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CALVERT CLIFFS NUCLEAR POWER PLANT

July 17, 2012

U.S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 and 2; Docket Nos. 50-317 and 50-318;
License Nos. DPR 53 and DPR 69
Licensee Event Report 2012-001, Revision 00
Valve Surveillance Requirement Not Met Due to Legacy Issues

The attached report is being sent to you as required by 10 CFR 50.73. Should you have questions regarding this report, please contact Mr. Douglas E. Lauver at (410) 495-5219.

Very truly yours,

Christopher R. Costanzo
Plant General Manager

CRC/KLG/bjd

Attachment: As stated

cc: N. S. Morgan, NRC
W. M. Dean, NRC

Resident Inspector, NRC
S. Gray, DNR

IEZZ
NRR

LICENSEE EVENT REPORT (LER)

(See reverse for required number of
digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. FACILITY NAME

Calvert Cliffs Nuclear Power Plant, Unit 1

2. DOCKET NUMBER

05000 317

3. PAGE

1 OF 07

4. TITLE

Valve Surveillance Requirement Not Met Due to Legacy Issues

5. EVENT DATE

MONTH	DAY	YEAR
05	18	2012

6. LER NUMBER

YEAR	SEQUENTIAL NUMBER	REV NO.
2012	- 001	00

7. REPORT DATE

MONTH	DAY	YEAR
07	17	2012

8. OTHER FACILITIES INVOLVED

FACILITY NAME	DOCKET NUMBER
Calvert Cliffs, Unit 2	05000 318
FACILITY NAME	DOCKET NUMBER
	05000

9. OPERATING MODE

1

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)

- | | | | |
|---|---|---|--|
| <input type="checkbox"/> 20.2201(b) | <input type="checkbox"/> 20.2203(a)(3)(i) | <input type="checkbox"/> 50.73(a)(2)(i)(C) | <input type="checkbox"/> 50.73(a)(2)(vii) |
| <input type="checkbox"/> 20.2201(d) | <input type="checkbox"/> 20.2203(a)(3)(ii) | <input type="checkbox"/> 50.73(a)(2)(ii)(A) | <input type="checkbox"/> 50.73(a)(2)(viii)(A) |
| <input type="checkbox"/> 20.2203(a)(1) | <input type="checkbox"/> 20.2203(a)(4) | <input type="checkbox"/> 50.73(a)(2)(ii)(B) | <input type="checkbox"/> 50.73(a)(2)(viii)(B) |
| <input type="checkbox"/> 20.2203(a)(2)(i) | <input type="checkbox"/> 50.36(c)(1)(i)(A) | <input type="checkbox"/> 50.73(a)(2)(iii) | <input type="checkbox"/> 50.73(a)(2)(ix)(A) |
| <input type="checkbox"/> 20.2203(a)(2)(ii) | <input type="checkbox"/> 50.36(c)(1)(ii)(A) | <input type="checkbox"/> 50.73(a)(2)(iv)(A) | <input type="checkbox"/> 50.73(a)(2)(x) |
| <input type="checkbox"/> 20.2203(a)(2)(iii) | <input type="checkbox"/> 50.36(c)(2) | <input type="checkbox"/> 50.73(a)(2)(v)(A) | <input type="checkbox"/> 73.71(a)(4) |
| <input type="checkbox"/> 20.2203(a)(2)(iv) | <input type="checkbox"/> 50.46(a)(3)(ii) | <input type="checkbox"/> 50.73(a)(2)(v)(B) | <input type="checkbox"/> 73.71(a)(5) |
| <input type="checkbox"/> 20.2203(a)(2)(v) | <input type="checkbox"/> 50.73(a)(2)(i)(A) | <input type="checkbox"/> 50.73(a)(2)(v)(C) | <input type="checkbox"/> OTHER |
| <input type="checkbox"/> 20.2203(a)(2)(vi) | <input checked="" type="checkbox"/> 50.73(a)(2)(i)(B) | <input type="checkbox"/> 50.73(a)(2)(v)(D) | Specify in Abstract below
or in NRC Form 366A |

