

Clinton Power Station  
8401 Power Road  
Clinton, IL 61727

U-604052  
January 27, 2012

10 CFR 50.73  
SRRS 5A.108

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

Clinton Power Station, Unit 1  
Facility Operating License No. NPF-62  
NRC Docket No. 50-461

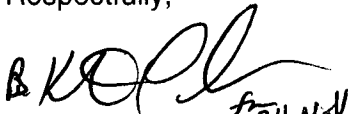
Subject: Licensee Event Report 2011-007-00

Enclosed is Licensee Event Report (LER) No. 2011-007-00: Unfused DC Ammeter Circuits Result in Unanalyzed Condition. This report is being submitted in accordance with the requirements of 10 CFR 50.73.

There are no regulatory commitments contained in this report.

Should you have any questions concerning this report, please contact A. Khanifar, at (217) 937-3800.

Respectfully,



William G. Noll *for Bill Noll*

Site Vice President  
Clinton Power Station

JLP/blf

Enclosure: Licensee Event Report 2011-007-00

cc: Regional Administrator, NRC Region III  
NRC Senior Resident Inspector, Clinton Power Station  
Office of Nuclear Facility Safety, IEMA Division of Nuclear Safety

IE22  
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 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, NE08-10202, (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.

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**4. TITLE**  
Unfused DC Ammeter Circuits Result in Unanalyzed Condition

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
12	08	2011	2011	007	00	01	27	2012	NA	05000
									FACILITY NAME	DOCKET NUMBER
									NA	05000

**9. OPERATING MODE**  
5

**10. POWER LEVEL**  
000

**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 checked="" 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"/> 50.73(a)(2)(xi)(A)
<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)(4)
<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"/> 73.71(a)(5)
<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> OTHER

Specify in Abstract below or in NRC Form 366A

**12. LICENSEE CONTACT FOR THIS LER**

FACILITY NAME A. Khanifar, Site Engineering Director	TELEPHONE NUMBER (Include Area Code) (217) 937-3800
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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

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

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

During a Clinton Power Station (CPS) review of an event at the Browns Ferry Station (ENS 47374), CPS determined that the original plant wiring design for the station battery ammeter circuits contains a shunt in the current flow from each direct current (DC) battery. Bolted onto the shunt bar are two Institute of Electrical and Electronics Engineers (IEEE) IEEE-383 qualified leads to an ammeter in the main control room (MCR). The small difference in voltage between the two taps on the shunt is enough to deflect the current meter in the MCR when current flows from the battery through the shunt. The ammeter wiring attached to the shunt does not have fuses, and if one of the ammeter wires shorts to ground at the same time another DC wire from the opposite polarity on the same battery also shorts to ground, a ground loop through the unfused ammeter cable could occur. With enough current going through the cable, the potential exists that the overloaded ammeter wiring could damage safe shutdown wiring in direct physical contact with the cable resulting in a loss of the associated safe shutdown function/capability.

The cause of this deficiency is the original design criteria not specify protection for shunt fed ammeter circuits. A modification is planned to correct the deficiency. Compensatory measures have been established until the modification has been installed.

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		2011	- 007	- 00	

**NARRATIVE**

**PLANT AND SYSTEM IDENTIFICATION**

General Electric – Boiling Water Reactor, 3473 Megawatts Thermal Rated Core Power  
Energy Industry Identification System (EIIIS) codes are identified in the text as [XX].

**EVENT IDENTIFICATION**

Unfused DC Ammeter Circuits Result in Unanalyzed Condition

**A. Plant Operating Conditions Before the Event**

Unit: 1	Event Date: 12/8/11	Event Time: 1230 hours CST
Mode: 5	Mode Name: Refueling	Reactor Power: 0 percent

