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GO2-07-093

10 CFR 50.73

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

Subject: **COLUMBIA GENERATING STATION, DOCKET NO. 50-397**
LICENSEE EVENT REPORT NO. 2007-003-00

Dear Sir or Madam:

Transmitted herewith is Licensee Event Report No. 2007-003-00 for Columbia Generating Station. This report is submitted pursuant to 10 CFR 50.73(a)(2)(i)(A). The enclosed report discusses items of reportability and corrective actions taken.

There are no new regulatory commitments being made. If you have any questions or require additional information, please contact Mr. GV Cullen at (509) 377-6105.

Respectfully,

DK Atkinson
Vice President, Nuclear Generation &
Chief Nuclear Officer

Enclosure: Licensee Event Report 2007-003-00

cc: BS Mallett – NRC RIV
CF Lyon – NRC NRR
INPO Records Center
NRC Sr. Resident Inspector – 988C (2)
RN Sherman – BPA/1399
WA Horin – Winston & Strawn
CE Johnson – NRC RIV/fax

IE22
NRC/NRR

NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION (6-2004)	APPROVED BY OMB NO. 3150-0104 EXPIRES 6/30/2007
LICENSEE EVENT REPORT (LER) (See reverse for required number of digits/characters for each block)	Estimated burden per response to comply with this mandatory information 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	2. DOCKET NUMBER	3. PAGE
Columbia Generating Station	05000397	1 OF 4

4. TITLE

Technical Specification Required Shutdown due to Inoperable AC Electrical Power Subsystem

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 0500
04	08	2007	2007	– 003	– 00	06	07	2007	FACILITY NAME	DOCKET NUMBER 0500

9. OPERATING MODE
1

10. POWER LEVEL
95

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

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203 (a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☒ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER *(Include Area Code)*
Stephen Mazurkiewicz, Senior Licensing Engineer	509-377-8463

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

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO				

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

On April 8, 2007 at approximately 0930 PST, Energy Northwest was replacing inoperable transformer E-TR-IN/2 when the ground reference for critical instrument power panel E-PP-8AA was unknowingly removed. The ensuing power fluctuations resulted in the panel being declared inoperable, entering Technical Specification 3.8.7, Condition A. Prior to exceeding the 8 hour completion time of Condition A, management decided to initiate a controlled reactor shutdown to address the issue.

The root cause of this event was a less than optimal design that introduced a vulnerability via the unnecessary routing of the grounded neutral wire for E-PP-8AA through E-TR-IN/2.

Corrective actions have been initiated to pursue a design change to facilitate maintenance and eliminate, as practical, vulnerabilities in neutral/ground paths supporting critical equipment.

There have been no other documented instances at Columbia involving the inadvertent removal of a neutral ground path leading to an event.

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17. NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)*

Plant Conditions

At the time of the event, Columbia Generating Station (Columbia) was operating in Mode 1 (Power Operation) at 95 percent power. Regulating transformer E-TR-IN/2 [EF-XFMR] was inoperable and isolated by clearance order at the time of the event. The removal of E-TR-IN/2 initiated the event leading to the shutdown of Columbia.

Event Description

On April 7, 2007 at 1327 PST, the Main Control Room received several "INVERTER IN-2A/2B TROUBLE" alarms [E-INVT]. Operators dispatched to investigate the alarms reported a fire in regulating transformer E-TR-IN/2, which provides backup power to critical instrument power panel E-PP-8AA. Operators promptly extinguished the fire.

On April 8, 2007 at approximately 0930 PST, maintenance was initiated to remove and replace E-TR-IN/2. While performing this activity it was not recognized that the neutral wire for the primary power source to E-PP-8AA was routed through E-TR-IN/2 and provided the path for the remote ground reference point. Replacement of E-TR-IN/2 required lifting this neutral wire which resulted in an unanticipated loss of ground reference for E-PP-8AA. The ensuing power fluctuations resulted in E-PP-8AA being declared inoperable. At 1432 PST, Energy Northwest entered Condition A of Technical Specification 3.8.7, "Distribution Systems – Operating."

