U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-266/86016(DRSS); 50-301/86015(DRSS)

Docket Nos. 50-266; 50-301 Licenses No. DPR-24; DPR-27

Licensee: Wisconsin Electric Power Company
231 West Michigan
Milwaukee, WI 53201

Facility Name: Point Beach Nuclear Plant (PBNP)

Inspection At: Point Beach Nuclear Plant, Units 1 and 2, Two Rivers, WI

Inspection Conducted: August 7-8, and October 16 and 17, 1986

Inspectors: R. A. Paul for 11-4-86
Date

Approved By: L. R. Greger, Chief 11-4-86
Facilities Radiation Protection Section Date

Inspection Summary

Inspection on August 7-8, and October 16 and 17, 1986 (Reports No. 50-266/86016(DRSS); No. 50-301/86015(DRSS))
Areas Inspected: Special inspection to review a radioactive material intake incident, and a routine inspection to review solid radwaste and transportation activities.
Results: Two violations were identified (failure to make adequate surveys to meet 10 CFR Part 20 requirements - Section 3; failure to adhere to a radiation protection procedural requirement - Section 3).

## DETAILS

1. Persons Contacted

**R. Bredvad, Plant Health Physicist
**D. Johnson, Project Engineer, Nuclear Plant Engineering
**T. Koehler, General Superintendent
J. Knorr, Regulatory Engineer, Nuclear Plant Engineering
*C. Krause, Senior Project Engineer
*E. Lipke, General Superintendent, Nuclear Plant Engineering
**J. Reisenbuechler, Superintendent, EQRS
*J. Zach, Plant Manager
E. Ziller, Shift Supervisor
**R. Hague, NRC, Senior Resident Inspector
**R. Leeman, NRC, Resident Inspector

The inspector also contacted auxiliary operators and other plant staff during this inspection.

*Denotes those present at the Enforcement Conference held on September 17, 1986.

**Denotes those present at the exit meeting held on October 17, 1986.

2. General

The onsite inspection, which began at 8:00 a.m., on August 7, 1986, was conducted to review the circumstances surrounding an incident in which a worker received an intake of radioactive material. The inspector contacted several licensee employees and reviewed licensee documentation during the review. Also inspected were solid radwaste and transportation activities.

3. Radiological Incident Involving an Intake of Radioactive Material

The inspector reviewed the circumstances surrounding an intake of radioactive materials by a station employee on July 19, 1986. During the review the inspector contacted licensee managers, health physicists, reactor and auxiliary operators, and security personnel. The inspector reviewed administrative and radiation protection records including bioassay results, survey results, and the report of the licensee's investigation into this incident. The following subsections describe the event, possible causes, licensee and inspector followups, and an Enforcement Conference held on September 17, 1986.

a. Summary of Incident

On Sunday July 20, 1986, an Auxiliary Operator (AO) was unable to exit the plant due to repetitive portal monitor alarms. Offsite health physics personnel who were contacted came to the site and performed a whole body count (WBC) of the AO. (Health physics

personnel are not normally onsite during weekends or midnight shifts.) The preliminary WBC data indicated the operator had an intake of radioactive material which was later determined to not exceed regulatory limits. The licensee informed an NRC resident of the incident on July 21, 1986; the NRC Resident Inspector notified a Region III radiation specialist of the incident on the same day.

The worker most likely received the intake during waste evaporator filter changing activities on Saturday, July 19, 1986; however, no personal contamination or unusual problems were reported by the AO for that day (even though he reportedly frisked after the evaporator filter job). He apparently passed through the portal monitor at the end of his workshift on that day without causing an alarm. On Sunday, July 20, the operator reported to work, did not enter the controlled side of the plant, and in violation of station procedures was allowed by the security department to exit the gatehouse on two occasions during the day after he set off the portal monitor alarms on both occasions; he did not leave the general site vicinity on either occasion. After the operator unsuccessfully attempted to pass through the portal monitors on additional occasions during the day the Duty Shift Supervisor (DSS) was contacted.

