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Constellation Energy Group

Nine Mile Point
Nuclear Station

February 14, 2003
NMP2L 2083

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: Nine Mile Point Unit 2
Docket No. 50-410; NPF-69

Licensee Event Report 02-006, "Reactor Scram Due to Loss of Generator Stator Cooling"

Gentlemen:

In accordance with 10 CFR 50.73(a)(2)(iv)(A), we are submitting Licensee Event Report 02-006, "Reactor Scram Due to Loss of Generator Stator Cooling."

Very truly yours,

LA Hopkins

Lawrence A. Hopkins
Plant General Manager

LAH/DEV/jm
Attachment
cc: Mr. H. J. Miller, NRC Regional Administrator, Region I
Mr. G. K. Hunegs, NRC Senior Resident Inspector

IE22

NRC FORM 366 (1-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004

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 Management Branch (T-6 E6), U S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@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 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)

Reactor Scram Due to Loss of Generator Stator Cooling

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
12	16	2002	2002	– 006 –	00	02	14	2003	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 all that apply) (11)

20 2201(b)	20 2203(a)(3)(ii)	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
20 2201(d)	20 2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)
20.2203(a)(1)	50 36(c)(1)(i)(A)	X 50 73(a)(2)(iv)(A)	73 71(a)(4)
20.2203(a)(2)(i)	50 36(c)(1)(ii)(A)	50 73(a)(2)(v)(A)	73 71(a)(5)
20 2203(a)(2)(ii)	50.36(c)(2)	50.73(a)(2)(v)(B)	OTHER
20 2203(a)(2)(iii)	50 46(a)(3)(ii)	50 73(a)(2)(v)(C)	
20 2203(a)(2)(iv)	50 73(a)(2)(i)(A)	50 73(a)(2)(v)(D)	
20.2203(a)(2)(v)	50 73(a)(2)(i)(B)	50 73(a)(2)(vii)	
20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50 73(a)(2)(viii)(A)	
20 2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Robert G. Randall, General Supervisor System Engineering	315-349-2445

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
X	TJ	TIC	F120	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 December 16, 2002, at 1545 hours, with Nine Mile Point Unit 2 (NMP2) operating at 100 percent power, an automatic turbine generator runback was experienced as a result of high temperature in the Generator Stator Cooling Water System. As a result of increasing reactor pressure, the reactor automatically scrammed at 1548 hours due to a "High Reactor Pressure" trip signal. At the time of the scram, reactor power was approximately 71 percent of rated power.

This event is reportable in accordance with 10 CFR 50 73(a)(2)(iv)(A) as an automatic actuation of the Reactor Protection System that resulted in a reactor scram

The cause of the high temperature in the Generator Stator Cooling Water System was failure of a mechanical linkage connection within stator water temperature controller 2GMC-TIC101. The cause for this failure was installation of the controller in a manner that exposed it to high vibration, which, over time, caused the linkage to fail. Recognition of past industry operating experience (OE) could have prevented occurrence of the NMP2 event.

The corrective actions include replacement of temperature controller 2GMC-TIC101, inspection of other pneumatic controllers, initiation of engineering activities to increase the long-term reliability of 2GMC-TIC101, and changes to the industry OE review program.

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

I. Description of Event

On December 16, 2002, at 1545 hours, with Nine Mile Point Unit 2 (NMP2) operating at 100 percent power, an automatic turbine generator runback was experienced as a result of high temperature in the Generator Stator Cooling Water System. In response to this event, two turbine bypass valves initially opened. The control room operators took actions to reduce power by reducing reactor recirculation flow. The resultant power reduction (to approximately 65 percent of rated power) was initially successful in closing the open turbine bypass valves. Further power reduction was commenced by the insertion of control rods; however, the rate of the power reduction was not sufficient to keep pace with the continuing turbine generator runback. When the turbine bypass valves were again reported to be opening, the Control Room Supervisor ordered a reactor scram. Before the mode switch was placed in Shutdown, all five of the turbine bypass valves opened, and with the turbine generator runback still in progress, reactor pressure began to rise. The reactor automatically scrammed at 1548 hours due to a "High Reactor Pressure" trip signal. At the time of the scram, reactor power had increased to approximately 71 percent of rated power due to the increasing reactor pressure. The maximum reactor pressure during the event was 1050 psig as measured by wide range pressure instrumentation.

All control rods fully inserted following the scram signal.

Reactor pressure was controlled using the turbine bypass valves following the reactor scram. No safety relief valves opened during the event. The cooldown rate remained less than 100 degrees Fahrenheit per hour during the scram recovery.

Reactor water level initially dropped below the level 3 scram setpoint of 159.3 inches and reached a minimum level of approximately 145 inches. Reactor water level was initially recovered using operating feedwater pumps 2FWS-P1A and 2FWS-P1C. Before operator action could be taken to secure a feedwater pump, both feedwater pumps tripped on high reactor water level as designed. Reactor water level rose to approximately 205 inches due to the initial injection of feedwater and the level swell associated with heating of the feedwater. The operating crew started the Reactor Core Isolation Cooling (RCIC) system, in accordance with procedures, as a means to control reactor water level. The feedwater pumps remained available to be restarted if required for level control.

