

UNITED STATES NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Report of Radwaste Management Inspection

IE Inspection Report No. 050-155/76-22

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

Big Rock Point Nuclear Power Plant
Charlevoix, Michigan

License No. DPR-6
Category: C

Type of Licensee: BWR - 240 MWt

Type of Inspection: Routine, Unannounced

Dates of Inspection: December 7-10, 1976

Principal Inspector: *L. J. Hueter*
L. J. Hueter

1-5-77
(Date)

Accompanying Inspectors: None

Other Accompanying Personnel: None

Reviewed By: *W. L. Fisher*
W. L. Fisher, Chief
Fuel Facility Projects and
Radiation Support Section

1-5-77
(Date)

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SUMMARY OF FINDINGS

Inspection Summary

Unannounced inspection on December 7-10, 1976, (76-22): Radioactive waste systems inspection included gaseous and liquid effluent releases, offsite shipment of radioactive waste and non-waste radioactive materials, records and reports of effluents and shipments, effluent control instrumentation, and procedures. Licensee's response to IE Circular No. 76-03, "Radiation Exposure in Reactor Cavities," was also reviewed.

Enforcement Items

The following items of noncompliance were identified during the inspection:

A. Infractions

1. Contrary to 10 CFR 20.203(c)(3), the locked doors and gates used to control access to high radiation areas in the reactor facility are not established in such a way that no individual will be prevented from leaving a high radiation area. (Paragraph 6, Report Details)
2. Contrary to 10 CFR 20.201(b), measurement of particulate radioactivity in airborne effluents was not adequate to ensure compliance with 10 CFR 20.106 and Technical Specification 6.5.4.(a), due to apparent bypass of the stack sample filter as noted for the week ending January 20, 1976. (Paragraph 9, Report Details)

B. Deficiency

Contrary to Technical Specification 6.9.3.a.(3), the semiannual report for the first half of 1976, dated August 31, 1976 and revised September 15, 1976, did not contain any of the required data regarding solid radwaste shipments made during the report period. (Paragraph 10, Report Details)

Licensee Action on Previously Identified Enforcement Items

At the time of the last radwaste management inspection^{1/} it was noted that the licensee had not completed the writing and approval of a formal procedure for measurement of the off-gas density, which in turn was part of the planned corrective action regarding an item

^{1/} IE Inspection Rpt No. 050-155/75-14.

of noncompliance noted during a previous inspection.^{2/} This procedure has now been written, approved, and implemented. (Paragraph 5, Report Details)

Other Significant Items

A. Systems and Components

1. The successful testing and plugging of leaking condenser tubes during the extended outage in the first half of 1976 has resulted, among other things, in a significant reduction in liquid radwaste effluent during the current run. The repairs, coupled with the favorable experience of fuel element cladding integrity during the last two runs, may result in the licensee maintaining liquid effluent activity (excluding tritium) below one curie during 1976, a new low for a one-year period. (Paragraph 8, Report Details)
2. Due to matters considered of higher priority by the licensee, little progress has been made since the last radwaste inspection regarding the problem of spurious alarms of the canal monitor discussed in previous inspection reports.^{3/} (Paragraph 7, Report Details)

B. Facility Inspection Plans and Procedures)

None.

C. Managerial Items

None.

D. Deviations

None.

E. Status of Previously Reported Unresolved Items

No previously reported unresolved items within the scope of this inspection.

Management Interview

The inspector conducted an interview with Mr. Hartman, Plant Superintendent, and other members of the plant staff at the conclusion of the inspection on December 10 and with Mr. Hartman by telephone on December 15, 1976. The following items were discussed with licensee personnel:

^{2/} RO Inspection Rpt No. 050-155/74-08.

^{3/} IE Inspection Rpts No. 050-155/75-09 and No. 050-155/75-14.

