

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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Report No: 50-255/98020(DRS)

Licensee: Consumers Energy Company

Facility: Palisades Nuclear Generating Plant

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

Dates: October 26-30, 1998

Inspectors: R. L. Glinski, Radiation Specialist
S. K. Orth, Senior Radiation Specialist
D. E. Jones, Reactor Engineer

Approved by: Gary L. Shear, Chief, Plant Support Branch 2
Division of Reactor Safety

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EXECUTIVE SUMMARY

Palisades Nuclear Generating Plant NRC Inspection Report 50-255/98020

The purpose of this inspection was to review the evaluation of the shipping cask used in a transportation incident wherein a Class 7 (radioactive) material shipment, which was transported as an exclusive use shipment on an open transport vehicle, exceeded the NRC and Department of Transportation (DOT) limits for radiation levels on the external surface of the package. In addition, this inspection reviewed the implementation of the radiological environmental monitoring program (REMP), radiological controls throughout the facility, and the corrective actions taken and planned in response to three violations which were identified during the previous refueling outage (REFOUT98). The following conclusions were reached:

- The Chemical and Radiological Services (C&RS) staff effectively implemented the REMP and land use census, and the 1997 data demonstrated that there was no discernable impact on the environment from plant operations. (Section R1.1)
- The radiological controls throughout the facility were well implemented and work during the at-power containment entry was properly controlled. (Section R1.2)
- A miscommunication between operations personnel resulted in additional dose during an at-power containment entry. (Section R1.2)
- The licensee's evaluation of a specialized transportation cask determined that significant voids in the lead shielding and the potential for movement of the surveillance capsule during transport were the root causes for the excessive radiation levels on the outer surface of the cask upon receipt at the vendor's facility. The inspectors' review of the data indicated that the licensee's determination was appropriate. (Section R8.1)
- The C&RS staff developed adequate corrective actions for REFOUT98 radiation protection violations and neither the plant personnel nor NRC inspectors identified any recurrence. In addition, C&RS staff have conducted periodic analyses of post accident sampling monitor (PASM) samples and the results indicated that the PASM delivered a representative sample of the primary system. (Sections R8.2, R8.3, R8.4, and R8.5)

Report Details

IV. Plant Support

R1 Status of Radiological Protection and Chemistry (RP&C) Controls

R1.1 Implementation of the Radiological Environmental Monitoring Program (REMP)

a. Inspection Scope (IP 84750)

The inspectors reviewed the 1997 Annual Radiological Environmental Operating Report, the 1998 land use census, and the Offsite Dose Calculation Manual (ODCM). The inspectors also observed air particulate/iodine sampling, and interviewed Chemical and Radiological Services (C&RS) staff regarding the operability and materiel condition of the sampling equipment and the implementation of the REMP.

b. Observations and Findings

The inspectors observed that the REMP sample collector's techniques ensured sample integrity and that the collector was knowledgeable of appropriate sampling principles. The collector appropriately labeled and packaged the samples, and also properly tested the air sampling train for leakage. During interviews, REMP staff indicated that there have been no operability problems with the air sampling equipment, and the air samplers were within the current calibration. The inspectors discussed with REMP staff whether the positioning of the ST-1 onsite air sampler behind a small shed would impede air flow from the plant stack to the air sampler. The staff indicated that although this sample location was not required by the ODCM, the sampler would be moved to ensure representative sampling would occur. The inspectors determined that the REMP sample collector was sufficiently knowledgeable of sampling requirements, equipment, and transport. No operability or materiel condition issues regarding the sampling equipment were identified.

The inspectors noted that the 1997 REMP report was submitted timely and that the report contained the information required by the ODCM. The report listed that the ODCM detection limits for barium/lanthanum-140 were not met for two of the required samples, due to misplacement of the samples prior to shipment, and the licensee had changed the shipping process to preclude any recurrence. The inspectors noted that the land use census was conducted in accordance with procedure regarding timeliness and data collection methodology. In particular, C&RS personnel effectively used local maps to identify locations and record data, and a new location for the nearest garden was identified for 1998.

The REMP included the collection and analysis of air, water, crops, fish, and lake sediment. Thermoluminescent dosimeters were used to measure direct radiation and were exchanged quarterly. The quality assurance data of the vendor radioanalytical laboratories demonstrated excellent analytical capabilities. The results from the REMP sampling and analyses indicated that plant operations did not have a discernable radiological impact on the environment.

c. Conclusions

The C&RS staff effectively implemented the REMP and land use census, and the 1997 data demonstrated that there was no discernable impact on the environment from plant operations.

