



Carrie T. Dunton  
Director, Nuclear Site Support  
Oconee Nuclear Station

**Duke Energy**  
ON01VP | 7800 Rochester Hwy  
Seneca, SC 29672

o. 864.873.3477  
f. 864.873.4208  
carrie.dunton@duke-energy.com

RA-18-0042

June 19, 2018

10 CFR 50.73

Attn: Document Control Desk  
U. S. Nuclear Regulatory Commission  
11555 Rockville Pike  
Rockville, MD 20852-2746

Duke Energy Carolinas, LLC  
Oconee Nuclear Station Unit 3  
Docket Numbers: 50-287  
Renewed Operating Licenses: DPR-55

Subject: Licensee Event Report 287/2018-001, Revision 00 – Two Main Steam Relief Valve Setpoints Found Out of Tolerance

Licensee Event Report 287/2018-001, Revision 0, is being submitted pursuant to the requirements of 10 CFR 50.73 to provide notification of the subject event.

There are no regulatory commitments associated with this LER.

If there are questions, or further information is needed, contact Laura Todd, Regulatory Affairs, at (864) 873-6774.

Sincerely,

Carrie T. Dunton  
Director, Nuclear Site Support  
Oconee Nuclear Station

Enclosure

JE 22  
NRR

RA-18-0042  
June 19, 2018  
Page 2

cc (w/Enclosure):

Ms. Catherine Haney, Administrator, Region II  
U.S. Nuclear Regulatory Commission  
Marquis One Tower  
245 Peachtree Center Ave., NE, Suite 1200  
Atlanta, GA 30303-1257

Ms. Audrey L. Klett, Project Manager  
(by electronic mail only)  
U.S. Nuclear Regulatory Commission  
11555 Rockville Pike  
Mail Stop O-08B1A  
Rockville, MD 20852-2738

Mr. Eddy Crowe  
NRC Senior Resident Inspector  
Oconee Nuclear Station



**LICENSEE EVENT REPORT (LER)**

(See Page 2 for required number of digits/characters for each block)  
 (See NUREG-1022, R.3 for instruction and guidance for completing this form <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

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 Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to [Infocollects.Resource@nrc.gov](mailto: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.

|  |                                     |                          |
|--|-------------------------------------|--------------------------|
| <b>1. Facility Name</b><br>Oconee Nuclear Station Unit 3 | <b>2. Docket Number</b><br>05000287 | <b>3. Page</b><br>1 OF 4 |
|--|-------------------------------------|--------------------------|

**4. Title**  
Two Main Steam Relief Valve Setpoints Found Out of Tolerance

| 5. Event Date |     |      | 6. LER Number |                   |         | 7. Report Date |     |      | 8. Other Facilities Involved |               |
|---------------|-----|------|---------------|-------------------|---------|----------------|-----|------|------------------------------|---------------|
| Month         | Day | Year | Year          | Sequential Number | Rev No. | Month          | Day | Year | Facility Name                | Docket Number |
| 04            | 20  | 2018 | 2018          | 001               | 00      | 06             | 19  | 2018 | N/A                          | 05000         |
|               |     |      |               |                   |         |                |     |      | Facility Name                | Docket Number |
|               |     |      |               |                   |         |                |     |      | N/A                          | 05000         |