- A. The three items of noncompliance identified were discussed. (Paragraphs 6, 9 and 10, Report Details)
- B. At the time of the last radwaste management inspection,^{4/} an apparent typographical error had been noted by the inspector in the licensee reported percent of limit of liquid radwaste released for 1974. The inspector acknowledged that the reported data had been corrected by the licensee. (Paragraph 8, Report Details)
- C. During a previous inspection^{5/} the inspector had noted some possible conservative discrepancies involving reporting of particulate activity released in gaseous effluent for December 1974 for xenon-138 and barium/lanthanum-140. The licensee has since reviewed the matter, documented the finding, and concluded that the reported data were valid. The inspector noted that he had reviewed the matter and has no further questions at this time regarding the matter. (Paragraph 9, Report Details)
- D. The status of the canal monitor spurious alarms study was discussed. (Paragraph 7, Report Details)
- E. Completion of final corrective action regarding a previous item of noncompliance, by the writing, approval, and implementation of a procedure for measurement of off-gas density, was discussed. The inspector stated that he had no further questions regarding the matter. (Paragraph 5, Report Details)

4/ IE Inspection Rpt No. 050-155/75-14.

5/ Ibid.

REPORT DETAILS

1. Persons Contacted

C. Hartman, Plant Superintendent
C. Axtell, Plant Health Physicist
T. Brun, Chemical and Radiation Protection Supervisor

2. Procedures

The inspector reviewed a revised and properly approved radiochemistry procedure (RCP) prepared since the last radwaste inspection. This procedure is designated RCP-3 (Rev. 0, May 14, 1976) "Off-Gas Composition Analysis." The inspector has no further questions at this time regarding the referenced procedure.

3. Containment Air-Cleaning Systems

A high efficiency filter is located at the base of the stack for removal of particulates from the air ejector off-gas following holdup. A demister precedes the filter. All other air and vent systems leading to the stack are unfiltered. A gauge measures the differential pressure across the filter in inches of water. The differential pressure reading is recorded once per shift in the Operations Log Book. The log reading is reviewed by the Plant Health Physicist. The filter has been changed at least once or twice yearly in the past two years. The differential pressure usually remains at zero throughout the filter use time, but has on occasion in the past read as high as one or two inches of water.

No in-place testing of the filter is performed at the time of filter installation. There are no provisions for introducing the test media. The inlet side of the filter is buried under ground and under about a foot-thick layer of concrete. No specific requirement is contained in the technical specifications or in the final safety analysis report for performing an in-place filter efficiency test. The licensee has a detailed maintenance procedure for filter installation to minimize potential for damage to the filter or improper installation, either of which could result in reduced efficiency.

4. Concentration of Iodine in Reactor Coolant

A review of records from January 1, 1976 through December 5, 1976 showed that primary coolant was sampled and analyzed daily as required for iodine concentration and other quality items during

periods of power operation and every second or third day during outages. The maximum iodine concentration measured was $2.5E-02$ microcuries per milliliter ($\mu\text{Ci/ml}$), which is less than one thousandth of the technical specification limit of $3.5E+01 \mu\text{Ci/ml}$. The coolant concentration reached a low of about $1.0E-07 \mu\text{Ci/ml}$ of iodine during the extended outage in the first half of 1976.

5. Followup on Previous Noncompliance Item

At the time of the last radwaste inspection^{6/}, the licensee had not completed all of the planned corrective action (writing and approval of a formal procedure for measurement of off-gas density) regarding an item of noncompliance noted during a previous inspection.^{7/} It was noted during this inspection that the procedure for measurement of off-gas density has been written, approved, and implemented.

6. Licensee Response to IE Circular No. 76-03.

By letter dated November 18, 1976, from the Assistant Nuclear Licensing Administrator of Consumers Power Company to IE:III, the licensee responded to IE Circular No. 76-03 titled "Radiation Exposures in Reactor Cavities." The inspector reviewed the licensee's response regarding the Big Rock Point facility and toured the facility, observing the locations and entrances to the continuous and transient high radiation areas. Review of survey data shows that the highest accessible radiation level is about 3 R/hr. Based on plant design, operation, and survey data history, the licensee does not foresee the possibility of radiation levels exceeding 10 R/hr maximum in accessible areas.

The continuous high radiation areas have locked gate or door entrances with key control by the shift supervisor. The opening of some of the gates or doors also sounds an alarm in the control room. A log-in and log-out in the control room log is used for each entrance and exit from these areas. A radiation survey is required for entry to high radiation areas. Entrances are posted with signs indicating the presence of a high radiation area and a status board showing results of the most recent radiation survey (including maximum and general working area levels) and stating the radiation precautions necessary for entry.

