energy harbor

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Rod L. Penfield
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440-280-5382

February 22, 2021
L-21-080

10 CFR 50.55a

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject:
Perry Nuclear Power Plant
Docket No. 50-440, License No. NPF-58
Response to Requests for Additional Information Regarding 10 CFR 50.55a Request Numbers VR-3, VR-4, VR-5, VR-6, and VR-7 (EPID numbers L-2021-LLR-0007, L-2021-LLR-0008, L-2021-LLR-0009, L-2021-LLR-0010, and L-2021-LLR-0011)

By letters dated January 28, 2021 (Accession No. ML21028A796), January 29, 2021 (Accession No. ML21031A002), and February 8, 2021 (Accession No. ML21039A409), Energy Harbor Nuclear Corp. submitted 10 CFR 50.55a requests VR-3, VR-4, VR-5, VR-6, and VR-7 to the Nuclear Regulatory Commission (NRC). The requests proposed a one-time extension for certain Perry Nuclear Power Plant valves scheduled for testing during the upcoming spring 2021 refueling outage. By email dated February 18, 2021, the NRC staff requested additional information regarding 10 CFR 50.55a requests VR-3, VR-4, VR-5, VR-6, and VR-7. The Energy Harbor Nuclear Corp. response to the February 18, 2021 NRC request is attached.

There are no regulatory commitments contained in this submittal. If there are any questions or if additional information is required, please contact Mr. Phil H. Lashley, Manager, Fleet Licensing, at (330) 696-7208.

Sincerely,

Penfield, Rod 55166

Penfield, Rod 55166
site vp
I am approving this document
Feb 22 2021 7:19 AM

DocuSign

Rod L. Penfield

Attachments:

1. Response to VR-3 Request for Additional Information
2. Response to VR-4 Request for Additional Information
3. Response to VR-5 Request for Additional Information
4. Response to VR-6 Request for Additional Information
5. Response to VR-7 Request for Additional Information

cc: NRC Region III Administrator
NRC Resident Inspector
NRR Project Manager

The NRC staff request for additional information (RAI) is provided below in bold text and is followed by the Energy Harbor Nuclear Corp. response.

(VR-3) RAI-EMIB-01

In the January 28, 2021 submittal, the licensee proposes a "one-time extension of the test frequency and position verification requirements scheduled to be performed during the spring 2021 refueling outage" for specific valves at PNPP.

- **Please clarify if the proposed extension is a one-time extension of the test frequency <u>for the leakage rate testing</u> and position verification requirements.**

Response:

The one-time test frequency extension is requested for both the leakage rate test frequency requirement (that is, tests shall be conducted at least once every two years) of American Society of Mechanical Engineers (ASME), Operations and Maintenance Code (OM Code), 2012 Edition, Paragraph ISTA-3630(a), and the position verification test frequency requirement (that is, valves with remote position indicators shall be observed locally at least once every two years) of ASME OM Code, 2012 Edition, Paragraph ISTC-3700 and 10 CFR 50.55a(b)(3)(xi).

Each NRC staff request for additional information (RAI) is provided below in bold text and is followed by the Energy Harbor Nuclear Corp. response.

(VR-4) RAI-EMIB-01

In the February 8, 2021 submittal, the licensee requests "a one-time extension of the test frequency requirements scheduled to be performed during the spring 2021 refueling outage" for specific check valves at Perry.

- **Please clarify which test frequencies are being extended. For example, will the quarterly frequency tests for 1E22-F0621 and 1E22-F0622 still be performed on a quarterly basis, or will these also be extended per this request?**

Response

The exercise close (EC) testing for 1E22-F0621 and 1E22-F0622 will continue to be performed during the quarterly pump and valve testing and is not a part of this one-time extension request. A one-time extension of the inservice test frequency requirement for exercise open (EO) testing for valves 1E22-F0621 and 1E22-F0622 is requested. For valves 1M51-F0531A/B, 1M51-F0532A/B, and 1M51-F0618A/B, a one-time extension of the inservice test frequency requirement is being requested for EO and EC testing.

(VR-4) RAI-EMIB-02

With respect to 1E22-F0621 and 1E22-F0622, the licensee states that engineering review of the test results revealed that the valves consistently demonstrated acceptable results. With respect to 1M51-F0531A/B, 1M51-F0532A/B, and 1M51-F0618A/B, the licensee states that a review of surveillance testing pertinent to the 1M51 combustible gas control check valves has revealed that there have been no failures of valves unable to meet acceptance criteria.

- **Please briefly describe the evaluation of test results that support the licensee's determination that the valves will be able to perform their safety function over the requested test interval extension for these valves.**

Response

Typically, during each refueling outage, new valves are given a pre-service test prior to installation into functional locations 1E22-F0621 and 1E22-F0622. The in-situ valves, those that were installed in the functional locations and have been removed, are tested, and discarded. The pre-service test and removal test are both performed to the same acceptance standards. A specialty test rig is constructed with the capability to measure pressure and flow, with minimum flow requirements established to verify that the valve has exercised open at four differential test pressures. The valves must be capable of passing 27.9 standard cubic feet per minute (scfm) at 3.9 psig, 36.3 scfm at 5.2 psig, 45.3 scfm at 6.5 psig, and 55.3 scfm at 9.1 psig. The pre-service test history closely matches the post-removal test history with only minor degradation indicated. Based on the test history listed below, the valves are expected to be operationally ready for another operating cycle.

