UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
2443 WARRENVILLE RD. SUITE 210
LISLE, IL 60532-4352

December 2, 2014

EA-14-168

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

SUBJECT: PALISADES NUCLEAR PLANT, NRC INSPECTION REPORT 05000255/2014010, PRELIMINARY WHITE FINDING

Dear Mr. Vitale:

On October 30, 2014, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Palisades Nuclear Plant. The enclosed report documents the results of this inspection, which were discussed on October 30, 2014, with you and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

This report documents a finding that has preliminarily been determined to be White or a finding with low-to-moderate safety significance. As documented in Section 2RS4 of this report, the NRC reviewed the methodology for monitoring external dose and the subsequent dose assessments performed by the licensee when the licensee replaced numerous (44) control rod drive (CRD) housings in February and March 2014. This finding was assessed based on the best available information, including influential assumptions, using the applicable Significance Determination Process (SDP).

Upon identification of this issue, you suspended the use of effective dose equivalent and tungsten shield vests. Additionally, you calculated the dose received for all the affected workers and updated the dose tracking system for the nuclear power industry with the results. Your staff indicated that no worker exceeded federal limits for occupational exposures as a result of these dose calculations.

This finding is also associated with two apparent violations of NRC requirements, which are being considered for escalated enforcement action in accordance with the NRC Enforcement Policy. The current Enforcement Policy can be found at the NRC's Web site at http://www.nrc.gov/reading-rm/doc-collections/enforcement.

In accordance with Inspection Manual Chapter (IMC) 0609, “Significance Determination Process,” we intend to complete our evaluation using the best available information and issue our final determination of safety significance within 90 days of the date of this letter. The SDP 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 the NRC makes its enforcement decision, we request that you either: (1) present to the NRC your perspectives on the facts and assumptions used by the NRC to arrive at the finding and its significance at a Regulatory Conference; or (2) submit your position on the finding to the NRC in writing. In either case, we request that you address why this issue occurred, and what corrective actions were taken.

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 conference is held, it will be open for public observation. The NRC will also issue a press release to announce the conference. If you decide to submit a written response, such submittal should be sent to the NRC within 30 days of the 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 Inspection Manual Chapter 0609.

Please contact Mr. Billy Dickson at (630) 829-9827 within 10 days of the date of this letter to notify the NRC of your intended response to the preliminary White finding and the associated apparent violations. The final resolution of this matter will be conveyed in separate correspondence.

Since the NRC has not made a final determination in this matter, no Notice of Violation is being issued for the inspection finding and associated apparent violations at this time. Please be advised that the number and characterization of the apparent violations described in the enclosed inspection report may change as a result of further NRC review.

In accordance with Title 10, *Code of Federal Regulations* (CFR), Section 2.390 of the NRC's "Rules of Practice," a copy of this letter, and its enclosure 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/

Kenneth G. O’Brien, Director
Division of Reactor Safety

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

Enclosure:
Inspection Report 05000255/2014010
w/Attachments 1 and 2

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No:	50-255
License No:	DPR-20
Report No:	05000255/2014010
Licensee:	Entergy Nuclear Operations, Inc.
Facility:	Palisades Nuclear Plant
Location:	Covert, MI
Dates:	August 11, 2014 – October 30, 2014
Inspectors:	J. Cassidy, Senior Health Physicist, DRS
Reviewed by:	B. C. Dickson, Chief Division of Reactor Safety Health Physics & Incident Response Branch
Approved by:	K. G. O'Brien, Director Division of Reactor Safety

Enclosure

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SUMMARY OF FINDINGS

Inspection Report 05000255/2014010, 8/11/2014 – 10/30/2014, Palisades Nuclear Plant, Occupational Dose Assessment.

This report documents the NRC review of the methodology for monitoring external dose and the subsequent dose assessments performed by the licensee when the licensee replaced numerous (44) control rod drive (CRD) housings between February 6 and March 8, 2014. The inspectors identified a finding with a preliminary significance of White and two associated apparent violations. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 5, dated February 2014.

A. NRC-Identified and Self-Revealed Findings

Cornerstone: Occupational Radiation Safety

- Preliminary White. The NRC identified a finding and two apparent violations of NRC requirements associated with the replacement of CRD housings between February 6 and March 8, 2014. Specifically, the inspectors identified an apparent violation of Title 10 of the *Code of Federal Regulations* (CFR) Part 20.1201, "Occupational Dose Limits for Adults," because the licensee failed to ensure that radiation worker dosimeters calibrated to the Deep Dose Equivalent (DDE) were located at the highest exposed portion of the respective compartment, a condition of the NRC-approved method for determining effective dose equivalent external (EDEX). The inspectors also identified an example of an apparent violation of Technical Specification 5.4 "Procedures," associated with this finding. Upon identification of this issue, the licensee suspended the use of EDEX and tungsten shield vests. The licensee re-calculated the dose received for the workers involved and updated the nuclear power industry's dose tracking system with the revised dose results. Additionally, a root cause evaluation was initiated under Condition Report CR-PLP-2014-04683.

