

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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Report No: 50-255/99006(DRS)

Licensee: Consumers Energy Company

Facility: Palisades Nuclear Generating Plant

Location: 27780 Blue Star Memorial Highway
Covert, MI 49043-9530

Dates: May 6 - 12, 1999

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EXECUTIVE SUMMARY

Palisades Nuclear Generating Plant NRC Inspection Report 50-255/99006(DRS)

This announced inspection included an evaluation of the effectiveness of aspects of the radiation protection (RP) program. The inspection focused on radioactive waste processing and shipping of radioactive material. Specifically, the inspectors reviewed the licensee's process control program, radioactive waste characterization, radioactive waste and material storage areas, and the implementation of the licensee's shipping program. In addition, the inspectors reviewed the radiological planning and oversight of maintenance outage activities. The report covers a one-week inspection concluded on May 12, 1999, performed by two radiation specialists. Three Non-Cited Violations of regulatory requirements were identified. (Sections R1.3 and R2.2)

Plant Support

- Licensee practices for radioactive waste processing ensured effective implementation of the radioactive waste management program. The staff processed wastes in accordance with a process control program, and station personnel provided effective oversight of vendor activities. Although still under development, the licensee also supported a waste minimization plan. (Section R1.1)
- The licensee established and implemented an effective program for classification of radioactive wastes. The RP staff's methodologies for determining the waste classification of radioactive waste shipments were technically sound. (Section R1.2)
- The inspectors noted that the RP staff did not maintain a procedure to ensure consistent and appropriate implementation of the scaling factor determination program, which the RP management planned to address. (Section R1.2)
- Radioactive material and waste shipping documents and manifests contained errors and omissions of required information, resulting in a Severity Level IV Non-Cited Violation of regulatory requirements. In particular, the inspectors identified errors in the RP staff's activity calculations and in the documentation of these determinations. The inspectors also noted that the problems associated with the shipping manifests and documentation were similar to previous NRC inspection findings in this area, which indicated that the licensee had not taken adequate corrective actions to address these findings and to prevent recurrence. (Section R1.3)
- The RP staff demonstrated effective planning and oversight of work activities for the reactor coolant pump seal replacement and pressurizer man way removal. Planning documents contained appropriate work instructions and RP controls, which were effectively communicated to the work crew. In addition, the workers demonstrated proper radiation protection practices. (Section R1.4)

- The licensee performed a thorough evaluation of the radiological consequences from the December 1998 overflow of the "A" cooling tower. Although radioactive contamination was spread outside of the south storage buildings, no significant radiological consequences resulted from the incident. (Section R2.1)
- The licensee identified that containers of radioactively contaminated sand had not been posted or labeled in accordance with NRC requirements, resulting in two Severity Level IV Non-Cited Violations. The inspectors concluded that the licensee was properly evaluating the incident. (Section R2.2)
- The licensee's training program was consistent with Department of Transportation and NRC requirements and was sufficient to ensure that the staff was properly prepared to handle, package, and ship radioactive material. Although the RP staff's current assessment of this area had identified some weaknesses, the licensee was evaluating actions to correct the issues, which had been entered into the licensee's corrective action system. (Section R5.1)
- Generally, the licensee established and implemented an effective and comprehensive audit program of the radioactive waste processing and the radioactive materials shipping programs. Internal reviews were of sufficient scope and depth to identify problems. (Section R7.1)
- Some problems were noted, however, with the resolution of findings identified by the quality assurance department and by the RP staff. Specifically, the inspectors identified that some findings were not addressed due to oversights in entering the issues into the licensee's corrective action program. In addition, the licensee failed to identify problems with shipping papers and waste manifests, which were identified by the NRC inspectors. (Section R7.1)

Report Details

IV. Plant Support

R1 Radiological Protection and Chemistry Controls

R1.1 Radioactive Waste Processing

a. Inspection Scope (86750)

The inspectors evaluated the implementation of the licensee's radioactive waste processing program. Specifically, the inspectors interviewed the radioactive material supervisor and reviewed the licensee's process control program (PCP) and the documentation for several radioactive waste shipments.

b. Observations and Findings

The licensee's solid radioactive waste streams consisted of spent ion exchange resins from radioactive waste processing systems, mechanical filter cartridges, evaporator concentrates, and various types of contaminated dry active wastes (DAW). In the case of ion exchange resins, the licensee sluiced the resins into high integrity containers (HICs) and de-watered the resins to meet the stability and free standing liquid requirements of 10 CFR 61.56. De-watered, primary resins were transferred offsite for burial. However, the licensee shipped secondary resins to a vendor for additional radiological surveys and screening, and, subsequently, disposed of any radioactive waste through transfer to a licensed disposal site. The licensee drained mechanical filter media to meet the free standing liquid requirement of 10 CFR 61.56 and transferred the media into HICs, which were also shipped to a burial site for disposal. Radioactive waste handlers collected DAW from various areas within the plant and shipped the wastes to a vendor for processing and disposal. Evaporator concentrates were processed through the licensee's radioactive waste volume reduction (RVR) system, which reduced the volume of liquid concentrates and ensured that wastes were not dispersible, as required by the disposal site's license. Licensee personnel indicated that there were no radiologically inaccessible areas of the plant due to degraded radioactive waste processing equipment.

