



**Evelon Generation.**

July 25, 2016

10 CFR 50.73

SVP-16-049

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D.C. 20555

Quad Cities Nuclear Power Station, Unit 2  
Renewed Facility Operating License No. DPR-30  
NRC Docket No. 50-265

**Subject: Licensee Event Report 265/2016-003-00, "Drywell/Suppression Chamber Differential Pressure and Primary Containment Oxygen Concentration Technical Specification Compliance"**

Enclosed is Licensee Event Report (LER) 265/2016-003-00, "Drywell/Suppression Chamber Differential Pressure and Primary Containment Oxygen Concentration Technical Specification Compliance," for Quad Cities Nuclear Power Station, Unit 2.

This report is submitted in accordance with the requirements of 10 CFR 50.73(a)(2)(i)(B), which requires the reporting of any operation or condition which was prohibited by the plant's Technical Specifications.

There are no regulatory commitments contained in this letter.

Should you have any questions concerning this report, please contact Mr. W. J. Beck at (309) 227-2800.

Respectfully,

Scott Darin  
Site Vice President  
Quad Cities Nuclear Power Station

cc: Regional Administrator – NRC Region III  
NRC Senior Resident Inspector – Quad Cities Nuclear Power Station

IE22  
NPR



**LICENSEE EVENT REPORT (LER)**

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 FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollections.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> Quad Cities Nuclear Power Station Unit 2	<b>2. DOCKET NUMBER</b> 05000265	<b>3. PAGE</b> 1 OF 5
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**4. TITLE**  
Drywell/Suppression Chamber Differential Pressure, Primary Containment Oxygen Concentration Technical Specification Compliance

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
05	25	2016	2016	003	00	07	25	2016	N/A	N/A
									FACILITY NAME	DOCKET NUMBER
									N/A	N/A

<b>9. OPERATING MODE</b>	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)</b>			
1	<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)
	<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)
10. POWER LEVEL	<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)(i)
	<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)(ii)
	<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 Tom Petersen – Regulatory Assurance	TELEPHONE NUMBER (309) 227-2825
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**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	BB	N/A	N/A	N					

<b>14. SUPPLEMENTAL REPORT EXPECTED</b> <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	<b>15. EXPECTED SUBMISSION DATE</b>	MONTH	DAY	YEAR
		N/A	N/A	N/A

**ABSTRACT**

On 05/23/16 Low Level Alarm 2A Recirc Motor occurred due to a low oil level condition for the 2A recirculation pump motor. As a result, the Station determined that a drywell entry was required to investigate the condition, make any needed repairs, and refill the oil reservoir. NRC provided that Station personnel did not comply with Technical Specifications (TS) 3.6.2.5 (DW to Suppression Chamber DP) and 3.6.3.1 (Primary Containment O2 concentration) since while in MODE 1, at the end of the 32 hour Completion Time (24 hour Action A, plus the 8 hour Action B) during the actual plant evolutions for power ascension, these Required Actions were not met because the associated Applicability for each TS were not met since the Unit remained in MODE 1.

The cause of the issue was Station personnel understanding and application of the subject TS as used in context under this infrequent plant condition, differed from the NRC's understanding and application of the subject TS. The specific difference is with the application of the term, "start-up," as used in the LCO Applicability.

Corrective actions included issuance of an Operations Standing Order, and revision of pertinent Operating procedures to ensure these Tech Specs are properly implemented.

The safety significance of this event was minimal. Given the impact on the Drywell/Suppression Chamber Differential Pressure, and Primary Containment Oxygen Concentration Technical Specifications, this report is submitted for Unit 2 in accordance with the requirements of 10 CFR 50.73(a)(2)(i)(B), which requires the reporting of a past operation or condition which was prohibited by the plant Technical Specifications.



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

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**NARRATIVE**

**PLANT AND SYSTEM IDENTIFICATION**

General Electric - Boiling Water Reactor, 2957 Megawatts Thermal Rated Core Power

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

**EVENT IDENTIFICATION**

Compliance Issue with the Drywell/Suppression Chamber Differential Pressure, and Primary Containment Oxygen Concentration Technical Specifications