  The inspectors reviewed the guidance in IMC 0612, Appendix E, "Examples of Minor Issues," and did not find any similar examples. The performance deficiency was determined to be of more than minor safety significance in accordance with IMC 0612 Appendix B, "Issue Screening," because it was associated with the program and process attribute of the Occupational Radiation Safety Cornerstone and adversely affected the cornerstone objective of ensuring adequate protection of worker health and safety from exposure to radiation, in that inaccurate radiation monitoring affects the licensee's ability to control and limit radiation exposures. Therefore, the performance deficiency was a finding. The finding did not involve as-low-as-reasonably-achievable (ALARA) planning or work controls and there was no overexposure or substantial potential for an overexposure. However, the NRC determined that the licensee's ability to assess dose was compromised. Consequently, the NRC concluded that the finding was preliminarily determined to be of White safety significance. The finding had a cross-cutting

characteristic in the area of human performance related to the cross-cutting aspect of change management, in that, the licensee's procedures did not include all of the requirements for implementing EDEX when the methods were approved by the NRC and did not provide adequate guidance for the new tungsten shield vests. (H.3) (Section 2RS4)

B. Licensee-Identified Violations

None

REPORT DETAILS

Event Summary

Between February 6 and March 8, 2014, the licensee replaced numerous (44) control rod drive (CRD) housings. The replacement of 44 CRD housings was a significant activity in terms of time, resources, and radiation dose. In August 2014, the inspectors reviewed the licensee's methodology for monitoring external dose during this work activity and the subsequent dose assessments performed by the licensee using Inspection Procedure (IP) 71124.04, "Occupational Dose Assessment." The NRC regulations in 10 CFR 20.1201(c), requires that when an external personal monitoring device is used to measure external exposure, the deep-dose equivalent (DDE) must be used as the effective dose equivalent (EDE) for external (EDEX) radiation exposures unless the EDEX is determined by an alternate NRC-approved dosimetry method. Regulatory Guide 8.40, "Methods for Measuring Effective Dose Equivalent from External Radiation Exposure," provides the criteria to be used in evaluating compliance with the applicable regulations and describes dosimetry methods that the NRC considers acceptable for determining the EDEX. Regulatory Guide 8.40 states that to ensure that the EDEX results are conservative, the dose to each compartment (or composite compartment) should be measured by locating the dosimeter (calibrated to the DDE) at the highest exposed portion of the respective compartment. The licensee concurrently implemented the use of tungsten shield vests to reduce exposure to the workers. However, the use of tungsten shield vests created new dose gradients to the workers that were not adequately assessed by the licensee to ensure that the dosimeters were appropriately placed in the highest exposed portion of the compartment.

2. RADIATION SAFETY

2RS4 Occupational Dose Assessment (71124.04)

The inspection activities supplement those documented in Inspection Report 05000255/2014004 and constitute a partial sample as defined in Inspection Procedure (IP) 71124.04-05.

.1 Special Dosimetric Situations (02.04)

Dosimeter Placement and Assessment of Effective Dose Equivalent for External Exposures

a. Inspection Scope

The inspectors reviewed the licensee's methodology for monitoring external dose in non-uniform radiation fields or where large dose gradients exist. The inspectors evaluated the licensee's criteria for determining when alternate monitoring, such as use of multi-badging, was to be implemented.

The inspectors reviewed dose assessments performed using multibadging to evaluate whether the assessment was performed consistent with licensee procedures and dosimetric standards.

b. Findings

Introduction

The inspectors identified a finding and two associated apparent violations (AVs) following the review of the effective dose equivalent external (EDEX) calculations for the CRD housing replacements that resulted in the significant under reporting of total dose to many workers. The inspectors identified the licensee's procedure failed to incorporate NRC requirements necessary to ensure that the EDEX results are in accordance with regulatory requirements. Specifically, the dose to each compartment (or composite compartment) was not measured by locating the dosimeter at the highest exposed portion of the respective compartment.

Description

Effective Dose Equivalent

Effective Dose Equivalent (EDE) is the sum of the products of the dose to organs and tissues of the body multiplied by their respective organ weighting factors. The NRC Total Effective Dose Equivalent (TEDE) dose limit is the sum of the EDE from external exposures (EDEX) and the Committed EDE (CEDE) from radionuclides taken into the body. Effective Dose Equivalent (internal or external) is not measurable directly. It must be determined by calculational techniques. Several techniques have been developed to estimate the EDEX by using personal monitoring devices (dosimeters) worn on the surface of the body. Each of these techniques has limitations and all are dependent on the geometry of the exposure measuring device specific to the radiation source. Regulatory Guide 8.40, "Methods for Measuring Effective Dose Equivalent from External Exposure," in July 2010 identifies several methods, and their limitations of use, that are approved by the NRC for estimating EDEX. These methods provide a conservative estimate of the EDEX and may be used to calculate the TEDE in demonstrating compliance with TEDE-based NRC regulatory requirements. The most widely used of the Regulatory Guide 8.40 methods is based on the guidance in American National Standards Institute (ANSI) Standard N13.41, "Criteria for Performing Multiple Dosimetry." This dose assessment method divides the whole body into seven separate compartments with applicable weighting factors commensurate with the radio-sensitivity of the specific body parts. Each compartment is usually monitored separately. However, the combination of adjacent compartments into a composite compartment is permitted provided the weighting factor for the composite compartment is the sum of the weighting factors for the individual compartments included in the composite compartment. In all cases, the dose to each compartment (or composite compartment) must be measured by locating the dosimeter at the highest exposed portion of the respective compartment.

The inspectors reviewed the Safety Evaluation Report issued by the Office of Nuclear Reactor Regulation related to the approval to use weighting factors for external radiation exposures for Entergy Operations Inc. and Entergy Operating, Inc. The inspectors identified that this report was licensee-specific and approved by the NRC before Palisades was owned and operated by Entergy. Consequently, the information provided in the report was not applicable for Palisades Nuclear Plant. However, the inspectors noted that the requirement to monitor dose to each compartment (or composite compartment) at the highest exposed portion of the respective compartment was identical to the conditions specified in Regulatory Guide 8.40.