Pre-Service Testing				Post Removal Testing			
Test Completed Date	**Valve**	**Acceptance Criteria - Min Flow**	**Measured Flow**	**Test Completed Date**	**Valve**	**Acceptance Criteria - Min Flow**	**Measured Flow**
						27.9 scfm	37 scfm
						36.3 scfm	44.0 scfm
					1E22F0621	45.3 scfm	49.5 scfm
						55.3 scfm	59.0 scfm
				5.24.2007		27.9 scfm	37.0 scfm
						36.3 scfm	44.0 scfm
					1E22F0622	45.3 scfm	49.5 scfm
						55.3 scfm	59.5 scfm
		27.9 scfm	38 scfm			27.9 scfm	37.0 scfm
	1E22F0621	36.3 scfm	45 scfm			36.3 scfm	43.5 scfm
		45.3 scfm	50.8 scfm		1E22F0621	45.3 scfm	49.5 scfm
		55.3 scfm	60 scfm			55.3 scfm	59.5 scfm
5.13.2007		27.9 scfm	38.1 scfm	4.7.2009		27.9 scfm	37.5 scfm
	1E22F0622	36.3 scfm	44.9 scfm			36.3 scfm	44.5 scfm
		45.3 scfm	51 scfm		1E22F0622	45.3 scfm	50.5 scfm
		55.3 scfm	60 scfm			55.3 scfm	60.5 scfm
		27.9 scfm	38.0 scfm		1E22F0621	27.9 scfm	39.1 scfm
	1E22F0621	36.3 scfm	44.5 scfm			36.3 scfm	45.5 scfm
		45.3 scfm	51.0 scfm			45.3 scfm	51.0 scfm
		55.3 scfm	60.5 scfm			55.3 scfm	61.0 scfm
2.10.2009		27.9 scfm	38.0 scfm	5.13.2011	1E22F0622	27.9 scfm	35.0 scfm
	1E22F0622	36.3 scfm	44.5 scfm			36.3 scfm	45.5 scfm
		45.3 scfm	51.0 scfm			45.3 scfm	51.0 scfm
		55.3 scfm	60.0 scfm			55.3 scfm	61.5 scfm
		27.9 scfm	39.0 scfm			27.9 scfm	38.0 scfm
1.25.2011	1E22F0621	36.3 scfm	46.0 scfm	4.3.2013	1E22F0621	36.3 scfm	45.0 scfm
		45.3 scfm	52.0 scfm			45.3 scfm	50.5 scfm

Pre-Service Testing				Post Removal Testing			
Test Completed Date	**Valve**	**Acceptance Criteria - Min Flow**	**Measured Flow**	**Test Completed Date**	**Valve**	**Acceptance Criteria - Min Flow**	**Measured Flow**
		55.3 scfm	62.5 scfm			55.3 scfm	61.0 scfm
	1E22F0622	27.9 scfm	39.0 scfm		1E22F0622	27.9 scfm	37.5 scfm
		36.3 scfm	45.0 scfm			36.3 scfm	45.0 scfm
		45.3 scfm	51.5 scfm			45.3 scfm	50.5 scfm
		55.3 scfm	62.0 scfm			55.3 scfm	61.5 scfm
3.4.2013	1E22F0621	27.9 scfm	37.5 scfm	4.14.2015	1E22F0621	27.9 scfm	33.0 scfm
		36.3 scfm	44.5 scfm			36.3 scfm	43.5 scfm
		45.3 scfm	50.5 scfm			45.3 scfm	50.0 scfm
		55.3 scfm	60.5 scfm			55.3 scfm	60.0 scfm
	1E22F0622	27.9 scfm	38.5 scfm		1E22F0622	27.9 scfm	33.5 scfm
		36.3 scfm	45.0 scfm			36.3 scfm	43.5 scfm
		45.3 scfm	51.0 scfm			45.3 scfm	50.0 scfm
		55.3 scfm	61.5 scfm			55.3 scfm	60.5 scfm
4.15.2015	1E22F0621	27.9 scfm	37.5 scfm	3.9.2017	1E22F0621	27.9 scfm	39 scfm
		36.3 scfm	43.9 scfm			36.3 scfm	43 scfm
		45.3 scfm	49.9 scfm			45.3 scfm	50 scfm
		55.3 scfm	59.9 scfm			55.3 scfm	60 scfm
	1E22F0622	27.9 scfm	37.5 scfm		1E22F0622	27.9 scfm	39 scfm
		36.3 scfm	44.1 scfm			36.3 scfm	45 scfm
		45.3 scfm	50.0 scfm			45.3 scfm	48 scfm
		55.3 scfm	60.5 scfm			55.3 scfm	60 scfm
3.9.2017	1E22F0621	27.9 scfm	39 scfm	5.28.2019	1E22F0621	27.9 scfm	36 scfm
		36.3 scfm	43 scfm			36.3 scfm	44 scfm
		45.3 scfm	50 scfm			45.3 scfm	49 scfm
		55.3 scfm	60 scfm			55.3 scfm	59 scfm
	1E22F0622	27.9 scfm	39 scfm		1E22F0622	27.9 scfm	35 scfm
		36.3 scfm	45 scfm			36.3 scfm	43 scfm
		45.3 scfm	48 scfm			45.3 scfm	48 scfm
		55.3 scfm	60 scfm			55.3 scfm	58 scfm
12.13.2018	1E22F0621	27.9 scfm	38 scfm				
		36.3 scfm	44 scfm				
		45.3 scfm	50 scfm				
		55.3 scfm	60 scfm				
	1E22F0622	27.9 scfm	36 scfm				
		36.3 scfm	44 scfm				
		45.3 scfm	50 scfm				
		55.3 scfm	60 scfm				