|                               |  |   |  |   |  |  |  |  |
|-------------------------------|--|---|--|---|--|--|--|--|
| <b>9. Operating Mode</b><br>1 | <b>11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: (Check all that apply)</b> |   |  |   |  |  |  |  |
|                               | <input type="checkbox"/> 20.2201(b)  | <input type="checkbox"/> 20.2203(a)(3)(i)             | <input type="checkbox"/> 50.73(a)(2)(ii)(A)                                    | <input type="checkbox"/> 50.73(a)(2)(viii)(A) |  |  |  |  |
|                               | <input type="checkbox"/> 20.2201(d)  | <input type="checkbox"/> 20.2203(a)(3)(ii)            | <input type="checkbox"/> 50.73(a)(2)(ii)(B)                                    | <input type="checkbox"/> 50.73(a)(2)(viii)(B) |  |  |  |  |
|                               | <input type="checkbox"/> 20.2203(a)(1)   | <input type="checkbox"/> 20.2203(a)(4)                | <input type="checkbox"/> 50.73(a)(2)(iii)                                      | <input type="checkbox"/> 50.73(a)(2)(ix)(A)   |  |  |  |  |
| <b>10. Power Level</b><br>083 | <input type="checkbox"/> 20.2203(a)(2)(i)  | <input type="checkbox"/> 50.36(c)(1)(i)(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)(ii)   | <input type="checkbox"/> 50.36(c)(1)(ii)(A)           | <input type="checkbox"/> 50.73(a)(2)(v)(A)                                     | <input type="checkbox"/> 73.71(a)(4)          |  |  |  |  |
|                               | <input type="checkbox"/> 20.2203(a)(2)(iii)  | <input type="checkbox"/> 50.36(c)(2)                  | <input type="checkbox"/> 50.73(a)(2)(v)(B)                                     | <input type="checkbox"/> 73.71(a)(5)          |  |  |  |  |
|                               | <input type="checkbox"/> 20.2203(a)(2)(iv)   | <input type="checkbox"/> 50.46(a)(3)(ii)              | <input type="checkbox"/> 50.73(a)(2)(v)(C)                                     | <input type="checkbox"/> 73.77(a)(1)          |  |  |  |  |
|                               | <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)(D)                                     | <input type="checkbox"/> 73.77(a)(2)(ii)      |  |  |  |  |
|                               | <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)(vii)                                      | <input type="checkbox"/> 73.77(a)(2)(iii)     |  |  |  |  |
|                               |  | <input type="checkbox"/> 50.73(a)(2)(i)(C)            | <input type="checkbox"/> Other (Specify in Abstract below or in NRC Form 366A) |   |  |  |  |  |

**12. Licensee Contact for this LER**

|   |  |
|---|--|
| Licensee Contact<br>Laura Todd, Oconee Regulatory Affairs | Telephone Number (Include Area Code)<br>(864) 873-6774 |
|---|--|

**13. Complete One Line for each Component Failure Described in this Report**

| Cause | System | Component       | Manufacturer | Reportable To ICES | Cause | System | Component       | Manufacturer | Reportable To ICES |
|-------|--------|-----------------|--------------|--------------------|-------|--------|-----------------|--------------|--------------------|
| X     | SB     | 3MSVA0005<br>RV | C710         | Yes                | X     | SB     | 3MSVA0008<br>RV | C710         | Yes                |

|  |                                     |       |     |      |
|--|-------------------------------------|-------|-----|------|
| <b>14. Supplemental Report Expected</b><br><input type="checkbox"/> Yes (If yes, complete 15. Expected Sub. Date) <input checked="" type="checkbox"/> No | <b>15. Expected Submission Date</b> | Month | Day | Year |
|  |                                     |       |     |      |

Abstract (Limit to 1400 spaces, i.e., approximately 14 single-spaced typewritten lines)

On 4/20/18, prior to shutdown of Unit 3 for refueling, all 16 of the Unit 3 Main Steam Safety Valves, referred to as Main Steam Relief Valves (MSRV) at Oconee, were tested to satisfy Technical Specification (TS) Surveillance Requirement (SR) 3.7.1.1. The testing found that the as-found lift pressure for two valves was higher than allowed by SR 3.7.1.1. The remaining fourteen valves met the SR. Guidance from NUREG 1022 Revision 3 states "the existence of similar discrepancies in multiple valves is an indication that the discrepancies may well have arisen over a period of time and that...the condition existed during plant operation". Thus, the event is considered an operation or condition prohibited by TS and is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B).

The causes of the MSRV test failures were determined to be a combination of setpoint drift and binding of spindle and upper spring washer. Although the lift pressures were above the acceptance criteria, this condition is bounded by current safety analysis limits and assumptions.



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

(See NUREG-1022, R.3 for instruction and guidance for completing this form  
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

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| 1. FACILITY NAME              | 2. DOCKET NUMBER | 3. LER NUMBER |                   |          |
|-------------------------------|------------------|---------------|-------------------|----------|
|                               |                  | YEAR          | SEQUENTIAL NUMBER | REV. NO. |
| Oconee Nuclear Station Unit 3 | 05000287         | 2018          | 001               | 00       |