The entrances to transient high radiation areas are also posted with status boards providing the same type of information. The sources of radiation in these areas are such that fields are not likely to change rapidly. These areas are surveyed daily for observation of any changes in radiation levels. Radiation surveys are required for any work performed in these potential high radiation areas.

6/ IE Inspection Rpt No. 050-155/75-14.

7/ RO Inspection Rpt No. 050-155/74-08.

During this review it was noted that the locked gates or doors used to control access to the high radiation areas were not established in such a way that an individual could always unlock the door from the inside. Therefore licensee personnel were informed that the licensee was in apparent noncompliance with 10 CFR 20.203(c)(3), in that the locked doors and gates used to control access to the high radiation areas in the reactor facility were not established in such a way that no individual would be prevented from leaving a high radiation area.

7. Status of Canal Monitor Spurious Alarms

The problem with spurious alarms of the canal monitor as well as some testing and recommended changes have been discussed in previous inspection reports.^{8/} Due to matters considered of higher priority by the licensee, little has been done on this matter in the past year. The project has been assigned to another individual, who has initiated some further testing for a possible alternative to enclosing in flexible conduit the signal cable between the auxiliary building and the screen house. The alternative is being sought, as it is anticipated that considerable difficulty may be encountered in enclosing the signal cable in flexible conduit due to the length and bends involved in the underground line. It was stated that spurious alarms have been much less frequent in recent months.

8. Liquid Radwaste

Liquid radwaste is collected and released on a batch basis. Before release, each batch is sampled and analyzed. The analysis includes a gross beta concentration and specific radionuclide concentrations of gamma emitters. A weighted MPC is determined for each batch. The component radionuclides not identified by gamma spectrometry but measured by gross beta analysis are conservatively presumed to be all strontium-90 and are released on that basis.

Records and reports of liquid radwaste were reviewed for the last six months of 1975 and the first six months of 1976; no discrepancies were noted. Release data, records, and reports for June 1976 were reviewed in more detail. Analytical and release calculations appear to have been performed accurately and results reported correctly. The total radioactivity released in liquid (excluding tritium) during 1975 was reported as 1.4 curies, 2.2% of the technical specification limit. During the first half of 1976 the corresponding liquid release was reported as about 0.57 curies, about 0.26% of the technical specification limit. The licensee anticipates being able to keep releases in liquid effluent below one curie (excluding

^{8/} IE Inspection Rpts No. 050-155/75-09 and No. 050-155/75-14.

tritium) for the entire year of 1976, a long sought after goal. The licensee has been aided toward this goal by the good integrity of fuel cladding during the past two fuel runs and by the testing and plugging of faulty condenser tubes during the extended outage in the first half of 1976, thus virtually ending the condenser inleakage problem and resultant waste water inventory problem noted in a previous inspection report.^{9/}

During a previous inspection,^{10/} the licensee agreed to correct a typographical error (involving a misplaced decimal point) observed during the inspection in the reported percent of technical specification limit for liquid releases. The correction was subsequently made on page 45 in the 23rd Semiannual Report of Operations.

9. Gaseous Radwaste

A sample of off-gas obtained weekly during power operation is analyzed by either GeLi or gamma spectrometry for six noble gas radionuclides. Based upon the off-gas flow and the mixture of the six nuclides, a stack release rate which includes a total of 22 noble gas radionuclides is determined. The stack release rate is based on a 30-minute holdup time for off-gas plus a 1% contribution from the turbine sealing steam system utilizing a two-minute holdup. The 1% turbine seal contribution has the same distribution of nuclides as the off-gas corrected for a two-minute decay period. By observing the off-gas monitor response at the time the off-gas sample is taken, a multiplying factor can be obtained which, when applied to the off-gas monitor response in counts per second, gives the resulting release rate at the stack in microcuries per second.

Particulate and halogen releases to the atmosphere are measured by counting particulate and charcoal filters weekly. The filters sample stack effluent continuously at a rate of three cubic feet per minute. Determination of release rates in this manner assumes that radioactivity is continually being deposited uniformly throughout the week on the filters. A decay correction to the time of analysis is applied, depending on the half-life of radionuclide observed. The net unidentified particulate beta activity is conservatively presumed to be all strontium-90 in determining the percent of release limit. The weekly charcoal and particulate filters are analyzed and counted at the plant and release rates determined.

