U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-155/94005(DRSS)

Docket No. 50-155 License No. DPR-6

Licensee: Consumers Power Company
212 West Michigan Avenue
Jackson, MI 49201

Facility Name: Big Rock Point Nuclear Plant

Inspection At: Big Rock Point site, Charlevoix, Michigan

Inspection Conducted: March 7-11, 1994

Inspector: N. Shah 3/29/94 Date

Approved By: M A Kunowski for J. W. McCormick-Barger, Chief 3-29-94 Date
Radiological Programs Section 1

Inspection Summary

Inspection on March 7-11, 1994 (Report No. 50-155/94005(DRSS))
Areas Inspected: Routine inspection of the radiation protection (RP) program (Inspection Procedure (IP) 83750) and gaseous, liquid, and solid radioactive waste (radwaste) programs (IPs 84750 and 86750). Also reviewed were several events concerning contaminated material found outside the radiological restricted area, and continuing problems in control of high radiation areas. A Deviation Report (DR) concerning leakage from the demineralized water fill line (DWFL) was also reviewed.
Results: Overall, the licensee's radiological performance during the current outage was good and improvements were noted in ALARA planning and preparation (Section 5). Gaseous and liquid effluent releases continue to be low (Section 9) and appropriately assessed. The leakage from the DWFL was appropriately handled (Section 10). Improvements were ongoing concerning the storage of solid radwaste in the radwaste building (Section 8). However, several events indicated additional management attention was warranted towards control of high radiation areas (Section 7) and one violation was identified concerning several events of contaminated material found outside the radiological restricted area (Section 6).

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DETAILS

1. Persons Contacted

*G. C. Withrow, Safety and Licensing Director
*K. E. Pallagi, Radiation Protection Supervisor
*M. Bourassa, Senior Licensing Engineer
T. A. Mosley, Senior Engineer (Chemistry and Health Physics)
*B. Olmstead, Dosimetry Supervisor, RP Technician
*T. Popa, Acting Chemistry Supervisor
R. Burdette, Lead Health Physicist
*E. A. Bogue, Manager Chemistry and Health Physics
*M. Moore, Quality Assurance auditor
*B. Hoagland, Acting ALARA Coordinator

* Present at the March 11, 1994, exit meeting

The inspector also interviewed other licensee and contractor personnel.

2. Licensee Action on Previous Inspection Items (IP 83750)

(Closed) Inspection Followup Item (IFI) No. 50-155/93021-01(DRSS): Licensee to develop method of tracking portable instrumentation with respect to maintenance history and location.

The licensee revised procedure RP-29 "Radiological Surveys" to require documentation of instrument functional checks and issued radiation protection (RP) guide 4.0 "Radiation Detection Instrument Log" to track the location of instruments during a refueling outage. Additionally, a computer database was developed to track each instrument's maintenance history. The inspector reviewed each of these actions; no problems were identified.

(Open) IFI No. 50-155/93021-02(DRSS): Licensee to survey accessible areas of plant to determine contamination levels and revise procedures for future surveillances of these areas.

Following the 1993 refueling outage (RFO) the licensee began surveying accessible areas in the turbine building and the sphere. Although turbine building contamination levels were $\leq$ 1000 disintegrations per minute (dpm)/100 cm^2, sphere levels ranged from 1000 to 20,000 dpm/100 cm^2. Therefore, the licensee concentrated decontamination efforts in the sphere. To date over 90% of the identified areas in the sphere have been decontaminated, which the inspector selectively verified during plant tours (Section 11). This contamination had accumulated over the previous 20 year operating history of the plant. Additionally, the licensee revised administrative procedure 5.9 "Contamination Control" to require RP notification prior to working around easily accessible horizontal surfaces.

The licensee was planning to decontaminate the turbine building after the sphere and was developing a further revision to their procedures requiring performance of these surveys after every refueling outage.

This item will remain open pending completion of the decontamination efforts and the procedure revision.

