10CFR50.73

Virginia Electric and Power Company
North Anna Power Station
P. O. Box 402
Mineral, Virginia 23117

April 27, 2000

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

Serial No.: 00-224
NAPS: JHL
Docket Nos.: 50-338, 50-339
License Nos.: NPF-4, NPF-7

Dear Sirs:

Pursuant to 10CFR50.73, Virginia Electric and Power Company hereby submits the following Licensee Event Report applicable to North Anna Units 1 and 2.

Report No. 50-338, 339/2000-002-00

This report has been reviewed by the Station Nuclear Safety and Operating Committee and will be forwarded to the Management Safety Review Committee for its review.

Very truly yours,

W. R. Matthews
Site Vice President

Commitments contained in this letter: None

Enclosure

cc: U. S. Nuclear Regulatory Commission
Region II
Atlanta Federal Center
61 Forsyth Street, SW, Suite 23T85
Atlanta, Georgia 30303

Mr. M. J. Morgan
NRC Senior Resident Inspector
North Anna Power Station

D F03

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)
NORTH ANNA POWER STATION , UNIT 1	05000338	1 OF 6

TITLE (
CONDITIONS PROHIBITED BY TS AND OUTSIDE DESIGN BASIS WITH EDGs INOPERABLE

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	DOCUMENT NUMBER
04	04	2000	2000	002	00	04	27	2000	North Anna Power Station, Unit 2	05000-339
									FACILITY NAME	DOCUMENT NUMBER 05000-

OPERATING MODE (9)	5
POWER LEVEL (10)	0%

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

	20.2201(b)		20.2203(a)(2)(v)	x	50.73(a)(2)(i)		50.73(a)(2)(viii)
	20.2203(a)(1)		20.2203(a)(3)(i)	x	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)		50.73(a)(2)(iv)		OTHER
	20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below
	20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		or in NRC Form 366A

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
W. R. Matthews, Site Vice President	(540) 894-2101

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
D	EK	DG	F010	Y					

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE	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 April 4, 2000, at 1145 hours, the "C" reserve station service transformer unloaded (refer to Licensee Event Report (50-339/2000-02-00). The 1H and 2J emergency busses lost power and then the 1H emergency diesel generator (EDG) did not start. It was determined that the 1H EDG became inoperable on March 22, 2000, at 1710 hours. On March 22, 2000, at 2329 hours, the 1J EDG was removed from service. TS 3.8.1.2 requires an operable EDG during movement of irradiated fuel assemblies when no fuel assemblies are in the reactor vessel. Irradiated fuel assemblies were moved in the spent fuel pool without an operable EDG. Also, with both Unit 1 EDGs inoperable, two Service Water pumps were inoperable for greater than the 72 hours allowed outage time specified in TS 3.7.4.1. Therefore, this is reportable pursuant to 10CFR50.73(a)(2)(i)(B) and 10CFR50.73(a)(2)(ii)(B). The reason for the 1H EDG not starting was that the number 3 cylinder was hydraulically locked due to being full of oil because of low lube oil temperatures that occurred during a bus outage. This event posed no significant safety implications since offsite power sources were operable and the SBO diesel was available to supply power to safety related equipment. Also, the control room emergency ventilation system was capable of performing its design basis function.

1.0 DESCRIPTION OF THE EVENT

On April 4, 2000, at 1145 hours, with Unit 1 in Mode 5 (Cold Shutdown) during recovery from a scheduled refueling outage, the "C" reserve station service transformer (RSST) (EIIS System EA, Component XFMR) unloaded (refer to Licensee Event Report (50-339/2000-02-00). This resulted in the loss of power to the 1H and 2J emergency busses. The 1H emergency diesel generator (EDG) (EIIS System EK, Component DG) subsequently received an undervoltage start signal. However, the 1H EDG did not automatically start. The 2J EDG automatically started and supplied power to the 2J emergency bus. The reason for the 1H EDG not automatically starting was that the number 3 cylinder was hydraulically locked by oil trapped between the pistons. A time line leading to the 1H EDG number 3 cylinder being hydraulically locked is provided below.

On March 16, 2000, at 0222 hours, the 1H EDG was tagged for a coolant change-out. Following the coolant change-out, the 1H EDG was satisfactorily post-maintenance tested. On March 21, 2000, at 0330 hours, the 1H EDG was tagged to support removal of the "H" bus for maintenance. On March 21, 2000, at 0924 hours, the "H" bus was de-energized. The "H" bus was re-energized at approximately 1400 hours on March 22, 2000 and subsequently returned to service on March 22, 2000, at 2320 hours. Prior to returning the "H" bus to service, the 1H EDG was returned to operable status by performing a pre-operational check to verify all switches and parameters were normal. It should be noted that no maintenance was performed on the 1H EDG during the "H" bus outage. Therefore, no additional testing was required.