**A. CONDITION PRIOR TO EVENT**

Unit: 2  
Reactor Mode: 1

Event Date: May 25, 2016  
Mode Name: Power Operation

Event Time: 11:10 hours  
Power Level: 100%

**B. DESCRIPTION OF EVENT**

On 05/23/16 Low Level Alarm [LA] 2A Recirc [AD] Motor [MO] occurred due to a low oil level condition for the 2A recirculation pump [P] motor. As a result, the Station determined that a drywell [NH] entry was required to investigate the condition, make any needed repairs, and refill the oil reservoir [TK]. NRC provided that Station personnel did not comply with TS 3.6.2.5 (DW to Suppression Chamber DP) and 3.6.3.1 (Primary Containment O2 concentration [BB]) since while in MODE 1, at the end of the 32 hour Completion Time (24 hour Action A, plus the 8 hour Action B) during the actual plant evolutions for power ascension, the Required Actions B for TS 3.6.2.5 and TS 3.6.3.1 were not met (at 1110 on 5/25/16, and 1123 on 5/25/16, respectively), because the Unit 2 LCO Applicability for establishing DW/Torus differential pressure and being fully inerted were not met since the Unit remained in MODE 1.

NRC provided that these TS were not met when the Station improperly used the LCO Applicability (a), 24 hour "clock reset" allowance to proceed above 15% power "following startup" without setting the DW/Torus differential pressure (Dp) > 1 psid, and oxygen concentration < 4% (inerted), during the Unit 2 power ascension. NRC provided this is contrary to the NRC's "plain language" interpretation of this associated TS Applicability, in that "following startup" was intended to mean "following MODE 2." Furthermore, the NRC provided that the Unit did not exit the Mode of Applicability just by dropping below 15% Rated Thermal Power (RTP), since the Unit was still in MODE 1, and a total of only 32 hours was available to re-achieve DW/Torus Dp and reinert while remaining in MODE 1. While under this interpretation, the resulting available options during this drywell entry were to either: 1) re-establish DW/Torus Dp and inerting prior to reaching 15% RTP during the power ascension, or 2) to exit MODE 1 to reset the 24 hour clock (meaning to start power ascension from MODE 2). In this situation, the TS LCO Applicability is not clear, does not coincide with the Bases intent, and may be overly restrictive in that it uses the terms, "startup" and "shutdown."

The cause of the issue was Station personnel understanding and application of the subject TS as used in context under this this infrequent plant condition, differed from the NRC's understanding and application of the subject TS. The specific difference is with the application of the term, "start-up," as used in the LCO Applicability.



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The safety significance of this event was minimal. Given the impact on compliance with the Drywell/Suppression Chamber Differential Pressure, and Primary Containment Oxygen Concentration Technical Specifications, this report is submitted for Unit 2 in accordance with the requirements of 10 CFR 50.73(a)(2)(i)(B), which requires the reporting of a past operation or condition which was prohibited by the plant Technical Specifications.

**C. CAUSE OF EVENT**

During the drywell entry and subsequent return to full power, the Station performed the power ascension under procedures, QCGP 3-1 (Reactor Power Operations) and QCOP 1600-20 (Nitrogen Inerting of Primary Containment Using the Vaporizer(s) and Reactor Building Ventilation System), for which under this infrequent plant condition, the context of "startup" was understood to refer to the "act of increasing reactor power," or "power ascension." Therefore, the apparent TS interpretation conflict occurred in the meaning and use of "startup," in the LCO Applicability, when during power ascension the Station proceeded above 15% RTP without resetting DW/Torus Dp and re-inerting within the 32 hour maximum allowed Completion Time.

This issue pertained to a reading of the language of the subject TS which in itself was not readily able to be consistently interpreted since the "plain language" did not match the TS Bases nor the NRC approved text of the Safety Evaluation (SE). This TS compliance interpretation issue occurred for only a 4 hour and 2 hour duration (in excess of the 32 hours total Completion Time allowed while in MODE 1), pertaining to the DW/Torus Dp and oxygen concentration, respectively.

**D. SAFETY ANALYSIS**

**System Design**

TS Bases 3.6.2.5, Drywell-to-Suppression Chamber Differential Pressure Applicable Safety Analyses provides: "The purpose of maintaining the drywell at a slightly higher pressure with respect to the suppression chamber is to minimize the drywell pressure increase necessary to clear the downcomer pipes to commence condensation of steam in the suppression pool and to minimize the mass of the accelerated water leg. This reduces the hydrodynamic loads on the torus during the LOCA blowdown. The required differential pressure results in a downcomer waterleg of approximately 1 ft. Initial drywell-to-suppression chamber differential pressure affects both the dynamic pool loads on the suppression chamber and the peak drywell pressure during downcomer pipe clearing during a Design Basis Accident LOCA. Drywell-to suppression chamber differential pressure must be maintained within the specified limits so that the safety analysis remains valid."