**B. DESCRIPTION OF EVENT**

During Clinton Power Station's (CPS) review of event ENS 47374, Deficiency Identified in Transition to Performance Based Standard for Fire Protection, CPS identified a similar condition. The station's review determined that the original plant wiring design for the station battery [BTRY] ammeter [II] circuits contains a shunt in the current flow from each direct current (DC) battery. Bolted onto the shunt bar are two Institute of Electrical and Electronics Engineers (IEEE) IEEE-383, Standard for Type Test of Class 1E Electrical Cables, Field Splices, and Connections for Nuclear Power Generating Stations, qualified leads to an ammeter in the main control room (MCR). The small difference in voltage between the two taps on the shunt is enough to deflect the ammeter in the MCR when current flows from the battery through the shunt. The ammeter wiring attached to the shunt does not have fuses, and if one of the ammeter wires shorts to ground at the same time as another DC wire from the opposite polarity on the same battery also shorts to ground, a ground loop through the unfused ammeter cable could occur. With enough current going through the cable, the potential exists that the overloaded ammeter wiring could damage other wiring in direct physical contact with the cable and result in a loss of the associated safe shutdown function/capability.

Review of the CPS design identified a similar condition to the condition identified in the operating experience review, since no protective devices (fuses or breakers) are installed off the shunts to the MCR DC ammeters. The DC distribution system [EJ] is a floating system with no established ground other than the high resistance ground provided through the ground detector. It is designed in this manner to allow the system to withstand one hard ground (zero resistance) with no adverse effect on the operation of any equipment fed from the DC system. If a second ground with low enough resistance is placed on the DC system, the operation of the grounded equipment could be adversely affected. The two ground paths could short around components to prevent them from operating or provide a current path to spuriously operate a piece of equipment.

The condition identified is contrary to the CPS Updated Safety Analysis Report which states that there are no associated non safe shutdown cables that are not electrically protected and share a common enclosure with safe shutdown cables.

Compensatory fire watch measures have been implemented for the affected areas in the plant and will remain in effect until the deficiency is corrected.

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

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**NARRATIVE**

**C. CAUSE OF EVENT**

Review of industry standards for DC Auxiliary Power Systems identified that the design of this system meets all general design criteria contained in Institute of Electrical and Electronics Engineers (IEEE) Standard IEEE-484, Recommended Practice for Installation Design and Installation of Large Lead Storage Batteries for Generating Stations and Substations, and IEEE-946, Recommended Practice for the Design of DC Auxiliary Powered Systems for Generating Stations. These design requirements do not specify protection for shunt fed ammeter circuits. The design standard used at CPS for the DC system does not specify fusing for the ammeter shunt circuit and references IEEE-946. The premise for this event to occur requires two concurrent extremely low resistance (hard) grounds (i.e., one on the positive side of the battery through the ammeter circuit wiring routed to the control room and one on the negative side of the battery through a second ground on the same battery system). The DC distribution system is floating with no established ground other than the high resistance ground provided through the ground detector [GDET]. It is designed in this manner to allow the system to withstand one hard ground (zero resistance) with no adverse affect on the operation of any equipment fed from the DC system. Since this is a very low probability event, it was likely not considered during the development of the related IEEE standards, which are typically developed and refined based on industry experience.

**D. SAFETY CONSEQUENCES**

This event is reportable in accordance with 10 CFR 50.73 (a)(2)(ii)(B) as a condition that resulted in the nuclear power plant being in an unanalyzed condition that significantly degraded plant safety in that the overloaded ammeter wiring could damage other wiring in physical contact with the cable and result in a loss of the associated safe shutdown function/capability.

There were no actual consequences for this event. An extent of condition review determined that this issue applies to the Division 1, 2 and 4 DC ammeter circuit wiring. The Division 3 DC system is not affected because it does not contain a remote MCR ammeter circuit.

Testing performed for other stations in similar applications have determined that IEEE-383 rated wiring sized for this application is not susceptible to self ignition. Industry experience discussed in NUREG/CR-6738, Risk Methods Insights Gained from Fire Incidents, supports that self ignition and fire propagation of IEEE-383 rated wiring is highly unlikely.

**E. CORRECTIVE ACTIONS**

Compensatory fire watch measures have been implemented for the affected areas in the plant and will remain in effect until the deficiency is corrected.

A modification is planned to correct the design deficiency.

**F. PREVIOUS OCCURRENCES**

A review was performed and it was determined that no similar conditions have occurred in the past.

**G. COMPONENT FAILURE DATA**

None