For valves 1M51-F0531A/B, 1M51-F0532A/B, and 1M51-F0618A/B, the valves are exercised open (EO) and exercised closed (EC) during refueling outages. To perform EO testing, leakage rate monitoring test equipment is used to verify flow greater than 20,000 scfm at a test pressure between 20.0 and 25.0 psig. The measured flowrate is recorded and compared against the acceptance criteria to determine if the valve passed or failed EO testing. To perform EC testing, the hydrogen analyzer channel is selected for the applicable valve and the flowrate is measured using a flowmeter. The measured flowrate is recorded and compared against an acceptance criterion of ≤ 1,000 standard cubic centimeter per minute (sccm) to determine if the valve passed or failed EC testing. The test history is listed below. The valves have passed testing criteria without any recurring preventive maintenance and no record of corrective maintenance.

VR-4 Sample Check Valves - Exercised Open Test Results				
Test Completed Date	Component	Acceptance Criteria Flow Rate	Measured Flowrate	Verification Result
4.13.2007	1M51F0531A	> 20,000 sccm	31,152 sccm	SAT
	1M51F0531B	> 20,000 sccm	33,984 sccm	SAT
	1M51F0532A	> 20,000 sccm	> 20,000 sccm	SAT
	1M51F0532B	> 20,000 sccm	> 20,000 sccm	SAT
	1M51F0618A	> 20,000 sccm	> 20,000 sccm	SAT
	1M51F0618B	> 20,000 sccm	> 20,000 sccm	SAT
3.12.2009	1M51F0531A	> 20,000 sccm	> 28,320 sccm	SAT
	1M51F0531B	> 20,000 sccm	> 28,320 sccm	SAT
	1M51F0532A	> 20,000 sccm	> 125,000 sccm	SAT
	1M51F0532B	> 20,000 sccm	> 125,000 sccm	SAT
	1M51F0618A	> 20,000 sccm	> 125,000 sccm	SAT
	1M51F0618B	> 20,000 sccm	88,600 sccm	SAT
5.3.2011	1M51F0531A	> 20,000 sccm	> 20,000 sccm	SAT
	1M51F0531B	> 20,000 sccm	> 20,000 sccm	SAT
	1M51F0532A	> 20,000 sccm	> 20,000 sccm	SAT
	1M51F0532B	> 20,000 sccm	> 20,000 sccm	SAT
	1M51F0618A	> 20,000 sccm	> 20,000 sccm	SAT
	1M51F0618B	> 20,000 sccm	> 20,000 sccm	SAT
4.15.2013	1M51F0531A	> 20,000 sccm	> 20,000 sccm	SAT
	1M51F0531B	> 20,000 sccm	> 20,000 sccm	SAT
	1M51F0532A	> 20,000 sccm	> 20,000 sccm	SAT
	1M51F0532B	> 20,000 sccm	> 20,000 sccm	SAT
	1M51F0618A	> 20,000 sccm	> 20,000 sccm	SAT
	1M51F0618B	> 20,000 sccm	> 20,000 sccm	SAT
3.26.2015	1M51F0531A	> 20,000 sccm	> 47,200 sccm	SAT
	1M51F0531B	> 20,000 sccm	> 47,200 sccm	SAT
	1M51F0532A	> 20,000 sccm	> 125,000 sccm	SAT
	1M51F0532B	> 20,000 sccm	> 125,000 sccm	SAT