10. POWER LEVEL

100

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME

K. L. Greene, Licensing Engineer

TELEPHONE NUMBER (Include Area Code)

410-495-4385

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU- FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU- FACTURER	REPORTABLE TO EPIX
X	BP	FCV	M120	N					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE)☒ NO15. EXPECTED
SUBMISSION
DATE

MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On May 18, 2012 a past condition at the site was determined to be reportable. Technical Specification Surveillance Requirement 3.5.2.1 requires the low pressure safety injection (LPSI) flow control valve on each unit to be verified in the open position with power removed from the valve operator. The valve is located in the common discharge header of both LPSI trains so if the valve went shut it would prevent both LPSI trains from performing their safety function. The method previously used to remove power from the valve was to isolate the electric signal going to the valve's current to pneumatic transducer with a key switch from the Control Room. It was determined that this method did not fully remove power to the valve operator. Apparent causes involved technical inaccuracies/omission of relevant information and document changes completed with inadequate reviews and documentation during the 1970s. Since the method did not fully accomplish the Surveillance Requirement, the associated Limiting Condition for Operation was not met. Since this condition unknowingly existed, Required Actions were not taken which placed both units in a condition prohibited by Technical Specifications. In December 2011, Calvert Cliffs switched to locking shut the instrument air valve leading to the valve positioner as the method to ensure power is removed to the valve operator.

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REV NO.	
Calvert Cliffs Nuclear Power Plant, Unit 1	05000 317	2012	-- 001 --	00	2 of 07

I. DESCRIPTION OF EVENT:

A. PRE-EVENT PLANT CONDITIONS:

On May 18, 2012, Unit 1 was operating at 100 percent rated thermal power and Unit 2 was operating at 99.5 percent rated thermal power. There were no systems, structures, or components inoperable that would have impacted this event.

B. EVENT:

On May 18, 2012, a past condition within the low pressure safety injection (LPSI) system was evaluated and determined to be reportable.

Calvert Cliffs' LPSI system functions to inject borated water into the Reactor Coolant System (RCS) in the event of a loss-of-coolant accident (LOCA) and to provide shutdown cooling flow through the reactor core and shutdown cooling heat exchangers. The LPSI system for each Unit consists of two LPSI pumps that have separate suction headers but come together into a common discharge header that ultimately branches off into four injection paths that go to each of the four RCS cold legs. Located within each Units' LPSI system common discharge header is a flow control valve (1CV306 for Unit 1 and 2CV306 for Unit 2). This valve is a fail open valve which is held open by actuator spring force and requires air pressure to close the valve. If the valve was to go shut, both LPSI pump headers would be unable to provide flow to the RCS. Calvert Cliffs Nuclear Power Plant Technical Specification Surveillance Requirement (SR) 3.5.2.1 requires operators to verify that the Unit Nos. 1 and 2 LPSI flow control valves are in an open position with power to their valve operator removed whenever the Unit is in Modes 1 and 2, and Mode 3 with pressurizer pressure ≥ 1750 psia. This SR is performed on a 12 hour frequency.

The method used to remove power from the CV306 valve operator has changed several times during the life of the plant. Prior to Unit 1's startup 1CV306 was identified as a single-point vulnerability for LPSI flow. To address a single-active failure, Calvert Cliffs inserted a jackscrew in the valve body of 1CV306 to mechanically prevent valve closure. However, no requirement for use of a jackscrew was included for Unit 2 when its Technical Specifications were initially issued in August 1976. In approving the Unit 2 Technical Specifications the Nuclear Regulatory Commission (NRC) accepted our proposal to remove power from the valve operator. Shortly after Unit 2 startup, Calvert Cliffs requested a change that deleted the requirement for using a jackscrew on 1CV306. This change was approved by the NRC in February 1977.

