

December 19, 2008

EA-08-322

Mr. Christopher J. Schwarz
Vice President, Operations
Entergy Nuclear Operations, Inc.
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043-9530

SUBJECT: PALISADES NUCLEAR PLANT BASELINE INSPECTION REPORT
05000255/2008011 PRELIMINARY WHITE FINDING

Dear Mr. Schwarz:

This refers to an inspection conducted between July 22, 2008, and November 19, 2008, at the Palisades Nuclear Plant. The purpose of the inspection was to review your evaluation of the radiological impact to workers during demobilization of refueling tools and equipment after fuel reconstitution, which was previously reported as an Unresolved Item (URI) in inspection report 05000255/2008002.

The enclosed report presents the results of this inspection including a finding that has preliminarily been determined to be White, a finding with low to moderate increased importance to safety that may require additional NRC inspections, which were discussed on November 19, 2008, with you and members of your staff. As described in Section 4OA5 of this report, an apparent violation of 10 CFR 20.1501 was identified for the failure to perform adequate radiological evaluations necessary to properly quantify the radiological hazards to assess the dose from the conditions that were identified through electronic dosimeter alarms (dose rate). On October 4, 2007, after you were notified of unexpected radiological conditions through electronic dosimeter alarms (dose rate), you failed to recognize radiological hazards in the work place. Specifically, you failed to recognize the presence of high beta dose rate discrete radioactive particles (DRPs) and removable alpha contamination and, therefore, failed to recognize the radiological hazard associated with the work activity. Consequently, you failed to account for the workers' extremity dose associated with handling the equipment, and with the workers' exposure to the particles. Additionally, you failed to recognize the presence of alpha contamination and, therefore, failed to assess potential intakes of alpha contamination that could result in total organ dose to the bone surfaces. After the finding was identified, your staff implemented corrective actions for all work involving the spent fuel pool to ensure that the finding did not present an immediate safety concern. This finding was assessed based on the best available information, using the Occupational Radiation Safety Significance Determination Process (SDP). The final resolution of this finding will be conveyed in a separate correspondence.

The finding is also an apparent violation of NRC requirements and is being considered for escalated enforcement action in accordance with the Enforcement Policy, which can be found on the NRC's Web site at <http://www.nrc.gov/reading-rm/doc-collections/enforcement>. Additionally, the enclosed report documents two related Non-Cited Violations (NCVs) of NRC requirements.

In accordance with NRC Inspection Manual Chapter (IMC) 0609, we intend to complete our evaluation using the information obtained through our inspection and issue our final determination of safety significance within 90 days of the date of this letter. The significance determination process encourages an open dialogue between the NRC staff and the licensee; however, the dialogue should not impact the timeliness of the staff's final determination.

Before we make a final decision on this matter, we are providing you with an opportunity to: (1) attend a Regulatory Conference where you can present to the NRC your perspective of the facts and assumptions the NRC used to arrive at the finding and assess its significance, or (2) submit your position on the finding to the NRC in writing. If you request a Regulatory Conference, it should be held within 30 days of the receipt of this letter, and we encourage you to submit supporting documentation at least one week prior to the conference in an effort to make the conference more efficient and effective. If a Regulatory Conference is held, it will be open for public observation. If you decide to submit only a written response, such submittal should be sent to the NRC within 30 days of your receipt of this letter. If you decline to request a Regulatory Conference or submit a written response, you relinquish your right to appeal the final SDP determination, in that by not doing either; you fail to meet the appeal requirements stated in the Prerequisite and Limitation Sections of Attachment 2 of IMC 0609.

Please contact Steven Orth at (630) 829-9827 within ten days from the issue date of this letter to notify the NRC of your intentions. If we have not heard from you within ten days, we will continue with our significance determination and enforcement decision. The final resolution of this matter will be conveyed in a separate correspondence.

Because the NRC has not made a final determination in this matter, no Notice of Violation is being issued for this inspection finding at this time. In addition, please be advised that the characterization of the apparent violation described in the enclosed inspection report may change as a result of further NRC review.

Based on the results of this inspection, one NRC-identified and one self-revealed finding of very low safety significance were also identified. The findings involved a violation of NRC requirements. However, because of their very low safety significance, and because the issues were entered into your corrective action program, the NRC is treating the issues as NCVs in accordance with Section VI.A.1 of the NRC Enforcement Policy.