VR-4 Sample Check Valves - Exercised Open Test Results				
Test Completed Date	Component	Acceptance Criteria Flow Rate	Measured Flowrate	Verification Result
	1M51F0618A	> 20,000 sccm	> 125,000 sccm	SAT
	1M51F0618B	> 20,000 sccm	88,800 sccm	SAT
3.16.2017	1M51Fo531A	> 20,000 sccm	> 125,000 sccm	SAT
	1M51F0531B	> 20,000 sccm	> 125,000 sccm	SAT
	1M51F0532A	> 20,000 sccm	> 125,000 sccm	SAT
	1M51F0532B	> 20,000 sccm	> 125,000 sccm	SAT
	1M51F0618A	> 20,000 sccm	> 125,000 sccm	SAT
	1M51F0618B	> 20,000 sccm	> 125,000 sccm	SAT
3.22.2019	1M51F0531A	> 20,000 sccm	> 125,000 sccm	SAT
	1M51F0531B	> 20,000 sccm	> 125,000 sccm	SAT
	1M51F0532A	> 20,000 sccm	> 125,000 sccm	SAT
	1M51F0532B	> 20,000 sccm	> 125,000 sccm	SAT
	1M51F0618A	> 20,000 sccm	> 125,000 sccm	SAT
	1M51F0618B	> 20,000 sccm	> 125,000 sccm	SAT

VR-4 Sample Check Valve - Exercised Closed Test Results				
Test Completed Date	Component	Acceptance Criteria Flow Rate	Measured Flowrate	Verification Result
4.3.2007	1M51F0531A	<= 1000 sccm	0 sccm	SAT
	1M51F0531B	<= 1000 sccm	0 sccm	SAT
	1M51F0532A	<= 1000 sccm	0 sccm	SAT
	1M51F0532B	<= 1000 sccm	0 sccm	SAT
	1M51F0618A	<= 1000 sccm	0 sccm	SAT
	1M51F0618B	<= 1000 sccm	0 sccm	SAT
2.24.2009	1M51F0531A	<= 1000 sccm	0 sccm	SAT
	1M51F0531B	<= 1000 sccm	0 sccm	SAT
	1M51F0532A	<= 1000 sccm	0 sccm	SAT
	1M51F0532B	<= 1000 sccm	0 sccm	SAT
	1M51F0618A	<= 1000 sccm	0 sccm	SAT
	1M51F0618B	<= 1000 sccm	0 sccm	SAT
4.19.2011	1M51F0531A	<= 1000 sccm	< 200 sccm	SAT
	1M51F0531B	<= 1000 sccm	< 200 sccm	SAT
	1M51F0532A	<= 1000 sccm	< 200 sccm	SAT
	1M51F0532B	<= 1000 sccm	< 200 sccm	SAT
	1M51F0618A	<= 1000 sccm	< 200 sccm	SAT
	1M51F0618B	<= 1000 sccm	< 200 sccm	SAT
3.21.2013	1M51F0531A	<= 1000 sccm	0 sccm	SAT
	1M51F0531B	<= 1000 sccm	0 sccm	SAT
	1M51F0532A	<= 1000 sccm	0 sccm	SAT
	1M51F0532B	<= 1000 sccm	0 sccm	SAT

VR-4 Sample Check Valve - Exercised Closed Test Results				
Test Completed Date	Component	Acceptance Criteria Flow Rate	Measured Flowrate	Verification Result
	1M51F0618A	<= 1000 sccm	0 sccm	SAT
	1M51F0618B	<= 1000 sccm	0 sccm	SAT
3.10.2015	1M51F0531A	<= 1000 sccm	300 sccm	SAT
	1M51F0531B	<= 1000 sccm	100 sccm	SAT
	1M51F0532A	<= 1000 sccm	100 sccm	SAT
	1M51F0532B	<= 1000 sccm	200 sccm	SAT
	1M51F0618A	<= 1000 sccm	0 sccm	SAT
	1M51F0618B	<= 1000 sccm	0 sccm	SAT
3.5.2017	1M51Fo531A	<= 1000 sccm	0 sccm	SAT
	1M51F0531B	<= 1000 sccm	0 sccm	SAT
	1M51F0532A	<= 1000 sccm	0 sccm	SAT
	1M51F0532B	<= 1000 sccm	0 sccm	SAT
	1M51F0618A	<= 1000 sccm	0 sccm	SAT
	1M51F0618B	<= 1000 sccm	0 sccm	SAT
2.11.2019	1M51F0531A	<= 1000 sccm	0 sccm	SAT
	1M51F0531B	<= 1000 sccm	0 sccm	SAT
	1M51F0532A	<= 1000 sccm	0 sccm	SAT
	1M51F0532B	<= 1000 sccm	0 sccm	SAT
	1M51F0618A	<= 1000 sccm	0 sccm	SAT
	1M51F0618B	<= 1000 sccm	0 sccm	SAT

Each NRC staff request for additional information (RAI) is provided below in bold text and is followed by the Energy Harbor Nuclear Corp. response.

(VR-5) RAI-EMIB-01

In the January 28, 2021 submittal, the licensee discusses a proposed alternative to the 48-month required test interval by the ASME OM Code for relief valves 1C41-F0029B and 1E51-F0018. The IST Program Plan and the ASME OM Code, Appendix I, "Inservice Testing of Pressure Relief Devices in Light-Water Reactor Nuclear Power Plants," subsection I-1350, "Test Frequency, Classes 2 and 3 Pressure Relief Valves," paragraph (a), 10-Yr Test Interval," indicate a 10-year test interval. Later in the submittal, the licensee references a 10-year test interval.

