UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, ILLINOIS 60532-4352

April 1, 2022

Mr. Darrell Corbin
Vice President, Operations
Entergy Nuclear Operations, Inc.
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043–9530

SUBJECT: PALISADES NUCLEAR PLANT – TRIENNIAL INSPECTION OF EVALUATION OF CHANGES, TESTS AND EXPERIMENTS BASELINE INSPECTION REPORT 05000255/2022010

Dear Mr. Corbin:

On March 4, 2022, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Palisades Nuclear Plant and discussed the results of this inspection with you and other members of your staff. The results of this inspection are documented in the enclosed report.

No findings or violations of more than minor significance were identified during this inspection.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at http://www.nrc.gov/reading-rm/adams.html and at the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

Richard A. Skokowski Signed by Skokowski, Richard on 04/01/22

Richard A. Skokowski, Chief
Engineering Branch 3
Division of Reactor Safety

Docket No. 05000255
License No. DPR-20

Enclosure:
As stated

cc w/ encl: Distribution via LISTSERV®

Letter to Darrell Corbin from Richard A. Skokowski dated April 1, 2022.

SUBJECT: PALISADES NUCLEAR PLANT – TRIENNIAL INSPECTION OF EVALUATION OF CHANGES, TESTS AND EXPERIMENTS BASELINE INSPECTION REPORT 05000255/2022010

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U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Number:	05000255
License Number:	DPR-20
Report Number:	05000255/2022010
Enterprise Identifier:	I-2022-010-0028
Licensee:	Entergy Nuclear Operations, Inc.
Facility:	Palisades Nuclear Plant
Location:	Covert, MI
Inspection Dates:	February 23, 2022 to March 04, 2022
Inspectors:	M. Gangewere, Reactor Inspector M. Holmberg, Senior Reactor Inspector G. O'Dwyer, Reactor Engineer A. Shaikh, Senior Reactor Inspector R. Trelka, Reactor Inspector
Approved By:	Richard A. Skokowski, Chief Engineering Branch 3 Division of Reactor Safety

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting a triennial inspection of evaluation of changes, tests and experiments baseline inspection at Palisades Nuclear Plant, in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to https://www.nrc.gov/reactors/operating/oversight.html for more information.

List of Findings and Violations

No findings or violations of more than minor significance were identified.

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
URI	05000255/2022010-01	Inadequate Evaluation for Revised Main Steam Line Break (MSLB) Analysis	71111.17T	Open

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

REACTOR SAFETY

71111.17T - Evaluations of Changes, Tests, and Experiments

Sample Selection (IP Section 02.01) (29 Samples)

The inspectors reviewed the following evaluations, screenings, and/or applicability determinations for 10 CFR 50.59 from November 2019, through November 2021.

(1) Evaluation 20-0059 R1, Engineering Change (EC) 76688 R1, V-27A/B/C/D Engineering Safeguards Room Ventilation Fans Modify Control Circuit to Resolve CR-PLP-2016-03456
(2) Evaluation 19-0117, EC 83306, Issue Revised Main Steam Line Break (MSLB) Analysis
(3) Evaluation 20-0058 R1, EC 76687 R1, V-24A/B/C/D Emergency Diesel Generator Room Ventilation Fans Modify Control Circuit to resolve CR-PLP-2016-03456
(4) Evaluation 20-0118 R1, EC 27518 R1, Motor Control Centers (MCCs) 1, 2, 7, & 8 Bucket Replacement
(5) Evaluation 18-0051 R1, EC 55441, Install High Head Auxiliary Feedwater (AFW) Pump P-8D & Shed and Cross-Connect Tank T-2 to T-939
(6) Screening 20-0061, Procedure Change-SOP-28, Fuel Handling System
(7) Screening 20-0076, EC 82400, Palisades Cycle 28 Reload Core Design Review
(8) Screening 20-0114, EC 87802, Actual Lake Michigan Elevation Exceeds Design Basis Elevation
(9) Screening 21-0050, Procedure Change-SOP-27, Spent Fuel Pool
(10) Screening 21-0074, Procedure Change-EM-04-29, Guidelines for Preparing Fuel Movement Plans
(11) Screening 21-0089, Procedure Change-SOP-27, Spent Fuel Pool
(12) Applicability Determination 19-0155, Procedure Change - Offsite Dose Calculation Manual (ODCM)
(13) Applicability Determination 19-0150, Procedure Change-SEP-ISI-PLP-003, Palisades Inservice Inspection Master Program Fifth Interval, American Society of Mechanical Engineers (ASME) Section XI, Division 1
(14) Screening 19-0133, COP-22A, Diesel Fuel Oil Sampling Procedure
(15) Screening 19-0135, SOP-3, Safety Injection and Shutdown Cooling System
(16) Screening 20-0011, EN-CY-122, Diesel Fuel Oil Program
(17) Screening 21-0090, EM-04-58, Spent Fuel Pool Metamic Coupon Surveillance Program