The licensee developed and maintained a PCP to ensure that radioactive waste was processed in a manner consistent with 10 CFR Part 61 requirements and with the low level disposal site licenses. The inspectors reviewed the PCP and concluded that the document adequately addressed radioactive waste processes used by the licensee. For example, the licensee recently revised the PCP to include the RVR system, which had been made a permanent modification to the plant. As a result of this change, the licensee was also revising the Updated Final Safety Analysis Report (UFSAR) to include the RVR system. The inspectors observed that the PCP addressed the stability and free standing liquid requirements of 10 CFR 61.56 and that the PCP was consistent with current licensee practices/procedures for waste processing. However, the inspectors noted that the PCP did not include information regarding the licensee's method of ensuring that radioactive waste met other characteristic requirements of 10 CFR 61.56, such as those pertaining to chemical and biological hazards. Members of the radiation

protection (RP) staff stated that the licensee's chemical control program effectively ensured that radioactive wastes met these requirements through limiting the use of such agents in certain areas of the plant. Nonetheless, RP management acknowledged that the PCP did not address these processes and planned to add this information in future revisions.

The licensee had developed a radioactive waste minimization plan which had not been fully implemented at the time of the inspection. As a result of directing resources to RP program improvement efforts, the licensee had limited progress implementing the plan. However, the RP department reorganized in March 1999 to provide more focused resources in the area of radioactive waste minimization. As part of the reorganization, a group of individuals, who reported directly to the RP manager (RPM), was specifically responsible for implementation of the radioactive waste program. The RP staff anticipated that these changes would provide more supervisory oversight and focus on waste minimization efforts. In the interim, the licensee continued to support a "green is clean" program whereby all non-radioactive waste was discarded into receptacles separate from radioactive waste containers to reduce the amount of radioactive waste that needed to be processed. In addition, the RP staff planned to organize a team of individuals tasked with devising methods to reduce the generation of radioactive waste at the station. The team members, however, had not been designated at the time of the inspection due to other emergent issues which dominated resources within the RP department.

Licensee personnel provided effective oversight of vendor waste processing activities. The licensee reviewed and approved vendor procedures for radioactive waste processing to ensure that they addressed all 10 CFR Part 61 requirements. In addition, a member of the RP staff was present during vendor waste processing activities to verify that 10 CFR Part 61 requirements, such as de-watering wet wastes, were satisfied prior to shipment. The inspectors reviewed shipping documentation for several radioactive waste shipments and confirmed that the waste met the 10 CFR Part 61 free standing liquid requirements. Finally, the licensee's nuclear performance and assessment department routinely observed vendor waste processing activities as part of the licensee's quality assurance program (Section R7.1).

c. Conclusions

Licensee practices for radioactive waste processing ensured effective implementation of the radioactive waste management program. The staff processed wastes in accordance with a PCP, and licensee personnel provided effective oversight of vendor activities. Although still under development, the licensee also supported a waste minimization plan.

R1.2 Classification of Radioactive Waste Shipments

a. Inspection Scope (86750)

The inspectors reviewed the licensee's method for determining the classification of radioactive waste shipments. Specifically, the inspectors interviewed members of the

RP staff regarding the scaling factor program, reviewed scaling factor data, and reviewed the licensee's procedures for classification of low-level radioactive wastes and the determination of shipment radioactivity.

b. Observations and Findings

The licensee established a scaling factor program for the analysis of difficult to measure (DTM) radionuclides in accordance with the NRC's technical positions on waste classification and form. Licensee personnel sampled and analyzed (via vendor) DAW, filter cartridges, primary and secondary resins, and evaporator concentrates biennially and compared the concentration of DTM radionuclides to easily measured gamma emitting radionuclides. The results were then averaged with historical data to establish scaling factors, which were used in calculating the activity of waste shipments (Section R1.3). The analysis was completed using a vendor supplied 10 CFR Part 61 sample analysis software program.

The licensee's implementation of the scaling factor program was technically sound. For example, DTM nuclides were scaled to the appropriate gamma emitting radionuclides, according to industry standards and the Electric Power Research Institute recommendations. The resultant scaling factors were evaluated against historical data and examined for statistical outliers and dispersion to ensure that the scaling factors were valid. The inspectors' comparison of the current and previous scaling factors confirmed that discrepancies warranting reevaluation of the data did not exist. The staff also ensured that representative samples of waste streams were obtained through collection of samples in appropriate locations and through comparison of the types and quantities of radionuclides in the sample to historical plant isotopic abundances. Licensee personnel ensured that the established scaling factors remained appropriate for plant operating conditions between sampling periods by evaluating the ratio of cobalt-60 to cesium-137 measured in materials shipped from the site. However, the inspectors identified that the RP staff did not routinely compare the vendor's gamma isotopic analysis to the chemistry staff's analysis to ensure consistent sample analyses. Although this quality verification was not a regulatory requirement, the RPM acknowledged that the verification of the vendor data was necessary to ensure the use of accurate scaling factors and planned to incorporate this element into the scaling factor program.