The inspector conducted a cursory review of gaseous halogen and particulate records and reports for the last half of 1975 and the first half of 1976. A more detailed review was made of the January 1976 data and report to evaluate data reduction techniques, radionuclide identification, and release rates. During this review some

^{9/} IE Inspection Rpt No. 050-155/75-14.

^{10/} Ibid.

problems were noted as described below: Particulate filter bypass was evident for the weekly samples removed and counted on January 20, 1976, in that only about $4.4E-04$ microcuries (μCi) of cesium-137 was collected on the particulate filter while about $1.2E-03$ μCi of cesium-137 was collected on the backup charcoal filter used for iodine collection. Therefore, about 2.7 times as much cesium-137 was collected on the charcoal filter (a filter not designed for efficient collection of particulates) as on the particulate filter. Also, about 1.6 times as much cesium-134 was collected on the charcoal filter as on the particulate filter. Therefore, the licensee is in apparent noncompliance with 10 CFR 20.201(b) in that measurement of particulate radioactivity in airborne effluent was not adequate to ensure compliance with 10 CFR 20.106 and Technical Specification 6.5.4.(a) during the first quarter of 1976 due to evidence of particulate filter bypass.

The problem of particulate filter bypass has previously been identified as noted in a recent Confirmatory Measurements Inspection Report^{11/} and the licensee has modified the procedure for particulate filter installation which the licensee believes has eliminated the problem. Also, as noted in the previously referenced Confirmatory Measurements Inspection Report, based on the result reported by the licensee in the confirmatory measurements comparison for the first quarter of 1976, the licensee would have underreported the radionuclide concentrations of particulate activity and therefore the particulate activity released in gaseous effluents during that quarter.

It should be noted that although the evaluation of particulate activity in gaseous effluent was inadequate, the licensee would not have approached any release rate limit, based on data reviewed for weeks when there was no evidence of particulate filter bypass and based on the magnitude of the differences in confirmatory measurements.

The inspector also observed during the review that the quantities of cesium-137 and cesium-134 reported in the radioactive effluent summaries report to the NRC dated August 31, 1976, as being released in gaseous effluent for the month of January 1976, were apparently in error. The sum of the activity for each of these two radionuclides as obtained from the weekly packet of data which the licensee stated was submitted to the corporate office for the report preparation was significantly higher than that contained in the report. From the data packets it was observed that about 400 μCi of cesium-137 were released in January, but the report showed only 92 μCi as being released. It appeared that only two of the four pieces of

^{11/} IE Inspection Rpt No. 050-155/76-20.

input data were included in the report data. Further, the data from the weekly packets indicated that 70 μ Ci or more of cesium-134 were released in January, but the record showed only 45 μ Ci as being released.

During a previous inspection^{12/} the inspector noted some possible discrepancies (conservative in nature) between xenon-138 and barium/lanthanum-140 particulate activity data in licensee records and data reported for December 1974. The licensee had agreed to review the matter and if errors were identified to correct previously reported data. During this inspection it was found that the licensee had reviewed the matter and documented the findings which concluded that the previously reported values were valid.

10. Solid Radwaste Storage, Transfer, and Records

The licensee's solid radwaste generation, handling and storage equipment and facilities, processing, disposal, and procedures are essentially as described in a previous inspection report.^{13/} No discrepancies were noted in a comparison of the licensee's recorded data pertaining to offsite shipments of radioactive waste for the last six months of 1975 and corresponding information contained in the semiannual report. Further, no problems were noted during the review of the licensee's records of surveys of containers and vehicles and records of contained activity and volume for the last half of 1975 and the first half of 1976.

Technical Specification 6.9.3.a.(3) requires that the semiannual report contain data on shipments of solid waste shipped from the plant site during the report period. No data on the truck load of drummed solid waste shipped on May 20, 1976 were contained in the semiannual report covering the first half of 1976, dated August 31, 1976 and as revised September 15, 1976. Therefore the licensee was informed of apparent noncompliance with Technical Specification 6.9.3.a.(3), in that the semiannual report for the first half of 1976, dated August 31, 1976 and revised September 15, 1976 did not contain any of the required data regarding solid radwaste shipments made during the report period.

^{12/} IE Inspection Rpt. No. 050-155/75-14.

^{13/} RO Inspection Rpt No. 050-155/74-08.