(18) Screening 21-0068, EC-88033, Alternate Shim Configuration for Regulator Mounting Clamps
(19) Screening 20-0006, EC-85325, Alternate Item for Cooling Tower Fan Starters
(20) Applicability Determination 21-0106, EN-DC-330, Fire Protection Program
(21) Applicability Determination 21-0101, FPSP-MO-1, Fire Suppression Water System Valve Alignment and FPSP-QO-2, Fire Protection Sprinkler System Water Flow Switch Alarm Surveillance Test
(22) Screening 20-0065, EC 86779 Service Water Pumps P-7C Pump Column Bracket Replacement
(23) Screening 20-0110, Procedure Change; Emergency Operating Procedure (EOP) Supplement 12, 'A' S/G SGTR Isolation Checklist EOP Supplement 13, 'B' S/G Steam Generator Tube Rupture (SGTR) Isolation Checklist EOP Supplement 17, 'A' S/G ESDE Isolation Checklist EOP Supplement 18, 'B' S/G ESDE Isolation Checklist
(24) Screening 20-0119, LBD Change; LBDCR 20-019
(25) Screening 21-0012, Procedure Change; Addition of the diesel driven AFW pump (P-8D) to EOP-7, EOP-9, and Abnormal Operating Procedure (AOP) Supplement 14 as an alternate source of steam generator inventory
(26) Screening 21-0037, Procedure Change; EN-DC-343, Underground Piping and Tanks Inspection and Monitoring Program
(27) Screening 21-0038, EC 89805, Establish Technical Basis for Entry Conditions to Abnormal Operating Procedure AOP-23, Primary Coolant Leak (and AOP-23 revision)
(28) Applicability Determination 21-0042, EN-DC-308, Safety and Quality Classification of Replacement Parts
(29) Applicability Determination 21-0103, RT-204 - Control Room Envelope Integrated Unfiltered In-Leakage Test

INSPECTION RESULTS

Unresolved Item (Open)	Inadequate Evaluation for Revised Main Steam Line Break (MSLB) Analysis URI 05000255/2022010-01	71111.17T

Description:

On October 4, 2018, the licensee was notified of a vendor (Framatome) identified deficiency in the Modified Barnett Critical Heat Flux (CHF) Correlation used in the Palisades Main Steam Line Break (MSLB) analysis and documented this condition in CR-PLP-2018-04548. Specifically, the licensee document that "the CHF correlation used in the current Palisades MSLB analysis (Modified Barnett CHF Correlation) may be non-conservative for predicting departure from nucleate boiling (DNB). The Palisades MSLB analysis (Final Safety Analysis Report (FSAR) 14.14) is based on the NRC approved Framatome methodology in EMF-2310. The NRC Safety Evaluation for EMF-2310 approved the use of several correlations for predicting CHF during MSLB events. Framatome has re-analyzed the MSLB event using approved CHF correlations with adjusted (when appropriate) correlation limits and has shown that DNB does not occur." The licensee corrective actions included an action for tracking the vendor (Framatome) revision of the topical report EMF-2310, and/or submittal to NRC and NRC approval. Additionally, once the vendor provided an updated Safety Analysis Report (UFSAR), the licensee proposed actions included revision to: the Core Operating Limits Report (COLR), FSAR Table 14.1-1 and Section 14.14 to be consistent with updated analysis of record.