R1.2 Radiological Controls in the Auxiliary Building and the Radioactive Material (RAM) Storage Out-Buildings

a. Inspection Scope (IP 83750)

The inspectors conducted a walkdown of the auxiliary, east radwaste, north storage, and south storage buildings; and interviewed plant personnel regarding the long-term storage of infrequently used equipment. The inspectors also observed work activities during an at-power containment entry and interviewed personnel concerning the inoperable steam generator (SG) blowdown radiation monitor.

b. Observations and Findings

The inspectors noted that the postings and labeling throughout the facility were appropriately placed and contained the required information. The radiological status sheets were accurate, up-to-date, and identified locations where localized elevated levels of radiation (hotspots) existed. The inspectors did not identify any housekeeping issues; however, rainwater was identified on the floor where contaminated equipment was stored, in both the north and south RAM storage buildings. In response, the C&RS staff conducted surveys and did not identify any spread of contamination from the stored components. For the north storage building, the C&RS staff submitted a request to grade the ground away from this building. At the south storage building, C&RS staff stated that the stored equipment was placed onto a wooden riser to prohibit contact with any water. Although the material condition of various components and systems was generally good, the inspectors noted significant boric acid crystals on the spent resin storage tank sluice discharge valve (MV-RTS106). In response, the licensee initiated a work request to tighten the packing on this valve.

The inspectors observed radworker practices and control of radworker activities by a health physics technician (HPT) during a routine bi-weekly entry into the containment building at full power. During this entry, an auxiliary operator (AO) checked a control rod drive mechanism leak rate, the readings of various gauges, and conducted a pump vibration check. The HPT effectively communicated the high and low dose areas of the 590' level during the pre-job brief, kept the entrants appraised of the dose rates during the entry, and ensured that low dose areas were utilized. During this entry, the AO noted that the shield cooling pump which was to be vibration tested was not running, as he had expected. The AO contacted the control room, the pump was started and the test was successfully completed. However, this evolution required approximately 30 minutes of additional time in containment, which resulted in unnecessary dose. The followup by plant personnel indicated that there was a miscommunication, as the senior reactor operator knew that the pump would not be activated until the AO reached that

area (in the event there was a pump leak). The inspectors concluded that the HPT controlled the entry effectively, but that miscommunications resulted in additional dose.

The inspectors interviewed the environmental supervisor regarding the inoperable SG blowdown radiation monitor (RE-0707). This monitor was declared inoperable on September 3, 1998, due to the low flow alarm being non-functional. There were no problems with the flow through the SG blowdown line. In response, the licensee initiated the compensatory measures for sampling and analysis, which were required by technical specifications for continued effluent releases of the SG blowdown. However, C&RS staff noted that these compensatory measures were only required prior to an effluent release of SG blowdown through the mixing basin to the environment, which is an effluent pathway that has not been used for several years. The normal plant configuration directs SG blowdown to the SG blowdown heat exchangers, filters, and demineralizers prior to re-introducing this water back into the SGs. In addition, there were other effluent pathways for SG blowdown that would utilize other radiation monitors. Based on this information, the licensee ceased the compensatory measures, as no SG blowdown effluents were being made through the mixing basin.

c. Conclusions

The inspectors determined that radiological controls throughout the facility were well implemented, and that work during the at-power containment entry was properly controlled, although a miscommunication resulted in additional dose.

R8 Miscellaneous RP&C Issues

- R8.1 (Closed) Escalated Enforcement Item (EEI) 50-255/98018-01: failure to prepare a shipment of radioactive material such that the radiation levels will not exceed 200 mrem/h on the external surface of the package. As discussed in Inspection Report 50-255/98018(DRS), an apparent violation was identified concerning the failure to transport a package of radioactive material in accordance with 49 CFR 173.441, and limit the radiation levels on the external surface of the package to no greater than 200 millirem per hour (mrem/h). This was a shipment of an irradiated reactor vessel surveillance capsule in a specifically designated DOT Type A transportation cask. The vendor shipping cask (Model TTC-5) consists of two steel cylinders arranged in an annulus which is filled with lead. The thickness of the lead shielding varies from 7 centimeters (cm) to 8.25 cm throughout the cask. The inspectors reviewed TTC-5 design drawings, numerous radiographs of the cask (which were done by an independent, third-party radiography company) and interviewed licensee radiography and engineering personnel.

The radiographic evaluation was managed by the shipping cask owner, with a licensee representative present, and the extensive testing revealed a significant void within the cask structure at the location of the cask where the dose rate exceeded the regulatory limit. This cask defect, which consisted of an approximately 1.9 cm void in the lead shielding (25%), reduced the effectiveness of the shielding. The determination of 1.9 cm for the effective void was based on the measured versus the calculated dose rates, and radiography with carbon steel plates of known thickness mounted on the defective

cask area. Several other voids in the cask were identified, and all these defects appeared to be consistent with an unequal cooling of the molten lead during the manufacturing process.

