

**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION III**

**Docket No:** 50-305  
**License No:** DPR-43

**Report No:** 50-305/99014(DRS)

**Licensee:** Wisconsin Public Service Corporation

**Facility:** Kewaunee Nuclear Power Plant

**Location:** N 490 Highway 42  
Kewaunee, WI 54216-9511

**Dates:** December 13-16, 1999

**Inspector:** K. Lambert, Radiation Specialist

**Approved by:** Steven K. Orth, Acting Chief, Plant Support Branch  
Division of Reactor Safety

## **EXECUTIVE SUMMARY**

### **Kewaunee Nuclear Plant NRC Inspection Report 50-305/99014(DRS)**

**This was an announced routine radiation protection inspection to review the internal and external exposure monitoring programs. The review included the self reading dosimeter check and comparison program, personnel contamination events, whole body counting, respiratory protection, declared pregnant worker program, and radiation protection audits. This inspection covered a 4-day period concluding on December 16, 1999, and was performed by a radiation specialist. No violations of regulatory requirements were identified.**

- Overall, the external exposure control program was effectively implemented in accordance with station procedures and regulatory requirements. The radiation protection staff was knowledgeable of procedures and processes to evaluate exposures. (Section R1.1)**
- The internal exposure control program was effectively implemented. In-vitro and In-vivo analyses were performed properly and consistent with industry standards. (Section R1.2)**
- The respiratory protection program was effectively implemented. Cognizant personnel were knowledgeable of procedures and regulatory requirements. The program was being revised to incorporate the upcoming changes to the respiratory protection requirements in 10 CFR Part 20. (Section R1.3)**
- Radiological postings and container labeling were well maintained and appropriately informed workers of radiological conditions. Housekeeping and material condition of radiation protection equipment was good. (Section R2.1)**
- The audit of the radiological environmental monitoring program was of sufficient scope and depth to identify deficiencies and areas where improvements were warranted. The radiation protection staff was effectively evaluating audit findings and implementing corrective actions/improvements. (Section R7.1)**

## Report Details

### IV. Plant Support

#### **R1 Radiological Protection and Chemistry Controls**

##### **R1.1 External Dose Control**

###### **a. Inspection Scope (83750)**

The inspector reviewed the programs for dosimetry usage, comparison of thermoluminescence dosimeters (TLDs) to self-reading dosimeters (SRDs), declared pregnant workers, and personnel contamination events (PCEs). This inspection also included a review of applicable procedures and dose records and interviews with radiation protection (RP) personnel.

###### **b. Observations and Findings**

As of November, the 1999 total station dose was 5.685 person-rem, based on SRD results. Radiation protection staff indicated that for those years without an outage, the station did not establish a specific dose goal, but strived to maintain the non-outage dose as-low-as-is-reasonably-achievable (ALARA). Radiation protection management indicated that they believed the 1999 total dose would be below 6 person-rem and would be the lowest dose accumulated for one year since the station began operating.

Station procedures for dosimetry usage, TLD/SRD comparison, PCEs, and declared pregnant workers were consistent with industry guidance and NRC requirements. Dose records were maintained in an electronic data base, with additional documents in individual files for dose history, PCEs, and records of those female workers who had declared themselves pregnant.

During the review of records, the inspector identified that one female worker had declared herself pregnant in 1999. The records included her declaration, estimated conception date, and exposure data for the individual and embryo/fetus since conception. The inspector noted that the dose to the declared worker was 0.0 millirem (mrem) for the year. The station established an administrative limit of 400 mrem for the gestation period and reviewed the individual's exposure daily to ensure limits were not exceeded.

The inspector verified that the TLD vendor was NVLAP (National Voluntary Lab Accreditation Program) certified for the TLDs used at Kewaunee. The licensee also performed vendor accuracy checks by exposing TLDs to a known dose and then reviewing the TLD vendor's results. The RP staff investigated those results outside of the station's acceptance criteria to resolve any problems. The inspector did not identify any 1999 accuracy checks where the vendor's results were outside the acceptance criteria.