TS Bases 3.6.3.1, Primary Containment Oxygen Concentration Applicable Safety Analyses provides: "The UFSAR, Section 6.2.5 calculations assume that the primary containment is inerted when a Design Basis Accident loss of coolant accident occurs. Thus, the hydrogen assumed to be released to the primary containment as a result of metal water reaction in the reactor core will not produce combustible gas mixtures in the primary containment. Oxygen, which is subsequently generated by radiolytic decomposition of water, will not result in the primary containment becoming de-inerted within the first 30 days following an accident."

**Safety Impact**

TS Bases 3.6.2.5 Drywell-to-Suppression Chamber Differential Pressure LCO Applicability provides: "As long as reactor power is < 15% RTP, the probability of an event that generates hydrogen or excessive loads on primary containment occurring within the first 24 hours following a startup or within the last 24 hours prior to a shutdown is low



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enough that these "windows," with the primary containment not inerted, are also justified. The 24 hour time period is a reasonable amount of time to allow plant personnel to perform inerting or de-inerting." For this event, since the period of time during which reactor power was > 15% RTP while the DW to Torus Dp was < 1 psid, was approximately 18 hours, the probability of an event that generates hydrogen or excessive loads on primary containment was low since this duration was less than 24 hours, therefore, the safety impact of this condition was minimal.

TS Bases 3.6.3.1, Primary Containment Oxygen Concentration LCO Applicability provides: "As long as reactor power is < 15% RTP, the potential for an event that generates significant hydrogen and oxygen is low and the primary containment need not be inert. Furthermore, the probability of an event that generates hydrogen occurring within the first 24 hours of a startup, or within the last 24 hours before a shutdown, is low enough that these "windows," when the primary containment is not inerted, are also justified. The 24 hour time period is a reasonable amount of time to allow plant personnel to perform inerting or de-inerting." For this event, since the period of time during which reactor power was > 15% RTP while the DW was not inerted (i.e., O<sub>2</sub> concentration > 4%), was approximately 16 hours, the probability of an event that generates hydrogen was low since this duration was less than 24 hours, therefore, the safety impact of this condition was minimal.

Due to the language in the associated TS Bases and SE documentation for the actions that the Station took during the drywell entry and subsequent power ascension, this TS compliance interpretation issue is not a significant event/issue, since the interpreted non-compliance occurred for only a 4 hour and 2 hour duration, pertaining to the DW/Torus Dp and oxygen concentration, respectively (i.e., 4 hour/2 hour in excess of the 32 hours total Completion Time allowed while in MODE 1). Furthermore, this event was the first known recorded occurrence of non-compliance with these TS under this interpretation. Since the condition created no consequences, the safety impact of this condition was minimal.

**Risk Insights**

The plant Probabilistic Risk Assessment (PRA) model was reviewed with respect to this event. Core Damage Frequency (CDF) and Large Early Release Frequency (LERF) were evaluated for impacts of oxygen concentration and DW/Torus Dp. Since the period of time during which reactor power was > 15% RTP while the DW was not inerted (i.e., oxygen concentration > 4%), was approximately 16 hours, and since the period of time during which reactor power was > 15% RTP while the DW to Torus Dp was < 1 psid, was approximately 18 hours, the incremental change in risk was minimal.

In conclusion, the overall safety significance and impact on risk of this event were minimal.

**E. CORRECTIVE ACTIONS**

Immediate:

1. Issued an Operations Standing Order that provided clarifying information when using the subject Tech Spec for drywell entries.

Follow-up:

2. The pertinent Operating procedures will be revised to ensure the subject Tech Specs are properly implemented for drywell entries.
3. This issue will be addressed under a proposed BWROG TSTF item for a potential future Tech Spec and Bases revision.
4. Operator Training will review this issue as an OPEX item, and for incorporation into appropriate lesson plans.



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**F. PREVIOUS OCCURRENCES**

The Station events database, LERs, and INPO Consolidated Event System (ICES) were reviewed for similar events at the Quad Cities Nuclear Power Station. This event was caused by Station personnel understanding and application of the subject Tech Specs as used in context under this infrequent plant condition, differed from the NRC understanding and application of the subject Tech Specs. The specific difference is with the application of the term, "start-up," as used in the LCO Applicability.

- No previous occurrences were identified as applicable to the circumstances of this event.

**G. COMPONENT FAILURE DATA**

Failed Equipment: N/A  
 Component Manufacturer: N/A  
 Component Model Number: N/A  
 Component Part Number: N/A

This event has not been reported to ICES since there was no equipment failure.