Although the staff's application of the scaling factor program was appropriate, the inspectors found that the licensee did not maintain a procedure on implementing the program. Although a work instruction on scaling factor methodology existed, the RP staff was unaware of the instruction because it expired in 1996. In addition, the instruction was not consistent with current practices. The inspectors' review determined that the instruction also did not fully address methods to ensure representative sampling, the appropriate measurable nuclides to scale to DTM radionuclides, or a threshold for identifying unacceptable discrepancies in the data. Although the development and use of a scaling factor procedure was not a regulatory requirement, RP management acknowledged that formal, comprehensive guidance on methods to determine scaling factors was necessary to ensure consistent and appropriate implementation of the scaling factor program and planned to revise and reissue the inactive work instruction.

The inspectors also reviewed procedures for determining the activity of nuclides contained in radioactive waste shipments and the resultant 10 CFR Part 61 waste classification of the shipment. These procedures were found to be consistent with 10 CFR Part 61 criteria for waste classification and outlined an acceptable methodology for activity determinations.

c. Conclusions

The licensee established and implemented an effective program for the classification of radioactive wastes. The RP staff's methodologies for determining the waste classification of radioactive waste shipments were technically sound. However, the inspectors noted that the RP staff did not maintain a procedure to ensure consistent and appropriate implementation of the scaling factor determination program, which the RP management planned to address.

R1.3 Radioactive Material and Waste Shipments

a. Inspection Scope (86750)

The inspectors reviewed the shipping documents for the following radioactive shipments, including the packaging determinations and labeling, shipping papers, and radioactive waste manifests:

- 98-023 Ion Exchange Resins (April 15, 1998);
- 98-028 Evaporator Bottoms (April 30, 1998);
- 98-067 Contaminated Hardware (August 17, 1998);
- 98-068 Irradiated Hardware (September 14, 1998);
- 98-080 Ion Exchange Resins (November 30, 1998);
- 98-086 Contaminated Metal Components (December 17, 1998); and
- 99-004 Samples for 10 CFR 61 Analyses (February 18, 1999).

b. Observations and Findings

The licensee determined the activity of each package of radioactive waste and material offered for transport using either a computer software program or by manually calculating the activities in accordance with the instructions and equations contained in procedure HP 10.13 (Revision 1), "Radioactive Waste Package Activity Calculation." In the case of de-watered ion exchange resins, the RP staff routinely determined the total activity of each shipment by obtaining the product of the radionuclide concentrations (determined by direct gamma spectroscopy measurements and scaling factors) and the mass of the material. In the case of other materials, the RP staff collected and analyzed surface contamination surveys or representative samples to determine the fractional abundances of gamma emitting radionuclides. The licensee then calculated the total activity through a dose-to-curie calculation, applying the radiation levels measured at specified distances and locations from the package and the radionuclide abundances. In many cases, the inspectors observed that the licensee did not maintain detailed records to indicate how these values were obtained, and, in some cases, the licensee's results could not be reproduced.

The inspectors reviewed the shipping documents and waste manifests associated with the above shipments of radioactive waste to ensure that the documents contained the information required by 10 CFR Parts 20 and 61. The inspectors performed independent calculations of the waste classifications and concluded that wastes were classified in accordance with the requirements of 10 CFR 61.55. However, the inspectors identified the following errors and omissions in the waste manifests:

- Shipment No. 98-023: The licensee applied an incorrect factor (i.e., the self absorption coefficient) in calculating the activity of the shipment. Due to a lack of detail in the records, the licensee was unable to reproduce the original calculation and to determine how this coefficient was originally derived. The NRC inspectors independently determined that the documented factor was not correct, which the licensee confirmed after recalculating the absorption coefficient. The error resulted in a 20 percent over-estimation of the total activity of the shipment, as documented on the NRC's Uniform Low-Level Radioactive Waste Manifest (ULRWM).
- Shipment No. 98-080: The manganese-54 concentration was incorrectly documented on the NRC's ULRWM as 4.81 millicuries ($1.78 \times 10^{+02}$ megabecquerels (MBq)). Based on the gamma spectroscopy results and on the mass of the package contents, the inspectors and licensee confirmed that the correct activity was 481 millicuries ($1.78 \times 10^{+04}$ MBq) of manganese-54. In addition, the licensee later identified that the cobalt-57 activity (62.4 millicuries ($2.31 \times 10^{+03}$ MBq)) was erroneously omitted from the manifest. As a result of these errors, the total activity of the shipment recorded on the manifest was also incorrect.
- Shipment 98-068: The licensee failed to complete the required shipper's certification on the NRC's ULRWM required by Appendix G to 10 CFR Part 20.
- Shipment No. 99-004: The licensee analyzed the contents of each sample 2 to 4 months before the shipment was to be made; however, the licensee did not uniformly decay the gamma spectroscopy results to the actual date of the shipment. Consequently, the documented activity was a conservative estimate of the activity contained in the package.

In each of the above examples, the RP staff's errors resulted in incorrect waste manifests and shipping papers. However, the inspectors verified that the errors did not result in an incorrect package classification or an improper waste classification, as applicable. In addition, the inspectors concluded that the errors would not have resulted in a significant failure to identify the type, quantity, or form of the material and consequently would not have resulted in a lack of radiological control of the shipment.