Surveys taken of the worker's house, personal clothing and automobile detected small quantities of radioactive materials, all of which was collected and returned to the station.

The inspector found that several errors made by responsible personnel (auxiliary operator, DSS, and security personnel) during this incident led to violations of procedural and regulatory requirements. In addition, programmatic weaknesses were identified concerning: the licensee's policy which allows auxiliary operators to perform certain radiation protection jobs without a radiation work permit because they are considered health physics qualified; the station policy of not providing health physics coverage for certain off-shift hours; and poor health physics practices associated with the reuse of protective clothing.

b. Identification of Intake Event

On July 20, 1986, the AO reported for work at about 2:30 p.m. He visited only uncontrolled areas of the plant until about 3:20 p.m. when he attempted to exit the gatehouse to visit the Energy Information Center which is located outside the protected area. When he passed through the portal monitors at the gatehouse, they alarmed (indicating that he may be contaminated). Although the AO was HP qualified and was aware of procedural requirements to perform a frisk (after alarming the portal monitor) before leaving the gatehouse, he proceeded to exit the gatehouse anyway, without performing a frisk. Before he exited, the AO informed a security guard that he had not been in the radiologically controlled area of the plant during his shift and that he would reenter the plant in a

few minutes. The Security Department did not initiate a report form as required by Procedure No. HP 1.11. This procedure, "Portal Monitor Use and Alarm Response" defines the responsibilities of Health Physics, Security, and DSS personnel when portal monitor contamination alarms are initiated. Failure to initiate the requirements of this procedure is a violation of Technical Specification No. 15.6.8 requirements (50-266/86016-01; 50-301;86015-01).

At about 6:50 p.m., the AO, in attempting to exit the gatehouse to make a brief visit to the parking lot, again set off the portal monitor alarm, and again did not follow the procedural requirements. The security officers also failed to initiate the procedural requirements of HP 1.11. The AO returned to the gatehouse shortly thereafter and, on his own initiative, attempted to pass through the three portal monitors; all alarmed. The AO then left the immediate area, removed his personal clothing and donned paper coveralls, and reentered the portal monitors; each monitor alarmed, and again the security officers failed to initiate procedural requirements. The AO then returned to the plant, showered, and was assisted in frisking his personal clothing by another AO. Small amounts of contamination were found on the AO's badge and plant keys; they were subsequently decontaminated.

At about 7:25 p.m. the AO again unsuccessfully attempted to pass through the portal monitors; at this point the security officers notified the DSS. The DSS was informed that the AO was in the gatehouse and was unable to pass through the portal monitors; the DSS was not informed that the AO had been unable to pass through the monitors on previous occasions during that day. Based on the information he was provided, the DSS instructed the security officer to inform the AO to return to the plant, frisk, and shower if necessary. However, because of apparent miscommunication between the DSS and the security officer, the AO thought his instructions from the DSS were to shower, wait until shift turnover, and try again to pass through the portal monitors. The DSS and the AO had no other discussion concerning this matter, and the DSS assumed that because the AO was HP qualified and that he had not heard from either the AO or the Security Department, there was no further problem.

At about 10:48 p.m., (the end of the shift) the AO again unsuccessfully attempted to exit the portal monitor wearing his personal clothing. The Security Department then initiated Procedure No. HP 1.11. The AO reshowered, returned to the gatehouse, and was again unable to pass through all three monitors. At this time the mid-shift DSS frisked the AO, found contamination on the AO's clothing and contacted the HP Duty and Call Supervisor who came to the site to perform further surveys and a whole body count (WBC). Based on preliminary results of the initial WBC, performed at 12:21 a.m. on July 21, 1986, the licensee determined that the AO had an intake of radioactive material as well as contamination on his personal clothing.