An investigation into the reason for the 1H EDG being hydraulically locked was performed. It was determined that Maintenance Operating Procedure (MOP) 6.74, Installing and Removing Temporary Power to 1H 480-Volt Loads, step 5.1.17, opened the breaker (EIIS Component BKR) which de-energizes the EDG lube oil and coolant keep warm systems (EIIS System LA). This allowed the EDG lube oil and coolant to cool to ambient conditions. When the Unit 1 "H" bus outage was completed, the keep warm systems were energized at the low ambient conditions. A review determined that the lube oil temperature was only 92 degrees F, after the keep warm system had been operating for a period after re-energizing the Unit 1 "H" bus. At lube oil temperatures below 110 degrees F, with the standby lube oil pump (EIIS Component P) running, the high viscosity oil may not drain back to the sump properly and the positive displacement pump will push the oil into the upper crankcase. The number 3 cylinder was positioned at the point where the exhaust ports were covered and the oil slowly seeped into and filled the cylinder between the pistons. It is conservatively estimated that the number 3 cylinder became hydraulically locked on March 22, 2000, at approximately 1710 hours.

On March 22, 2000, at 2329 hours, the 1J EDG was removed from service for maintenance. Unit 1 was defueled at this time. Post-maintenance testing and 18 month operability testing of the 1J EDG was completed on March 26, 2000, at 0800 hours.

Following testing, the 1J EDG mode selector switch remained in manual-local. On March 26, 2000, at 0955 hours, the 1J EDG was tagged out again to repair a lube oil leak. The leak was repaired and post-maintenance testing was satisfactorily completed on March 26, 2000, at 2300 hours. Therefore, Unit 1 was without an operable EDG for approximately 96 hours.

Technical Specification (TS) 3.8.1.2.b requires that one EDG be operable during movement of irradiated fuel assemblies or loads over irradiated fuel assemblies when no fuel assemblies are in the reactor vessel. However, between March 23 and March 26, 2000, irradiated fuel assemblies were moved in the spent fuel pool without an operable EDG. Therefore, this event is reportable pursuant to 10CFR50.73 (a)(2)(i)(B) for a condition prohibited by the TS.

Technical Specification (TS) 3.7.4.1 requires that two service water (EIIS System BI) loops (shared with Unit 2) shall be operable with each loop consisting of two operable service water pumps with their associated normal and emergency power supplies and an operable flowpath. Actions for two service water pumps inoperable require, within one hour, that component cooling water heat exchanger (EIIS System CC, Component HX) flow must be throttled to ensure the remaining service water pumps are capable of providing adequate flow to the recirculation spray heat exchangers (EIIS System BE). In addition, within 72 hours, at least one SW pump must be restored to operable status or both units are to be placed in Hot Standby within the next 6 hours and in Cold Shutdown within the following 30 hours. During the timeframe that both Unit 1 EDGs were inoperable, the SW System was in a throttled condition, but only the two Unit 2 SW pumps were operable. The timeframe that both EDGs and consequently both Unit 1 SW pumps were inoperable exceeded the Unit 2 SW TS allowed outage time by greater than the modest amount allowed in NUREG-1022, Rev. 1. Therefore, this event is reportable pursuant to 10CFR50.73 (a)(2)(i)(B) for a condition prohibited by the TS and 10CFR50.73(a)(2)(ii)(B) for a condition that was outside the design basis of the plant.

2.0 SIGNIFICANT SAFETY CONSEQUENCES AND IMPLICATIONS

This event posed no significant safety implications, since during the timeframe when both Unit 1 EDGs were inoperable, the Unit 1 reactor vessel was defueled and two independent offsite power supply circuits were operable and capable of supplying power to safety related equipment. In addition, the station blackout (SBO) diesel was available to provide power in the event of an emergency.

Updated Final Safety Analysis Report (UFSAR) Section 15.4.5.1 describes the fuel handling accident outside containment. The UFSAR assumes that electrical power for at least one train of AC and DC busses be available during movement of irradiated fuel assemblies or the movement of loads over irradiated fuel assemblies. The power requirements allow for the operation of equipment and instrumentation required to ensure that doses to control room personnel meet 10CFR50, Appendix A, General Design

Criterion (GDC) 19. Specifically, the emergency power requirements are necessary to ensure the control room emergency ventilation system (EIIS System VI) is operable to mitigate the effects of a fuel handling accident.

