Nebraska Public Power District

Nebraska's Energy Leader

NLS990107
November 17, 1999

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

Gentlemen:

Subject: Licensee Event Report No. 1999-008
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
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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)

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TITLE (4)

Troubleshooting Activities Causes Critical Bus Undervoltage and ESF Actuations

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	18	1999	1999	-- 008 --	00	11	17	1999		05000
									FACILITY NAME	DOCKET NUMBER
										05000

OPERATING MODE (9)	1
POWER LEVEL (10)	100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	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)
Roy A. Radloff, Licensing Engineer	(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

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 18, 1999, at approximately 1512, troubleshooting activities for Circulating Water system [EIIS:NN] Pump [EIIS:P] D resulted in an erroneous undervoltage signal being sensed on non-critical 4160V bus [EIIS:BU] 1B and caused unexpected plant equipment responses including tripping critical 4160V bus 1G. An automatic start of Diesel Generator [EIIS:DG] (DG) 2 and activation of several Primary Containment Isolation System [EIIS:JM] components and Secondary Containment isolation system components, including a start of the Standby Gas Treatment [EIIS:BH] system resulted from the undervoltage on Critical 4160V bus 1G. The start of DG 2 was an automatic engineered safety feature actuation, however, the DG did not load because the Emergency Station Service Transformer [EIIS:XFMR] automatically re-energized the bus after approximately two seconds in accordance with the undervoltage protection circuitry design. The DG was returned to a normal standby lineup at 16:34.

The erroneous undervoltage condition occurred when a portable analog recorder [EIIS:IR] was attached at the 4160V bus 1B panel meter which is on the bus metering potential transformer [EIIS:XPT] (PT) secondary circuit. The recorder's signal input terminals include a removable ground strap that introduced a short circuit to ground, blew the PT secondary fuse, and led to the erroneous undervoltage signal.

The plant power generation systems were restored to normal alignments on October 18, 1999, at 17:30. The normal alignment for auxiliary AC power was restored on October 19,1999, at 16:07.

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

PLANT STATUS

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

BACKGROUND

The station electrical power systems [EIIS:EA] provide a diversity of dependable power sources which are physically isolated. The station electrical power systems consist of the normal unit and start-up AC power systems, the emergency AC power system, the 4160V and 480V auxiliary power distribution systems, standby AC power system, 125 and 250V DC power systems, 24V DC power system, and the 115/230V uninterruptible AC power system.

The normal unit AC power source provides power to the station auxiliaries and is the normal station AC power source when the main generator is operating. The start-up station off-site AC power source provides power to the station auxiliaries and is normally in use when the normal AC power source is unavailable.

The emergency off-site 69kV AC power source provides power to critical station auxiliaries. It is used to supply critical station auxiliary loads only when the main generator is shutdown and the start-up (off-site) AC power source is unavailable.

The station 4160V and 480V auxiliary power distribution systems distribute the AC power necessary for startup, operation, or shutdown of station loads. These portions of this distribution system receive power from the normal AC power source or the start-up AC power source. The critical service portions of this distribution system also can receive power from the standby AC power source or the emergency 69kV power source.

The standby a-c power source [EIIS:EK] provides two independent 4160 volt Diesel Generators (DG) as the on-site sources of a-c power to the critical service portions of the auxiliary power systems. Each on-site source provides a-c power to safely shutdown the reactor, maintain the safe shutdown condition, and operate the auxiliaries necessary for station safety.

Automatic fast-transfer capability is provided in the design to transfer the start up AC power source (start-up transformer) to the auxiliary power distribution system in the event that the normal AC power source is lost for any reason.

There are two normal power sources available to the 4160V buses, the normal power source and the start-up power source (start-up transformer). The loss of the normal power source results in automatic fast transfer to the start-up power source. The loss of the start-up or normal transformer source to either critical service bus results in the automatic connection to the emergency power source and the automatic starting of the DG (stand-by power source) associated with that bus. If the emergency power source fails or is unavailable the supply breaker will close within 16 seconds after the DG has reached rated speed and voltage, restoring power to the affected emergency bus.