On September 6, 2019, in Safety Evaluation (SE) No. 19-0117 the licensee evaluated and accepted a revised MSLB Analysis as implemented by EC-83306 “Issue Revised Main Steam Line Break (MSLB) Departure from Nucleate Boiling (DNB) Analysis.” To support this change, the licensee also implemented changes to Chapter 14 of the UFSAR including Chapter 14.10 “Increase in Steam Flow (Excess Load).” This UFSAR update (Revision 35) included incorporation by reference the supporting vendor report “EMF-2310(P)(A) Revision 1, SRP Chapter 15 Non-LOCA Methodology for Pressurized Water Reactors, Framatome ANP, May 2004.” In SE No. 19-0117, the licensee identified that the MSLB event was analyzed to assess the potential for fuel failure due to a DNB and that a CHF correlation was used in the analysis to obtain the minimum DNB ratio (MDNBR) – the ratio of the heat flux at the predicted core conditions that would result in DNB to the actual heat flux at those conditions. This ratio was verified by the licensee to be above the CHF correlation limit, which includes appropriate uncertainties at an appropriate confidence interval (i.e., 95/95), to ensure the MSLB event does not result in fuel failures due to DNB. The current MSLB Analysis utilized the Modified Barnett CHF correlation to determine the MDNBR (FSAR Section 14.14.2.1) and the associated Modified Barnett DNB Correlation Limit (FSAR Table 14.1-1). The revised MSLB Analysis utilized three CHF correlations (Modified Barnett, Biasi, and HTP) and the associated correlation limits to cover the range of boundary conditions, with a corrected limit used for Modified Barnett that addresses the discovered deficiency (CR-PLP-2018- 04548). The licensee concluded this change did not require prior NRC approval based on evaluation of the eight criteria identified in 10 CFR 50.59. In particular, the licensee determined that this change did not represent a departure from a method of evaluation described in the UFSAR used in establishing the design bases or in the safety analyses. To support this conclusion the licensee stated “Framatome developed a new applicable CHF correlation limit in accordance with methods used for other NRC-accepted correlation limits. A new applicable value was needed as a result of evaluating the new test data. The new value is appropriate for the intended application and within the limitations and conditions of use of the safety evaluation for the EMF-2310 methodology. In lieu of a fixed limit, the new Modified Barnett correlation limit varies with pressure to avoid an overly conservative limit but is at all pressures more conservative (higher) than the existing limit. Therefore, the change is a change to a different method of evaluation that is approved by the NRC for the intended application.”

The Team identified that the change evaluated in SE No. 19-0117 also represented a change associated with application of the elements (e.g., CHF correlations) within the existing vendor NRC approved topical report methodology (EMF-2310(P)(A) Revision 1) that had been incorporated into the license basis. In particular, based on NRC endorsed guidance in NEI 96-07 “Guidelines for 10 CFR 50.59 Implementation,” the three CHF correlations that are the subject of this change, are elements of the NRC approved methodology supporting the DNBR methodology (e.g., EMF-2310(P)(A) Revision 1). However, in SE No. 19-0117, the licensee had not identified these CHF correlations as elements of the methodology, nor provided a basis to support the change from applying one to three CHF correlations to confirm this did not represent a change to an element of the methodology, nor if the change to adopt three CHF correlations resulted in an increase in margins to the MDNBR safety limits. The licensee had applied the revised methodology in Table 2.3 “Summary of MDNBR and FCM/LHR Results” of revision 1 to ANP-3707 “Palisades Cycle 27 Safety Analysis.” Specifically, in Table 2.3, for the “15.1.5 Steam System Piping Failures Inside and Outside Containment,” and “HZP [Hot Zero Power] with LOOP [Loss of Offsite Power]” event, the MDNBR result changed from 1.641 to 3.427 which appeared to represent a gain in margin to the DNBR safety limit. Gaining margin by revising an element of a method of evaluation is

considered to be a non-conservative change and thus a departure from a method of evaluation for purposes of 10 CFR 50.59 as discussed in Sections 3.4 and 4.3.8.1 of NEI 96-07. Therefore, the Team determined that SE 19-0117 did not provide an adequate written basis to demonstrate that the change in application of the elements of the license basis DNBR methodology would not represent a departure from the NRC approved methodology (and thus require NRC approval). Failure to document a written evaluation which provides the bases for the determination that the change, from applying one to three CHF correlations did not require a license amendment pursuant to 10 CFR 50.59 (c)(2) is contrary to 10 CFR 50.59 and represented a licensee performance deficiency.

Violations of 10 CFR 50.59 are dispositioned using the traditional enforcement process instead of the significance determination process (SDP) because they are considered to be violations that potentially impede or impact the regulatory process. In this case, the Team was not able to evaluate/inform the underlying issue with the SDP process because of the subject matter of this change (e.g., vendor proprietary software and codes to assess changes to CHF correlations) which was not amenable to application of the NRC SDP process. Therefore, the Team evaluated the significance of this issue in accordance with the NRC traditional enforcement process. Specifically, in accordance with Section 2.1.3 of the NRC Enforcement Manual, violations of 50.59 are minor if there is no reasonable likelihood that the change would ever require NRC approval. In this case, the Team could not make this determination and therefore this issue is an unresolved item until the licensee completes additional written analysis to demonstrate that the change as evaluated within SE 19-0117 did not require NRC prior approval.

Planned Closure Actions: The Team will review the updated SE 19-0117 after the licensee revises this document, to determine if the issue of concern is a more than minor violation of NRC requirements.