The design basis of the control room ventilation system assumes that the control room envelope is pressurized by the bottled air system, during the first hour following an accident, to provide an emergency source of breathing air. The bottled air system pressurizes the control room envelope for approximately one hour to ensure outward leakage. In the case of the fuel handling accident outside containment, the bottled air system automatically actuates on receipt of a high-high radiation signal from either the new fuel storage area or fuel bridge area of the fuel building. The bottled air system can also be manually actuated. With both Unit 1 EDGs inoperable, the Unit 2 control room emergency fans would have been started and placed in the recirculation mode concurrently with the actuation of the bottled air system. After the first hour, one emergency ventilation fan would be aligned to ensure control room pressurization. The emergency ventilation fan will supply air from the Turbine Building through HEPA and charcoal filters (EIIS Component FLT) for the duration of the accident. Therefore, 10CFR50, Appendix A, GDC 19 requirements would have been met in the event of the fuel handling accident outside containment.

The Service Water (SW) System is designed to ensure sufficient cooling capacity is available for safety-related equipment during normal and accident conditions. Technical Specifications specify the number of flow paths and pumps that are required to ensure sufficient flow is available to remove heat following a design basis accident. During the timeframe when both Unit 1 EDGs were inoperable, two Unit 2 SW pumps were operable and capable of providing design flow requirements and the SW system was in a throttled condition. Therefore, the SW System was capable of performing its design function.

Therefore, the health and safety of the public were not affected at any time during this condition.

3.0 CAUSE

The reason for the 1H EDG not automatically starting was that the number 3 cylinder was hydraulically locked due to being full of oil. This occurred because station procedures did not provide guidance to ensure EDG lube oil temperatures were maintained greater than or equal to 110 degrees F, nor prescribe corrective action should temperatures decrease below 110 degrees F. Temperatures above 110 degrees F will ensure a low enough oil viscosity to prevent flooding the upper crankcase.

A contributor to the event is the timeframe associated with performing EDG maintenance and bus outages. Major EDG maintenance is performed while the Unit is on-line. After EDG maintenance is completed, the EDG is started and any excessive oil accumulation would be removed when exhaust temperatures increased. However, bus outages are

typically performed during refueling outages. Controls were not sufficient to ensure oil does not accumulate between the pistons on the EDG following a bus outage.

4.0 IMMEDIATE CORRECTIVE ACTION(S)

The TS 3.8.1.1 action was entered to ensure the 1H EDG was returned to operable status prior to entry into Mode 4.

5.0 ADDITIONAL CORRECTIVE ACTIONS

The 1H EDG was tagged for maintenance and inspection. No problems were identified as a result of the 1H EDG number 3 cylinder being hydraulically locked due to being full of oil. The 1H EDG underwent post-maintenance testing and was subsequently returned to operable status on April 5, 2000.

The 1J EDG was checked as a precautionary measure to ensure that it was not full of oil. No abnormalities were identified.

6.0 ACTIONS TO PREVENT RECURRENCE

Procedures 1/2-OP-6.6A, Emergency Generator Pre-Operational Check for "H" and "J" Diesel and 1/2-LOG-6F, Safeguards Log were revised to require EDG lube oil temperatures to be greater than or equal to 110 degrees F. Temperatures greater than or equal to 110 degrees F will ensure a low enough oil viscosity to prevent flooding the upper crankcase. If lube oil temperature is less than 110 degrees F, engineering is to be notified to evaluate potential hydraulic locking of the EDG.

A root cause evaluation of the 1H EDG event is being performed. Following completion of the root cause evaluation, any additional recommended corrective actions will be evaluated and implemented, as required.

7.0 SIMILAR EVENTS

LER 50-339/84-11-02 dated April 19, 1985 identified both Unit 2 EDGs being inoperable at the same time. The 2J EDG was out of service for troubleshooting when the 2H EDG tripped on high crankcase pressure during testing.

LER 50-339/84-13-00 dated January 3, 1985 identified both Unit 2 EDGs inoperable at the same time. The 2H EDG was removed from service for preventive maintenance when the 2J EDG was started to determine operability and it tripped on high crankcase pressure.

LER 50-339/88-004-01 dated August 30, 1988 identified both Unit 2 EDGs being inoperable at the same time. The 2J EDG was out of service for preplanned maintenance when it was identified that the 2H EDG was inoperable because the closing

springs were not being charged due to the charging motor being disengaged from the breaker housing when the mounting bolts backed out.

LER 50-338/97-008-00 dated November 4, 1997 identified both Unit 1 EDGs being inoperable at the same time. The 1J EDG was declared inoperable to perform surveillance testing due to the 1H EDG being inoperable as a result of an engine cooling fan failure.

8.0 ADDITIONAL INFORMATION

Description: 01-EE-EG-1H, 1H Emergency Diesel Generator

Manufacturer: Fairbanks Morse

Model No.: 38TD8.125