Personnel dosimetry results between SRDs and TLDs were compared quarterly. The TLD results were used for the permanent record unless a discrepancy was identified. The licensee considered a discrepancy to be: (1) When the SRD or TLD reading is between 100 and 300 millirem (mrem) and the TLD reading is 1.25 times the SRD; or (2) When the SRD or TLD reading is greater than 300 mrem and the SRD to TLD ratio is less than 0.75 or greater than 1.25. The licensee evaluated discrepancies to determine which record was more accurate (TLD or SRD) and used that record for assigning dose to a worker. The inspector reviewed several discrepancy evaluations and noted that they were performed and documented in accordance with station procedures.

Personnel contamination events (PCEs) greater than 100 counts per minute (cpm) above background were evaluated and documented. Radiation protection staff documented ten PCEs greater than 100 cpm between January and November 1999. The inspector selectively reviewed PCE evaluations and noted that they were appropriately completed and technically sound.

Radiation protection procedures required that the RP staff perform dose evaluations when contamination greater than 10,000 cpm was identified. The inspector reviewed the PCE summary log and noted that dose evaluations were required for five events. The inspector verified that dose evaluations were performed for each of the five cases. These contaminations were all due to hot particles and resulted in a maximum exposure to an individual of 593 mrem shallow dose equivalent. The evaluation further indicated that the doses were below the threshold for assigning dose to an individual. However, the licensee retained the evaluations as part of the individual's exposure file.

c. Conclusions

Overall, the external exposure control program was effectively implemented in accordance with station procedures and regulatory requirements. The RP staff was knowledgeable of procedures and processes to evaluate exposures.

R1.2 Internal Dose Control

a. Inspection Scope (83750)

The inspector reviewed the in-vitro (e.g., biological sampling) and in-vivo (e.g., external whole body counting) programs for assessing internal exposure. Included in this inspection was a review of applicable procedures and documents and interviews with RP personnel.

b. Observations and Findings

Station procedures for both in-vitro and in-vivo analyses were technically sound and consistent with industry guidance and NRC regulations. Although in-vitro analyses had not been performed within the last two years, the sampling and analyses would be performed under the direction of the Superintendent - Plant Radiation Protection.

The licensee performed periodic whole body counting for station personnel, including post-outage whole body counts for individuals routinely exposed to radioactive materials during outage activities. Contractor personnel received pre and post employment whole body counts. The inspector reviewed personnel whole body counting records for 1999 and noted that counting was performed in accordance with station procedures.

Licensee procedures required an evaluation of the uptake of radioactive materials when: (1) a nasal swab indicated radioactivity greater than 10,000 disintegrations per minute; (2) a calculated exposure to greater than 20 DAC-hours (Derived Air Concentration) in a week occurred; or (3) if there was a real or suspected inhalation or ingestion of radioactive materials. The inspector reviewed PCEs with facial contamination that occurred in 1999 and determined that evaluations for internal contamination were performed in accordance with station procedures, including whole body counting when appropriate. The inspector also noted that in accordance with station procedures, no dose was required to be assigned to any individuals as a result of the evaluation of PCEs and whole body counts.

Whole body counter calibrations were performed annually by the contractor from which the system was rented. Calibration data for 1998 and 1999 were reviewed and indicated that the counter was calibrated at the appropriate frequency and that calibration records were complete. The calibration was performed using a phantom, and the staff compared the analysis results with the activity of National Institute of Standards and Technology traceable sources of cobalt-60, cesium-137, and barium-133. The inspector noted that the calibration was technically sound.

c. Conclusions

The internal exposure control program was effectively implemented. In-vitro and In-vivo analyses were performed properly and consistent with industry standards.

R1.3 Respiratory Protection Program

a. Inspection Scope (83750)

The inspector reviewed the RP staff's implementation of the respiratory protection program. This included a review of applicable procedures, respirator maintenance and storage, fit testing, respirator issuance, respirator user training, and discussions with cognizant RP staff.

b. Observations and Findings

The inspector reviewed the respiratory protection program procedures and concluded that procedures were adequate to ensure that the program was effectively implemented. Procedures reviewed provided guidance concerning bioassays, issuance and fit testing, and maintenance of respirators. For example, health physics procedure HP 02.01, "Personnel Respiratory Protection", included a policy statement that discussed the use of process or engineering controls; routine, non-routine and emergency use of respirators; and the periods of respirator use and relief. The licensee was revising the

procedures to ensure that they complied with the new respiratory protection requirements in 10 CFR Part 20, effective February 4, 2000.