If you contest the subject or severity of these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001. with a copy to the Regional Administrator, U.S. Nuclear Regulatory Commission-Region III, 2443 Warrenville Road, Suite 210, Lisle, IL 60532-4352; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the Resident Inspector Office at the Palisades Nuclear Plant.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any), will be available electronically for public inspection in the

NRC Public Document Room or from the Publicly Available Records System (PARS) component of NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

/RA by Anne T. Boland for/

Steven West, Director
Division of Reactor Safety

Docket No. 50-255
License No. DPR-20

Enclosure: Inspection Report No. 05000255/2008011

cc w/encl: Senior Vice President
Vice President Oversight
Senior Manager, Nuclear Safety & Licensing
Senior Vice President and COO
Assistant General Counsel
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W. DiProfio
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Docket No. 50-255
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cc w/encl: Senior Vice President
Vice President Oversight
Senior Manager, Nuclear Safety & Licensing
Senior Vice President and COO
Assistant General Counsel
Manager, Licensing
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Letter to Mr. Christopher J. Schwarz from Mr. Steven West dated December 19, 2008.

SUBJECT: PALISADES NUCLEAR PLANT BASELINE INSPECTION REPORT
05000255/2008011 PRELIMINARY WHITE FINDING

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REGION III

Docket Nos: 50-255
License Nos: DPR-20

Report No: 05000255/2008-011

Licensee: Entergy Nuclear Operations, Inc.

Facility: Palisades Nuclear Plant

Location: Covert, MI

Dates: July 22, 2008 through November 19, 2008

Inspector: John Cassidy, Senior Health Physicist

Approved by: Steven Orth, Chief
Plant Support Team
Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000255/2008-011; 07/22/2008 – 11/19/2008; Palisades Nuclear Plant, Unit 1

The report covered the inspection activities for an unresolved item regarding the evaluation of radiological hazards and associated dose assessment to workers demobilizing equipment after fuel reconstitution. The inspection was conducted by a regional radiation protection inspector with support from other technical specialists. The inspection identified one preliminary White finding and an associated Apparent Violation (AV) and two Green findings and associated Non-Cited Violations (NCV) of NRC regulations. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

A. NRC-Identified and Self-Revealed Findings

Cornerstone: Occupational Radiation Safety

- Preliminary White. The inspector identified a finding and associated Apparent Violation of 10 CFR 20.1501 for the failure to perform adequate radiological evaluations necessary to properly quantify the radiological hazards to assess the dose from the conditions that were identified through electronic dosimeter alarms (dose rate). On October 4, 2007, after the licensee was notified of unexpected radiological conditions through electronic dosimeter alarms (dose rate), the licensee failed to recognize radiological hazards in the work place associated with the handling and disassembly of fuel reconstitution equipment. Specifically, the licensee failed to recognize the presence of high beta dose rate discrete radioactive particles (DRPs), and alpha contamination and, therefore, failed to assess the radiological hazard associated with the work activity and the dose to the three workers involved. The licensee failed to account for the workers' extremity doses associated with handling the temporary storage baskets (TSBs) and the exposure to the particles. Additionally, the licensee failed to assess the total organ doses to the bone surface from potential intakes of alpha contamination. As corrective actions, the licensee revised monitoring practices for spent fuel pool work.

The finding is more than minor because it impacted the program and process attribute of the Occupational Radiation Safety cornerstone and affected the cornerstone objective of ensuring adequate protection of worker health and safety from exposure to radiation, in that the failure to perform evaluations for discrete radioactive particles and alpha contamination impacted the licensee's ability to assess dose to the workers. The inspector determined that this finding was not related to as-low-as-is-reasonably-achievable (ALARA) Planning or Work Controls. The NRC could not determine that there was an overexposure. Additionally, the NRC could not determine that there was a substantial potential for overexposure. The inspector determined that the ability to assess dose was compromised. Specifically, DRPs and alpha contamination were identified following the incident; however, the licensee failed to account for the workers' extremity dose associated with handling temporary storage baskets (TSBs) and to assess the total organ dose to the bone surface from potential intakes of alpha contamination. Based on the Occupational Radiation Safety Significance Determination Process (SDP), the inspector preliminarily determined that the finding is White. The cause of this deficiency had a cross-cutting aspect in the area of Human Performance. Specifically, the licensee failed to utilize conservative assumptions in decision making and did not adopt a requirement to demonstrate that the proposed action is safe in order to proceed (H.1(b)). (Section 40A5)

- Green. An NRC-identified finding of very low safety significance and associated NCV of 10 CFR 20.1501 was identified for failure to perform adequate radiological evaluations necessary to properly assess the radiological hazards and prescribe appropriate radiological controls necessary to minimize dose to workers associated with failed fuel. Fuel reconstitution, a planned activity for the refueling outage, had a high potential to result in discrete radioactive particles and alpha contamination from the degraded fuel pins. The licensee failed to anticipate these radiological hazards and to implement appropriate controls to minimize exposure to radiation. As corrective actions, the license revised all radiation work permits (RWPs) associated with work in the spent fuel pool.