- **Please clarify the 48-month test interval that is being discussed in the submittal.**

Response

American Society of Mechanical Engineers (ASME), Operation and Maintenance of Nuclear Power Plants Code (OM Code), 2012 Edition, Mandatory Appendix I, Subparagraph I-1350(a), requires in part that a minimum of 20 percent of the valves from each valve group be tested within any 48-month interval. A one-time extension of the 48-month test interval for valves 1C41-F0029B and 1E51-F0018 from March of 2021 until the next refueling outage in the spring of 2023 is being requested.

ASME OM Code, 2012 Edition, Mandatory Appendix I, Subparagraph I-1350(a) imposes an additional requirement that the test interval for any installed valve shall not exceed 10 years. A discussion of this requirement is provided for information only in Section 5, "Proposed Alternative and Basis for Use," of the request but no relief is being requested from the 10-year test interval requirement.

(VR-5) RAI-EMIB-02

The licensee discusses valves 1C41-F0029B and 1E51-F0018 both being in groups of two.

- **Please discuss the test results and performance of the other valves in these groups in support of the proposed extension of the test interval for 1C41-F0029B and 1E51-F0018.**

Response

Valve Group 1 consists of two valves, standby liquid control pump A relief valve (1C41-F0029A), and standby liquid control pump B relief valve (1C41-F0029B).

Valve Group 2 consists of two valves, low pressure core spray pump discharge line relief valve (1E21-F0018), and reactor core isolation cooling (RCIC) turbine lube oil

cooler relief valve (1E51-F0018) that discharges when open to the auxiliary building clean radiological waste sump.

Valve group 1 and 2 set pressure testing results are provided in the tables below for the first valve actuation.

VR-5 Valve Group 1 Test Results					
Test Completed Date	Component	Valve Serial Number	Test Type	Acceptance Criteria (psig)	Lift Pressure (psig)
2.28.2009	1C41-F0029A	8	Post Removal	1343 to 1525	1434.9 (SAT)
4.22.2011	1C41-F0029A	2	Post Removal	1343 to 1525	1393.9 (SAT)
3.26.2013	1C41-F0029B	4	Post Removal	1343 to 1525	1412 (SAT)
3.13.2017	1C41-F0029A	8	Post Removal	1343 to 1525	1368.9 (SAT)

VR-5 Valve Group 2 Test Results					
Test Completed Date	Component	Valve Serial Number	Test Type	Acceptance Criteria (psig)	Lift Pressure (psig)
4.3.2009	1E51-F0018	2	Post Removal	145.5 to 154.5	146.9 (SAT)
3.17.2009	1E21-F0018	1	Post Removal	567.5 to 602.5	600 (SAT)
4.5.2013	1E21-F0018	2	Post Removal	567.5 to 602.5	590.4 (SAT)
3.16.2017	1E51-F0018	5	Post-Removal	145.5 to 154.5	88.3 (UNSAT)
10.13.2017	1E21-F0018	1	Post-Removal	567.5 to 602.5	546.5 (UNSAT)

During RCIC system operation a small amount of RCIC pump discharge flow is directed to the RCIC turbine lube oil cooler before being returned to the RCIC pump suction. Relief valve 1E51-F0018 is located on this pipeline downstream of a pressure control valve and upstream of the RCIC turbine lube oil cooler.

If 1E51-F0018 were to lift low, water would be diverted from the RCIC lube oil cooler. There is a RCIC turbine oil cooler outlet high temperature alarm on the cooler that would actuate if temperature were greater than 160 degrees Fahrenheit, and this condition would be identified. Even with the low lift pressure for this valve, no RCIC lube oil cooler temperature alarms, and no step increases in the auxiliary building clean radiological waste drain sump were noted during RCIC pump operation.

The group testing history shows the valves did not lift above the set pressure range, assuring the piping integrity would not be challenged.

Each NRC staff request for additional information (RAI) is provided below in bold text and is followed by the Energy Harbor Nuclear Corp. response.

(VR-6) RAI-EMIB-01

With respect to the valves listed in the VR-6 request, the licensee states that based on several years of valve test history and other information for the specific listed valves, there is reasonable assurance that the valves will remain operationally ready until the 2023 refueling outage.

- **Please briefly describe the evaluation of test results that support the licensee's determination that the valves will be able to perform their safety function over the requested test interval extension for these valves.**

Response

0P42-F0260A/B, 0P42-F0265A/B

Diagnostic testing results and trace analysis for 0P42-F0260A and 0P42-F0265A in 2020 were used to make the determination for these valves.

Ten years of inservice testing history for 0P42-F0260B and 0P42-F0265B, as well as review of similar valves in similar applications were also used to make the determination. The system restoration section of the inservice test instruction for these valves contain a conditional statement to return the water chemistry to specification by flushing the system following exercise open and exercise close testing. The past test performances show flushing was performed. The elevated conductivity indicates the valves exercised to the open position, allowing raw water to interface with the controlled chemistry portion of the system.

