observations made during a plant tour.
- d. The chemistry record falsification.