The finding is more than minor because it impacted the program and process attribute of the Occupational Radiation Safety cornerstone and affected the cornerstone objective of ensuring adequate protection of worker health and safety from exposure to radiation, in that, the licensee did not implement radiological controls necessary to minimize dose to workers. The finding was determined to be of very low safety significance because it was not an ALARA planning issue, the NRC could not identify an overexposure nor potential for overexposure, and the licensee's ability to assess dose was not compromised. The cause of this deficiency had a cross-cutting aspect in the area of Human Performance. Specifically, the licensee failed to appropriately plan the work activity by incorporating risk insights and job site conditions, including environmental conditions, which may impact radiological safety (H.3(a)). (Section 4OA5)

- Green. A self-revealed finding of very low safety significance and associated NCV of Technical Specification 5.7.1 was identified for the failure to post and control an area with dose rates greater than 100 millirem/hour as a high radiation area. Specifically, the area of the refuel floor that contained the fuel reconstitution equipment was not posted as a high radiation area. Dose rates of approximately 450 millirem/hour were measured 30 centimeters (cm) from the equipment after three workers received electronic dosimeter alarms (dose rate). As corrective actions, the licensee corrected the radiological posting and controls for the area.

The finding is more than minor because it impacted the program and process attribute of the Occupational Radiation Safety cornerstone and affected the cornerstone objective of ensuring adequate protection of worker health and safety from exposure to radiation, in that, job specific radiological surveys failed to identify elevated dose rates around the spent fuel pool during fuel reconstitution demobilization. The finding was determined to be of very low safety significance because it was not an ALARA planning issue, there was no overexposure nor potential for overexposure, and the licensee's ability to assess dose was not compromised. This finding appeared to be caused by inadequate coordination of work activities between the radiation protection staff and the contractors. Consequently, the cause of this deficiency had a cross-cutting aspect in the area of Human Performance. Specifically, the licensee failed to appropriately coordinate work activities by incorporating actions to communicate, coordinate, and cooperate with each other during activities in which inter-departmental coordination is necessary to assure plant and human performance (H.3(b)). (Section 4OA5)

B. Licensee-Identified Violations

No violations of significance were identified.

REPORT DETAIL

4. OTHER ACTIVITIES

4OA5 Other Activities

.1 Closure of Unresolved Item 05000255/2008002-06: Failure to evaluate the shallow (skin) dose to three workers involved in tool disassembly and failure to barricade and conspicuously post each entryway to a high radiation area

a. Inspection Scope

The inspector reviewed additional evaluations and analysis of an incident involving the disassembly and handling of fuel reconstitution equipment on October 4, 2007. Three contract workers received electronic dosimeter (ED) dose rate alarms when they disassembled tools used for fuel reconstitution on the 649' level of the Auxiliary Building near the spent fuel pool. The inspection was performed through in-office reviews of documents generated by the licensee at the plant site. This review included discussion with various members of the licensee staff, both in person and by teleconference, which provided a common understanding of the events as they occurred. Additionally, select data provided by the licensee was independently reviewed by a technical expert on the NRC staff. The list of documents that were reviewed is included in an Attachment to this report. This URI is closed.