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EVENT DESCRIPTION

On October 18, 1999, at approximately 1512, troubleshooting activities for Circulating Water [EIIS:NN] Pump [EIIS:P] D resulted in an erroneous undervoltage being sensed on non-critical 4160V bus [EIIS:BU] 1B and caused unexpected plant equipment responses. An automatic start of Diesel Generator [EIIS:DG] (DG) 2 and activation of several Primary Containment Isolation System [EIIS:JM] (PCIS) components and Secondary Containment (SC) isolation system components, including a start of the Standby Gas Treatment [EIIS:BH] (SGT) system resulted from the undervoltage on Critical 4160V bus 1G when its normal feed tripped. The start of DG 2 was an automatic engineered safety feature actuation, however, the DG did not load because the Emergency Station Service Transformer [EIIS:XFMR] (ESST) automatically re-energized the bus after approximately two seconds in accordance with the undervoltage protection circuitry design.

The erroneous undervoltage condition on bus 1B occurred when a portable analog recorder [EIIS:IR] was attached at the bus panel meter on the bus metering potential transformer [EIIS:XPT] (PT) secondary circuit to record voltage and current during the start of CW-P-D. The recorder's signal input terminals include a removable ground strap that introduced a short circuit to ground resulting in a blown fuse in the PT secondary circuit. Bus undervoltage relay [EIIS:27] EE-REL-(27-1B), which is included in the secondary circuit, sensed the erroneous undervoltage signal and initiated trip of the critical 4160V bus G normal feed. Loss of voltage on critical 4160V bus 1G caused an automatic start of the DG and a automatic closure of the critical 4160V bus 1G feed from ESST in accordance with station design.

The two second undervoltage on Critical 4160V bus 1G caused the activation of several PCIS and SC isolation components including a start of the SGT system due to component control circuits with seal-in relays sensing an approximately two second loss of power before the ESST re-energized the bus. No group isolations signals were present and the DG did not load.

The DG2 was restored to stand-by alignment at 16:34. The plant power generation systems were restored to normal alignments on October 18, 1999 at 17:30. The normal alignment for auxiliary AC power was restored on October 19, 1999 at 16:07.

BASIS FOR REPORT

This event is reportable 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 (ESF).

CAUSE

The cause of this event is a lack of training for the use of portable recorders and a failure to use/correctly use procedures for identifying work boundaries and plant impacts, and for performing pre-job briefs.

The use of portable recorders is not listed on the electrician training task list. The user was considered fully qualified yet he lacked the knowledge to complete the job successfully without incident. Plant procedures contain administrative barriers intended to prevent the unplanned plant response that occurred in this event. The troubleshooting instructions are supposed to identify work boundaries and plant impact. The boundary statement on the troubleshooting instructions did not accurately reflect the boundary of the work that was to be done and as a consequence the plant impact statement failed to convey the risks associated with connecting to the 4160 bus 1B volt meter.

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Post- job critiques and pre-job briefs in accordance with station procedures are performed on an inconsistent basis. This particular troubleshooting evolution began several days before the event. A pre-job brief was done at the beginning of troubleshooting. A post-job critique did not occur following completion of earlier troubleshooting. The electrician participating on the day of the event did not have the benefit of a pre-job brief.

SAFETY SIGNIFICANCE

The actual safety significance of this event is low. Critical 4160V Bus 1G was de-energized for approximately two seconds. The normal bus AC power source (the Normal Station Service Transformer (NSST) via bus 1B) and the preferred offsite AC power source (the Start-up Station Service Transformer (SSST) via bus 1B) were not available because the troubleshooting activities unexpectedly tripped supply breaker EE-CB-4160B(1BG). Bus undervoltage protection circuitry automatically fast transferred the bus to the second offsite AC source, the ESST by closing 4160V breaker EE-CB-4160G(1GS). The undervoltage protection circuitry also started the DG 2 as designed in the event that the ESST was unable to provide adequate voltage for the Critical 4160V Bus 1G. The DG was not needed and was manually secured.

The availability and diversity of offsite AC sources was reduced and the Division 2 Emergency Core Cooling System (ECCS) power supply was de-energized for approximately two seconds. After two seconds, the undervoltage logic circuitry had actuated to transfer Critical 4160V Bus 1G to the ESST as designed, restoring power to both critical buses. The NSST remained in service and continued to provide power to the 4160V buses except the Critical 4160V bus 1G. The SSST remained available to power the other 4160V buses (except the Critical 4160V bus 1G) if needed. The ESST was in service providing power to the Critical 4160V bus 1G (which powers ECCS Division 2 components). Both essential (i.e. safety related) onsite AC sources (DG 1 and DG 2) remained available to provide power to their respective Critical 4160V buses (1F and 1G) if needed.