Nuclear Administrative Directive NAD 1.14, Revision 4, "Respiratory Protection Program", listed three categories of individuals: (1) those individuals required to be qualified at all times; (2) those individuals required to be qualified prior to performance of a specific task; and (3) those individuals required to have annual respiratory protection training only. The station used a computer-based matrix to ensure that individuals assigned to the categories met the requirements.

During the review of the matrix, the inspector noted that the licensee had ongoing actions regarding two individuals' qualifications. One individual's physical results were pending, and the second individual's training had expired. Licensee management indicated that the first individual's physical results were being reviewed by a physician. Based on discussions with the physician, the licensee intended to maintain the individual as respirator qualified. The second individual did not attend the training provided in the first quarter of 1998. Station procedures required training annually. Radiation protection staff indicated that this person was listed as continuously qualified because he was a member of the Emergency Response Organization (to perform emergency repairs). However, the individual was not an operator or fire brigade member; therefore, prior to wearing a respirator, the individual was required to sign-onto the appropriate radiation work permit (RWP). The RP staff maintained a respirator qualified list that was reviewed as part of developing the RWP to identify those individuals who were respirator qualified. The RP staff indicated that during the review of the RWP and pre-job briefing, the individual would be identified as not being respirator qualified and would not be allowed to perform work involving the use of a respirator. The inspector verified that the individual was not on the respirator qualified list. Radiation protection management indicated that the individual was scheduled to attend training on January 6, 2000.

The inspector observed the demonstration of an individual fit test. The RP technician performing the testing was knowledgeable in the fit testing process and referred to the procedure during the test to ensure compliance with the procedure. No problems were identified.

The respirator storage, cleaning, and maintenance areas were well organized and exhibited good housekeeping. Respirators had been placed in plastic bags and stored in cabinets. The inspector noted that the respirators were properly stored in plastic bags in the cabinet.

c. Conclusions

The respiratory protection program was effectively implemented. Cognizant personnel were knowledgeable of procedures and regulatory requirements. The program was being revised to incorporate the upcoming changes to the respiratory protection requirements in 10 CFR Part 20.

## **R2 Status of Radiological Protection and Chemistry Facilities and Equipment**

### **R2.1 Radiological Posting, Labeling and Housekeeping**

#### **a. Inspection Scope (83750)**

The inspector reviewed radiological postings and labeling of containers during several walk downs of the auxiliary building. In addition, housekeeping and material condition of radiation protection equipment was reviewed.

#### **b. Observations and Findings**

The inspector observed that radiological postings and boundaries in the auxiliary building were well maintained. The inspector determined, through independent measurements, that radiation and high radiation areas were appropriately posted and controlled in accordance with station procedures and regulatory requirements. Containers were also labeled in accordance with station procedures and regulatory requirements. Housekeeping and material condition of radiation protection equipment in use was good.

#### **c. Conclusions**

Radiological postings and container labeling were well maintained and appropriately informed workers of radiological conditions. Housekeeping and material condition of radiation protection equipment was good.

## **R7 Quality Assurance In Radiological Protection and Chemistry Activities**

### **R7.1 Radiation Protection Audit**

#### **a. Inspection Scope (83750)**

The inspector reviewed a Quality Programs audit (Performed during the second quarter of 1999) of the radiation protection department regarding the radiological environmental monitoring program. The assessment reviewed the sample collection schedule, data analysis, methodology for demonstrating compliance with dose limits to the public, and the land use census.

#### **b. Observations and Findings**

The audit was self critical and performed by qualified staff that included a subject matter expert from another nuclear power plant. The assessment documented strengths, findings, deficiencies, and recommendations for program improvements. Findings were entered in the Quality Program's Quality Assessment Report, which was the licensee's method for tracking audit findings requiring a response. Radiation protection management indicated that responses to the findings were being developed and would be implemented. Radiation protection management also indicated that the

recommendations and program enhancements were being evaluated for possible implementation.

c. Conclusions

The audit was of sufficient scope and depth to identify deficiencies and areas where improvements were warranted. The radiation protection staff was effectively evaluating audit findings and implementing corrective actions/improvements.