This inspection supplements the sample reported in Inspection Report 05000255/2008002.

b. Findings

Introduction: The inspector identified three findings:

1. A Preliminary White NRC-identified finding of low to moderate safety significance and associated Apparent Violation (AV) of 10 CFR 20.1501 was identified for failure to assess dose to workers. After the licensee was made aware of unplanned radiological conditions through electronic dosimeter alarms (dose rate), the licensee failed to evaluate the actual radiological hazards to assess dose to workers that handled tools used for reconstituting failed fuel on October 4, 2007, as required by 10 CFR 20.1501 to demonstrate compliance with the dose limits of 20.1201.
2. A Green NRC-identified finding of very low safety significance and associated NCV of 10 CFR 20.1501 was identified for the failure to perform adequate radiological evaluations necessary to properly assess the radiological hazards and prescribe appropriate radiological controls necessary to minimize dose to workers associated with failed fuel. Fuel reconstitution, a planned activity for the refueling outage, had a high potential to result in discrete radioactive particles and alpha contamination from the degraded fuel pins. However, the licensee failed to implement appropriate controls to minimize exposure to radiation.
3. A Green self-revealed finding of very low safety significance and associated NCV of Technical Specification 5.7.1 was identified for the failure to post and control areas with dose rates greater than 100 millirem/hour as a high radiation area. Specifically, the area of the refuel floor that contained the fuel reconstitution equipment was not

posted as a high radiation area. Dose rates of approximately 450 millirem/hour were measured at 30 cm from the equipment after three workers received electronic dosimeter alarms (dose rate).

Description: During a refueling outage in October 2007, fuel reconstitution was performed under water where degraded/damaged fuel pins (or rods) from a fuel bundle were replaced with other fuel pins inside a temporary storage basket (TSB). These “reconstituted” bundles were subsequently returned to the reactor for use. After the fuel reconstitution was complete, the TSBs were removed from the spent fuel pool and were processed by contract staff for return to the vendor. The process involved disassembly of the TSBs and their packaging for shipment, which included the removal of spacer pins.

Personal accounts of the work activity indicate that the TSBs were not rinsed with water when removed from the spent fuel pool as is the normal industry practice. Rinsing is typically done as a contamination control mechanism that removes particles from the component and returns them to the pool where they can be more readily controlled. A radiation protection technician (RPT) performed radiation surveys as the TSBs were removed from the spent fuel pool and placed the TSBs into a designated laydown area near the pool. The area was initially posted and controlled as a radiation area and contamination area. No additional controls for the laydown area were prescribed by the RPT during the removal process. After all TSBs were in the laydown area, the work group left the area for a break. The RPT remained behind and performed additional contamination surveys in the general area surrounding the spent fuel pool. As a result of these additional surveys, the RPT performed some decontamination of the area, and escalated the posting to a high contamination area. The technician left the area, apparently to document these results.

The three person work crew returned to disassemble the TSBs after the RPT left the area. Two workers wore Class 2 (single) protective clothing and one wore Class 3 (double set) protective clothing. The workers initiated disassembly of the TSBs without the RPT present. Neither the RWP nor the briefing required continuous RPT coverage; however, the RPT assumed the work group would not resume work without RPT coverage. During disassembly of the TSBs, all three workers received electronic dosimeter alarms (dose rate) and vacated the area to report the alarming condition to radiation protection. Two of the three workers alarmed the personnel contamination monitors when they attempted to exit the radiologically controlled area (RCA). Two discrete radioactive particles were removed from the collar and skin of the forearm of one of the workers.

Radiation protection staff responded to the dosimeter alarms and performed follow-up radiation surveys of the work areas. These follow-up surveys disclosed elevated dose rates on a box ~12 inches long and 6–8 inches deep that was open and housed the spacer pins. The follow-up surveys identified gamma dose rates of 4.8 R/hour on contact with the box and 450 millirem/hour measured at 30 cm from the box. Surveys further revealed beta dose rates of 16 rad/hour on contact and 800 millirad/hour (beta) measured at 30 cm from the outside of the box.

At the time of the incident, the licensee characterized the issue as an unposted high radiation area (HRA). Actions taken by the licensee were limited to correcting the posting in the area, attempting to secure the box, and removing the box from the area a few days later. However, the licensee failed to recognize the potential for significant

radiation exposure to the workers. Consequently, the licensee did not evaluate the high beta dose rates on the box either to assess whether any workers were exposed to these dose rates or to determine the source of the unusually elevated dose rates from beta radiation. Additionally, a bag of trash was found in the area with measured contact and 30 cm dose rates of 600 millirem/hour and 80 millirem/hour, respectively, which further demonstrated that an unrecognized radiological hazard existed. Furthermore, the work activity involved the potential for alpha contamination and the licensee failed to monitor for airborne contamination, and to evaluate surface contamination with alpha radiation sensitive equipment.