(Open) IFI 50-155/92021-01(DRSS): Licensee to develop 10 CFR 50.59 safety evaluation (SE) for radwaste storage.

The licensee developed a new SE for the radwaste storage building accounting for future storage and processing options. Although the SE reasonably estimated the radiological consequences of storage, it did not provide for routine monitoring of airborne activity in the building. Also, although the SE identified a fire as the most credible accident, it did not address seismic or tornado events. The licensee will revise the SE to include provisions for airborne monitoring and address seismic and tornado events in the accident analysis. This item will remain open pending the revision.

3. Changes (IP 83750)

Several minor changes have occurred in the licensee's staffing. The station ALARA coordinator replaced the chemistry supervisor, who was temporarily reassigned to the station decommissioning group. An RP technician, previously assigned as maintenance work planner, was acting as the ALARA coordinator, and a contract ALARA specialist, hired during the 1993 RFO, will act as the maintenance work planner. These changes were expected to last about 1 year, after which the chemistry supervisor would return. To date, the inspector identified no performance problems with these changes.

No violations or deviations were identified.

4. Audits and Appraisals (IPs 84750 and 86750)

The inspector reviewed several audits and appraisals concerning the gaseous, liquid, and solid radwaste programs. While these audits were technically sound and addressed relevant compliance based elements, they did not contain performance based observations documented in Field Monitoring Reports (FMRs) or supervisory tours. This was discussed with the auditors who explained that trends identified in FMRs were integrated with audit results into the annual Specialist Performance Assessment Report (SPAR), which approximates the NRC's Systematic Assessment of Licensee Performance (SALP) report. Although the SPAR provided a well balanced view of licensee performance, the inspector observed that not incorporating performance based elements into the routine audits may delay identification and resolution of issues until the end of the assessment year. The auditors agreed and will address the inspector's observations in an upcoming revision to the audit program.

The inspector reviewed several events (Sections 6, 7, and 10) associated with the control of contaminated material and high radiation areas that were identified by the licensee.

No violations or deviations were identified.

5. External Exposure Control (IP 83750)

The inspectors reviewed the licensee's radiological performance during the recent maintenance outage (which began March 2, 1994) and the 1993 RFO.

About 14 rem (140 milliSieverts (mSv)) was accrued to date for the maintenance outage, exceeding the 12 rem (120 mSv) outage goal. Emergent work on the recirculation pump sump valves (about 2.5 rem (25 mSv) to date) was the reason for the increase. This work also resulted in extending the outage (14 days to date) beyond its original 10-day scope. Other significant jobs included replacement of the #1 Recirculation pump seal for 2.9 rem (29 mSv), and the repair of valves VOP 70-63 for 3 rem (30 mSv), N004 (vent line from reactor head to steam drum) for 600 millirem (6 mSv), and VP 301 (recirculation pump room) for 1.3 rem (13 mSv). About 10 personnel contamination events (PCEs) were accrued to date, significantly below the licensee's goal of 1 per day (about 14 PCEs to date).

Maintenance outage ALARA planning was performed by the station ALARA coordinator and a contract ALARA specialist assigned to the maintenance department. The use of the contract specialist significantly improved the ALARA planning process, as did improvements in historical job files made during the 1993 RFO (inspection report No. 50-155/93012(DRSS)). ALARA initiatives included the use of video cameras for remote work coverage, plant photos during planning, and heat exchanger flushing which reduced dose rates from 400-800 millirem/hr (4-8 mSv/hr) to 100-400 millirem/hr (1-4 mSv/hr).

During the 1993 RFO about 117 rem (1.17 Sv) was accrued, significantly below the goal of 200 rem (2 Sv). This was the lowest dose total achieved during the operating history of the plant and was attributed to the ALARA planning and initiative improvements described above. A total of 46 personal contaminations were also recorded for the RFO.

In 1993, a total of 152 rem (1.52 Sv) and 94 personal contaminations were accrued.