Following this change the method used to remove power from CV306 was to isolate the electric signal going to the valve's current to pneumatic (I/P) transducer with a key switch located in the Control Room. This method left air pressure supplied to the I/P and the valve positioner. The valve positioner would require an air pressure signal from the I/P to close the valve.

On December 1, 2010 a plant technician, while in the process of conducting routine maintenance, inadvertently bumped into the current to pneumatic (I/P) transducer for 2CV306.

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Calvert Cliffs Nuclear Power Plant, Unit 1	05000 317	YEAR	SEQUENTIAL NUMBER	REV NO.	3 of 07
		2012	-- 001 --	00	

The bumping damaged the I/P such that a control air signal was supplied to the valve positioner causing the valve to partially shut. A subsequent engineering analysis determined that the LPSI system still would have been able to deliver more than its required accident flow rate through this partially shut valve. The valve was returned to its full open position and the site continued to remove power from CV306 by isolating the electric signal going to the I/P with a key switch in the Control Room.

An NRC Problem Identification and Resolution sample inspection in the Fall of 2011 questioned whether the method Calvert Cliffs used to remove power from CV306 complied with the Technical Specification SR. In December 2011, while the issue was being evaluated, Calvert Cliffs shifted our method of removing power to the valve operator by removing instrument air to CV306 positioner by locking shut its instrument air supply manual valve. This action put in place a more robust method of removing power from the valve operator and provided greater margin in assuring CV306 remained in the full open position.

On May 18, 2012, a condition report (CR-2012-005390) was initiated that determined the pre-December 2011 method of removing power from the valve operator did not meet Technical Specification SR 3.5.2.1. Because the surveillance test was not adequate to meet the requirement of SR 3.5.2.1 it is considered a failure to meet the Limiting Condition for Operation (LCO) for Technical Specification 3.5.2. Since the site did not recognize the LCO was not met, the Required Actions stated in the Technical Specification were not performed. As a result, unknowingly, both Units were in a condition prohibited by Technical Specifications.

C. INOPERABLE STRUCTURES, COMPONENTS, OR SYSTEMS THAT CONTRIBUTED TO THE EVENT:

There were no inoperable structures, components, or systems that contributed to this event.

D. DATES AND APPROXIMATE TIMES OF MAJOR OCCURRENCES:

May 4, 1973 Supplement No. 1 of the Safety Evaluation for Calvert Cliffs Nuclear Power Plant. Section 3.2.2.2 describes CV306 as a single locked open, air operated valve. The locked open feature is provided through use of a key-lock in the Control Room. However, because of the concern of a single active failure, the NRC required a modification to the valve. Calvert Cliffs Nuclear Power Plant added a plug inserted through the bottom of the valve body that mechanically prevents closure of the valve. The NRC determined that this modification was acceptable.

May 4, 1973 Original Unit 1 Technical Specifications. Section 3.3.C – The jackscrew preventer on CV306 of the LPSI header shall be in place whenever the reactor coolant temperature exceeds 300F.

April 16, 1975 Long-Term Emergency Core Cooling System (ECCS) Operation. This letter provided our procedures to address core flush for long-term cooling

LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Calvert Cliffs Nuclear Power Plant, Unit 1	05000 317	YEAR	SEQUENTIAL NUMBER	REV NO.	4 of 07
		2012	-- 001 --	00	

capability. The attachment to the letter described CV306 operation for long-term core flush. For hot leg suction, it says that CV306 or Safety Injection valves -615, 616, 617, and 618 needs to be shut. However, if the differential pressure between containment and the RCS is less than 20 psi, then shutting CV306 is the only option. It also provides the qualification of CV306, noting that it is an air operated globe valve, fails open, must shut for long-term core cooling, and is located outside containment and so is not qualified for post-LOCA environments.