As designed, both recirculation pumps automatically downshifted to slow speed when reactor water level dropped below the level 3 setpoint of 159.3 inches following the scram. Both reactor recirculation pumps continued to operate at slow speed after the event.

No structures, systems, or components were inoperable at the start of the event that would have exacerbated the event. Operators and required equipment responded as expected.

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

II. Cause of Event

The cause of the high temperature in the Generator Stator Cooling Water System, which resulted in the turbine generator runback and subsequent scram, was failure of a mechanical linkage connection within a stator water temperature controller.

Generator stator temperature is controlled by a three-way valve (2GMC-TV101), which regulates stator cooling water temperature by controlling the amount of water passing through or bypassing a set of coolers. Valve 2GMC-TV101 is controlled by a Fischer & Porter Model 1451 temperature controller (2GMC-TIC101), which senses the stator cooling water inlet temperature by means of a capillary bulb with a helical element. This helical element is mechanically linked to the indicator and control element within the controller, which repositions valve 2GMC-TV101 to adjust temperature. The mechanical link failed because the pin at the linkage connection fractured, causing the controller to sense a false low temperature and bypass all stator water around the coolers. As a result, stator water temperature rose until temperature switch 2GMC-TS109 initiated a turbine generator runback. The cause for the pin failure was vibration-induced fatigue failure.

The cause for the mechanical linkage connection failure within temperature controller 2GMC-TIC101 was installation of the controller in a manner that exposed it to high vibration, which, over time, caused the linkage to fail. During the cause investigation, it was identified that vibration-induced failure of components in similar controllers had previously occurred at several other nuclear power plants during the mid-1990s. This industry operating experience (OE) was obtained from a review of Licensee Event Reports (LERs) that have not routinely been screened for OE. Recognition of this industry OE could have prevented occurrence of the NMP2 event.

III. Analysis of Event

This event is reportable in accordance with 10 CFR 50.73(a)(2)(iv)(A) as an automatic actuation of the Reactor Protection System that resulted in a reactor scram. No significant safety consequences resulted from this event because all required safety systems were available and functioned as designed.

The Generator Stator Cooling Water System cools the generator and the exciter rectifiers. The turbine generator runback was initiated by high cooling water temperature, which is designed to protect the generator and all associated equipment. The automatic reactor scram on high reactor pressure, which immediately preceded operator action to manually scram the reactor, limited the reactor power and pressure resulting from the turbine generator runback.

The RCIC system was available and functioned properly to control reactor water level and remove decay heat from the reactor following the shutdown.

No Emergency Core Cooling Systems actuated during the event or should have actuated. No safety relief valves opened during the event. The cooldown rate remained less than 100 degrees Fahrenheit per hour during the scram recovery.

A probabilistic risk assessment was performed on this event. The assessment concluded that, based on the resulting Conditional Core Damage Probability, this event was of very low risk significance.

Based on the above, the event did not pose a threat to the health and safety of plant personnel or the public.

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

IV. Corrective Actions

1. Temperature controller 2GMC-TIC101 was replaced and satisfactorily tested.
2. Other instrumentation mounted on the generator stator cooling water skid was evaluated for susceptibility to vibration-induced failures. None was found.
3. Other pneumatic controllers in high vibration environments whose failure could cause a plant transient were visually inspected to identify degraded mechanical linkage conditions similar to those found on temperature controller 2GMC-TIC101. None of the inspected controllers exhibited the degradation found on 2GMC-TIC101.
4. Engineering activities have been initiated to provide a replacement controller in a vibration resistant location to increase the long-term reliability of temperature controller 2GMC-TIC101.
5. Methods to review LERs will be developed and implemented to capture equipment issues potentially affecting plant operation. A review of appropriate historical LERs involving equipment failures that are applicable to NMP2 will be conducted.

V. Additional Information

1. Failed Components:

   Temperature controller, mark no. 2GMC-TIC101, manufactured by Fischer & Porter, Model 1451

2. Previous similar events:

   NMP2 has not experienced any previous similar reactor scrams or reportable events due to controller mechanical linkage failure. LER 01-001, "Reactor Scram Due to Relay Failure in Electro Hydraulic Control System," describes an event in which high resistance in a normally closed relay contact led to turbine stop valve closure and a reactor scram. The cause of the event was inadequate preventive actions taken in response to known industry OE. The corrective actions of LER 01-001 were specific to the event and would not have prevented the inadequate OE review that was identified during investigation of the generator stator cooling water temperature controller failure.

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V. Additional Information (Cont'd.)

3. Identification of components referred to in this Licensee Event Report:

Components	IEEE 805 System ID	IEEE 803A Function
Reactor Protection System	JC	N/A
Feedwater System	SJ	N/A
Main Steam System	SB	N/A
Generator Stator Water Cooling System	TJ	N/A
Main Turbine Generator System	TA/TB	N/A
Turbine Bypass Control System	JI	N/A
Reactor Recirculation System	AD	N/A
Reactor Core Isolation Cooling System	BN	N/A
Reactor	AC	N/A
Pump	SJ, AD	P
Valve	SB, TJ	PCV, RV, TCV
Vessel	AD	VSL
Temperature Switch	TJ	TS
Temperature Indicating Controller	TJ	TIC
Control Rod	AC	ROD