The NRC learned of the incident and reviewed the licensee's apparent cause evaluation during a routine inspection in January 2008. The NRC questioned the values recorded on the survey map and questioned the licensee regarding its evaluation of extremity dose for the affected workers. The inspector found that the licensee did not perform a dose evaluation either before the work started or after the ED alarms, despite the elevated dose rates measured by the licensee during its follow-up surveys and despite indications that the workers wiped down the spacer pins by hand prior to placing them in the storage box. The work crew involved in the October 2007 event consisted of contractors who were no longer on-site during the January 2008 inspection, hampering the ability to accurately reconstruct work activity. Therefore, the licensee could not readily determine the dose impact to the workers that wiped down these spacer pins before placing them in the box.

Licensee Evaluation

Following the January 2008 inspection, the licensee determined that the box containing the spacer pins that caused the dosimeter alarms was located in another package mixed with items waiting for offsite disposal. In May 2008, the licensee retrieved the box to perform additional radiological surveys. These surveys determined that the source of elevated dose rates was not the spacer pins, but rather discrete radioactive particles inside the box. The licensee retrieved two of these particles from the box. The radiation level measured on one of the particles exceeded the measuring capability of the survey instrument, and the other was at the upper bounds of the instruments capability of 50 rad/hour. This survey also identified significant levels, up to 200,000 disintegrations per minute/100 cm², of alpha contamination on the spacer pins.

On July 22, 2008, the licensee completed its evaluation of the worker dose consequence associated with the spacer pins. The licensee concluded that the high activity particles found in the box were not found in the top portion of the box, the portion used during fall 2007 outage. The licensee concluded that the particles may have been from activities in previous outage(s). Therefore, calculated dose was not assigned to any of the three workers involved in the activity. The licensee estimated that if the particles identified in May 2008 were handled by an individual for one minute, the calculated dose value would be about 23.3 rem. The one minute was assumed by the licensee based upon interviews with RP supervisors, who had observed some of the work through remote monitoring (camera) equipment. Licensee procedure EN-RP-203, "Dose Assessment," Section 5.5[8] provided a formula to assess the dose when isotopic analysis is not available:

$$\underline{SDE = 20R_{ow}T}$$

SDE	=	Shallow Dose Equivalent averaged of 10 cm ²
20	=	ion chamber dose rate correction factor
R _{ow}	=	ion chamber contact open-window measurement
T	=	exposure time in hours

NRC Evaluation

The inspector's review did not agree with the licensee's conclusion. The NRC concluded that the workers were exposed to high beta dose rates from discrete radioactive particles. This is based upon the elevated radiological conditions on the exterior of the box and documented statements from one of the involved contractors indicating that the equipment had been wiped, combined with the identification of two particles on one of the workers after anti-contamination clothing was removed. The fact that the particles were found in the middle of the box six or more months after the incident may not be an accurate representation of the conditions of the box at the time of the evolution, and the particles likely migrated during handling of the box.

The NRC also reviewed the dose assessment provided by the licensee. The NRC determined that methods and parameters used to calculate this result did not account for all radiological hazards identified in the surveys performed in May 2008. Specifically, the evaluation failed to evaluate the dose from alpha contamination, and the dose calculation from discrete radioactive particles was not decay corrected to account for approximately eight months between the events in October 2007 and the time of survey in May 2008. Additionally, the licensee lacked a technical basis for the exposure time of one minute used by the licensee for the contact with the discrete radioactive particles. Although the licensee based its evaluation on RP observations of some aspects of the evolution, the licensee indicated that recordings from the remote video monitoring equipment could not be used to view the work activities as they were just outside the field of view of the cameras. Furthermore, the one minute estimate was based on the estimated duration a worker handled a spacer pin, not the duration a DRP may have been on a worker. The licensee's evaluation did not account for a DRP remaining on the worker after a spacer pin was placed in the box.

The NRC determined that the licensee failed to recognize the radiological hazards associated with demobilization of fuel reconstitution equipment and also failed to provide appropriate controls for discrete radioactive particles and alpha contamination in the following categories:

- Work Area:
 - Confinement or containment practices to limit spread of particles;
 - Increased frequency of contamination surveys; and
 - Additional postings and communications required by licensee procedures.
- Work Activities:
 - Periodic particle surveys on workers hands;
 - Frequent glove changes; and
 - Use of finger dosimetry to measure dose to extremities.

- Review and Oversight:
 - Additional sampling for airborne radioactivity;
 - Additional analysis for alpha radiation;
 - Pre-defined stop work criteria; and
 - Increased supervisor oversight.