- August 10, 1976 Supplement No. 5 to the Safety Evaluation Report for Calvert Cliffs Nuclear Power Plant, Unit 2. Section 7.5.3 says, "To satisfy the single failure criterion, the applicant has proposed to lock out power to the motor operator of LPSI discharge valve CV306 in the open position. We will include this requirement in the Technical Specifications." Section 7.6 discusses the method of core flush. It references the April 16, 1975 letter and describes the NRC review of the procedures contained in that letter. It concludes that the procedures are acceptable. It also notes that the core flush methods are not single-failure proof, but no single-failure can disable both methods. Therefore, it found the ECCS overall single-failure proof.
- August 13, 1976 Issuance of facility operating license for Unit 2. Issued Unit 2 Technical Specifications, including Technical Specification 4.5.2.a which says the ECCS shall be demonstrated operable at least once per 12 hours by verifying that the following valves are in the indicated positions with power to the valve operators removed: CV306, LPSI Flow Control, Open. The Technical Specification Bases do not discuss any details about CV306.
- February 11, 1977 Issuance of Amendment 20 for Unit 1, Conversion to Standard Technical Specification. This change deleted the requirement to install the jackscrew on CV306 and changed the SR wording to match Unit 2.
- March 31, 1978 Long-Term Cooling following LOCA. We stated that the hot leg suction method of core flush was no longer proposed. Instead, we would use a hot leg injection path.
- May 17, 1982 Boron Precipitation during Long-Term ECCS Operation. We provided descriptions and drawings of the primary and alternate flow paths for ECCS flushing. Our description of the primary flow path (hot leg injection) shows that flow is directed through an open CV306.
- June 2, 1982 Letter from the NRC. This letter accepted our revised ECCS long-term operation lineup.

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REV NO.	
Calvert Cliffs Nuclear Power Plant, Unit 1	05000 317	2012	-- 001 --	00	5 of 07

December 1, 2010 2CV306 was inadvertently bumped by a technician resulting in the valve going 25 percent shut. Subsequent evaluation determined LPSI trains were still capable of providing required accident flow rate despite the partially shut valve.

December 2011 Calvert Cliffs isolated instrument air to the valve operator.

May 18, 2012 CR-2012-005390 was initiated that determined the pre-December 2011 method of removing power to the valve operator did not adequately meet Technical Specification SR 3.5.2.1 and thus the event is reportable.

E. OTHER SYSTEMS OR SECONDARY FUNCTIONS AFFECTED:

No other systems or secondary functions were affected by this event.

F. METHOD OF DISCOVERY:

This condition was evaluated based on questions raised during an NRC inspection. Following further review and discussion, determination was made that the method of removing power to the valve operator employed by Calvert Cliffs, prior to December 2011, did not meet the stated requirements of SR 3.5.2.1.

G. MAJOR OPERATOR ACTION:

Calvert Cliffs shifted to isolating instrument air to the valve operator by locking shut an instrument air manual hand valve. This method removes power to the valve operator and meets the requirement stated in SR 3.5.2.1.

H. SAFETY SYSTEM RESPONSES:

There were no demands for safety system actuations during this event. Although determination was made that 1CV306 and 2CV306 did not meet SR 3.5.2.1, both valves were always verified in the full open position (with the exception of the bumping incident) which allowed LPSI to be capable of performing its safety function.

II. CAUSE OF EVENT:

This event is documented in the site's Corrective Action Program under CR-2012-005390. The apparent causes of this event involved: 1) technical inaccuracies/omission of relevant information and 2) approved document changes completed with inadequate reviews and limited documentation that occurred during the mid to late 1970s. The site and regulatory cultures in the 1970s did not require as much rigor in the documentation and review for changes to the licensing basis as exists today. Current Calvert Cliffs Licensing procedures and Engineering procedures require significantly more internal review and interaction with the NRC in order to implement a change to the licensing basis.