Radiation surveys performed during radiography indicated that the dose rates were approximately three times higher over the location of interest than the adjacent area (14 rem/h vs. 4.8 rem/h). The survey results were consistent with the licensee's surveys which determined that the shipment's hotspot was 380 mrem/h, while the adjacent areas were 120 mrem/h. From the review of radiographic and radiation survey data, and previous interviews with the cask vendor, the inspectors determined that the root cause of the violation was the shifting of the surveillance capsule/basket assembly during transit combined with the reduced shielding in the defective area.

Therefore, the inspectors concluded that although a violation of NRC and DOT regulations occurred, the licensee was not responsible since there were defects within the shipping cask which could not have been known by the licensee. In addition to the above evaluations, the C&RS management used this occurrence as a "Lessons Learned" at a stand down meeting on October 9, 1998.

A copy of this inspection report, with associated data, will be forwarded to the DOT for their review. Based on the completed actions, this item is closed.

- R8.2 (Closed) Violation, VIO 50-255/98009-04: failure to lock or guard Radiation Controlled Doors (RCDs) accessing areas with radiation levels in excess of 1000 mrem/h. On April 29 and May 28, 1998, during REFOUT98, there were two instances wherein contract personnel left RCDs either unlocked or unguarded, which was a violation of the technical specification requirements for RCDs. As immediate corrective actions, the C&RS management stopped the work and held a stand down meeting with HPTs regarding the requirements and expectations for RCD controls. After the second instance, the issuance of the RCD keys was transferred from the HP crew leaders to the Duty HP.

Other corrective actions included a revision to the RCD procedure to remove the waiver of double verification for locking the RCDs during outages (the inspectors verified this revision), issuance of RCD keys only to HPTs, use of a high radiation area (HRA)/RCD checklist mounted on the RCD key locker that is reviewed with each work crew prior to work in-an HRA, and RCD status verifications by C&RS on daily rounds. The inspectors reviewed the HP log and verified that the RCD checks were conducted daily, and the inspectors did not identify any unlocked RCDs during their walkdowns throughout the facility. The inspectors also reviewed the RCD key issuance log and the HRA/RCD checklist, and noted that the keys and RCDs were properly controlled. Interviews with C&RS staff indicated that the RCD corrective actions and expectations were well understood. Based on the completed corrective actions, this item is closed.

- R8.3 (Closed) VIO 50-255/98009-05: failure to comply with station procedural requirements for appropriate radiation protection practice. On May 19 and 22, 1998, contract personnel did not follow station radiation protection (RP) requirements as they did not stop work promptly and did not log an entry into the Radiation Controlled Area (RCA) for

dose tracking purposes, respectively. These were isolated examples of inappropriate radworker performance. The C&RS staff counseled these individuals regarding their poor radworker practice and the site RP expectations, and a specific hand signal for "stop work" was developed. One individual, who was a crew leader, was denied RCA access for the remainder of REFOUT98. The HPTs were also counseled about their responsibility to ensure that all staff on remote dosimetry were logged into the system.

In addition, the C&RS training staff produced a video to enhance the training for contract personnel which covered all of the activities conducted by radworkers in the RCA. The inspectors reviewed the video and determined that the video effectively communicated the necessary RP information. The C&RS staff have also planned to develop just-in-time training for use by site staff, which will address work in high radiation and high contamination areas and RP stop work orders. Based on the completed and planned corrective actions, this item is closed.

- R8.4 (Closed) VIO 50-255/98009-06: failure to post the reactor cavity high radiation area. On May 27, 1998, a contract HPT failed to post the reactor cavity HRA. This was primarily due to the failure of the HPT to self-check to ensure that the posting was appropriate. This posting for this area was corrected promptly after a Duty HP reviewed the radiological survey sheet.

As a further corrective action, the C&RS staff developed an HRA/ RCD checklist (which is mounted on the RCD key locker) that is now reviewed with each work crew prior to work in any HRA, and the status of the HRA postings are now verified by C&RS staff on a weekly basis. During their facility walkdowns, the inspectors and the resident staff did not identify any unposted HRAs, and the licensee has not found any recurrence of HRA posting violations. In addition, the inspectors reviewed the HP log and noted that the weekly HRA checks were conducted appropriately. The C&RS staff has also planned to develop a checklist to be used when an HRA posting is changed to verify that the posting is correct. Based on the completed and planned corrective actions, this item is closed.

- R8.5 (Closed) Inspection Followup Item (IFI) 50-255/97016-02: post accident sampling monitor (PASM) hydrogen analyzer is unreliable and lack of verification that the PASM delivers representative samples. For the past two years, the C&RS staff have not conducted any chemical or radiochemical analyses to ensure that the PASM delivered representative samples of the reactor coolant and the in-line hydrogen analyzer performance was unreliable. In response to these deficiencies, the C&RS staff completed several corrective actions.