In accordance with Entergy Fleet Procedures for EDEX, the licensee placed dosimeters on the head, each arm, and each leg of each worker. The licensee then combined the thorax and abdomen into a composite compartment and placed the dosimeter on the worker's chest. The inspectors noted that although this location might be appropriate for some situations, it is not appropriate for all situations. Specifically, at Palisades during the CRD housing replacement, the source of radiation was below the worker and the dosimeter should be placed lower in the combined compartment to assess workers' exposures. The inspectors noted that the licensee's procedure did not capture the limitations described in Regulatory Guide 8.40 or the Safety Evaluation Report for the EDEX. Specifically, licensee Procedure EN-RP-204, "Special Monitoring Requirements," did not carry forward the requirement to locate the dosimeter at the highest exposed portion of the respective compartment.

Source of Radiation

The dosimetry data indicated that the source of radiation was generally below the worker. This was evidenced by several of the workers' thighs having the highest dosimeter results, followed by the workers' upper arms, then the workers' heads. Dosimetry placed on the workers' chests was sometimes placed under a tungsten shield vest. Therefore, the dosimeter results were not necessarily indicative of workers' exposures, nor necessarily indicative of the workers' orientation relative to the source of radiation. Additionally, the radiological surveys provided by the licensee also demonstrate that the source of radiation was from below the worker. Furthermore, interviews with plant staff confirmed that the work area was a non-uniform radiation field with the primary source of radiation below the workers, when the workers were in an upright body position.

Photographs provided by the licensee depict shielding that was placed below the worker to reduce this source of exposure. Other photos provided by the licensee indicate that plant system shielding was not always present when workers were in the field. These conditions further complicated the dose gradients present at the work site.

Tungsten Shield Vest

The use of tungsten shield vests was a specific point of discussion between the inspectors and plant management in January 2014. Specifically, the inspectors identified several vulnerabilities regarding the use of tungsten shield vests when used in industrial settings and non-uniform radiation fields coincident with the application of EDEX. Other issues identified by the inspectors included the weight (~30 pounds) of the shield vest itself and the associated impact on worker fatigue, gaps in shielding protection that occur around the neck/thorax while in use, and dynamic worker orientations in relation to the sources of radiation in non-uniform radiation fields.

The use of the tungsten shield vest was optional and not required by the radiation work permit. Interviews with plant staff and photographs provided by the licensee indicated that the tungsten shield vests, with an optional back panel, were worn by most of the workers, most of the time. No quantitative data was available for inspectors review since the licensee did not maintain records of which workers wore shield vests or when the shield vests were worn.

Regulatory Guide 8.40 includes the following limitation: "(T)o ensure that the EDEX results are conservative, the dose to each compartment (or composite compartment) should be measured by locating the dosimeter (calibrated to the DDE) at the highest

exposed portion of the respective compartment." The use of tungsten shield vests created new dose gradients that should have been assessed to ensure that the dosimeters were appropriately placed in the highest exposed portion of the compartment. Photos provided by the licensee show significant gaps between the front vest and rear vest for many workers, leaving large portions of the thorax and abdomen unshielded while the dosimeter for this region remained shielded. Other photos depicted workers lying on their side during work activities, exposing the unshielded portion of the thorax and abdomen directly to the source of radiation. One photo showed a worker lying on his side and the tungsten shield vest appeared to be covering the thigh. Furthermore, some photos depicted workers sitting in the work area in an orientation that negates the protective qualities of the tungsten shield vest for the gonads while the dosimeter for those organs remained shielded by the tungsten shield vest. The photos are included in Attachment 2 of this report.

Members of the licensee staff indicated that the shield vests used for work activities were recently purchased for the sole purpose of having the additional back shield vest to reduce exposure in this work environment. The inspectors noted that the procedure for EDEX was not revised to include the backside shield vest and the procedure did not contain guidance for all of the possible configurations to ensure the shield vest completely encompassed the compartment(s) without gaps to prevent new dose gradients.

The inspectors noted the licensee did not perform a thorough review of the dosimeter data, nor was this review required by station procedures. The use of EDEX involves extensive radiological planning and in-field follow-up by the licensee's staff in order to assess worker dose. Specifically, the licensee staff is required to ensure that the dose assigned by using multiple dosimeters and application of the different weighting factors for the body compartments was indicative of actual worker exposure. A thorough review of dosimeter results, radiation field characterization, and a review of when and where the dosimeters were worn would allow the licensee to:

- assess whether the compartments were combined appropriately for the actual source distribution;

- assess whether the dosimeter placement was in the highest exposed portion of the compartment; and

- calculate an accurate dose for the workers.

The inspectors discussed with plant staff that placement of the dosimeter on the chest for these workers (>100 workers) was not appropriate given the source was below the worker, the gaps observed in the shield vest, and worker positioning during work activities. The licensee indicated they would develop a method to re-evaluate the dose received by the workers. The licensee evaluated three processes or methods to re-evaluate the dose received by the workers. The licensee selected a method that combined compartments to recalculate the doses. This method combined the thorax, abdomen, and highest thigh into a combined compartment and applied the dosimeter reading to the combined compartment. The licensee identified occasions where the dose was not from below the worker (where the arm was higher than the thigh). In these cases, the licensee combined thorax, abdomen, and highest arm into a single compartment. Using this method, the licensee recalculated the doses for approximately 185 workers involved and added ~ 86 Rem for this work activity. The licensee updated

the exposure records and notified the affected workers as well as other nuclear power plants of the increased doses for the workers.

Mock-up Review

The licensee requested an opportunity to demonstrate worker position and orientation using a full scale mock-up. On November 14, 2014, the NRC observed the mock-up demonstration. The demonstration focused on two of the three major work functions, machining and welding, as these activities required the longest times and resulted in higher doses. The licensee indicated that the machining and welding activities were similar and used the same equipment but with different attachments. The licensee showed that the machining/welding workers were primarily in a seated position leaning over the work surface facing the primary source of radiation. The licensee indicated that workers occasionally needed to lie down to inspect and observe the material and the position of the tooling. The third major work function was the removal of bolted connections at the base of the CRD housings and associated restraints, and was not included in the demonstration.

