Nebraska Public Power District
Nebraska's Energy Leader

NLS2000098
November 13, 2000

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

Gentlemen:

Subject: Licensee Event Report No. 2000-011
Cooper Nuclear Station, NRC Docket 50-298, DPR-46

The subject Licensee Event Report is forwarded as an enclosure to this letter.

Sincerely,

J. A. McDonald
Plant Manager

/rar
Enclosure

cc: Regional Administrator
USNRC - Region IV

Senior Project Manager
USNRC - NRR Project Directorate IV-1

Senior Resident Inspector
USNRC

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NRC FORM 366 (6-1998) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2001

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503. If 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.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Cooper Nuclear Station	05000298	1 OF 5

TITLE (4)

Automatic Reactor Scram Due to Actuation of Generator to Transformer Differential Phase C Relay

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
10	14	2000	2000	-- 011 --	00	11	13	2000		05000
									FACILITY NAME	DOCKET NUMBER
										05000

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
POWER LEVEL (10)	100		20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
			20.2203(a)(1)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)
			20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
			20.2203(a)(2)(ii)		20.2203(a)(4)	X	50.73(a)(2)(iv)		OTHER
			20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Sharon Mahler, Assistant Manager Nuclear Licensing and Safety	402-825-3811

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
B	EL	XFMR	M175	Y						

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

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On October 14, 2000 at approximately 3:24 Central Daylight Time (CDT), a phase 'C' differential current trip (87/GT relay) [EIIS:87] resulted in a Main Generator [EIIS:GEN] trip and automatic reactor scram. All rods inserted. Reactor Pressure Vessel (RPV) pressure initially rose to 1068 psig which is below the lowest Safety Relief Valve setpoint of 1080 psig and then was controlled by the Digital Electro-Hydraulic control system. RPV level initially lowered due to shrink and caused Group 2 (Primary Containment), Group 3 (Reactor Water Cleanup), and Group 6 (Secondary Containment) isolations. The Alternate Rod Insertion (ARI) signal initiated on low RPV level; however, level recovered prior to ARI tripping the Reactor Recirculation Motor Generator field breakers. Reactor Feed Pump turbines tripped on high RPV water level swell following the scram. The RPV swell dampened the RPV pressure transient. A normal cooldown was commenced and the plant was placed in Mode 4, Cold Shutdown, at 17:48 CDT on October 14, 2000.

The cause of the event was vibration induced insulation wear in a current transformer (CT) [EIIS:XCT] lead wire [EIIS:CBL2] associated with the main power transformer [EIIS:XFMR] which resulted in a short to ground. The worn insulation has been repaired, and a spare CT in the transformer has been used to replace the CT with the damaged leads. The CT with the damaged leads has been spared in place.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Cooper Nuclear Station	05000298	2000	-- 011 --	00	2 OF 5

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

PLANT STATUS

Cooper Nuclear Station (CNS) was in Mode 1, Power Operation, at approximately 100 percent power at the time of this event.

BACKGROUND

The objectives of electrical system protection and coordination are to prevent injury to personnel, to minimize damage to the system components, and to limit the extent and duration of service interruptions whenever equipment failure, human error, or adverse natural events occur on any portion of the system. With regard to the main station generator, CNS has a number of individual protective relay schemes to protect the generator from damage in the event of abnormal conditions. One such protective relay scheme involves the Generator to Transformer (G/T) Differential Phase relays, TG-REL-GT(87)A, B and C. Basically, this relay scheme compares the vectorial sum of the current leaving the main station generator and the current entering the station normal service transformer, EE-XFMR-N, to the current leaving the main station step-up transformers, EE-XFMR-MAIN(A), (B) and (C). If circuit conditions between the generator and the transformers are normal, the comparison should show that the generator output current minus the normal service transformer input current is approximately the same as the main transformer currents, allowing for some percentage of loss. If a fault occurs in the circuit, part of the current flow will be deflected into the fault, and the current comparison being made by at least one of the G/T Differential Phase relays will detect a difference outside of the allowable loss limits. The relay(s) detecting the differential current will trip. In the protective relay scheme used at CNS, tripping of one or more of the G/T Differential Phase relays will cause a trip of the main turbine and generator and subsequently, the reactor will scram via a Reactor Protection System (RPS) actuation.

The RPS initiates a reactor scram when one or more monitored parameters exceed their specified limits to preserve the integrity of the fuel cladding and the reactor coolant pressure boundary and minimize the energy that must be absorbed following a loss of coolant accident. This can be accomplished either automatically or manually.

The protection and monitoring functions of the RPS have been designed to ensure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RPS, as well as Limiting Conditions for Operation (LCOs) on other reactor system parameters and equipment performance. The LSSS are defined as the Allowable Values, which, in conjunction with the LCOs, establish the threshold for protective system action to prevent exceeding acceptable limits, including Safety Limits during Design Basis Accidents.