Plant personnel developed acceptance criteria which were consistent with NRC guidance and initiated comparative analyses of PASM samples with routine reactor coolant liquid and gas samples. These analyses coincided with the semi-annual vendor PASM maintenance and were incorporated into the Periodic and Predetermined Activity Control (PPAC). The two comparisons of PASM boron and radioactivity conducted to date demonstrated that the PASM samples were representative of the primary system. The licensee had the vendor perform an audit of the materiel condition and operation of the PASM. The staff subsequently revised several steps of the operational procedure

and, in particular, the method for collecting the gas sample was improved. In addition, defective components of the PASM have been replaced and the routine chemistry sampling of the chemical and volume control system for primary samples eliminated numerous water hammers to PASM components. The inspectors did not identify any PASM materiel condition issues.

The licensee also contracted with an independent vendor to conduct an assessment of the PASM and those recommendations are currently under review. Due to the PASM declining reliability, the system engineer categorized the system as a(1) under the 10 CFR 50.65 maintenance rule for enhanced attention and an action plan was developed to track and improve PASM performance. Although the performance of the in-line gas chromatography hydrogen analyzer has improved slightly, the licensee was also reviewing options of a dissolved hydrogen instrument or a modification to increase the gas stripping efficiency.

Based on the completed actions and the satisfactory comparative chemical and radiochemical results, this item is closed.

X1 Exit Meeting

The inspector presented these inspection findings to members of the licensee's management during an exit meeting on October 30, 1998. Plant personnel did not indicate that any information in this report was considered proprietary.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

J. Beer, Technical Support Supervisor
W. Doolittle, HP Technical Support
B. Dotson, Licensing Analyst
G. Goralski, Configuration Control Manager
M. Grogan, REMP/RETS Analyst
N. Haskell, Licensing Director
R. Henry, Radiation Material Shipping Supervisor
D. Malone, Licensing Manager
D. Malone, Engineering Manager
M. Moore, NPAD Assessor
T. Neal, Environmental Supervisor
T. Palmisano, Site Vice President and General Manager
C. Plachta, Radiation Protection Manager, Radiological Services Supervisor
D. Rogers, General Manager Plant Operations
D. Watkins, Duty HP Supervisor
D. Ziglar, Senior Technical Analyst

NRC

J. Lennartz, Senior Resident Inspector, Palisades

INSPECTION PROCEDURES USED

IP 83750 "Occupational Radiation Exposure"
IP 84750 "Radioactive Waste Treatment, and Effluent and Environmental Monitoring"
IP 92904 "Followup - Plant Support"

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Closed

- | | | |
|-----------------|-----|--|
| 50-255/98018-01 | EEI | Failure to prepare a shipment of radioactive material such that the radiation levels will not exceed 200 mrem/h on the external surface of the package. (Section R8.1) |
| 50-255/98009-04 | VIO | Failure to lock or guard Radiation Controlled Doors accessing areas with radiation levels in excess of 1000 mrem/h. (Section R8.2) |
| 50-255/98009-05 | VIO | Failure to comply with station procedural requirements for appropriate radiation protection practice. (Section R8.3) |
| 50-255/98009-06 | VIO | Failure to post the reactor cavity high radiation area. (Section R8.4) |
| 50-255/97016-02 | IFI | PASM hydrogen analyzer is unreliable and lack of verification that the PASM delivers representative samples. (Section R8.5) |

ACRONYMS USED

AO	Auxiliary Operator
C&RS	Chemical and Radiological Services
cm	centimeter
DOT	Department of Transportation
EEI	Escalated Enforcement Item
HP	Health Physics
HPT	Health Physics Technician
HRA	high radiation area
mrem	millirem
mrem/h	millirem per hour
ODCM	Offsite Dose Calculation Manual
PASM	Post Accident Sampling Monitor
RP	Radiation Protection
PPAC	Periodic and Predetermined Activity Control
RAM	radioactive material
RCA	Radiologically Controlled Area
RCD	Radiation Controlled Door
REMP	Radiological Environmental Monitoring Program
RP	radiation protection
SG	steam generator

PARTIAL LISTING OF DOCUMENTS REVIEWED

Technical Specifications Section 6.5 - Programs and Manuals

Offsite Dose Calculation Manual

1997 Annual Radiological Environmental Operating Report, dated 4/27/98.

Procedure No. HP 10.11, Revision 2, "Land Use Census".

Procedure No. HP 2.5, Revision 16, "Use of Radiation Controlled Doors".

Palisades Nuclear Plant Action Plan MR98-05, "Post Accident Sampling System".

NWT Corporation, "Palisades PASS Review and Proposed Solutions to PASS Problems", dated 7/24/98.

Sentry Equipment Corporation, "On-site Evaluation of February 23, 1998", dated 3/2/98.

Procedure No. EI-7.1, Revision 14, "Post Accident Sampling - PCS Liquid/Gas and Containment Air".