c. Radioactive Material Intake Quantification

After initial determination by whole body counting that an intake of radioactive material had occurred, additional Whole Body Counting (WBC) was performed and fecal and urine samples were collected and analyzed; the additional counting, sampling, and analyses were performed during the period July 21-26, 1986. The analysis and whole body counting results indicated that about 450 nanocuries of primarily cobalt-58, cobalt 60, cerium 144, silver 110m, and chromium-51 were taken into the AO's body. The material was retained in his GI tract for about 2.5 days and was then eliminated; this indicates that the radioactive materials were ingested, or inhaled in a manner that resulted in rapid translocation to the GI tract. The licensee assessed that the intake did not exceed the 10 CFR 20.103 control measure (40 MPC-hours) for inhaled material. The inspector agrees with the licensee's assessment.

As discussed below, the isotopic mix found in the AO's body was similar to the isotopic mix found on the waste evaporator feed filters on which the AO worked on July 19, 1986, the day before the intake was discovered.

d. Probable Causes of Intake Event

On July 19, 1986, the AO performed several duties in the controlled area. The duties included changing out the blowdown evaporator feed and bottoms loop filter. The licensee speculates the AO's intake of radioactive material occurred while performing the changeout. This conclusion was reached after the licensee performed isotopic analyses on the AO's personal clothing worn on July 19 and 20, the protective clothing (pc's) he wore on July 19, his bioassay results, and a section of the bottom loop filter and smears of the filter cubicle area. The results of the analyses show good correlation between the isotopic mix of the radionuclides on the pc's, personal clothing, bioassay samples, and the isotopic mix found on the bottoms filter and smears of the cubicle area. The mechanism by which the radioactivity was taken in by the AO was not determined.

These filter changes are not required to be performed under a Radiation Work Permit and no direct radiation protection coverage is provided by HP personnel. HP qualified AOs provide their own radiation protection coverage. The licensee's program for qualifying AOs as radiation protection workers allows them to provide radiation protection duties for certain RWP exempt jobs. The qualification program for the AOs begins at the entry level, and consists of approximately six months of classroom and OJT in the Health Physics Department, after which they begin AO qualification training. Once an AO is HP qualified, there is no routine program that periodically rotates them back through health physics for extended OJT retraining; however, some additional training is provided those AOs who act as radiation protection control technicians during refueling outages.

The AO indicated that for each entry into the controlled area to perform his work activities on July 19, 1986, he used one set of pc's wearing only his socks, underwear and shoes under the pc's. No respirator was worn. He also indicated that after he performed each work function during that day he removed the pc's, and without surveying them, placed them in his locker for reuse (his personal clothes were also in the locker). Before each exit from the control zone he used an HP 210 pancake probe to perform a frisk of his person, wearing only his underwear, socks and shoes; no contamination was found during any survey. At the end of his shift he apparently passed through a gatehouse portal monitor without triggering an alarm. Only one set of protective clothing (PC) is required by station procedures unless contamination levels in the area exceed 30,000 dpm/100 $cm^2$ at which point radiation protection procedures require that two sets of pc's be worn. On July 19, 1986, the AO surveyed the feed and bottoms filters and found contact readings of 500-800 mR/hr. However, no contamination surveys were made by the AO to determine if two sets of protective clothing or other additional precautions were required.

A review of the routine survey records of the filter cubicle area provided to the inspector indicate that only three individual floor smears were collected between June 6 and 23, 1986; the smear analysis results ranged up to 1500 dpm/100 $cm^2$. No floor survey smears were collected between June 23 and July 21, 1986. On July 21, 1986, a more extensive floor smear survey was performed. Floor contamination levels within the cubicle, outside the filter curbed area ranged up to 95,000 dpm/100 $cm^2$. Smear survey results inside the curbed filter area ranged up to 350,000 dpm/100 $cm^2$.