**NARRATIVE**

**EVALUATION:**

**BACKGROUND**

System Design and Inservice Testing (IST) Program Information

There are two steam lines with eight self-actuated safety valves on each line designed to limit over-pressurization of the Main Steam System [EIS: SB] to 110% of design pressure under all conditions. The Main Steam Relief Valves (MSRV) [EIS: RV] actuate to relieve excess steam pressure during plant accidents or events such as Turbine/Reactor trips, rod withdrawal accident at power, etc. These valves have staggered set pressures with nominal values that vary from 1050 psig up to 1104 psig. The allowable tolerance range varies from +3 % to -3%; depending on the specified valve. This acceptance criteria is maintained in the Updated Final Safety Analysis Report (UFSAR), Section 10.3.3, "Main Steam System – Safety Evaluation".

| Number of Valves per Line | Nominal Set Pressure (psig) | Allowable As-Found Relief Pressure (psig) |
|---------------------------|-----------------------------|---|
| 1                         | 1050                        | 1019 – 1060 (+1%/-3%)                     |
| 1                         | 1065                        | 1033 – 1096 (+/-3%)                       |
| 1                         | 1070                        | 1038 – 1102 (+/-3%)                       |
| 1                         | 1075                        | 1043 – 1107 (+/-3%)                       |
| 2                         | 1080                        | 1048 – 1112 (+/-3%)                       |
| 1                         | 1090                        | 1058 – 1122 (+/-3%)                       |
| 1                         | 1104                        | 1071 – 1137 (+/-3%)                       |

Each Oconee Unit has sixteen (16) Crosby, Model HA/HC-65W valves. All sixteen (16) valves are as-found setpoint tested each refueling outage in accordance with the Inservice Testing (IST) Program. Each valve is disassembled/inspected and refurbished every ten (10) years. These inspections are staggered such that a sample of the population is inspected each refueling outage. Valve 3MS-5 was last disassembled in 2010. Valve 3MS-8 was last disassembled in 2012.

Related Technical Specifications (TS) and TS Bases

Limiting Condition for Operation (LCO) 3.7.1 states: "Eight MSRVs shall be OPERABLE on each main steam line," and is applicable in Modes 1, 2 and 3. The only Condition in TS 3.7.1 is Condition A, which is entered when one or more MSRV is inoperable. Required Action A.1 requires entry into Mode 3 within 12 hours and, A.2 requires entry into Mode 4 within 18 hours, if any MSRV is inoperable. The only Surveillance Requirement (SR) for this specification is SR 3.7.1.1 which states: "Verify each MSRV lift setpoint in accordance with the Inservice Test Program."

The TS 3.7.1 bases states: "To be OPERABLE, lift setpoints must remain within limits, specified in the UFSAR."

Plant Operating Conditions

At the time of this event, Oconee Unit 3 was in Mode 1 at approximately 83% power (Note: Unit 3 was in an end-of-cycle power coastdown in preparation for a refueling outage). There are no safety systems or components that interact with the MSRV's ability to function. No structures, systems, or components were out of service at the time of this event that contributed to this event.

Reportability Basis

Guidance from NUREG 1022 Revision 3 states "the existence of similar discrepancies in multiple [safety] valves is an indication that the discrepancies may well have arisen over a period of time and that...the condition existed during plant operation." Thus, the event is considered an operation or condition prohibited by TS and is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B).



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Operating Experience

In 2012, a similar event was reported in LER 287/2012-001-00. The cause of these setpoints being out of tolerance was attributed to setpoint drift. The internal inspection of the valves did not reveal signs of actual binding; however, the potential for binding was identified. Planned actions from the 2012 LER included revision of the appropriate procedures to incorporate the latest manufacturer's criteria for the guide bearing inner diameter (ID) into MSR/V scheduled Preventative Maintenance (PM). Additionally, the inspection of the spindle, top spring washer ID, and adjusting bolt ID in their contact area was incorporated into station procedures.

**EVENT DESCRIPTION**

On April 20, 2018, Oconee Unit 3 was preparing to shutdown for a scheduled refueling outage (O3R29). As part of the planned activities, maintenance personnel performed MSR/V testing prior to shutdown. All sixteen (16) of the MSR/Vs were tested. Fourteen (14) MSR/Vs were found within tolerance but two (2) were out of tolerance.

Specifically, valves 3MS-5 and 3MS-8 as-found set pressure was outside the +3% and +1% allowable range, respectively. Immediately following each test failure, the control room was notified, the valves were declared inoperable, and the affected valves were adjusted within the as-left acceptance range. Operations was notified that the valves were back within setpoint tolerance.