10 CFR Part 20.2006(b)(2) requires that any licensee shipping radioactive waste intended for ultimate disposal at a licensed land disposal facility must document the information required on NRC's ULRWM and transfer this recorded manifest information to the intended consignee in accordance with Appendix G to 10 CFR Part 20. Appendix G to 10 CFR Part 20 requires, in part, that the shipping manifest contain the following: (1) the total activity of each container and the identities and activities of individual

radionuclides contained in each container of radioactive waste; and (2) a signed and dated certification that the transported materials are properly classified, described, packaged and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation (DOT) and the Commission. The failure to provide the correct activities of radionuclides contained in the above three waste shipments (nos. 98-023, 98-080, and 99-004) and to provide the signed and dated certification for one of the above shipments of low level waste (no. 98-068) are examples of a violation of 10 CFR 20.2006(b)(2). This Severity Level IV violation is being treated as a Non-Cited Violation, consistent with Appendix C of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as CR No. C-PAL-99-0638. (50-255/99006-01)

The inspectors also reviewed the shipping documents and waste manifest associated with the above shipments of radioactive wastes and materials to ensure that the documents contained the information required by 49 CFR Part 172 and to ensure that shipments were packaged in accordance with the requirements contained in 49 CFR Part 173. In accordance with these requirements, the licensee prepared the shipments as Low Specific Activity (LSA) - II, Surface Contaminated Object (SCO) - I and II, Type A, and Type B packages. However, the inspectors identified the following problems:

- Shipment No. 98-067: The inspectors identified a problem concerning the licensee's consistent use of SI units [International System of Units] in recording the activity contained in one-of-the-two packages shipped.
- Shipment No. 98-067: The licensee recorded a transport index (TI) of 18 on the shipping papers; however, the RP staff documented a maximum radiation level of 20 millirem/hr at 1 meter from the package (i.e., a TI of 20) on Form HP 6.20-4, "Type A Container Survey Form," dated August 14, 1998. Although not contained in the documentation, the shipper stated that additional surveys were performed after the package was taken to an area of lower background radiation, which resulted in the difference in TIs.
- Shipment No. 99-004: Although not specifically required by DOT or NRC regulations, the licensee shipped the package with exclusive use instructions to the carrier. However, the licensee failed to indicate that this was an exclusive use shipment on the shipping papers.

Although the above examples did not result in a violation of NRC requirements, the inspectors noted that these errors/anomalies indicated attention to detail problems and a weakness in reviewing shipping documentation.

These problems were similar to those previously identified by the NRC (NRC Inspection Report 50-255/97010(DRS)). For example, the previous inspection documented similar problems (i.e., no violations of NRC requirements were identified) concerning the calculation of the activities contained in radioactive material shipments and the accuracy of entries on shipping documentation. Based on the errors and the violation identified above, the inspectors concluded that the licensee's previous corrective actions were not

effective. The RPM acknowledged the inspectors' observations and planned to take immediate actions to correct erroneous documentation, to develop a check-list, and to implement additional reviews to ensure that shipping documents were complete and accurate in the future.

c. Conclusions

Radioactive material and waste shipping documents and manifests contained errors and omissions of required information, resulting in a Severity Level IV Non-Cited Violation of regulatory requirements. In particular, the inspectors identified errors in the RP staff's activity calculations and in the documentation of these determinations. The inspectors also noted that the problems associated with the shipping manifests and documents were similar to previous NRC inspection findings in this area, which indicated that the licensee had not taken adequate corrective actions to address these findings and to prevent recurrence.

R1.4 Maintenance Outage Activities

a. Inspection Scope (83750)

The inspectors reviewed radiological performance associated with maintenance outage work evolutions. Specifically, the inspectors reviewed the RP instructions and oversight concerning two radiologically significant evolutions, i.e., the reactor coolant pump (RCP) seal replacement and pressurizer man way removal. The inspectors also attended pre-job briefings and observed work in progress.

b. Observations and Findings

The inspectors reviewed the As-Low-As-Is-Reasonably-Achievable (ALARA) Pre-job Review Checklists and the radiation work permits (RWPs) associated with the RCP seal replacement and pressurizer man way removal. The inspectors concluded that the instructions generally contained appropriate radiological controls and information. For example, the RP staff stressed the use of engineering controls to reduce airborne radiological hazards associated with both activities. In the case of the RCP seal removal, the RWP contained instructions to reduce the potential for the spread of contamination. Specifically, the RWP required that the old seal be contained prior to its removal from the immediate area and that all tools and equipment were to be wiped down. The ALARA checklists also incorporated lessons learned from previous job performances. However, the inspectors noted that neither the RWPs nor the ALARA checklists contained many radiological hold points (re. radiological survey requirements or radiation dose rate/contamination limits). The duty health physicist indicated that these issues were discussed with the staff during pre-job meetings but that additional emphasis was being placed on entering these issues into the work control documents.

The RP staff properly performed respiratory protection evaluations for the two evolutions to determine if respirator use was consistent with maintaining the workers' total effective dose equivalent ALARA. Although engineering controls were to be implemented for both activities, the RP staff determined that respiratory protection was also to be used during the removal of the RCP seal. The staff based this evaluation on high transuranic air

sample results (7 to 32 derived air concentrations (DACs)) obtained during a previous RCP seal removal, which were attributed to 1993 fuel integrity problems. Due to the relatively low annual limit on intakes (ALIs) associated with transuranic radionuclides, the RPM stated that the previous air sample results and the potential for significant internal doses resulted in the decision to require respiratory protection. Although similar air sample results were not obtained during the most recent RCP removal, the inspectors understood the licensee's precautions in the evaluation. After obtaining additional air sample data, the RPM planned to re-evaluate the use of respiratory protection equipment for future RCP seal replacements.

