

Exelon Generation Company, LLC www.exeloncorp.com
Byron Station
4450 North German Church Road
Byron, IL 61010-9794

June 12, 2006

LTR: BYRON 2006-0069
File: 1.10.0101

United States Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Byron Station, Units 1 and 2
Facility Operating License Nos. NPF-37 and NPF-66
NRC Docket Nos. STN 50-454 and STN 50-455

Subject: Licensee Event Report (LER) 454-2006-002-00, "All Refueling Water Storage
Tank Level Instrumentation Channels Made Inoperable During a Single Channel
Calibration Activity Due to a Design Flaw"

Enclosed is an LER for the issue involving a flawed design change to the Refueling Water Storage Tank level instrumentation implemented in the 1989 timeframe. This condition is reportable to the NRC in accordance with 10 CFR 50.73 (a) (2) (v) (D).

Should you have any questions concerning this matter, please contact Mr. William Grundmann, Regulatory Assurance Manager, at (815) 234-5441, extension 2800.

Respectfully,



David M. Hoots
Site Vice President
Byron Nuclear Generating Station

Attachment LER 454-2006-002-00

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: 50 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 Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@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 Byron Station Unit 1	2. DOCKET NUMBER 0500454	3. PAGE 1 of 4
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4. TITLE All Refueling Water Storage Tank Level Instrumentation Channels Made Inoperable During a Single Channel Calibration Activity Due to a Design Flaw

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	11	2006	2006	002	00	06	12	2006	Byron Unit 2	0500455
									FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE 1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)																																				
10. POWER LEVEL 100	<table style="width:100%; border: none;"> <tr> <td><input type="checkbox"/> 20.2201(b)</td> <td><input type="checkbox"/> 20.2203(a)(3)(i)</td> <td><input type="checkbox"/> 50.73(a)(2)(i)(C)</td> <td><input type="checkbox"/> 50.73(a)(2)(vii)</td> </tr> <tr> <td><input type="checkbox"/> 20.2201(d)</td> <td><input type="checkbox"/> 20.2203(a)(3)(ii)</td> <td><input type="checkbox"/> 50.73(a)(2)(ii)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(viii)(A)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(1)</td> <td><input type="checkbox"/> 20.2203(a)(4)</td> <td><input type="checkbox"/> 50.73(a)(2)(ii)(B)</td> <td><input type="checkbox"/> 50.73(a)(2)(viii)(B)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(i)</td> <td><input type="checkbox"/> 50.36(c)(1)(i)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(iii)</td> <td><input type="checkbox"/> 50.73(a)(2)(ix)(A)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(ii)</td> <td><input type="checkbox"/> 50.36(c)(1)(ii)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(iv)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(x)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(iii)</td> <td><input type="checkbox"/> 50.36(c)(2)</td> <td><input type="checkbox"/> 50.73(a)(2)(v)(A)</td> <td><input type="checkbox"/> 73.71(a)(4)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(iv)</td> <td><input type="checkbox"/> 50.46(a)(3)(ii)</td> <td><input type="checkbox"/> 50.73(a)(2)(v)(B)</td> <td><input type="checkbox"/> 73.71(a)(5)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(v)</td> <td><input type="checkbox"/> 50.73(a)(2)(i)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(v)(C)</td> <td><input type="checkbox"/> OTHER</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(vi)</td> <td><input type="checkbox"/> 50.73(a)(2)(i)(B)</td> <td><input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)</td> <td>Specify in Abstract below or in NRC Form 366A</td> </tr> </table>	<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 type="checkbox"/> 50.73(a)(2)(i)(B)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A
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12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME Byron Station, William Grundmann, Regulatory Assurance Manager	TELEPHONE NUMBER (Include Area Code) (815) 406-2800
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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
N/A	N/A	N/A	N/A	N/A					

14. SUPPLEMENTAL REPORT EXPECTED <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On March 15, 2006, during the 18-month calibration of one of four Refueling Water Storage Tank (RWST) level channels, a licensed control room operator noticed a minor deviation in one of the other level channels. This anomaly was documented in the corrective action program. The ensuing investigation concluded on April 11, 2006, that the 1989 modification to the reference leg of the four channels was flawed in that it did not provide for a single channel calibration activity without impacting the other three channels. The condition renders the four safety related channels of RWST level indication inoperable when one of the four is being calibrated. The cause is a legacy issue with the design change process in the 1989 timeframe and could not be exactly determined. Corrective actions involve modifying the channels to allow for single channel calibration without impacting the other channels and performing a extent of condition review of other plant modifications. This event had minimal safety consequences. This condition is reportable to the NRC under 10 CFR 50.73 (a)(2)(v), as an event or condition that could have prevented fulfillment of a safety function.

LICENSEE EVENT REPORT (LER)

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A. Plant Condition Prior to Event:

Event Date: April 11, 2006

Unit 1 - Mode 1 – Power Operations, Reactor Power 100%

Unit 2 - Mode 1 – Power Operations, Reactor Power 100%

Reactor Coolant System [AB]: Normal operating temperature and pressure.