Licensee Actions: The licensee determined this issued did not impact operability and entered this concern into the corrective action program and intend to develop a revision to SE No. 19-0117.

Corrective Action References: CR-PLP-2022-00441, Deficiency Identified in 50.59 Evaluation 19-0117.

EXIT MEETINGS AND DEBRIEFS

The inspectors confirmed that proprietary information was controlled to protect from public disclosure.

On March 4, 2022, the inspectors presented the triennial inspection of evaluation of changes, tests and experiments baseline inspection results to Darrell Corbin, Site Vice President and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.17T	Corrective Action Documents	CA-33 of WT-WTPLP-2020-00002	Corrective Action Generated to Document LBDCR 20-019	04/20/2020
		CR-PLP-2018-01229	Coupon Removal Activity	03/13/2018
		CR-PLP-2018-04548	Framatome Identified Deficiency in the Modified Barnett Critical Heat Flux Correlation Used in the Palisades Main Steam Line Break Analysis	10/04/2018
		CR-PLP-2019-03933	General PAD Quality Issues as Identified in the Past Three PAD Self-Assessment that Have the Potential to Lead to Violation of Licensing or Design Basis Requirements	10/01/2019
		CR-PLP-2019-03935	Engineering Change 63472, "Revise NAI-1149-024, Determination of Direct Shine Doses for Design Basis LOCA for Palisades, to Accommodate Track Alley West Wall Modification for DFS" 50.59 Evaluation Did Not Clearly Document the Software Differences and/or Benchmark Runs between MicroShield 8.03 and MicroShield 5 for the Criterion #8 Response	10/01/2019
		CR-PLP-2019-04880	SE 18-0051 Did Not Evaluate an Additional Manual Operator Action	12/12/2019
		CR-PLP-2020-01376	OSRC Annual Review of Completed PAD Forms for PAD 2019-0134, EC 83004 Air Operated Valve Calculations Update	04/30/2020
		CR-PLP-2021-02800	OSRC Annual Review of Completed PAD Forms for PAD 2020-0086, EN-OP-125, Fire Brigade Drills	11/01/2021
		CR-PLP-2021-03060	Impact Reviews for Fire Protection Program	12/02/2021
		CR-PLP-2021-03118	A Continuing Theme Was Noted with Overall PAD Quality and the Most Common Issue Was PADs that Were Missing Information	12/09/2021
	Corrective Action Documents	CR-PLP-2022-00441	Deficiency Identified in 50.59 Evaluation 19-0117	03/03/2022

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
	Resulting from Inspection			
	Drawings	C-103 SHT 6 Section K-K	Standard MISC. Steel Details Sheet 6, EC-88033 Markup	2
		M-11 Sh. 1	Equipment Location Turbine Building Plan of El. 590'-0"	55
		M-215 Sh. 1	Piping & Instrument Diagram Plant Heading System	103
		M-655 Sh. 1	Piping & Instrument Diagram Radwaste Auxiliary System	78
	Engineering Changes	76688	V-27A/B/C/D Engineered Safeguards Rooms Cooler Fans Modify Control Circuit to Resolve CR-PLP-2016-03456	1
		79725	Engineering Input on Deficiency in Modified Barnett Critical Heatflux Correlation Used in the Palisades MSLB Core Response Analysis (FSAR 14.14)	0
		83306	Issue Revised Main Steam Line Break (MSLB) Departure from Nucleate Boiling (DNB) Analysis	0
	Miscellaneous	18-0051	Safety Evaluation - Engineering Change (EC) 55441, Install High Head AFW Pump P-8D & Shed and Cross-Connect Tank T-2 to T-939	1
		19-0117	Safety Evaluation - Engineering Change (EC) 83306, Issue Revised MSLB Analysis	0
		19-0133	Screening - COP-22A, Diesel Fuel Oil Sampling Procedure	0
		19-0135	Screening - SOP-3, Safety Injection and Shutdown Cooling System	0
		19-0150	Applicability Determination - Procedure Change-SEP-ISI-PLP-003, Palisades Inservice Inspection Master Program Fifth Interval, ASME Section XI, Division 1	0
		19-0155	Applicability Determination - Procedure Change - Offsite Dose Calculation Manual (ODCM)	0
		20-0006	Screening - EC-85325, Alternate Item for Cooling Tower Fan Starters	0
		20-0011	Screening - EN-CY-122, Diesel Fuel Oil Program	0
		20-0058	Safety Evaluation, EC 76687 R1, V-24A/B/C/D Emergency Diesel Generator Room Ventilation Fans Modify Control Circuit to Resolve CR-PLP-2016-03456	1
		20-0059	Safety Evaluation - Engineering Change (EC) 76688 R1,	1