The RPS includes sensors, relays, bypass circuits, and switches that are necessary to cause initiation of a reactor scram. Functional diversity is provided by monitoring a wide range of dependent and independent parameters. The input parameters to the scram logic are from instrumentation that monitors reactor vessel water level, reactor vessel pressure, neutron flux, main steam line isolation valve position, turbine control valve fast closure, trip oil pressure, turbine stop valve position, drywell pressure, and scram discharge volume water level, as well as reactor mode switch in shutdown position and manual scram signals. There are at least four redundant sensor input signals from each of these parameters (with the exception of the manual scram signal and the reactor mode switch in shutdown scram signal). Most channels include instrumentation that compares measured input signals with pre-established setpoints. When the setpoint is exceeded, the channel outputs an RPS trip signal to the trip logic.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Cooper Nuclear Station	05000298	2000	-- 011 --	00	3 OF 5

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

EVENT DESCRIPTION

On October 14, 2000 at approximately 3:24 Central Daylight Time (CDT), a phase 'C' differential current trip (87/GT relay) [EIIS:87] resulted in a Main Generator [EIIS:GEN] trip and automatic reactor scram. All rods inserted. Reactor Pressure Vessel (RPV) pressure initially rose to 1068 psig which is below the lowest Safety Relief Valve setpoint of 1080 psig and then was controlled by the Digital Electro-Hydraulic control system. RPV level initially lowered due to shrink and caused Group 2 (Primary Containment), Group 3 (Reactor Water Cleanup), and Group 6 (Secondary Containment) isolations. The Alternate Rod Insertion (ARI) signal initiated on low RPV level; however, level recovered prior to ARI tripping the Reactor Recirculation Motor Generator field breakers. Reactor Feed Pump (RFP) turbines tripped on high RPV water level swell following the scram. The RPV swell dampened the RPV pressure transient. The sequence of events for the load rejection, turbine trip, and RPV pressure/level response occurred per plant design. A normal cooldown was commenced and the plant was placed in Mode 4, Cold Shutdown, at 17:48 on October 14, 2000.

Significant unrelated conditions during the event and associated Problem Identification Report (PIR) numbers are as follows:

RFP B turbine would not reset while attempting to restart the pump. PIR 4-11969.

Several Plant Management Information System terminals locked up after the reactor trip. PIR 4-12061.

BASIS OF REPORT

This event is being reported under the requirements of 10CFR50.73(a)(2)(iv), as an event or condition that resulted in a manual or automatic actuation of any engineered safety feature, including the reactor protection system.

CAUSE

The root cause of the event was vibration induced insulation wear on the current transformer (CT) wire, within the main power transformer EE-XFMR-MAIN(B), which runs from the CT of the main power transformer to the penetration connection leading to the external transformer wiring that resulted in a ground.

The Generator to Transformer Differential Phase C relay tripped due to the ground on the phase B main transformer CT wiring. The ground was located within the B phase main power transformer in the wiring between the coil of the CT and the bulkhead penetration to the field wiring outside of the transformer. The exact location of the ground was at a point were the wiring curved around a piece of steel within the transformer. The wire insulation had been worn through so that the conductor was in contact with the steel.

SAFETY SIGNIFICANCE

During the event, the plant responded as expected with no major equipment malfunctions with the exception of RFP B turbine. Both RFP turbines tripped as expected on high reactor water level. When an attempt to reset RFP B turbine did not succeed, RFP A turbine was reset and promptly provided vessel water level

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

control. High Pressure Coolant Injection, Reactor Core Isolation Cooling and Control Rod Drive cooling were available during this event as additional high pressure coolant makeup sources.

The success criterion for the feedwater system is to have one of the two trains available. This criterion was achieved, using train A. Based on this review, it is concluded that the plant response was within the bounds of the T3A transient (Plant Trip with the Condenser available as a heat sink) as evaluated in the CNS Probabilistic Risk Assessment.

This event was also evaluated to determine if the event should be classified as a Safety System Functional Failure (SSFF). The results of the evaluation demonstrated that CNS retained the ability to:

A. Shut down the reactor and maintain it in a safe shutdown condition.
B. Remove residual heat.
C. Control the release of radioactive material.
D. Mitigate the consequences of an accident.

Therefore, this event is not reportable as a SSFF in accordance with the guidance contained in Nuclear Energy Institute 99-02, Revision 0, or under the provisions of 10CFR50.73(a)(2)(v).

In conclusion, the safety significance of this event is low.

CORRECTIVE ACTIONS

Immediate Actions:

1. The plant was safely shutdown. Mode 4, Cold Shutdown, was entered at 17:48 CDT on October 14, 2000.

2. The following two actions were taken to resolve the condition associated with the phase B main transformer:

   Use of an existing installed spare current transformer in place of the current transformer with the damaged lead insulation.

   Application of an appropriate insulating tape to the worn wire insulation and covering of the metal bracket with a plastic sleeve of appropriate material to prevent continued grounding of the affected leads.

3. Actions were taken on the phase C main transformer to eliminate the potential for friction wear of the current transformer wiring insulation such that a ground could result. It was determined that the installation and routing of the wiring within the phase A main transformer was different than that of the phase B main transformer such that the same vibration induced wear mechanism was not present.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Cooper Nuclear Station	05000298	2000	-- 011 --	00	5 OF 5

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

Additional Corrective Actions:

CNS will inspect the insulation repair and friction dressing applied to the CT wiring in the phase B and C main power transformers to ensure that there has been no degradation of the repair. This inspection will be performed during the next scheduled refueling outage.

Based on inspection results, CNS will determine if future inspections are required.

PREVIOUS EVENTS

The last automatic scram with the reactor in Mode 1 (Power Operation), occurred in March 1994. This event was reported in License Event Report 94-004-00.

Correspondence Number: NLS2000098

The following table identifies those actions committed to by the District in this document. Any other actions discussed in the submittal represent intended or planned actions by the District. They are described to the NRC for the NRC's information and are not regulatory commitments. Please notify the NL&S Manager at Cooper Nuclear Station of any questions regarding this document or any associated regulatory commitments.

COMMITMENT	COMMITTED DATE OR OUTAGE
CNS will inspect the insulation repair and friction dressing applied to the current transformer wiring in the phase B and C main power transformers to ensure that there has been no degradation of the repair. This inspection will be performed during the next scheduled refueling outage.	Prior to Restart from Refuel Outage RE-20
Based on inspection results, CNS will determine if future inspections are required.	30 days after Restart from Refuel Outage RE-20