After the demonstration, the licensee made a presentation of other activities that the licensee performed. This included mathematical calculations to characterize the significance between the licensee's original dose assessments from the first and second quarter of this year to the dose assessments performed by the licensee after the failure to locate the dosimeters in the highest exposed location of the compartment was recognized. The approach selected by the licensee was to create results for a "virtual" dosimeter as if it was worn on the abdomen, then calculate EDEX using the methods in Regulatory Guide 8.40 with seven dosimeters; head, upper right arm, upper left arm, thorax, abdomen, right thigh, and left thigh. The virtual dosimeter was created by developing an equation. The licensee plotted the summed results of the head, the summed average for the arm, and summed average for the thighs for 216 dosimetry packs as these were all unshielded locations. The licensee applied a polynomial fit to the data then interpolated results for an unshielded chest and unshielded abdomen and established the slope associated with this curve. The licensee used this curve to re-evaluate the dose to each worker and calculated the results for the virtual abdomen dosimeter. The licensee stated that using this new method, the dose to the highest worker was ~ 1800 mrem, which was significantly less than the highest dose previously calculated. Additionally, this method resulted in only 15 workers receiving more than 100 mrem above the values determined during the first and second quarters of 2014. Furthermore, the additional dose added to the total dose for the CRD housing replacement was reduced from an additional ~86 rem to ~8 rem. The inspectors questioned the validity of using the results from all the dosimeters, regardless of worker actions or work activity, to develop the curve to extrapolate virtual abdomen results for workers performing welding/machining activities. The NRC determined that the methods developed by the licensee were not an NRC-approved method of calculating EDEX as required by 10 CFR 20.1201. The licensee's analysis did not change the NRC overall assessment of this issue. Specifically, the licensee's analysis was not an NRC approved method for calculating EDEX.

Analysis

The inspectors identified a performance deficiency in that, the dose to each compartment (or composite compartment) was not measured by locating the dosimeter at the highest exposed portion of the respective compartment. Specifically, the EDEX calculations for the CRD housing replacements resulted in the significant under-reporting

of total dose to many workers and the licensee's procedure failed to incorporate NRC requirements necessary to ensure that the EDEX results are conservative.

This activity was within the licensee's ability to foresee and should have been prevented as the NRC noted the requirements in multiple documents, including Regulatory Issue Summary 2009-09, "Use of Multiple Dosimetry and Compartment Factors in Determining Effective Dose Equivalent from External Radiation Exposures," in 2009 and Regulatory Guide 8.40, "Methods for Measuring Effective Dose Equivalent from External Exposure," in 2010. Additionally, the inspectors shared several vulnerabilities regarding the use of tungsten shield vests when used in industrial settings and non-uniform radiation fields and the application of EDEX shortly before this work activity was initiated. The finding was not subject to traditional enforcement since the incident did not impact the NRC's ability to perform its regulatory function and was not willful.

The inspectors reviewed the guidance in IMC 0612, Appendix E, "Examples of Minor Issues," and did not find any similar examples. The performance deficiency was determined to be of more than minor safety significance in accordance with IMC 0612, Appendix B, "Issue Screening," because it was associated with the program and process attribute of the Occupational Radiation Safety Cornerstone and adversely affected the cornerstone objective of ensuring adequate protection of worker health and safety from exposure to radiation, in that inaccurate radiation monitoring affects the licensee's ability to control and limit radiation exposures.

Since the finding involved occupational radiation safety, the inspectors utilized IMC 0609, Appendix C, "Occupational Radiation Safety Significant Determination Process," to assess its significance.

Specifically, the inspectors determined that the finding did not involve: (1) as low as is reasonably achievable (ALARA) planning and controls; (2) a radiological overexposure; and (3) a substantial potential for an overexposure.

The NRC reviewed the details related to this performance deficiency and determined that they represented deficient program requirements (i.e., inadequate procedures that resulted in program failures) that resulted in a chronic failure to account for exposures that exceeded or could have exceeded 100 mRem whole body from external exposure, per individual. Specifically,

- work activities covered an extended time frame;
- work activities involved many workers;
- there was inadequate health physics oversight of individual worker's radiological exposures; and
- there were inadequate procedures for EDEX dose monitoring.

Consequently, the NRC determined that there was a compromised ability to assess dose and the finding was of potentially greater-than-green safety significance.

Although the licensee has calculated the potential unmonitored dose, the calculations have substantial uncertainties, which are not resolvable. The unmonitored dose involves complexities involving shield vest orientation, worker orientation in the radiation field and other factors.

As described above, the licensee did not include all of the requirements for implementing EDEX when the methods were approved by the NRC and did not provide adequate guidance for the new tungsten shield vests. Consequently, the inspectors identified a cross-cutting aspect in the area of Human Performance – Change Management. Specifically, the leaders did not use a systematic process for evaluating and implementing change so that nuclear safety remains the overriding priority (H.3).

Enforcement

The licensee's methods for calculating EDEX represent two apparent violations.

1. Title 10 CFR 20.1201(c) states, in part, that, "when the external exposure is determined by measurement with an external personal monitoring device, the deep-dose equivalent (DDE) must be used in place of the effective dose equivalent (EDE), unless the EDE is determined by a dosimetry method approved by the NRC." During control rod drive housing replacement work activities at the Palisades Nuclear Plant between February 6 and March 8, 2014, the EDE was not determined by a dosimetry method approved by the NRC. Specifically, the licensee failed to ensure that radiation worker dosimeters (calibrated to the DDE) were located at the highest exposed portion of the respective compartment, a condition of the NRC-approved method for determining EDE.