The conductivity specification is substantially less than a raw water system. The elevation in conductivity followed by return to specification provides positive indication of stem-to-disc integrity of the valves and that they are fully seated. These valves are 10-inch butterfly valves that are used in other functional locations in the system with no issues noted. Conductivity results and the use of engineering judgment, when compared to the performance of similar valves, provides reasonable assurance the valves will perform their safety function.

1B21-F0001, 1B21-F0002

Installed temperature monitoring, the last five performances of the reactor pressure vessel leakage test, and valve design were used to make the determination. Valves

1B21-F0001 and 1B21-F0002 are both motor operated valves (MOVs) in series in the same service application and condition. The use of performance history for 1B21-F0001 and the valve design has been considered for 1B21-F0002 history. Recorder 1H13-R614, point 20, records the temperature of the vent piping downstream of 1B21-F0001 and 1B21-F0002. Closing valve 1B21-F0001 during the reactor coolant system leakage pressure test establishes the air volume for performance of the test. There have been no temperature issues or difficulty in establishing reactor pressure vessel (RPV) leakage test pressure. The valve design is similar to a stop check, where the stem is not attached to the disc. The actuator moving in the closed direction pushes the disc into the seat. The failure mode of the disc stuck open is deemed low. Thus, there is reasonable assurance the valves will perform their safety function in the closed direction.

1C11-F0010, 1C11-F0011, 1C11-F0180, 1C11-F0181

A supplemental position indication test in the closed direction to address the concerns of Industry Event Notification 85-72, Uncontrolled Leakage of Reactor Coolant Outside Containment, was developed for these valves. The last three testing results, over a seven year period, showed the valves were satisfactorily exercised to the closed position to perform their safety function.

1E12-F0039A, 1E12-F0039B, 1E12-F0039C, 1E21-F0007, 1E22-F0036

Historical plant operating experience, diagnostic testing, field observations, and procedure changes were used to make the determination. On April 9, 2009, the stem separated from the disc of similar valve, 1E12-F0010. The stem was found rotating 360-degrees with a stem travel of approximately 18 inches. As part of the extent of condition for this event, these five manual valves had ultrasonic testing performed that determined the valve stems were intact. System operating procedures were revised to include a limit to the torque applied to each valve when closing it. When opening and closing these manual valves in subsequent outages, 360-degree stem travel has not been noted since the 2009 event for any valve. Thus, there is reasonable assurance the valves will perform their safety function in the open direction.

1E12-F0047A, 1E12-F0047B

Ten years of quarterly pump and valve surveillances show these valves passed a minimum required amount of flow in conjunction with proper light indication. The test results show there is reasonable assurance the valves will perform their safety function in the open direction.

1E12-F0073A, 1E12-F0073B, 1E12-F0074A, 1E12-F0074B, 1E12-F0037A, 1E12-F0037B

Ten years of local leak rate testing data was reviewed for these valves. The containment isolation valves 1E12-F0073A, 1E12-F0073B, 1E12-F0037A, and 1E12-F0037B have passed the acceptance criteria without exception. No intrusion of water

from the test boundary valves 1E12-F0074A and 1E12-F0074B during conduct of the local leak rate tests was noted during this timeframe. The test history shows there is reasonable assurance the valves will perform their safety function in the closed direction.

1E21-F0001

Ten years of quarterly pump and valve surveillances, leakage testing, and diagnostic testing was used to make this determination. A minimum amount of flow in conjunction with proper light indication has been observed over this timeframe. The test results show the valve performed its safety function in the open direction. Leakage testing results during this timeframe passed the 1 gallon per minute (gpm) acceptance criterion. Additionally, MOV diagnostic testing performed on the valve show satisfactory results. These tests provide reasonable assurance the valve will perform its safety function in the closed direction.

1E51-F0004, 1E51-F0005, 1E51-F0025, 1E51-F0026

Reactor Core Isolation Cooling (RCIC) operability testing and engineering judgement was used to make this determination. Valves 1E51-F0004 and 1E51-F0005 are located on the RCIC turbine exhaust drain pot. Valves 1E51-F0025 and 1E51-F0026 are located on the RCIC steam line drain pot. There is a high level alarm on both drain pots when the level reaches the midrange of the drain pot. The RCIC system low pressure operability test is performed at least once every 24 months and after maintenance. At the conclusion of the refueling outage, plant data shows both alarms actuated while the system was idle, and condensation began filling the drain pot level during system warmup and RCIC start. The two high level alarms cleared when they automatically opened during the conduct of the 24-month test, thus proving stem-to-disc integrity. The second of the valves in series, 1E51-F0005 and 1E51-F0026, are similar in design and service application to the first valve in series. Thus, based on 10 years of satisfactory testing, there is reasonable assurance the valves will perform their safety function in the open and closed directions.