Prior to exceeding the 8 hour completion time of Condition A, management decided to initiate a controlled reactor shutdown to address the issue. Energy Northwest entered Condition C of Technical Specification 3.8.7 at 2232 PST and notified the NRC of the shutdown via Event Notification #43291. Columbia entered Mode 3 (Hot Shutdown) at 0920 PST on April 9, 2007.

Immediate Corrective Action

A Technical Issues Resolution Team was promptly initiated to troubleshoot and correct the immediate electrical conditions and restore system operability.

Cause of Event

The root cause of this event was a less than optimal design that does not accommodate maintenance and established a unique error-prone condition.

Contributing to this event was a unique grounded neutral configuration that was not well understood by plant personnel, less than adequate detail in the lead termination and splicing procedure, and unclear documentation concerning the location of the reference ground. Had drawings been clearly labeled, it is likely that the ground path vulnerability would have been recognized and the event averted.

Assessment of Safety Consequences

This event did not pose a threat to the health and safety of the public or plant personnel.

The act of lifting the neutral wire during removal of E-TR-IN/2 eliminated the ground reference point for power panel E-PP-8AA and created a condition where the neutral-to-ground potential was free to vary with circuit conditions. The neutral-to-ground potential was measured to be approximately 68 VAC. This increase in neutral potential in E-PP-8AA resulted in a change in the line voltage supplied from inverter IN/2 with respect to plant ground. Due to the internal impedance characteristics of the inverter, the line voltage with respect to the neutral was maintained at 120 VAC and the Line 1-to-Line 2 voltage was maintained at 240 VAC. The line-to-ground voltages changed over time as load demand changed.

Some of the loads supplied from E-PP-8AA have a neutral connection to other panels that were still at ground potential and would have seen the line-to-ground potential rather than the line-to-neutral voltage from the inverter. This resulted in blown power supply fuses in the Area Radiation Monitors (ARMs), momentary drop-out of a control relay supporting one of two inboard Main Steam Isolation Valve (MSIV) solenoids, changes in the intensity of the MSIV position indication lights, voltage fluctuations on the MSIV solenoids, and a failed surge protection power strip for the Digital Electro-Hydraulic (DEH) printer.

Once the decision was made to shut down the plant, operators were briefed and the shut down performed in a coordinated and controlled manner. The systems necessary to support a safe shutdown were operable and performed their required functions. The plant remained in safe shutdown condition until corrective actions could be performed to restore system operability.

Further Corrective Actions

For components with similar vulnerabilities as E-TR-IN/2, Energy Northwest is pursuing a design change to facilitate maintenance and eliminate, as practical, vulnerabilities to loss of ground reference (e.g., move internal neutral connections to an external junction box or provide an alternate ground reference point closer to the load). Should a particular design change not be implemented, Energy Northwest will establish a justification and alternate corrective actions to prevent recurrence. Until such changes can be implemented, Energy Northwest has established an additional level of review by engineering for electrical work packages to ensure that the impact on the plant is completely understood and accounted for.

Energy Northwest will pursue other corrective actions to enhance the quality of associated drawings, procedures, and training of personnel to recognize similar conditions.

Similar Events

E-TR-IN/2 was replaced offline in 2001. During this replacement, E-PP-8AA was supplied from a temporary power source, and therefore, the neutral ground path through the transformer was not required.

There have not been any documented instances at Columbia involving the actual inadvertent removal of a neutral ground path that has resulted in an event. Nonetheless, prior events have indicated weaknesses in understanding the significance of neutral and ground references. Corrective actions associated with these prior events have been focused on correcting the condition and did not fully address the apparent/root causes or other generic implications.

EIIS Information (Denoted as [XX])

Text Reference	System	Component
E-PP-8AA	EF	
E-TR-IN/2	EF	XFMR
E-IN-2A and 2B	EF	INVT