2. Technical Specification 5.4.1, "Procedures," and Regulatory Guide 1.33, "Quality Assurance Program Requirements," Revision 2, Appendix A, dated February 1978 required that the licensee establish, implement and maintain program procedures for personnel monitoring. Radiation Protection Procedure EN-RP-204, "Special Monitoring Requirements," Revision 6, provides instructions and requirements for the relocation of whole body dosimeters and the use and issuance of dosimeters for Effective Dose Equivalent External (EDEX) monitoring. However, by omitting limitations described in Regulatory Guide 8.40 in Procedure EN-RP-204, the licensee failed to ensure the procedure met the minimum requirements of 10 CFR 20.1201(c) for all practical workers' positions and shielding geometries prior to implementation. Specifically, EN-RP-204 did not contain the requirements to locate the dosimeter at the highest exposed portion of the respective compartment.

The finding and two associated apparent violations were of preliminary White significance (AV 05000255/2014010-01, "Failure to monitor the highest exposed part of the compartment when using EDEX.")

4OA6 Management Meetings

.1 Exit Meeting Summary

An exit meeting for this inspection was conducted with Mr. A. Vitale and other members of the licensee's staff on October 30, 2014. Following this exit meeting, the licensee provided additional information to the NRC staff on November 14, 2014. This additional information is discussed in the "Description" section of Section 2RS4 of this report. This information did not change the NRC's assessment of the finding discussed in this report. The inspectors provided their assessment of the additional information to the licensee. The inspectors confirmed that none of the potential report input discussed was considered proprietary.

ATTACHMENT-1: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

A. Vitale, Site Vice President, Palisades Nuclear Plant
J. Fontaine, Radiation Protection Support Supervisor
D. Watkins, Radiation Protection Manager
A. Williams, General Manager Plant Operations

U.S. Nuclear Regulatory Commission

R. Pedersen, Sr. Health Physicist

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000255/2014010-01	AV	Failure to Monitor The Highest Exposed Part Of The Compartment When Using EDEX. (Section 2RS4)

Closed, and Discussed

None

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 inspectors reviewed the documents in their entirety, but rather, that selected sections of 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.

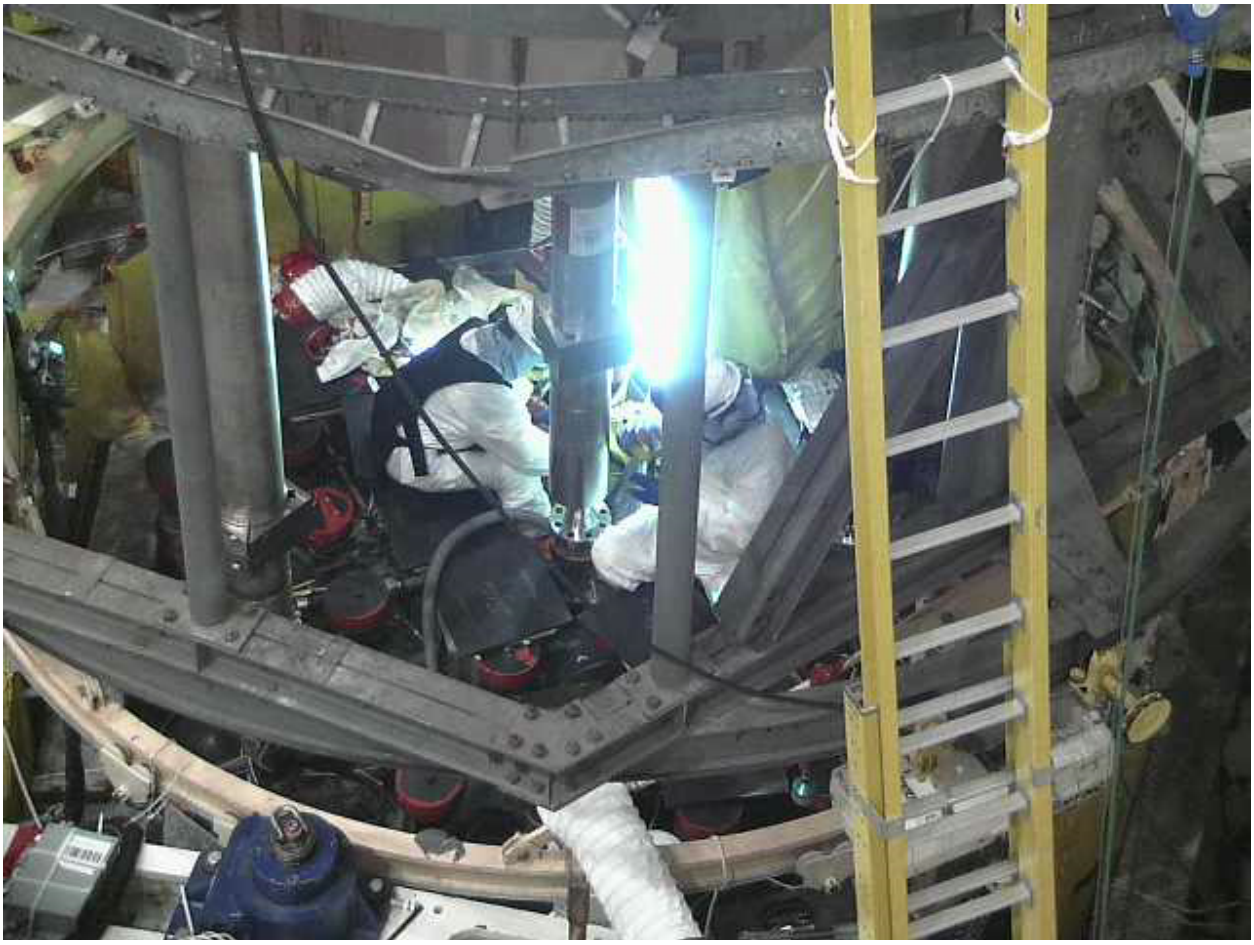
2RS4 Occupational Dose Assessment (71124.04)