1G42-F0080

Suppression Pool Clean-Up (SPCU) system operability testing over the last 10 years was used to make this determination. When the suppression pool demineralizer is backwashed, a flow value on a local flow indicator is observed to obtain 83 gpm from the condensate header with 1G42-F0080 closed. There have been no issues noted during this evolution, which is performed approximately every year and a half. Additionally, the valve is open and closed during normal SPCU operations when the system is in service with no issues noted. Thus, based on 10 years of satisfactory testing, there is reasonable assurance the valve will perform its safety function in the closed direction.

1M14-F0065 and 1M14-F0070

Ten years of inservice testing data, plant operation history, and local leak rate testing history for similar valves was used to make the determination. In the refuel mode, both valves open to provide airflow with a readout on the airflow control center. The ability to establish proper flow establishes the stem-to-disc integrity of these valves. The valve is returned to the closed position with a spring. These valves have passed all exercise close and fail-safe testing to date.

Additionally, these valves are 36-inch Henry Pratt Model 1200 valves, which are the same manufacturer and model as the larger 42-inch containment isolation valves 1M14-F0045 and 1M14-F0085. Valves 1M14-F0065 and 1M14-F0070 are similar to the containment isolation valves in that they are not permitted to be opened in modes 1, 2, and 3, and serve similar isolation functions in the same environment in containment. The containment isolation valves are tested at least once every 184 days and have exhibited good leakage performance history with an ability to maintain test pressure. The maintenance strategy for all four valves is identical in that air drop test and calibration is performed on a nominal interval of once every third refueling outage, with a rebuild of the actuator as required. Neither containment isolation valve actuator has been rebuilt in five years while maintaining good performance history. Based on exercise close testing, fail-safe testing, and leakage data for nearly identical valves with a similar maintenance strategy, there is reasonable assurance these valves will perform their safety function in the closed direction.

1N22-F0420A/B/C/D

Ten years of local leak rate testing history of the main steam isolation valves (MSIVs) was used to make the determination. The successful capability to establish backpressure on the outboard MSIVs over the last 10 years show these valves closed. Since the valves are identical and in the same service applications, this gives additional confidence into performance for the group. The MSIV local leak rate testing demonstrates the valves will perform their safety function in the closed direction.

(VR-6) RAI-EMIB-02

For some valves listed in the VR-6 request, the licensee states that valve obturator position is confirmed by verifying that remote position indication accurately reflects valve "stem travel" direction as observed locally. The staff notes that stem travel will not verify the remote position indicating lights if the valve stem-disc connection has separated.

- **Please describe an appropriate method to verify the valve remote indicating lights as required in paragraph ISTC-3700, "Position Verification Testing," of the ASME OM Code (2012 Edition) with the condition in 10 CFR 50.55a(b)(3)(xi).**

Response

The remote indicating lights are evaluated during the valve test to ensure the remote indicating lights accurately reflect valve position to fully meet requirement of ASME OM Code-2012, Subsection ISTC-3700. For example, a successful local leak rate test of valve 1E12-F0073A proves the valve obturator is in the closed position but the ISTC-3700 requirement would not be fully met unless the indicating lights agreed with expected valve position.

(VR-6) RAI-EMIB-03

Some valves listed in the VR-6 request are stated as being passive but also are containment isolation valves.

- **Please explain the basis for specifying a valve as passive that has a safety function to close.**

Response

A total of four valves are categorized as passive valves that have a containment isolation function. They are 1E12-F0037A, 1E12-F0037B, 1E12-F0073A, and 1E21-F0001.

1E12-F0037A/B

These normally closed valves have a passive safety function in the closed direction as containment isolation valves. The containment isolation function of the valves is required in modes 1, 2, and 3. The valves have a non-safety opening function to allow the RHR to provide upper containment pool and spent fuel pool cooling/makeup as a backup to the fuel pool cooling and clean-up (FPCC) system. The valves also have a non-safety open function as an alternate flowpath for shutdown cooling when vessel water clarity needs to be improved. The valves have automatic closure signals on high RHR room temperature, reactor pressure vessel low level 3, or RPV pressure above 135 pounds per square inch gauge (psig). The valves are prohibited from opening with any of these conditions present. There is no reasonable scenario under which the valves would be taken out of its safety position during the timeframe for which their safety closure functions are required.

1E12-F0073A

The valve has a passive safety function in the closed direction as a containment isolation valve. The valve has no automatic functions. The valve has non-safety functions in the open direction for filling and venting the residual heat removal (RHR) system, depressurizing RHR A heat exchangers and heat exchanger outlet piping and draining the RHR A loop during shutdown periods. Given that the valve is normally closed and must remain closed to perform its safety function, has no automatic

functions, and is opened only during controlled RHR operations, the valve can be considered passive.