The inspectors attended a pre-job briefing for the RCP seal replacement/installation, which provided acceptable instructions to the work crew. For example, the staff discussed radiological conditions, protective clothing requirements, crew size, and RWP requirements.

The inspectors observed work activities for the RCP seal replacement and the pressurizer man way removal. The inspectors observed that areas within the Containment Building were properly controlled and posted. In addition, the RP staff provided good oversight of the evolutions and ensured that engineering controls and RWP requirements were properly implemented. The inspectors also observed proper radiation worker practices by the work crews. Specifically, workers used low dose areas and demonstrated generally effective contamination control practices. However, the inspectors observed workers occasionally touch/adjust their safety glasses with their exterior gloves, which increased the potential for facial contaminations. Although no personnel contaminations resulted from this practice, the inspector discussed this with a member of the crew, who planned to inform the other crew members. Based on the staff's performance and accumulated doses (e.g., about 0.220 person-rem for removing the old RCP seal), the licensee projected that the accumulated dose for the evolution would be notably less than the licensee's original goal (1.635 person-rem), which was commensurate with previous RCP seal replacements.

c. Conclusions

The RP staff demonstrated effective planning and oversight of work activities for the RCP seal replacement and pressurizer man way removal. Planning documents contained appropriate work instructions and RP controls, which were effectively communicated to the work crew. In addition, the workers demonstrated proper radiation protection practices.

R2 Status of Radiation Protection and Chemistry Facilities and Equipment

R2.1 Spread of Radioactive Contamination from Cooling Tower Overflows

a. Inspection Scope (83750)

The inspectors reviewed the circumstances surrounding the December 1998 overflow of the cooling towers, which resulted in the spread of radioactive contamination near the

radioactive material storage buildings. Specifically, the inspectors discussed the event with members of the RP staff and reviewed the licensee's radiological evaluation, surveys, and corrective actions.

b. Observations and Findings

In December 1998, the operations staff changed the line-up of the "A" cooling tower. During this evolution, the "A" tower basin was overflowed, which resulted in a flood of water through the South Radioactive Material Storage Building and South Pole Barn. Following the overflow, the RP staff found radioactive contamination in areas downstream of the flooding. The staff sampled the affected areas, evaluated the levels of radioactivity in the samples, and concluded that radioactive contamination had been deposited in the soil. Since the licensee had knowledge of existing contamination (a 10 CFR 20.302 approval for residual radioactive contamination from 1987 overflow events was granted), the RP staff confirmed that additional radioactive contamination had been deposited (in the range of 1.9×10^{-6} microcuries per gram ($\mu\text{Ci/gm}$) to $4 \times 10^{-5} \mu\text{Ci/gm}$ of cobalt-60 and cesium-137). The licensee did not detect contamination in any drains, which would have directed water into Lake Michigan. Consequently, the licensee concluded that no contamination was released offsite.

The RP staff performed a thorough analysis of the event and evaluated the radiological consequences. The licensee noted that radioactively contaminated material (enclosed in only plastic wrappings) had been routinely stored on the floor of both storage buildings. Although the South Radioactive Materials Storage Building had a raised center floor (about 18 inches), some materials were also stored in the lower regions, which were affected by the flood of water. In addition, the South Pole Barn contained many radioactively contaminated items which were located on its floor. Based on these conditions, the licensee postulated that the overflow of water from the cooling tower had entered the storage buildings and the enclosures (i.e., the plastic wrappings) of the contaminated materials. Consequently, radioactive contamination was carried by the flood of water from the contaminated materials to areas outside of the buildings. The RP staff performed an evaluation to determine the radiological impact of the contamination, which was based on the methodology used in the licensee's previous 10 CFR 20.302 approval (described above). The inspectors reviewed the RP staff's calculation and did not identify any discrepancies. The staff calculated an annual dose to the maximally exposed individual (onsite radiation worker) of about 0.46 millirem (0.46 millirem/yr from ground shine and 6.86×10^{-4} millirem/50yr from the inhalation pathway), which was a small fraction of regulatory limits. For the general public, the RP staff determined that the dose would be significantly below regulatory limits.

The licensee developed corrective actions to lessen the potential for future water intrusions to result in the spread of contamination. For example, the licensee planned to raise all packages off of the floors (i.e., the unraised floors) of the buildings or create containments to ensure that intrusions of water would not come in contact with radioactive materials. In addition, the licensee planned to evaluate the feasibility of raising the floors in both buildings to lessen the potential for future flooding. During this

inspection, an inspector performed a walkdown of the two buildings and observed that the licensee had emptied the South Pole Barn and was sorting and removing items from the South Radioactive Material Storage Building. The inspector noted that some items remained on the floor of the South Radioactive Material Storage Building but that those items were stored on the raised floor.

c. Conclusions

The licensee performed a thorough evaluation of the radiological consequences from the December 1998 overflow of the "A" cooling tower. Although radioactive contamination was spread outside of the south storage buildings, no significant radiological consequences resulted from the incident.