- EN-RP-204; Special Monitoring Requirements; Revision 6
- Regulatory Guide 8.40; Methods for Measuring Effective Dose Equivalent from External Exposure; July 2010
- NRC Regulatory Issue Summary 2009-09; Use of Multiple Dosimetry and Compartment Factors in Determining Effective Dose Equivalent from External Radiation Exposures; July 13, 2009
- Arkansas Nuclear One, Unit 1, Grand Gulf Nuclear Station, Unit 1, Indian Point Nuclear Generating Unit Nos. 2 and 3, Pilgrim Nuclear Power Station, River Bend Station Unit 1, Vermont Yankee Nuclear Power Station, and Waterford Steam Electric Station, Unit 3; Application to Use Effective Dose Equivalent Weighting Factors for External Exposure (TAC Nos. MD 1736, MD1739, MD1740, MD1741, MD1742, MD1743, MD1744, and MD1745); October 2, 2006

LIST OF ACRONYMS USED

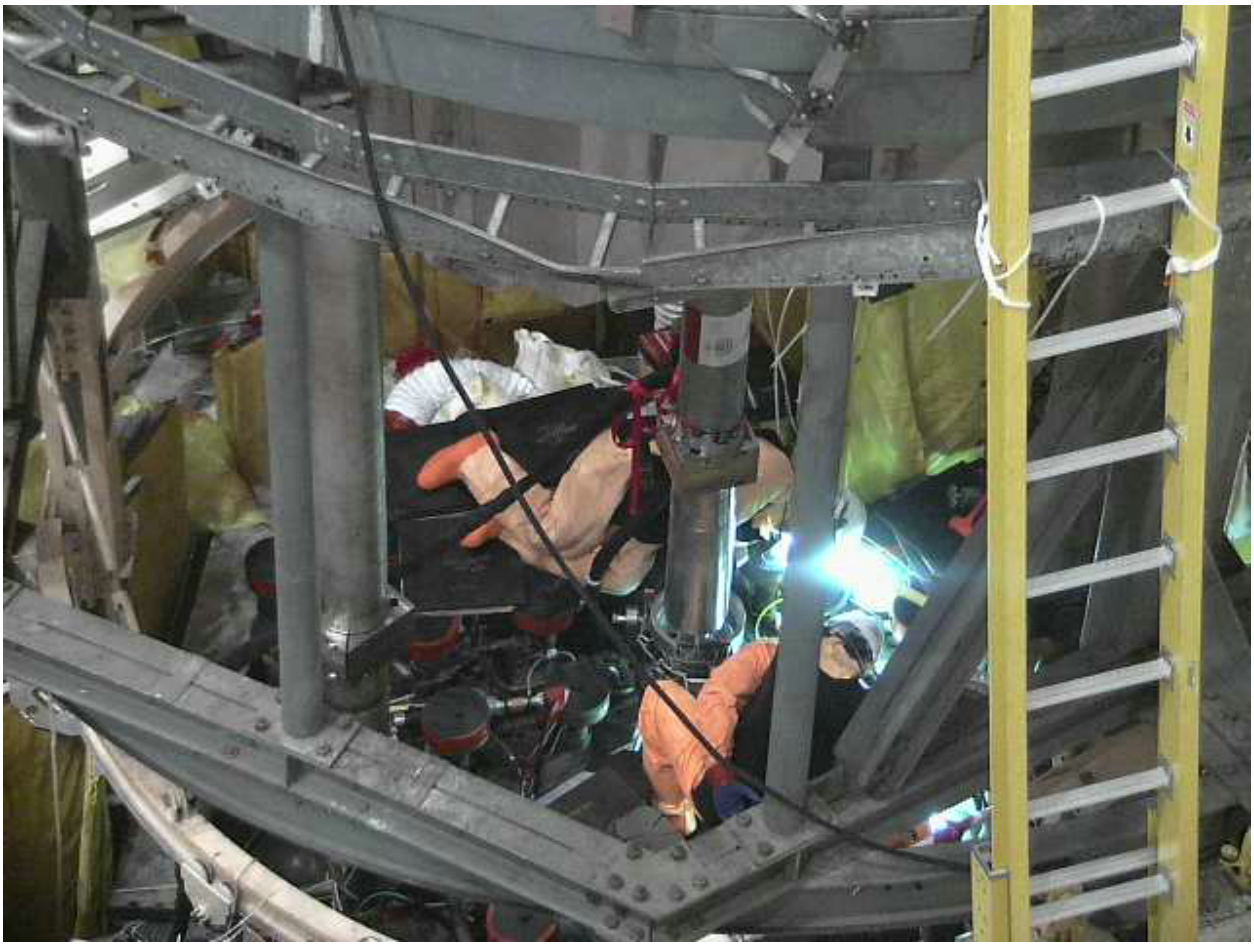
ADAMS	Agencywide Documents Access and Management System
ALARA	As-Low-As-Reasonably-Achievable
ANSI	American National Standards Institute
AV	Apparent Violation
CEDE	Committed Effective Dose Equivalent
CFR	Code of Federal Regulations
CRD	Control Rod Drive
DDE	Deep Dose Equivalent
EDE	Effective Dose Equivalent
EDEX	Effective Dose Equivalent External
IMC	Inspection Manual Chapter
NRC	U.S. Nuclear Regulatory Commission
PARS	Publicly Available Records System
SDP	Significance Determination Process
TEDE	Total Effective Dose Equivalent