The NRC concluded the ability to assess the dose from these events was compromised given that the licensee failed to fully recognize and characterize the radiological hazards at the time of the event. The efforts, made more than six months after the event to assess the conditions, were limited by radiological surveys of highly directional sources after changing orientation and to the information documented. Additionally, there was an inability to resolve conflicting statements from personnel that are no longer on-site.

Analysis Finding 1: The inspector identified a performance deficiency in that the licensee failed to perform adequate radiological evaluations necessary to properly quantify the radiological hazards to assess the dose from the conditions that were identified through electronic dosimeter alarms (dose rate). In accordance with Inspection Manual Chapter (IMC) 0612, "Power Reactor Inspection Reports," Appendix B, "Issue Screening," issued on September 20, 2007, the inspector determined that the issue was associated with the Program and Process attribute of the Occupational Radiation Safety Cornerstone and potentially affected the cornerstone objective to ensure the adequate protection of the worker health and safety from exposure to radiation from radioactive material during routine civilian nuclear reactor operation. Specifically, the failure to perform surveys for discrete radioactive particles and alpha contamination impacted the licensee's ability to assess dose to the workers. Therefore, the issue was more than minor and represented a finding which was evaluated using the Significance Determination Process (SDP). Since the finding involved a problem with assessing dose to workers, the inspector utilized IMC 0609, Appendix C, "Occupational Radiation Safety SDP," to assess its significance.

The inspector determined that this finding was not related to ALARA Planning or Work Controls. The NRC could not determine that there was an overexposure. Additionally, the NRC could not determine that there was a substantial potential for overexposure. This is primarily due the limited information of the various parameters that comprise the dose equation (particle composition, actual activity performed, duration a particle could have been in contact with worker and airborne contamination generated by the evolution). A minor change to any single parameter is offset by the uncertainty associated with each of the other parameters.

The inspector determined that the ability to assess dose was compromised. The event occurred on October 4, 2007. Immediately following the event, the licensee focused its attention on the unposted high radiation area, without fully evaluating the dose associated with unexpectedly high beta dose rates. Surveys taken immediately after the electronic dosimeter alarms (dose rate) did not assess contamination for discrete radioactive particles or alpha contamination. Additionally, the licensee did not take immediate actions to assess for exposure to airborne radioactivity, including in-vitro bioassay techniques for alpha contamination. The licensee performed whole body counts approximately five days following the incident, which would not have been effective in quantifying an exposure. Three months passed before the NRC became fully aware of the events and raised issues concerning skin dose assessment for the workers. The licensee used another five months to locate the box containing the

spacers, plan and prepare an area to receive the box, transport the box back into the plant and survey the box of spacer pins. The delays allowed for radioactive decay and introduced uncertainties from packaging and from handling. The delays also resulted in the inability to obtain first hand information from all of the contracted personnel involved and to reconcile the accounts provided by the various individuals. Based on the Occupational Radiation Safety SDP, the inspector preliminarily determined that the finding was of low to moderate safety significance (White).

As described above, this finding was caused by an assumption that the event was limited to an unposted high radiation area. Consequently, the cause of this deficiency had a cross-cutting aspect in the area of Human Performance. Specifically, the licensee failed to utilize conservative assumptions in decision making and did not adopt a requirement to demonstrate that the proposed action is safe in order to proceed (H.1(b)).

Enforcement Finding 1: Title 10 CFR 20.1501 requires that each licensee make or cause to be made surveys that may be necessary for the licensee to comply with the regulations in 10 CFR Part 20 and that are reasonable under the circumstances to evaluate the, (1) magnitude and extent of radiation levels; (2) concentrations or quantities of radioactive materials; and (3) potential radiological hazards.

As defined in 10 CFR 20.1003, "survey" means an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material, or other sources of radiation. Title 10 CFR 20.1201 limits the occupational annual dose to the skin of the extremities for adults to 50 rem and the total effective dose equivalent to 5 rem.