The following are the specifics for each valve found out of tolerance:

| Valve | Nominal Setpoint (psig) | Limit (psig) | As-Found (psig) | Time Found | Time Restored |
|-------|-------------------------|--------------|-----------------|------------|---------------|
| 3MS-5 | 1080                    | 1112 (+3%)   | 1129 (+4.5%)    | 0906       | 0937          |
| 3MS-8 | 1050                    | 1060 (+1%)   | 1062 (+1.1%)    | 1037       | 1132          |

**CAUSAL FACTORS:**

3MS-8

The as-found measured setpoint for 3MS-8 was 1.1% above nameplate. Since no observable abnormalities were found when the valve was disassembled, the failure itself was attributed to setpoint drift; a historical characteristic with relief valves of this design. While enhancements to maintenance and testing can influence setpoint drift, it is recognized as a phenomenon that can't be totally prevented (IN2006-24).

3MS-5

The as-found measured setpoint for 3MS-5 was 4.5% above nameplate. This is outside normal setpoint drift and abnormalities were found when the valve was disassembled. The 3MS-5 MSR/V degradation/failure mechanisms were determined to be binding of spindle and upper spring washer coupled with setpoint drift; which accounted for the total +4.5% setpoint variation.

The binding was due to the spindle being bowed out of tolerance. The guide bearing inner diameter was also found to be smaller than the manufacturer's recommended tolerance. Although no obvious signs of binding were found in this area, it could have affected the set pressure. The inner diameter of the guide bearing would have been inspected and increased during the next scheduled disassembly of 3MS-5 based on corrective actions from the 2012 LER.



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During a second test (prior to disassembly), the measured setpoint dropped to +3% of nameplate which further suggested internal valve parts were binding during the first lift. Because the second lift was +3% of nameplate and subsequent lifts following adjustments were consistent, there was also an indication of setpoint drift present with this valve.

**CORRECTIVE ACTIONS:**

Immediate: 3MS-5 and 3MS-8, which had an as-found result outside of the allowed tolerance, were promptly adjusted within in tolerance and acceptably retested.

Subsequent: 3MS-5 and 3MS-8 were disassembled during the O3R29 refueling outage (Work Orders 20247773 and 20247772, respectively). Both valves were machined to the increased inner diameter of the guide bearing. 3MS-8 was reassembled when no abnormalities were found and set to the as-left setpoint criteria at the end of the unit refueling outage. The spindle and spring assembly were replaced on 3MS-5. The valve was reassembled and set to the as-left setpoint criteria during the unit refueling outage.

None of the above corrective actions are NRC Commitment items. There are no other NRC Commitment items contained in this LER.

**SAFETY ANALYSIS**

The as-found setpoints of 3MS-1 thru 16 measured on 4/20/2018 were reviewed in aggregate and found to maintain peak secondary pressures that are within safety analysis of record. The feedwater flow capacity for decay heat removal and long-term plant cooldown is determined by the lift pressure of the lowest lifting MSRVs. In this case, 3MS-8 and 3MS-16. Although the lowest lifting valve on the "A" Steam Generator (SG) (3MS-8) was found to be 2 psi too high, this condition is more than offset by the lowest lifting valve on the "B" SG (3MS-16) being 22 psi lower than the design value. These as-found setpoints provide sufficient feedwater flow for decay heat removal and long-term plant cooldown when using either the Emergency Feedwater (EFW), Protected Service Water (PSW), or Standby Shutdown Facility Auxiliary Service Water (SSF ASW) systems. Thus, it is concluded that the impact of this condition on overall plant risk is insignificant and had no impact on public health and safety.

**ADDITIONAL INFORMATION**

A search of the Oconee Corrective Action Program (CAP) database for the preceding five (5) year period revealed no similar events that occurred at Oconee Nuclear Station (ONS). Additionally, a review of industry Operating Experience (OE) databases was conducted using applicable keyword searches, i.e., "MSRVs setpoint," etc., to ascertain other reported events.

One related event occurred at Oconee prior to the preceding five (5) year period on April 13, 2012. This LER is discussed in the Background section.

Energy Industry Identification System (EIIS) codes are identified in the text as [XX].

This event is considered INPO Consolidated Events System (ICES) Reportable.

There were no releases of radioactive materials, radiation exposures or personnel injuries associated with this event.