Photos



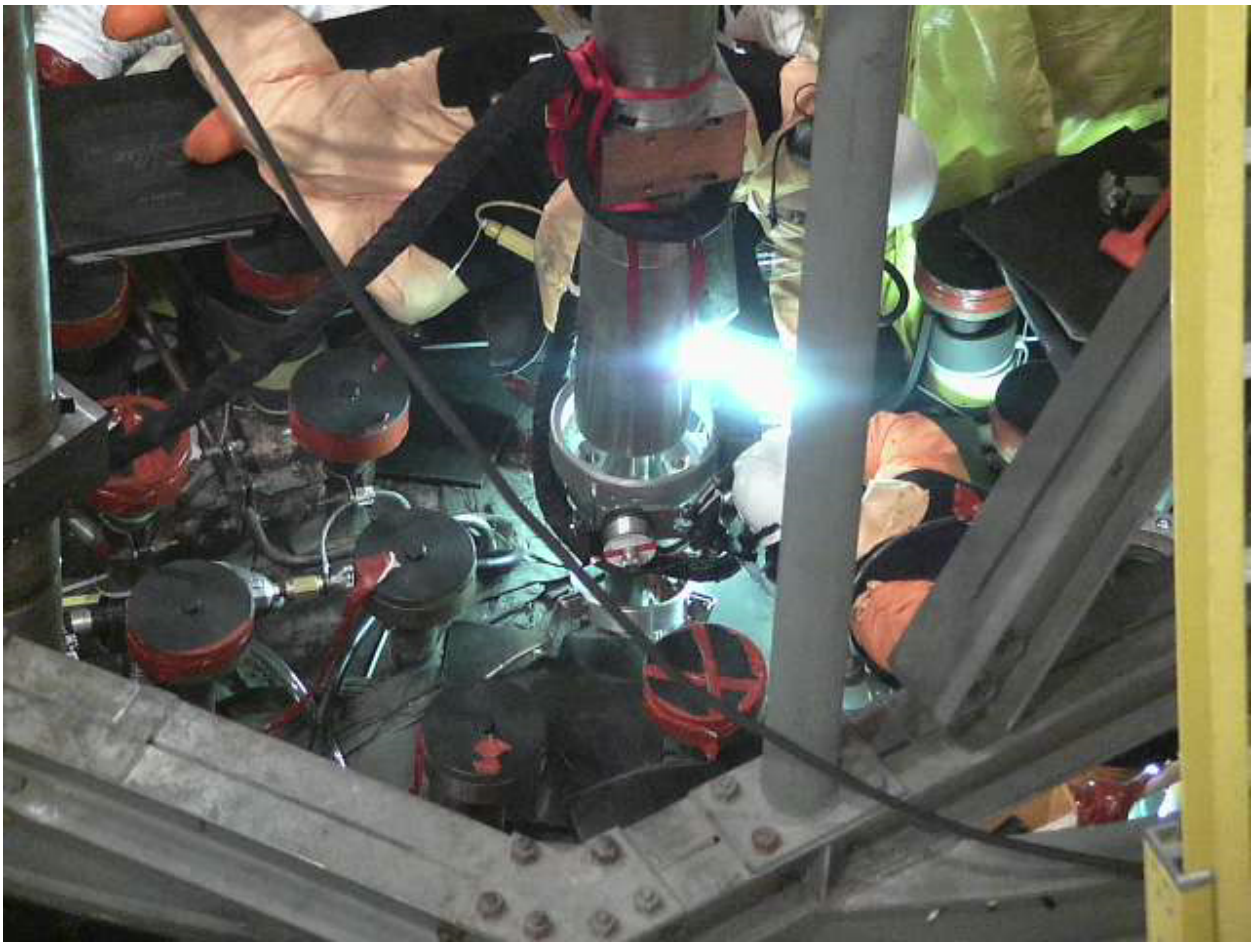
Worker at 9 o'clock position is wearing shield vest with significant gaps at the sides. Notice the seated position negates the protective qualities of the shield vest for the gonads, while the dosimeter for those organs remained shielded by the vest.

Worker at 5 o'clock position appears to be seated without ashield vest.



Worker at 12 o’clock wearing a shield vest with an apparent gap between the front vest and side back vest and the worker is lying down.

Worker at 5 o’clock wearing a shield vest and appears to be seated.



Worker at 12 o’clock wearing a shield vest with a possible gap between the front vest and side back vest and the worker is lying down. Additionally, the shielded vest might be covering the dosimeters on the worker’s right thigh.

Worker at 5 o’clock wearing a shielded vest.