No violations or deviations were identified.

6. Release of Contaminated Materials to Unrestricted Areas (IP 83750)

The inspector reviewed three events concerning contaminated materials found outside the radiologically restricted area (RRA).

- On July 22, 1993, an RP technician performing routine surveys in the new machine building identified a screwdriver (labeled as contaminated) and impact wrench (unlabeled) with fixed contamination levels of 100 and 500 counts per minute (cpm), respectively. The tools were confiscated and a detailed survey of the shop identified no other contaminated tooling. The new machine building was located outside the RRA, but within the protected area. After the event, maintenance workers were counselled on the importance of surveying tools prior to exiting the RRA.

- On September 20, 1993, the licensee was notified that the General Electric (GE) regional tool facility in Cincinnati, Ohio, had identified a tool (drop light) labeled "radioactive material 500 cpm" in a supposedly noncontaminated batch of tools returned to the facility after the licensee's 1993 RFO. The licensee was also notified that other tools from the above batch had also been sent to five fossil fuel stations in Indiana and Ohio and to the LaSalle nuclear plant. A licensee RP supervisor was immediately dispatched to the GE site and subsequently identified the following items: drop light (labeled) 200 cpm fixed, shackle (unlabeled) 500 cpm fixed, mallet (unlabeled) 4000 cpm fixed and 300 cpm loose, ruler (labeled) < 100 cpm; the remaining 700 to 1000 items had < 100 cpm of contamination. After retrieving the contaminated tools, the licensee contacted the radiation protection manager at LaSalle and asked GE management to appraise their representatives at each fossil plant. Although each of the fossil plants did not identify any other contaminated tooling (via visual inspection), the LaSalle station found low levels of contamination (100-150 cpm fixed) on chain falls and assorted parts. Because this equipment had been stored in a contaminated area at LaSalle, the source of the contamination was indeterminate. The licensee initiated a deviation report (DR BRP-93-054) and contacted the NRC Region III office.

  A subsequent licensee investigation identified no documented survey results for these tools prior to leaving the station. The root cause was identified as lack of supervisory oversight owing to excessive emphasis on the RFO work schedule. Immediate corrective actions for this event included counseling plant workers and instituting a logbook to document material surveys. Long term corrective actions included development of a tool control program, revision of applicable plant procedures, installation of a tool monitor, and further training to workers.

- On February 16, 1994, an RP technician performing routine surveys of equipment from the new maintenance building found about 400 cpm fixed contamination on an eye bolt (not labeled as radioactive material). A subsequent survey of the new maintenance building identified four additional contaminated (about 200 cpm each) items. This event will be covered in the corrective actions for the September 20 event.

Procedure RM-56 "Radiological Clearance for Off-Site Removal of Material" requires that all material receiving "clean" status shall have no activity as detected by a direct frisk prior to release for unrestricted use. The above three events, in the aggregate, constitute a violation of Technical Specification 6.11 which requires adherence to RP procedures (violation No. 50-155/94005-01(DRSS)). Additionally, the above examples indicate a significant breakdown in the control of contaminated material resulting from a lack of effective management oversight. Interviews with workers indicated to the inspector that this issue was being viewed as an RP concern. At the exit meeting (Section 12), the inspector indicated the issue was a station concern and stressed the importance of cooperating with the RP group.

One violation was identified.

7. Control of High Radiation Areas (HRAs) (IP 83750)

Inspection report Nos. 50-155/93008(DRSS) and 50-155/93012(DRSS) discuss two events concerning the licensee's failure to properly control HRAs. During this inspection, the inspector reviewed two other recent events indicating a recurrent problem exists:

- On March 5, 1994, an auxiliary operator performing routine rounds discovered the steam drum door, a locked high radiation area, was closed, but unlocked. After locking the door, the licensee identified that an RP technician, who had earlier (about 7 hours) entered the area, had forgotten to lock the door. The licensee verified that the area was not a high radiation area (highest dose rate was about 60-80 millirem (0.6-0.8 mSv)/hr) and that no additional entries had been made in the interim.