The event did not challenge any barriers to radioactive release. At no time was the health and safety of the public, nor plant personnel, endangered, and no radioactive releases in excess of Technical Specifications allowable limits resulted from this event.

The event did not impact the plants ability to shutdown or maintain the reactor in a safe shutdown condition. The critical (i.e. safety related) systems and components that are supported by the auxiliary AC distribution remained operable during and after the event because bus voltage was maintained. Offsite and onsite AC sources remained operable.

The event and subsequent plant response did not place the plant in an unanalyzed condition. The event on October 18, 1999, and the subsequent plant response is bounded by the Station Safety Analysis in Updated Safety Analysis Report.

In addition, a Probabilistic Safety Assessment analysis concluded that the effects on Core Damage Frequency (CDF) and Large Early Release Frequency (LERF) were negligible. This event was evaluated to determine the affect on CDF and LERF. The evaluation included the transfer of the 4160G bus to the ESST along with other Maintenance and Testing taking place in the plant during the event. It was determined that the CDF remained below the Average Test and Maintenance CDF for CNS and LERF did not increase, therefore, the risk significance is negligible. Thus it is concluded that this event was of low risk significance.

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

Based upon Risk Management Safety System Functional Failure evaluator review of this event and NEI 99-02 (Draft Rev C) guidance, there are no safety system functional failures (SSFF) associated with this event. A system is considered capable of performing its specified safety function(s) when the safety functions can be fulfilled and when the necessary attendant instrumentation, controls, electrical power, cooling and seal water, lubrication and other auxiliary equipment are also capable of performing their related support function(s). As documented in this report, the safety systems performed as they were designed. Therefore, there is no SSFF associated with this event.

CORRECTIVE ACTION

Immediate Actions:

1. The blown fuse has been replaced and the 4160V G bus has been restored to its normal power supply.

2. Tailgate training sessions that convey CNS and industry experience with troubleshooting was presented to select personnel from operations, maintenance, and engineering.

On-going Actions:

1. CNS will perform a "needs analysis" for training electricians on the use of portable recorders, and implement the required training.

2. CNS will provide training that emphasizes that the boundary statement and the plant impact statement must be accurate and that troubleshooting steps confine work to within the stated boundaries for individuals that prepare and perform troubleshooting instructions. The need to provide this training on a recurring basis will be evaluated.

3. CNS will revise procedures to address repeating the pre-job brief when longer duration jobs span several shifts or several days.

4. CNS will conduct a review of test equipment training requirements to ensure adequacy of "skill of the craft." Special emphasis will be placed on recorders and other Maintenance and Test Equipment that can introduce grounds into the circuit being tested.

PREVIOUS EVENTS

The following previous events which resulted in unplanned ESF actuations were identified:

LER 95-004	Primary Containment Group Isolations Caused by Surveillance Procedure Deficiencies
LER 95-015	Transfer of the "F" Bus to the Emergency Transformer due to a Maintenance Activity
LER 95-022-01	Reactor Trip Signal, ESF Actuation, and Loss of Shutdown Cooling During Maintenance Activity

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LER 96-005	Partial ESF Actuation of Containment Isolation Due to Personnel Error
LER 97-004-01	Reactor Trip Signal, ESF Actuation, and Loss of Shutdown Cooling During Maintenance Activity

Correspondence No: NLS990107

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 perform a "needs analysis" for training electricians on the use of portable recorders, and implement the required training.	January 6, 2000
CNS will provide training that emphasizes that the boundary statement and the plant impact statement must be accurate and that troubleshooting steps confine work to within the stated boundaries for individuals that prepare and perform troubleshooting instructions. The need to provide this training on a recurring basis will be evaluated.	January 6, 2000
CNS will revise procedures to address repeating the pre-job brief when longer duration jobs span several shifts or several days.	December 15, 1999
CNS will conduct a review of test equipment training requirements to ensure adequacy of "skill of the craft". Special emphasis will be placed on recorders and other Maintenance and Test Equipment that can introduce grounds into the circuit being tested.	January 6, 2000