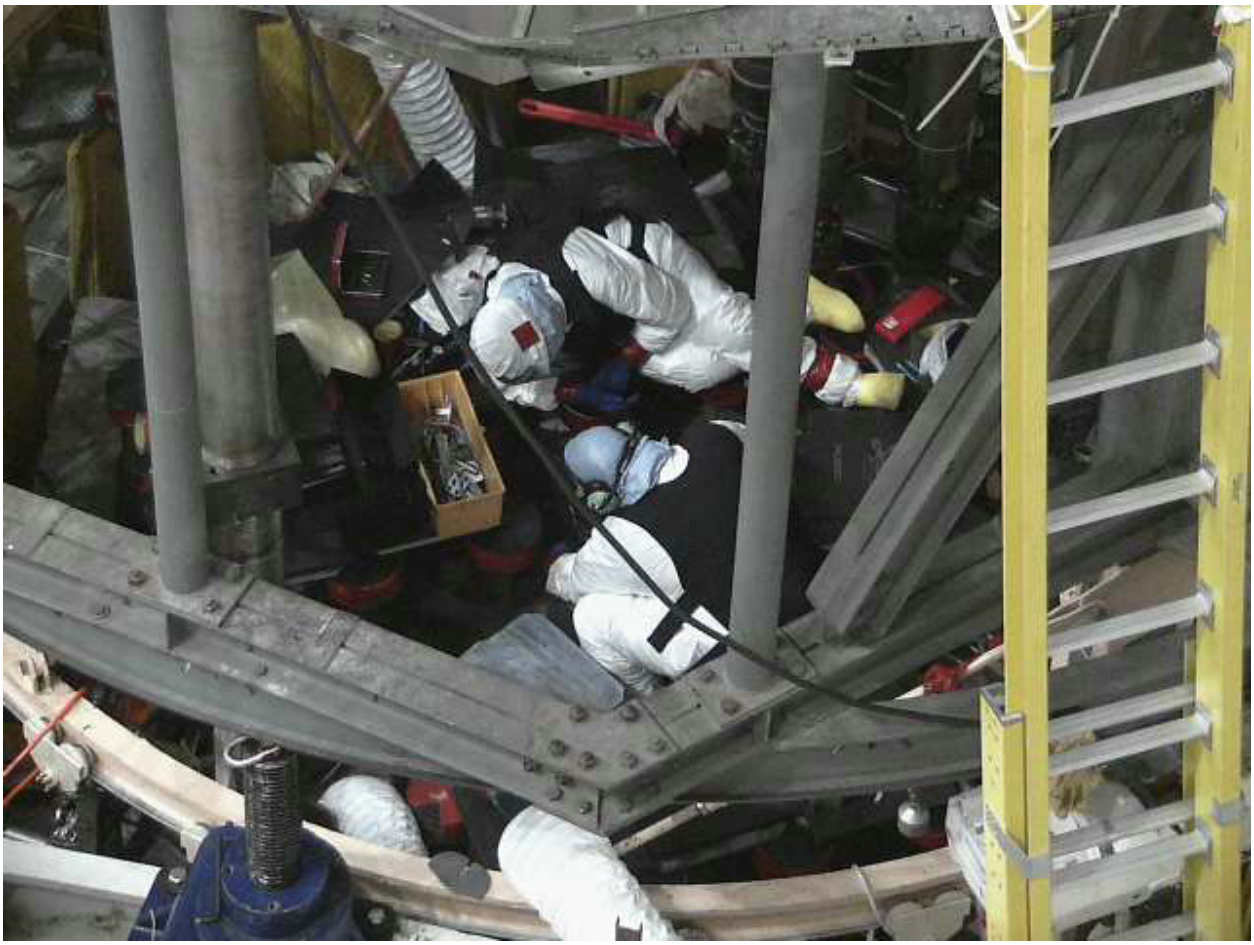
Worker at 11 o’clock not wearing a shield vest and appears to be seated.

Worker at 5 o’clock wearing a shield vest and appears to be seated.

Worker at 11 o’clock wearing a shield vest and appears to be seated.

Worker at 5 o’clock wearing a shield vest and appears to be seated.

Worker at 12 o’clock wearing a shielded vest and appears to be seated. Note that the seated position negates the protective qualities of the shield vest for the gonads. While the dosimeter for those organs remained shield by the vest.



Worker at 12 o’clock wearing a shield vest with an apparent gap between the front vest and side back vest and the worker is lying down.

Worker at 6 o’clock wearing a shield vest with a significant gap between the front vest and side back vest and appears to be seated.

Worker at 12 o’clock wearing a shield vest with an apparent gap between the front vest and side back vest and the worker is lying down.

Worker at 5 o’clock wearing a shield vest with a significant gap between the front vest and side back vest and appears to be seated.

Worker at 7 o’clock not wearing a shield vest and appears to be seated.

Worker at 11 o’clock wearing a shield vest with an apparent gap between the front vest and side back vest and appears to be seated.

Worker at 5 o’clock wearing a shield vest with a significant gap between the front vest and side back vest and standing.

Before the NRC makes its enforcement decision, we request that you either: (1) present to the NRC your perspectives on the facts and assumptions used by the NRC to arrive at the finding and its significance at a Regulatory Conference; or (2) submit your position on the finding to the NRC in writing. In either case, we request that you address why this issue occurred, and what corrective actions were taken.

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 conference is held, it will be open for public observation. The NRC will also issue a press release to announce the conference. If you decide to submit a written response, such submittal should be sent to the NRC within 30 days of the 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 Inspection Manual Chapter 0609.

Please contact Mr. Billy Dickson at (630) 829-9827 within 10 days of the date of this letter to notify the NRC of your intended response to the preliminary White finding and the associated apparent violations. The final resolution of this matter will be conveyed in separate correspondence.

Since the NRC has not made a final determination in this matter, no Notice of Violation is being issued for the inspection finding and associated apparent violations at this time. Please be advised that the number and characterization of the apparent violations described in the enclosed inspection report may change as a result of further NRC review.

In accordance with Title 10, *Code of Federal Regulations* (CFR), Section 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure 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/

Kenneth G. O'Brien, Director
Division of Reactor Safety

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

Enclosure:
Inspection Report 05000255/2014010
w/Attachments 1 and 2

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Letter to Anthony Vitale from Kenneth G. O'Brien dated December 2, 2014.

SUBJECT: PALISADES NUCLEAR PLANT, NRC INSPECTION REPORT 5000255/2014010, PRELIMINARY WHITE FINDING

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