The licensee assumes the increased contamination levels in the area were the result of several filter changes between July 14 and 19, 1986. Although the assumption may be correct, it is difficult to determine because no smear surveys were performed in the cubicle between June 23 and July 21, 1986. The failure to perform timely evaluations (smears) before the filter changeouts, including the July 19, 1986 filter changeout, to determine radiological conditions to ensure individuals would not be permitted to intake radioactive material in quantities greater than 10 CFR 20.103 limits is considered noncompliance with 10 CFR 20.201 requirements (50-266/86016-02; 50-301/86015-02). The radioactive contamination conditions associated with the filter changeouts must be adequately evaluated to permit appropriate selection of protection clothing and respiratory equipment for the existent conditions.

In addition to the item of noncompliance, apparent programmatic weaknesses were identified concerning the licensee's program which permits AOs to provide their own HP job coverage for several radiological significant jobs, lack of full time health physics coverage during certain off-shift hours, and the reuse of protective clothing; these matters are further discussed in Section 3.f.

e. Offsite Surveys

As a result of this intake and personal contamination incident, the licensee performed contamination surveys of the AO's apartment and car on July 23, 1986. The surveys consisted of collection and counting of smears, direct surveys using both G-M tube and plastic scintillation detector survey instruments. The swipe and direct survey using the G-M tube instrument indicated all areas within the apartment and car to be less than detectable. The direct survey using the plastic scintillation detector identified small quantities of detectable activity on the bathroom rug, around the toilet, and in the toilet bowl. No other contamination was found. The detected radioactive materials were collected and returned to the station.

f. Enforcement Conference

An enforcement conference was held on September 17, 1986, to discuss the circumstances surrounding this incident and another incident which occurred in December 1985 involving errors attributed to HP qualified AOs, Region III's concerns related to these incidents, and the identified violations. The meeting, held at the NRC Region III office, was attended by Mr. A. B. Davis, Deputy Regional Administrator, Mr. J. J. Zach, Plant Manager, and members of their respective staffs.

The licensee was informed that this was the second incident within eight months which was apparently caused by AO error that had the potential for an overexposure, and that repeated violations could lead to escalated enforcement action. Discussed were the similarities between the two incidents (both AO errors occurred during off-shift hours when HP personnel are not required to be onsite, and when the AOs were performing RWP exempt jobs). In both the subject radiological incidents, it appears the HP qualified AOs committed errors that would not be expected from full time radiation control technicians, and should not be expected from HP qualified AOs. In addition, the following associated programmatic weaknesses were discussed.

- Health Physics Coverage

  The licensee's practice of not normally providing full time (around the clock) health physics coverage, one of only two nuclear power facilities in Region III that does not. The licensee's technical specifications only require that an individual qualified in radiation protection procedures shall be onsite when fuel is in the reactor. The licensee meets this requirement by having HP qualified AOs and other HP qualified operator personnel onsite when full time HPs are not onsite. Current technical specifications for most other nuclear power plants requires that a health physics technician be onsite when fuel is in the reactor.

During both incidents involving the AOs, no qualified full time radiation protection technician was onsite to provide job coverage, worker surveillance, health physics expertise, and experience. In both incidents, radiation protection coverage may have prevented the occurrence. The policy of not providing full time health physics coverage appears to be a programmatic weakness which should be corrected.

- RWP Program

Radiation Protection Procedure No. HP2.5, which permits certain work activities to be performed by HP qualified radiochemical technicians, radiation control operators, and auxiliary operators who are exempt from RWP requirements. The permitted activities are different for each work group; the activities include surveys, sampling, surveillances, system valve lineups, and filter changes. The incidents involving AOs occurred during filter changes under the exempt RWP provision of the procedure; AOs provided their own radiation protection coverage.

Permitting workers who are performing work in radiologically significant areas to provide their own radiation protection coverage, as a secondary function, increases the chance for inadequate radiation protection coverage. The practice of allowing performance of certain radiological work activities as RWP exempt is a programmatic weakness that should be corrected.