  The steam drum door was appropriately posted and, owing to its size, required at least two people to open. Also, opening the door results in an audible and visual alarm in the control room. The licensee counseled the RP technician and placed a letter documenting the incident in his file.

- On March 14, 1994, an RP technician performing a routine survey, discovered that the HRA posting for the sock filter housing was down. The posting was immediately replaced and the licensee subsequently identified that auxiliary operators working in the area earlier (about 4 hours) had forgotten to replace the posting. The licensee verified the area was not a high radiation area (highest dose rate about 20 millirem (0.2 mSv)/hr)) and that no additional entries had been made in the interim. The shift supervisor counseled the operator after the event.

Although all the above events were of minor safety significance, they indicated a lack of management attention concerning the control of HRAs. Recognizing this, the corporate Vice-President issued a memorandum to all station department heads delineating the appropriate HRA controls, which was discussed with workers during the current outage. Also, the department heads and the Human Performance Evaluator will review the above events to determine the root cause and develop long term corrective actions. The inspector will review the results of this review in a subsequent inspection (IFI No. 50-155/94005-02(DRSS)).

No violations or deviations were identified.

8. Solid Radioactive Waste and Transportation Program (IP 86750)

The licensee's processing and storage of solid radioactive waste remains essentially as described in inspection report No. 50-155/92011(DRSS), with the exception that the offsite processing of dry active waste (DAW) and waste oil now includes incineration. Although the licensee was prohibited from shipping radwaste for burial per the Michigan waste ban, several DAW shipments to an offsite contractor were reviewed by the inspector; no problems were identified.

Current radwaste inventory included about 56 m^3 (about 16 m^3 processed) of DAW and 6.0 m^3 of filters in the radwaste building, about 0.5 m^3 of spent resin in the temporary demineralizer system (inspection report No. 50-155/92025(DRSS)), and about 27 m^3 of spent resin in the concentrator and resin disposal tanks. Using 1993 waste generation data (about 24 m^3 for DAW and 12 m^3 for spent resin and filters) the licensee estimated adequate storage capacity for 5 years of DAW and filters, but only 2-3 years worth of spent resin.

To accommodate future resin generation, the licensee has purchased several liner storage modules (LSMs) from a waste contractor. The LSMs are concrete cylinders which can accommodate a variety of shielding based on the radiological characteristics of the stored waste. Each LSM also includes a filter element for venting of waste gases produced by the resin. The supplying contractor has accounted for fire, seismic and tornado events in the SE for the LSMs. Currently, the licensee is developing plans for constructing a 4"-6" gravel base, behind the radwaste storage building, for the LSMs.

To facilitate future storage, the licensee was considering a number of radwaste reduction options including washable glove liners and equipment bags, reusable decontamination rags, velcro attachments for protective clothing and a wood planer for contaminated wood recovery. The licensee hopes these initiatives will allow them to achieve their goal of $\leq$30 m^3 of radwaste in 1994.

No violations or deviations were identified

9. Gaseous and Liquid Effluent Releases (IP 83750)

Minor fuel leakage resulted in a slight increase in gaseous activity from 1992 (1803 curies (Ci) (66711 gigabecquerels (GBq)) to 1993 (5144 Ci (190328 GBq)); no change was seen in liquid activity (1.23 and 1.6 Ci, respectively). Although one leaking element, identified in mid-1992, was reconstituted in the 1993 RFO there were indications of another leaking element in late 1993. The offgas release rate increased from 250 microCi (9250 kiloBq)/sec to about 300 microCi (11,100 kiloBq)/sec, with a slight corresponding increase in reactor coolant iodine levels (2.5E-4 microCi (9.3E-3 kiloBq)/ml to 3E-4 microCi (1.1E-3 kiloBq)/ml, respectively). These increases were consistent with those observed in the earlier fuel leak and had no consequential effect on offsite doses. The licensee plans to perform ultrasonic testing of the fuel in the 1994 RFO to identify the leaking element for either reconstitution or removal.