R2.2 Storage of Contaminated Sand

a. Inspection Scope (83750)

The inspectors reviewed the licensee's investigation surrounding the storage of containers of radioactively contaminated sand, which were not properly posted or labeled. The inspectors reviewed the RP staff's assessment of the level of radioactivity contained, discussed the issue with members of the RP staff, and performed a visual inspection of the containers to verify the current radiological controls.

b. Observations and Findings

On April 15, 1999, the licensee identified that boxes of radioactively contaminated sand contained quantities of radioactivity that required labeling and posting pursuant to 10 CFR 20.1902 and 20.1904. Historically, the containers had been stored in a number of locations within the owner controlled area between 1988 and 1999, but the containers were not labeled and were not consistently located within posted radioactive material areas (RMAs). At the time of the identification, the licensee had sampled and evaluated the contents of 12 of 68 containers that were stored outside of its East Radioactive Material Storage Building, which was not a posted RMA. Of the 12 containers, the licensee determined that 11 containers held quantities of radioactivity requiring labels and that the activity of 9 containers exceeded the quantities requiring an RMA posting. Consequently, the licensee labeled the containers, constructed a boundary around the containers, and posted the applicable areas, as required by 10 CFR Part 20.

At the time of this inspection, the licensee was performing an investigation to determine the root cause of the problem and to evaluate the contents of the remaining containers (Condition Report No. C-PAL-99-0464). Although the licensee had not maintained comprehensive documentation, the RP staff attributed the containers' contents to onsite contamination incidents (i.e., tank overflows and cooling tower overflows) and to the accumulation of contaminated building materials (i.e., shingles, etc.). As described above, the licensee had performed gamma isotopic evaluations of 12 of the 68 containers. Applying the "sum of the fractions rule," the licensee calculated that 11 of the 12 containers contained cobalt-60 and cesium-137 at concentrations of 1.83 to 65.5 times the values listed in Appendix C to 10 CFR Part 20. In the future, the licensee planned to perform evaluations of the remaining containers. Overall, the inspectors

determined that the licensee was performing an acceptable review of the incident and that no unexpected dose was received by personnel as a result of the lack of posting and labeling.

Part 20.1902 of Title 10 of the CFR requires, in part, that the licensee post each area or room in which there is used or stored an amount of licensed material exceeding 10 times the quantity of such material specified in Appendix C to Part 20 with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL(S)" or "DANGER, RADIOACTIVE MATERIAL(S)." As described above, the failure to post the appropriate caution signs in areas where the containers were stored is a violation of 10 CFR 20.1902. This Severity Level IV violation is being treated as a Non-Cited Violation, consistent with Appendix C of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as CR No. C-PAL-99-0464. (50-255/99006-02)

Part 20.1904 of Title 10 of the CFR requires, in part, that the licensee ensure that each container of licensed material bears a durable, clearly visible label bearing the words "CAUTION, RADIOACTIVE MATERIAL" or "DANGER, RADIOACTIVE MATERIAL" and providing sufficient information to permit individuals handling or using the containers, or working in the vicinity of the containers, to take precautions to avoid or minimize exposures. As described above, the failure of the licensee to ensure that the containers of radioactively contaminated sand bore appropriate labels is a violation of 10 CFR 20.1904. This Severity Level IV violation is being treated as a Non-Cited Violation, consistent with Appendix C of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as CR No. C-PAL-99-0464. (50-255/99006-03)

c. Conclusions

The licensee identified that containers of radioactively contaminated sand had not been posted or labeled in accordance with NRC requirements, resulting in two Severity Level IV Non-Cited Violations. The inspectors concluded that the licensee was properly evaluating the incident, which had been entered into the licensee's corrective action system.

R5 Staff Training and Qualification in Radiation Protection and Chemistry

R5.1 Training for Personnel Involved in the Handling, Packaging, or Shipping of Radioactive Materials

a. Inspection Scope (86750)

The inspectors reviewed the training of personnel involved in the shipping of radioactive materials, as required by Subpart H of 49 CFR Part 172. Specifically, the inspectors reviewed the licensee's designation of authorized shipping personnel and the training records of those personnel involved in the shipping program.

b. Observations and Findings

The inspectors reviewed the training records for the individuals assigned to ship radioactive material (the radioactive material shipping supervisor and the assigned alternate), for the radioactive waste handlers, and for RP technicians involved in shipping activities. For these individuals, the licensee provided training courses conducted by a vendor and by the licensee's training department. Based on the licensee's records, the inspectors noted that personnel had successfully completed training within the last 3 years, which satisfied the requirements of 49 CFR 172.704.

In addition, the inspectors reviewed the agendas/outlines for the applicable training courses. Based on this review, the inspectors noted that the training was comprehensive and provided personnel with instructions for the scope of their shipping activities, as well as a broad understanding of NRC and DOT requirements.

However, the RP staff had recently performed a self assessment of the radioactive material shipping program and had identified some problems concerning the implementation of the training program (Section R7.1). For example, the staff had identified that the RPM had not clearly identified the personnel assigned to certify and release shipments. In addition, the staff had identified some problems concerning the frequency of certain training courses and the method by which the licensee certifies hazardous material workers. The inspectors verified that the licensee had entered these findings into its corrective action system to ensure that these issues were fully evaluated and corrected.

c. Conclusions

The licensee's training program was consistent with DOT and NRC requirements and was sufficient to ensure that the staff was properly prepared to handle, package, and ship radioactive material. Although the RP staff's current assessment of this area identified some weaknesses, the staff was evaluating actions to correct the issues, which had been entered into the licensee's corrective action system.