- Protective Clothing Reuse

Radiation Protection Procedure No. 2.7 which specifies that minimum protective clothing (pc's) for persons crossing step of pads (SOPs) consists of coveralls, surgeons cap, and cotton or rubber gloves. The procedure also allows the reuse of protective clothing if certain contamination levels are not exceeded, and encourages the reuse of protective clothing due to the licensee's limited laundry capacity and the desire to reduce the generation of waste water. After use of the pc's they are generally stored in the workers' lockers; no surveys of the pc's are required before they are placed in the locker; however, workers are required to periodically monitor their clothing with available friskers to ensure they are not contaminated above procedural limits.

In the incident concerning the worker who received an intake of radioactivity, the isotopic composition of the contamination found on his personal clothing closely matches the isotopic composition of the contamination found on his pc's. It seems likely that his personal clothing contamination was caused by cross contamination from the pc's when they were stored together in his locker on several occasions on July 19, 1986.

The practice of reusing pc's that have been worn in SOP areas while performing radiological tasks is a poor health physics practice.

Also discussed were additional concerns identified during the inspector's investigation of the incident which occurred on July 19 and 20, 1986. The AO, who on two occasions alarmed the gatehouse portal monitors, exited from the gatehouse without following procedural requirements. The HP qualified AO should have considered the alarming portal monitors to be valid, followed the required procedures, recognized the possibility of internal contamination, and pursued his contamination problem with the DSS. Although the AO was responsible for adhering to the portal monitor alarm procedural requirements, the security guards should also have adhered to the same requirements, and should not have been influenced by the reasons the AO offered justifying why he could not have been contaminated. If the licensee continues the practice of allowing AOs, whose primary function is not radiation protection, to perform significant radiation protection activities, then a more comprehensive on-the-job retraining and qualification program should be implemented.

The licensee acknowledged Region III's comments and stated they have actively considered the matters discussed. The licensee presented several possible interim and long term corrective actions concerning full time health physics coverage, the RWP exempt program, and the reuse of protective clothing.

4. IE Bulletins

The inspector reviewed licensee action in response to IE Bulletin No. 78-80. The specified actions for IEB 78-08 have been completed for Units 1 and 2. NRC inspectors have verified the actions were taken.

5. Dry Radioactive Waste Volume Reduction Program

The licensee does not segregate or survey controlled zone waste to reduce radioactive waste volume; however, waste volume reduction is accomplished by reducing the material and equipment allowed into the controlled zone. Money for waste volume reduction equipment is budgeted for 1988; the licensee is considering purchasing waste segregation equipment, and super compactor use, and increased compaction efficiency.

6. Solid Radioactive Waste

The inspector reviewed the licensee's solid radioactive waste management program including: determination whether changes to equipment have reduced effectiveness of the systems; adequacy of test programs for the solid waste system; adequacy of the monitoring system to determine valid radiation measurements; adequacy of required records and procedures; and

experience and training concerning operation of solid waste systems. The inspector toured the radwaste facility and found considerable improvement in cleanliness and access controls. No waste solidification activities were in progress that could be observed during this inspection.

The solid radioactive waste and transportation of waste programs are described in Inspection Reports No. 50-266/84022; No. 50-301/84020 and No. 50-266/85017; No. 50-301/85017. No significant changes in the kinds of waste produced, handled, and shipped have occurred. The licensee is currently using the Chem-Nuclear portable cement solidification system and does not intend to use the in house waste solidification system.

The inspector selectively reviewed the licensee's revised procedures for radioactive materials handling. The procedures are current with respect to NRC/DOT requirements. The Process Control Program for the solidification and packaging of waste was also reviewed; it appeared the program was used adequately to meet the technical specification requirements.

Records of radioactive waste shipments were selectively reviewed for compliance with 49 CFR 172-173 and 10 CFR 71. From July through December 1985, and 1986 through September, the licensee shipped approximately 534 and 339 cubic feet of evaporator bottoms, and 177 and 1063 cubic feet of primary plant resins respectively. Total dry active waste (DAW) shipped during 1986 through September was 2407 cubic feet. Also reviewed was an LSA shipment of a tube sheet sample from a steam generator (replaced during the SGRP) and three spent fuel assembly shipments. No problems were noted. There were no transportation incidents during this period.