Contrary to the above, as of January 18, 2008, the licensee failed to evaluate the radiological hazards to assess dose to workers that handled tools used for reconstituting failed fuel during work on the refueling floor on October 4, 2007, as required by 10 CFR 20.1501 to demonstrate compliance with the dose limits of 10 CFR 20.1201. (AV 05000255/2008011-01)

Analysis Finding 2: The inspector identified a performance deficiency, in that the licensee failed to perform adequate radiological evaluations necessary to properly assess the radiological hazards, and prescribe appropriate radiological controls necessary to minimize dose to workers associated with failed fuel. In accordance with Inspection Manual Chapter (IMC) 0612, "Power Reactor Inspection Reports," Appendix B, "Issue Screening," issued on September 20, 2007, the inspector determined that the issue was associated with the Program and Process attribute of the Occupational Radiation Safety Cornerstone and potentially affected the cornerstone objective to ensure the adequate protection of the worker health and safety from exposure to radiation from radioactive material during routine civilian nuclear reactor operation. Specifically, the failure to evaluate and monitor for discrete radioactive particles and alpha contamination when demobilizing fuel reconstitution equipment impacted the licensee's ability to prescribe effective radiological controls to minimize dose to the workers. Therefore, the issue was more than minor and represented a finding which was evaluated using the SDP. Since the finding involved a problem with the assessing dose to workers, the inspector utilized IMC 0609, Appendix C, "Occupational Radiation Safety SDP," to assess its significance.

The inspector determined that this finding was not related to ALARA Planning or Work Controls. The NRC could not determine that there was an overexposure. Additionally, the NRC could not determine that there was a substantial potential for over exposure. The inspector determined that the lack of radiological controls did not result in a compromised ability to assess dose. Based on the Occupational Radiation Safety SDP, the inspector determined that the finding was of low safety significance (Green).

As described above, this finding was caused by inadequate planning and coordination of work activities. Consequently, the cause of this deficiency had a cross-cutting aspect in the area of Human Performance. Specifically, the licensee failed to appropriately plan the work activity by incorporating risk insights and job site conditions, including environmental conditions which may impact radiological safety (H.3(a)).

Enforcement Finding 2: Title 10 CFR 20.1501 requires that each licensee make, or cause to be made, surveys that may be necessary for the licensee to comply with the regulations in 10 CFR Part 20, and that are reasonable under the circumstances to evaluate the, (1) magnitude and extent of radiation levels; (2) concentrations or quantities of radioactive materials; and (3) potential radiological hazards.

As defined in 10 CFR 20.1003, "survey" means an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation. Title 10 CFR 20.1201 limits the occupational annual dose limits to the skin of the extremities for adults to 50 rem and the total effective dose equivalent to 5 rem.

Contrary to the above, as of October 4, 2007, the licensee failed to properly assess the radiological hazards and prescribe appropriate radiological controls necessary to minimize dose to workers associated with failed fuel, as required by 10 CFR 20.1501 to demonstrate compliance with the dose limits of 20.1201. (NCV 05000255/2008011-02)

Analysis Finding 3: The inspector reviewed a self-revealed performance deficiency was identified when electronic dosimeter alarms (dose rate) identified conditions that exceed the posting and controls for the area around the spent fuel pool. In accordance with Inspection Manual Chapter (IMC) 0612, "Power Reactor Inspection Reports," Appendix B, "Issue Screening," issued on September 20, 2007, the inspector determined that the issue was associated with the Program and Process attribute of the Occupational Radiation Safety Cornerstone and potentially affected the cornerstone objective to ensure the adequate protection of the worker health and safety from exposure to radiation from radioactive material during routine civilian nuclear reactor operation. Specifically, job specific radiological surveys failed to identify elevated dose rates around the spent fuel pool during fuel reconstitution demobilization. Therefore, the issue was more than minor and represented a finding, which was evaluated using the SDP. Since the finding involved a problem with the assessing dose to workers, the inspector utilized IMC 0609, Appendix C, "Occupational Radiation Safety SDP," to assess its significance.

The inspector determined that this finding was not related to ALARA Planning or Work Controls. The inspector determined that the lack of radiological posting and controls did not result in an overexposure or substantial potential for overexposure. Additionally, the

lack of radiological postings and controls did not result in a compromised ability to assess dose. Based on the Occupational Radiation Safety SDP, the inspector determined that the finding was of low safety significance (Green).

As described above, this finding was caused by inadequate coordination of work activities between the radiation protection staff and the contractors. Consequently, the cause of this deficiency had a cross-cutting aspect in the area of Human Performance. Specifically, the licensee failed to appropriately coordinate work activities by incorporating actions to communicate, coordinate, and cooperate with each other during activities in which interdepartmental coordination is necessary to assure plant and human performance (H.3(b)).