Background:

Each unit at Byron Station contains one Refueling Water Storage Tank (RWST) [BQ] that supplies borated water to the Chemical and Volume Control System (CV) [CB] during abnormal operating conditions and to the Emergency Core Cooling System (ECCS) [BQ] and Containment Spray (CS) [BE] during accident conditions.

Each RWST has four level instrumentation channels. The primary purpose of these level channels ensures switchover of the suction source for the ECCS pumps from the RWST to the containment sump occurs at the correct RWST low level.

In 1989, a modification was installed on each RWST to allow the reference leg of the four RWST level instruments (i.e., Level Transmitter (LT)-930, 931, 932 and 933) to communicate with the RWST vapor space rather than the auxiliary building atmosphere. This was intended to ensure RWST level would be accurately reflected by the instrumentation. During drawdown of the RWST during an ECCS injection, vacuum pressure could exist in an RWST. With the reference leg vented to the auxiliary building atmosphere instead of the RWST vapor space, an error could have been introduced in the indicated tank level. The modification corrected this condition by attaching the instruments' common reference leg to the overflow line of the RWST (i.e., communicating with the vapor space).

B. Description of Event:

On March 15, 2006, during the 18-month calibration of Unit 1 LT-933, a licensed control room operator noticed a minor deviation in level indication on Unit 1 LT-930. This anomaly was documented in the corrective action program. The ensuing investigation concluded on April 11, 2006, that the 1989 modification to the reference leg was flawed in that it did not provide for a single channel calibration activity without impacting the other three channels. Disconnecting an instrument's reference leg for the calibration activity exposes the common reference line of the other channels to the auxiliary building atmosphere.

The condition renders the four safety related channels of RWST level indication inoperable when one of the four is being calibrated. Technical Specification (TS) 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation, condition K, allows one instrument channel to be inoperable for 6 hours. With all four channels inoperable, Limiting Condition for Operations (LCO) 3.0.3 becomes applicable. LCO 3.0.3 requires actions to be initiated within one hour to place the unit in Mode 3 within 7 hours, Mode 4 within 13 hours and Mode 5 within 37 hours. A review of all RWST level instrumentation channel calibration activities for the past three years indicated the calibration timeframe was always less than an hour. Consequently, the conditions of LCO 3.0.3 were not violated. However, this condition is reportable to the NRC under 10 CFR 50.73 (a)(2)(v), as an event or condition that could have prevented fulfillment of a safety function.

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C. Cause of the Event

The exact cause could not be determined. The modification was designed in 1989 timeframe by the Station's engineering vendor. The modification was developed by the vendor's Mechanical Design and Drafting Division instead of their Control and Instrument Division (C&ID). In addition, the C&ID did not perform a cross disciplinary review of the proposed design. It could not be determined why the task was assigned in this manner or why a review was not performed by C&ID. It is speculated that the engineer involved from the mechanical division, though very experienced in mechanical design, was unaware of the C&ID design criteria to provide isolation valves for sensing lines to allow for testing without taking the complete line and other connecting instruments out of service.

A contributing cause includes the design change process in the 1989 timeframe did not utilize a design consideration checklist as used in today's process which would have triggered an Instrument Maintenance review for impact on calibration activities. An Instrument Maintenance review would have likely caught this design flaw.

Another contributing cause involved the instrument mechanics not questioning this non-typical calibration method in that it required a fitting to be disconnected versus a more typical calibration where a five-valve manifold is provided.

D. Safety Analysis

This condition had minimal safety consequences. During the injection phase of a design basis loss of coolant accident (LOCA), the RWST is the source of water for all ECCS pumps. A low level in the RWST coincident with a Safety Injection signal provides protection against a loss of water for the ECCS pumps and indicates the end of the injection phase of the LOCA. The RWST is equipped with four level transmitters which are calibrated on an 18 month frequency. A two-out-of-four logic initiates the protection function actuation.

This condition could have caused a premature end of the injection phase resulting in possible inadequate source of water for the ECCS pumps. However, this condition existed only during past transmitter calibrations between the time of disconnecting and reconnecting the tubing for the reference leg. The typical duration of this activity was less than an hour. Therefore, the time exposure to this condition was relatively small. Since the exact magnitude of level error during Safety Injection could not be quantified, the volume of RWST water injected and available to the recirculation sumps may have been less than assumed in design analysis. Operators have emergency procedural guidance to respond to inadequate water inventory in the containment sump. A bounding risk analysis indicates that the condition of having all four RWST channels inoperable for approximately 1 hour four times every 18 months is not risk significant.

E. Corrective Actions

A design change to the RWST level instrumentation will be installed to allow for single channel calibration that will not impact the remaining channels.

The current design change process was reviewed and determined to have sufficient controls in place to ensure similar issues would not occur in current design changes.

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Since this is a legacy issue involving the design change process 17 years ago, an extent of condition review of mechanical modifications that impact instrumentation will be conducted. This review will cover the timeframe since initial startup of the units until present.

A review of calibration practices for other Technical Specification level instruments will be conducted to identify and correct similar issues.

F. Previous Occurrences

There have been no LER occurrences of this nature at Byron in the previous two years.