The inspector reviewed the licensee's in house audit of radwaste activities conducted during March, 1986. The audit included compliance with 10 CFR 173 requirements and implementation of station procedures. Audit findings concerning waste classification documentation, construction of LSA boxes, and NRC certificates of compliance were identified. The findings were corrected by the licensee.

Since the previous inspection (50-266/85017; 50-301/85017) the licensee has implemented several changes in the handling and processing of solid wastes to achieve ALARA. These changes include: improved procedures to reduce exposures by preventing resin waste from being placed into improper containers; transuranic sample analysis results made available before processing and transferring wastes; and, the use of a remote capping on certain Chem-Nuclear liners. The radwaste supervisor is also evaluating an improved method of dumping demineralizers to transfer cask, which should reduce personal radiation exposures.

The current training program for solid radwaste workers (contract employers) consists of OJT given by the radwaste supervisor; each worker is required to meet qualification card standards. The licensee intends to expand radwaste worker training in the near future to include more comprehensive formal radiation protection training. This matter will be reviewed during a future inspection (50-266/86016-03; 50-301/86015-03).

7. Evacuation of Unit 2 Containment

On Sunday, October 12, 1986 and Tuesday, October 14, 1986, small quantities of iodine-131 were released into the Unit 2 containment building, resulting in the evacuation of personnel.

The evacuation on October 12, 1986 was ordered when the Unit 2 purge exhaust stack SPING iodine monitor spiked causing an alarm which isolated the containment ventilation purge system. The spike was caused by an electrical transient. The isolation of the purge system caused small quantities of iodine-131, which were being exhausted from the Unit 2 Steam Generator (S/G) channel head ventilation system into the containment purge system, to back up through a louver in the containment purge system into the Unit 2 containment. The purge system was off for about thirty minutes; sometime during this period the S/G channel head ventilation fans were intentionally secured.

Samples collected from a low volume air sampler running in the containment during and subsequent to the release indicated that the maximum personnel exposure was less than 10MPC-hours. A sample taken downstream of the charcoal filters on the containment purge system indicated no iodine-131 was released offsite during the incident.

On October 14, 1986, the control room notified health physics personnel that the Unit 2 containment purge supply and exhaust fans had been inadvertently secured, leaving a potential release path of iodine-131 into the Unit 2 containment from the S/G channel head ventilation system. Health physics personnel advised containment evacuation, and the control room initiated the evacuation. Unlike the incident which occurred on October 12, 1986, the purge vent system was not isolated; however, because the exhaust fans were not operating, there was insufficient suction to exhaust the iodine-131 released into the purge exhaust system from the S/G channel head ventilation system. As a result, small quantities of iodine-131 were released into the Unit 2 containment from a louver in the purge exhaust system. The fans were off for approximately two hours; air sample data and stay time were reviewed; no persons exceeded 3 MPC-hours. Whole body counts performed of numerous persons who were in the containment during both incidents indicated no identifiable radioactive intakes of I-131.

This matter was discussed with the licensee who stated that actions will be taken to prevent the release of radioactivity into the containment buildings when the S/G ventilation system is venting into the containment purge exhaust system. The corrective actions will include modifications which tie the isolation of the S/G exhaust system to the isolation of both the purge vent isolation and blower fan systems. Until modifications can be made, increased surveillance of the operation of the system has been initiated. This matter will be further viewed at a future inspection (50-266/86016; 50-301/86015-04).

8. Exit Meeting

The inspector met licensee representatives (denoted in Section 1) at the conclusion of the inspection on October 17, 1986. Discussed were the

findings and scope of the routine inspection performed on October 16 and 17, 1986. The inspector also discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspector during the inspection. The licensee did not identify such documents/processes as proprietary. In response to certain matters discussed, the licensee:

- Acknowledged the inspectors comments concerning the need to take actions to prevent further releases of iodine-131 into the containment from the S/G ventilation system (Section 7).