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
			V-27A/B/C/D Engineering Safeguards Room Ventilation Fans Modify Control Circuit to Resolve CR-PLP-2016-03456	
		20-0061	Screening - Procedure Change - SOP-28, Fuel Handling System	0
		20-0065	Screening - Engineering Change (EC) 86779 Service Water Pumps P-7C Pump Column Bracket Replacement	0
		20-0076	Screening - Engineering Change (EC) 82400, Palisades Cycle 28 Reload Core Design Review	0
		20-0110	Screening - Procedure Change; EOP Supplement 12, 'A' S/G SGTR Isolation Checklist EOP Supplement 13, 'B' S/G SGTR Isolation Checklist EOP Supplement 17, 'A' S/G ESDE Isolation Checklist EOP Supplement 18, 'B' S/G ESDE Isolation Checklist	0
		20-0114	Screening - Engineering Change (EC) 87802, Actual Lake Michigan Elevation Exceeds Design Basis Elevation	0
		20-0118	Safety Evaluation - Engineering Change (EC) 27518 R1, MCCs 1, 2, 7, & 8 Bucket Replacement	1
		20-0119	Screening - LBD Change; LBDCR 20-019	0
		21-0012	Screening - Procedure Change; Addition of the diesel driven AFW Pump (P-8D) to EOP-7, EOP-9, and AOP Supplement 14 as an Alternate Source of Steam Generator Inventory	0
		21-0037	Screening - Procedure Change; EN-DC-343, Underground Piping and Tanks Inspection and Monitoring Program	0
		21-0038	Screening - Engineering Change (EC) 89805, Establish Technical Basis for Entry Conditions to Abnormal Operating Procedure AOP-23, Primary Coolant Leak (and AOP-23 Revision)	0
		21-0042	Applicability Determination - EN-DC-308, Safety and Quality Classification of Replacement Parts	0
		21-0050	Screening - Procedure Change - SOP-27, Spent Fuel Pool	0
		21-0068	Screening - EC-88033, Alternate Shim Configuration for Regulator Mounting Clamps	0
		21-0074	Screening - Procedure Change - EM-04-29, Guidelines for Preparing Fuel Movement Plans	0

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		21-0089	Screening - Procedure Change - SOP-27, Spent Fuel Pool	0
		21-0090	Screening - EM-04-58, Spent Fuel Pool Metamic Coupon Surveillance Program	0
		21-0093	Applicability Determination - CEP-UPT-0100 Underground Piping and Tanks Inspection and Monitoring	09/21/2021
		21-0101	Applicability Determination - FPSP-MO-1, Fire Suppression Water System Valve Alignment and FPSP-QO-2, Fire Protection Sprinkler System Water Flow Switch Alarm Surveillance Test	0
		21-0103	Applicability Determination - RT-204 - Control Room Envelope Integrated Unfiltered In-Leakage Test	0
		21-0106	Applicability Determination - EN-DC-330, Fire Protection Program	0
		ANP-3707	Palisades Cycle 27 Safety Analysis Report	0 and 1
		EMF-2310(NP)(A)	SRP Chapter 15 Non-LOCA Methodology for Pressurized Water Reactors	1
		LBDCR 19-009	EC-83306 – Issue Revised MSLB Analysis	09/05/2019
		PLP-RPT-17-00028	Palisades Cycle 27 Principal Plant Parameters	0
		SEP-ISI-PLP-003	Palisades Inservice Inspection Master Program Fifth Interval, ASME Section XI, Division 1	9
		Topic Notes for EC-88411	Topic Notes for EC-88411 Rev 0 Associated with LBDCR 20-019	0
	Procedures	COP-22A	Diesel Fuel Oil Sampling Procedure	38
		EM-04-29	Guidelines for Preparing Fuel Movement Plans	22
		EM-04-58	Spent Fuel Pool Metamic Coupon Surveillance Program	2
		EN-AD-101	NMM Procedure Process	35
		EN-DC-308	Safety and Quality Classification of Replacement Parts	5
		EN-DC-330	Fire Protection Program	9
		EN-DC-343	Underground Piping and Tanks Inspection and Monitoring Program	13
		EN-LI-100	Process Applicability Determination	31
		EN-LI-101	10 CFR 50.59 Evaluations	20
		RT-204	Control Room Envelope Integrated Unfiltered In-Leakage	4

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
			Test	
		SOP-27	Fuel Pool System	73 and 74
		SOP-28	Fuel Handling System	55