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REV NO.	
Calvert Cliffs Nuclear Power Plant, Unit 1	05000 317	2012	-- 001 --	00	6 of 07

III. ANALYSIS OF EVENT:

This event is reportable in accordance with the following:

10 CFR 50.73(a)(2)(i)(B); "Any operation or condition which was prohibited by the plant's Technical Specifications."

Calvert Cliffs Nuclear Power Plant Technical Specifications, SR 3.5.2.1 requires Operators to verify CV306 in the listed (open) position with power to the valve operator removed. While performance of this SR was successful in verifying the valve remained in the full open position it did not, because of the method chosen to remove power, ensure that the valve could not be inadvertently moved from its full open position. The surveillance test method did not fully achieve the requirement of SR 3.5.2.1. Not meeting the requirements of SR 3.5.2.1 is a failure to meet LCO 3.5.2. Since the site was unaware the LCO was not met, the Required Actions stated in the Technical Specification were not performed. As a result each Unit existed in a condition prohibited by Technical Specifications whenever the Unit was in an applicable mode of operation. The condition existed since at least 1982 when the site did not reevaluate the appropriateness of the method used to remove power from the valve operator in light of no longer requiring CV306 to be shut during long-term ECCS operations. As a result this event is reportable pursuant to 10 CFR 50.73(a)(2)(i)(B).

This event did not result in any actual nuclear safety consequences. Performance of the surveillance tests during this timeframe verified the valve remained in its full open position which would allow LPSI system to perform its safety function.

In Calvert Cliffs probabilistic risk analysis CV306 is analyzed in the following accident sequence:

A large or very large break LOCA occurs and CV306 spuriously closes. This prevents inventory control to the RCS and core damage occurs.

Although operator recovery at CV306 is plausible, that recovery is not modeled.

Using industry data from the Equipment Performance and Information Exchange database the failure rate of the valve to spuriously close over its mission time was assessed at 2E-5. The probability of a large or very large break initiating event is 6E-6. This then results in a core damage frequency of 1.2E-10. This postulated accident sequence has less than a 0.01 percent contribution to overall core damage frequency. This is a very small contribution to risk. Even if the industry failure rate is increased by a factor of 100, core damage frequency only increases to 1.2E-8, and the accident sequence contribution to overall core damage frequency only increases to 1.0 percent. Therefore the overall risk is not considered significant.

This event has no impact on the NRC Reactor Oversight Process Performance Indicators.

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Calvert Cliffs Nuclear Power Plant, Unit 1	05000 317	YEAR	SEQUENTIAL NUMBER	REV NO.	7 of 07
		2012	-- 001 --	00	

IV. CORRECTIVE ACTIONS:

A. ACTION TO RETURN AFFECTED SYSTEMS TO PRE-EVENT NORMAL STATUS:

- Operators locked shut the manual valve on the instrument air line leading to CV306 valve positioner. The applicable Operating Instruction was revised to indicate this instrument air valve's normal operating position as locked shut.

B. ACTION TAKEN OR PLANNED TO PREVENT RECURRENCE:

- Revise Technical Specification Basis for SR 3.5.2.1 to identify the acceptable method used to remove power from CV306 valve operator.

If information is subsequently developed, that would significantly affect the understanding of this event, a supplemental licensee event report will be submitted.

V. ADDITIONAL INFORMATION:

A. FAILED COMPONENTS:

None.

B. PREVIOUS LERS ON SIMILAR EVENTS:

A review of Calvert Cliffs reportable events during the last three years was performed. Although there were other LERs that involved conditions prohibited by Technical Specifications none of them involved the same underlying concern or reason for this event.

C. THE ENERGY INDUSTRY IDENTIFICATION SYSTEM (EIIS) COMPONENT
FUNCTION IDENTIFIER AND SYSTEM NAME OF EACH COMPONENT OR SYSTEM
REFERRED TO IN THIS LER:

COMPONENT	IEEE 803 EIIS FUNCTION	IEEE 805 SYSTEM ID
1CV306, LPSI Flow Control Valve	FCV	BP
2CV306, LPSI Flow Control Valve	FCV	BP

D. SPECIAL COMMENTS:

None