1E21-F0001

The valve has a passive safety function to remain in the open direction to provide a flowpath for the low pressure core spray pump suction. Since the control switch for the valve is normally key-locked in the open position, the valve requires no automatic signal for initiation. The valve has a safety function in the closed direction to provide containment isolation for penetration P103, but the emergency core cooling system (ECCS) suction lines are normally filled with water on both the inboard and outboard side of containment, thereby forming a water seal to the containment environment. The valve is open during post-loss of cooling accident conditions to supply a water source for the ECCS pumps. Since a break in an ECCS line need not be considered in conjunction with a design basis accident (DBA), the only possible situation requiring this valve to be closed during a DBA is an unacceptable leakage in an emergency core cooling system. However, because these ECCS systems are constantly monitored for excessive leakage, this is not a credible event.

Each NRC staff request for additional information (RAI) is provided below in bold text and is followed by the Energy Harbor Nuclear Corp. response.

(VR-7) RAI-EMIB-01

In the January 29, 2021 submittal, the licensee states that "From 2003 to present, the leakage tests performed for all four check valves has met the acceptance criterion."

- **Please provide specific testing results (for example, a table indicating dates of tests and results for each valve) that illustrate the test history with sufficient detail to support an extension of the test interval until the 2023 refueling outage.**

- **Clarify if the test results mentioned are inclusive of the three types of IST tests specified in the IST Program Plan.**

Response

The three types of tests for these valves are exercise open, exercise close, and water leak rate. Exercise open testing will continue to be performed during quarterly pump and valve testing and is not a part of this request.

Water leak rate testing satisfies the exercise close test requirements of the Inservice Testing Program. The water leak rate acceptance criterion is less than or equal to 200 gallons per minute (gpm) per feedwater penetration when tested at greater than or equal to 1.1 P_a, where P_a is the limit for the peak containment pressure for the design basis loss of coolant accident, and was established in a commitment on March 4, 1999 (Accession No. ML20207K094).

As stated in the January 29, 2021 request, the leakage tests for all four check valves from 2003 to present has met the acceptance criterion. Results from 2003 to 2009 are based on a historical calculation that generated two acceptance curves that the as-found leakage was then compared to and determined to be satisfactory.

However, the most recent refueling outage (RFO) test results dating back to 2011 are shown in the following table. Other than one valve that tested unusually high during the 1R16 refueling outage, test results have demonstrated 30 percent margin or greater to the 200 gpm leak rate acceptance criterion.

Therefore, based on the recent test history, there is reasonable assurance that the four valves in the request will remain operationally ready until the 2023 refueling outage.

RFO - Year	Component ID	Calculated Leakage (gpm)
1R13 - 2011	1B21-F032A	99.5
	1N27-F559A	139
	1B21-F032B	26.0
	1N27-F559B	43.5
1R14 - 2013	1B21-F032A	44.03
	1N27-F559A	100.96
	1B21-F032B	97.76
	1N27-F559B	36.35
1R15 - 2015	1B21-F032A	41.96
	1N27-F559A	103.24
	1B21-F032B	92.9
	1N27-F559B	66.2
1R16 - 2017	1B21-F032A	14.9
	1N27-F559A	52.48
	1B21-F032B	189.9
	1N27-F559B	44.8
1R17 - 2019	1B21-F032A	35.95
	1N27-F559A	102.54
	1B21-F032B	96.09
	1N27-F559B	32.41

(VR-7) RAI-EMIB-02

The January 29, 2021 submittal specifies under Section 2 that the 2012 Edition, Subsection ISTD, "Preservice and Inservice Examination and Testing of Dynamic Restraints (Snubbers) in Light-Water Reactor Nuclear Power Plants," of the ASME OM Code is applicable to the VR-7 request. In that Subsection ISTD is applicable to dynamic restraints (snubbers), this reference appears to be in error.

- **Please correct this reference as appropriate.**

Response

The reference was in error and the applicable code edition and addenda is the American Society of Mechanical Engineers Operation and Maintenance of Nuclear Power Plants Code, 2012 Edition.

(VR-7) RAI-EMIB-03

The NRC staff compared the licensee's submittal to the version of the IST Program Plan available to the NRC staff (ADAMS Accession No. ML20045E972) and noted apparent differences between the submittal and the IST Program Plan. Please confirm the information with respect to the differences noted below:

- **All four check valves in the request are listed as Valve Category AC in the IST Program Plan, but Valve Category C in the submittal.**

- **The IST Program Plan indicates these four check valves are subject to the following test requirements: exercise open (quarterly), exercise closed (refueling outage), and "LD" (Other Category A valves requiring seat leakage tests per the OM Code). The proposed alternative requests a one-time extension of check valve exercise testing scheduled for the spring 2021 refueling outage. Please clarify which of the three tests are being requested for extension by the proposed alternative.**

Response

The four feedwater check valves are Category C valves since they are self-actuating, as well as Category A since seat leakage is limited to a specific maximum amount in the closed direction. Valves with these characteristics are designated AC in the Perry Nuclear Power Plant IST Program.

As stated previously, the exercise open testing will continue to be performed during quarterly pump and valve testing and is not a part of this request. A one-time extension to the exercise closed and seat leakage tests is being requested by the proposed alternative.