Based on corporate chemistry assessments of manganese (Mn)-54 production rates versus iron (Fe)-59 levels, the licensee recently installed new resin with a higher removal efficiency for Fe-59. To date, the licensee has observed some decrease in Fe-59 levels, but has seen a significant increase in sulfate levels (up to 7 parts per billion (ppb) from 4-5 ppb). The licensee attributes the increase to resin breakthrough and was investigating the cause. This investigation will be reviewed during routine chemistry inspections.

During plant tours (Section 11), the inspector verified that process monitors were operational and in good condition.

No violations or deviations were identified

10. Leakage from Demineralized Water Fill line (DWFL) (IP 84750)

On November 27, 1993, an operator on routine rounds noticed water dripping from the DWFL and ice buildup on the pavement underneath the line. The DWFL is an outdoor, aboveground line that carries demineralized water to the condensate storage tank (CST). After discovery, the DWFL was isolated and isotopic samples collected. The sample analysis indicated low levels of fission product activity in the 9E-7 to 2E-5 microCi (3.3E-5 to 7.4E-4 kBq)/ml range. The majority of the identified isotopes were short lived (≤8-day half-life), but about 1.5% of the total activity was attributed to Mn-54, which has a 312-day half-life. The contamination source was believed to be the main condensate process monitor reject line, which intersected the DWFL upstream of the leakage point.

The licensee excavated soil around the leak for storage in 55-gallon drums. Soil samples collected during the excavation indicated low levels of cesium (Cs)-137 and cobalt (Co)-60 activity between 2E-7 to 3E-7 microCi (6.4E-6 to 1.1E-5 kiloBq)/g. A similar CST leak had occurred in this area on May 30, 1984. Soil samples collected in an area isolated from the 1993 leak, but in the vicinity of the 1984 leak, indicated Co-60 and Cs-137 activity consistent with the above results. Because the estimated transport time (based on the 1984 licensee analysis) through the soil to the lake was about 7 years, an unmonitored release was not considered probable given the half-life of Mn-54.

The licensee plans to further excavate the hole and resurvey the soil. If analysis results are again consistent with the 1984 leak, the hole will be backfilled with clean soil. The licensee has not yet decided whether to document the event per 10 CFR 50.59 or seek a 10 CFR 20.2002 submittal (as for the 1984 leak) for the event. The inspector informed the licensee of the requirements for both options at the exit meeting (Section 12).

No violations or deviations were identified.

11. Plant Tours (IPs 83750, 86750 and 84750)

The inspectors toured work areas, observed work in progress, and took confirmatory radiological measurements.

Significant improvement in contaminated area control was noted in the sphere as was a significant reduction in total contaminated area. Improvement was also noted in housekeeping and tool control, both weaknesses in the 1993 RFO. Workers and radiation protection technicians were knowledgeable of the work area and associated radiological conditions. The inspector also noted good controls used during radiography of piping in the steam drum. Although confirmatory radiological surveys were generally good, the inspector identified a 2000 dpm/100 cm^2 area of contamination on a work table in the machine

shop. The area had earlier been used for contaminated valve work, although it had been decontaminated since then. The licensee immediately resurveyed and decontaminated the area. This example further illustrates the importance of the contamination surveys described in Section 2.

No violations or deviations were identified.

12. Exit Interview

The scope and findings of the inspection were reviewed with licensee representatives (Section 1) at the conclusion of the inspection on March 11, 1994. No documents were identified as proprietary by the licensee. The following matters were specifically discussed by the inspectors:

- Inclusion of performance-based elements in audits (Section 4)
- Violation associated with contaminated material control (Section 6)
- Control of high radiation areas (Section 7)
- Fuel leakage (Section 9)
- Leakage from DWFL (section 10)