**X1 Exit Meeting Summary**

The inspector presented the inspection results to members of licensee management at the conclusion of the inspection December 16, 1999.

The licensee did not identify any items discussed as proprietary.

**PARTIAL LIST OF PERSONS CONTACTED**

Licensee

- B. Gauger, Health Physicist
- G. Harrington, Plant Licensing Supervisor
- C. Long, Health Physics Supervisor
- D. Morgan, Health Physics Crew Leader
- M. Reinhart, Superintendent, Plant Radiation Protection
- K. Weinbauer, Manager, Kewaunee Plant

**INSPECTION PROCEDURES USED**

IP 83750                      Occupational Radiation Exposure

**LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

Opened

None

Closed

None

Discussed

None

## LIST OF ACRONYMS USED

<b>ALARA</b>	<b>As-Low-As-Is-Reasonably-Achievable</b>
<b>DAC</b>	<b>Derived Air Concentration</b>
<b>DRS</b>	<b>Division of Reactor Safety</b>
<b>mrem</b>	<b>millirem</b>
<b>NRC</b>	<b>Nuclear Regulatory Commission</b>
<b>PCE</b>	<b>Personnel Contamination Event</b>
<b>PDR</b>	<b>Public Document Room</b>
<b>RP</b>	<b>Radiation Protection</b>
<b>RPT</b>	<b>Radiation Protection Technician</b>
<b>RWP</b>	<b>Radiation Work Permit</b>
<b>SRD</b>	<b>Self Reading Dosimeter</b>
<b>TLD</b>	<b>Thermoluminescent Dosimeter</b>

## LIST OF DOCUMENTS REVIEWED

### Procedures

HP-1.03, Revision E, "Administrative Exposure Control and Records";  
HP-1.04, Revision G, "RCA Entry and Exit";  
HP-2.01, Revision A, "Personnel Respiratory Protection";  
HP-2.02, Revision G, "Respiratory Protective Equipment";  
HP-2.08, Revision Orig., "Evaluation of Airborne Radioactive Areas";  
HP-2.03, Revision C, "Evaluation for Use of Respiratory Protection";  
HP-3.01, Revision D, "Shallow Dose Equivalent Calculation";  
HP-3.02, Revision Orig., "Hot Particle Control";  
HP-3.03, Revision Orig., "Hot Particles Handling, Labeling, Storage and Analysis";  
HP-3.04, Revision G, "Contracted TLD Program";  
HP-3.05, Revision G, "dose Recording, Tracking and Reporting";  
HP-3.06, Revision D, "In-Vitro Bioassay Measurement";  
HP-3.07, Revision A, "Personnel Decontamination";  
HP-3.08, Revision A, "Evaluation of Inhalations or Ingestions";  
HP-3.09, revision C, "Calculating Internal Dose From Whole Body Counter Results";  
HP-3.10, Revision Orig., "Area Monitoring Program (TLD)";  
HP-6.05, Revision B, "Instrument Operating Procedure - BD-PND Neutron Bubble Dosimeter";  
HP-6.75, Revision D, "Instrument Operating Procedure - Whole Body Counter";  
NAD-01.11, Revision G, "Personnel Monitoring"; and  
NAD-01.14, Revision D, "Respiratory Protection Program".

### Audits

Kewaunee Audit Report: Second Quarter 1999, Audit #99-002.

### Miscellaneous

Contamination Log;  
Personnel Dose Reports for 1999;  
Self Reading Dosimeter Calibration Summary, March 1999 and September 1999;  
Bubble Neutron Dosimeter Issue Worksheet, 1999;  
Random Personnel Contamination Event Records for 1998 and 1999;  
Respirator Qualification Matrix;  
SRD to TLD Comparison Report, 1999;  
SRD/TLD Discrepancy Investigation reports, November 1998;  
Vendor TLD Accuracy Verification; and  
Whole Body Counter Calibrations 1998, 1999.