R7 Quality Assurance in Radiation Protection and Chemistry Activities

R7.1 Assessments and Audits of Radioactive Waste Processing and Radioactive Material Shipping Activities

a. Inspection Scope (86750)

The inspectors reviewed the licensee's quality assurance (QA) program to assess the licensee's ability to identify and correct problems related to processing radioactive waste and transporting radioactive materials. Specifically, the inspectors interviewed nuclear performance assessment department (i.e., QA department) personnel and reviewed applicable audits, surveillances, field monitoring reports, and RP staff self assessments completed in 1998 and 1999.

b. Observations and Findings

The inspectors determined that the QA department's established audit program was comprehensive and included aspects essential for effective problem identification and resolution. For example, the audit program outlined an audit scope consisting of selections from NRC inspection procedures and industry guidelines and standards. Based on program needs, QA auditors supplemented this audit scope and included routine field observations of radioactive waste shipments and vendor processes. From the basic areas reviewed and supplemental audit topics, the QA department developed a checklist for each review to ensure that areas were acceptably reviewed. In addition, auditors from other 10 CFR Part 50 licensees' staffs were included on each audit team to provide an independent assessment. Routinely, the QA department tracked findings through the licensee's corrective action program, as well as maintaining a database to track audit recommendations. To ensure that previously identified problems were corrected, follow-up on previous audit findings was included in the scope of the subsequent audit.

In general, the licensee's implementation of the QA program ensured that problems were identified and corrected. Audits and assessments were conducted at the frequency required by the licensee's quality program and included performance-based assessment activities, such as system walk-downs and observations of radioactive waste shipments. The scope of each review was sufficient to assess the radioactive waste program. Based on a review of the above audits, the inspectors determined that the findings added value to the radioactive waste program and resulted from generally thorough assessments of program areas. In addition, the inspectors found that the QA department identified issues that were similar to the NRC's findings regarding the scaling factor program discussed in Section R.1.2. However, the assessments did not identify any problems with shipping papers or manifests, which were identified by the inspectors (Section R1.3).

Although most identified problems were corrected, the inspectors noted some instances where findings were not fully resolved due to oversights by the staff. For example, the 1999 QA findings related to the scaling factor program were inadvertently omitted from the final audit summary and, therefore, were not entered into the licensee's corrective action system. In addition, two-of-the-three 1997 RP staff's self assessment recommendations had also not been implemented at the time of the inspection due to the staff's oversight in entering the issues into the corrective action system. Upon discovery of these errors, the licensee entered the findings into the appropriate corrective action systems and planned to evaluate potential improvements in the licensee's methods for resolving self-identified problems.

c. Conclusions

Generally, the licensee established and implemented an effective and comprehensive audit program of the radioactive waste processing and the radioactive materials shipping programs. Internal reviews were of sufficient scope and depth to identify problems.

Some problems were noted, however, with the resolution of findings identified by the QA department and by the RP staff. Specifically, the inspectors identified that some findings were not addressed due to oversights in entering the issues into the licensee's corrective action program. In addition, the licensee failed to identify problems with shipping papers and waste manifests, which were identified by the NRC inspectors.

R8 Miscellaneous Radiation Protection and Chemistry Issues (92904)

R8.1 (Closed) Inspection Follow-up Item (IFI) No. 50-255/98012-04: The inspectors identified that certain accident scenarios (e.g., a loss of coolant accident with a loss of offsite power) may result in an unexpected/unevaluated ground level release of radioactivity from the Auxiliary Building. In addition, the inspectors noted that other accident scenarios could potentially affect Auxiliary Building ventilation dampers, which may also result in unexpected ground level releases of radioactivity. The licensee reviewed these observations and compared the above scenarios to the evaluations described in Chapter 14 of the UFSAR. In summary, the licensee concluded the following:

- a. All releases from the station have been modeled and quantified as ground level releases.
- b. The most conservative accident release scenario (relative to the effect on control room habitability) postulated leakage from the reactor Containment Building, which resulted in an unfiltered, ground level release to the environment. Within this scenario, radioactivity from the Auxiliary Building is released through the containment building (no hold up is assumed or modeled). Since the licensee assumed no hold up time, the release of the radiological source term from the Auxiliary Building was adequately evaluated and bounded by this evaluation. Therefore, the integrity of the Auxiliary Building and the status of the ventilation system did not introduce any new consequences to the evaluated accident scenarios. This item is closed.