Enforcement Finding 3: Technical Specification 5.7.1 requires areas with dose rates greater than 100 millirem/hr to be posted and controlled as a high radiation area.

Contrary to this, on October 4, 2007, the area of the refuel floor that contained the refuel reconstitution equipment, with a radiation dose rate of approximately 450 millirem/hour 30 cm from the source, was not posted or controlled as a high radiation area. (NCV 05000255/2008011-03)

4OA6 Management Meetings

.1 Exit Meeting Summary

On November 19, 2008, the inspector presented the inspection results to Mr. C. Schwarz and other members of the licensee staff. The licensee acknowledged the issues presented. The inspector confirmed that none of the potential report input discussed was considered proprietary.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

M. Ginzel, Radiation Control Supervisor
C. Sherman, Radiation Protection Manager

Nuclear Regulatory Commission

D. Forsyth, Nuclear Engineer
P. Lee, PhD., CHP Senior Health Physicist

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened

05000255/2008011-01	AV	Failure To Assess Dose To Three Workers After A Known Change In Radiological Conditions Near The Spent Fuel Pool (4OA5)
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Closed

05000255/2008002-006	URI	Failure To Evaluate The Shallow (Skin) Dose To Three Workers Involved In Tool Disassembly And Failure To Barricade And Conspicuously Post Each Entryway To A High Radiation Area
05000255/2008011-02	NCV	Failure To Implement Effective Radiological Controls For Working With Equipment In Contact With Failed Fuel (4OA5)
05000255/2008011-03	NCV	Failure to Post and Control Access to High Radiation Area (4OA5)

LIST OF DOCUMENTS REVIEWED

The following is a list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspector reviewed the documents in their entirety, but rather, that selected sections or portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

4OA5 Other Activities

Apparent Cause Evaluation; CR-PLP-2007-04869

Radiological Survey Sheet; Room ID 419; RWP # 755; Followup Survey for PCE & Dose Rate Alarm; 10/4/2007@1700

Radiological Survey Sheet; Room ID 419; RWP #775; Aux Building 649' SFP; 8/23/2007@0800

Radiological Survey Sheet; Room ID 419; RWP #775; A and B Flow Diverter Valves; 10/2/2007@2230

Radiological Survey Sheet; Room ID 419; RWP #842; Fuel Sipping Basket Spacers; 10/9/2007@1030

Radiological Survey Sheet; Room ID 419; RWP 842; Auxiliary Building 649' Spent Fuel Pool; 10/9/2007@1200

Radiological Survey Sheet; Room ID 419; RWP 755; AFP Box Laydown Area; 10/4/2007@2240

Radiological Survey Sheet; Room ID 419; RWP 775; Ultrasonic Cleaner Filter Skid Pumps; 10/18/2007@1700

Radiological Survey Sheet; Room ID 419; RWP 775; Filtration Skid; 10/19/2007@1700

Radiological Survey Sheet; Room ID 419; RWP 842; 649' Spent Fuel Pool Floor; 10/9/2007@1700

Radiological Survey Sheet; Room ID 419; RWP 775; Ultrasonic Cleaner Filter Skid Pumps; 10/17/2007@1700

Radiological Survey Sheet; Room ID 421; RWP 20080083; CWD Pit Fuel Pin Spacer Characterization; 5/14/2008 and 5/15/2008

Electronic Dosimeter Alarm Investigation Form(s) associated with CR-PLP-2007-04883; 10/4/2007

Skin Dose Assessment Technical Basis; Point Source Correction Factor for Instrument Reading; HP-CALC-2003-002; 5/14/2003

Radiation Work Permit #755; Refuel Project- Refueling Activities; Revision 1

FP-RP-SD-01; Special Dosimetry; Revision 3

EN-RP-203; Dose Assessment; Revision 2

CR-PLP-2007-04869; Corrective Action #25; Formal Evaluation of Dose Consequence Associated with the Spacer Pins during the Palisades 2007 Refuel Outage

Gamma Spectroscopy Report; Spacer Smear; 5/16/2008

Personnel Contamination Event Log Sheet associated with CR-PLP-2007-04867; 10/4/2007

LIST OF ACRONYMS USED

DRP	Discrete Radioactive Particle
ED	Electronic Dosimeter
HRA	High Radiation Area
RCA	Radiologically Controlled Area
RPT	Radiation Protection Technician
SFP	Spent Fuel Pool
TSB	Temporary Storage Basket