V. Management Meeting

X1 Exit Meeting Summary

On May 12, 1999, the inspectors presented the inspection results to licensee management. The licensee acknowledged the findings presented. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

J. Beer, Technical Support Supervisor
E. Bogue, Manager, Chemical and Radiological Services (C&RS)
T. Brown, Radiological Services Supervisor
B. Dotson, Licensing
J. Hager, C&RS, Support
N. Haskell, Director, Licensing
R. Henry, Radioactive Material Shipper, C&RS
D. Malone, Licensing
K. Marbaugh, Nuclear Plant Assessment Department
M. Mennucci, Radioactive Materials Supervisor
S. Pierce, Nuclear Engineering
D. Rogers, Manager, Plant Operations
K. Schneider, Training Coordinator, C&RS
D. Watkins, Duty Health Physicist

INSPECTION PROCEDURES USED

IP 83750: Occupational Radiation Exposure
IP 86750: Solid Radioactive Waste Management and Transportation of Radioactive Material
IP 92904: Follow-up -- Plant Support

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-255/99006-01	NCV	Errors and omissions on NRC Uniform Low-level Waste Manifests. (Section R1.3)
50-255/99006-02	NCV	Failure to post required caution signs in areas containing radioactive material. (Section R2.2)
50-255/99006-03	NCV	Failure to label containers of radioactive material. (Section R2.2)

Closed

50-255/98012-04	IFI	Licensee to evaluate the potential for ground-level radiation release. (Section R8.1)
50-255/99006-01	NCV	Errors and omissions on NRC Uniform Low-Level Waste Manifests. (Section R1.3)
50-255/99006-02	NCV	Failure to post required caution signs in areas containing radioactive material. (Section R2.2)
50-255/99006-03	NCV	Failure to label containers of radioactive material. (Section R2.2)

Discussed

None

LIST OF ACRONYMS USED

ALARA	As-Low-As-Is-Reasonably-Achievable
ALI	Annual Limit on Intake
CFR	Code of Federal Regulations
CR	Condition Report
DAC	Derived Air Concentration
DAW	Dry Active Waste
DTM	Difficult to Measure
DOT	Department of Transportation
DRS	Division of Reactor Safety
HIC	High Integrity Container
IFI	Inspection Follow-up Item
IP	Inspection Procedure
IR	Inspection Report
LSA	Low Specific Activity
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
PCP	Process Control Program
PDR	Public Document Room
QA	Quality Assurance
RCP	Reactor Coolant Pump
RMA	Radioactive Material Area
RP	Radiation Protection
RPM	Radiation Protection Manager
RVR	Radioactive Waste Volume Reduction
RWP	Radiation Work Permit
SCO	Surface Contaminated Object
SI	International System of Units
TI	Transport Index
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
ULRWM	Uniform Low-Level Radioactive Waste Manifest

LIST OF DOCUMENTS REVIEWED

Action Item Record No. A-CMT-98-121, "NRC Inspection Report No. 50-255/98012 and Notice of Violation," dated May 11, 1999.

"Chemical & Radiological Services Department, OM&C Training Matrix," (Revision 6), dated March 11, 1996.

"Chemical & Radiological Services Department, Radiological Services Exempt Training Matrix," (Revision 6), dated February 8, 1999.

"Chemical and Radiological Services Department Self Assessment #97-29", dated August 1, 1997.

"Chemical and Radiological Services Department Self Assessment #99-09", dated May 7, 1999.

Condition Reports:

C-PAL-98-1957, "Abnormal Release of Radioactivity;"

C-PAL-99-0464, "Improperly Labeled/Posted Boxes of Contaminated Sand;"

C-PAL-99-0583, "Potential Training Deficiencies for Rad Material Shipping Program Activities;"

C-PAL-99-0638, "Errors Found on Radioactive Material Shipping Papers;"

"Consumers Energy, Palisades Nuclear Plant, Engineering Analysis Cover Sheet, " EA-WWD-99-003, "Dose Calculation for Abnormal Release of Activity, " dated April 16, 1999.

"Consumers Energy, Palisades Nuclear Plant, Process Control Program," (Revision 6), dated December 18, 1997.

"Consumers Energy Palisades Nuclear Plant Process Control Program", Revision 7, dated April 28, 1999.

"Nuclear Performance and Assessment Department Surveillance P-99-010: Radwaste Control, Shipping, and Minimization Efforts", dated April 29, 1999.

"Palisades Nuclear Plant Work Instruction WI-RSD-R-004: Low-Level Waste Scaling Factor Methodology", Revision 3.

Procedures Nos.:

Health Physics Procedure (HP) 1.1 (Revision 14), "Radiation Safety Technician Qualification Program;"

HP 6.20 (Revision 16), "Radioactive Material Shipments;"

HP 10.13 (Revision 1), "Radioactive Waste Package Activity Calculation;"

HP 10.14 (Revision 2), "Classifications of Low-Level Radioactive Wastes;"

Palisades Administrative Procedure (PAP) No. 7.00 (Revision 15), "Chemical & Radiological Services Department Organization and Responsibilities;" and

PAP No. 7.09 (Revision 3), "Standards for Shipment of Low-Level Radioactive Waste."

RWP Package (RWPs, associated ALARA Pre-Job Review Checklists, and related radiological surveys) Nos. P991303 (Revision 0), dated May 5, 1999, and P991311 (Revision 0), dated May 6, 1999.

"Radiological Survey Sheet" (Attachment 2 of Procedure HP 2.17), "Primary Coolant Pump Seal," dated May 12, 1999.

"Radiological Survey Sheet" (Attachment 2 of Procedure HP 2.17), "Replace Seal for P-50-A/ Old Seal Flown Out/ Pre Decon Survey," dated May 12, 1999.