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SUBJECT: LER 90-006-00:on 891027,unverified assumption in App R safe shutdown analysis.

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NIAGARA MOHAWK

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NMP70166

August 10 , 1990

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

RE: Docket No. 50-220
LER 90-06

Gentlemen:

In accordance with 10 CFR 50.73, we hereby submit the following voluntary Licensee Event Report: LER 90-06.

This report was completed in the format designated in NUREG-1022, Supplement 2, dated September 1985.

Very truly yours,

Joseph F. Firlit
Vice President - Nuclear Generation

JFF/DS/lmc

ATTACHMENT

xc: Regional Administrator, Region I
Sr. Resident Inspector, W. A. Cook

00001

#P306177565

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NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Nine Mile Point Unit 1	0 5 0 0 0 2 2 0	1 OF 0 7

TITLE (4)
Unverified Assumption in Appendix R Safe Shutdown Analysis

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 NAMES	DOCKET NUMBER(S)
									N/A	0 5 0 0 0
1 0	2 7	8 9	9 0	— 0 0 6	— 0 0	0 8	1 0	9 0	N/A	0 5 0 0 0

OPERATING MODE (9)	N
POWER LEVEL (10)	0 0 0

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

20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	X OTHER *(Specify in Abstract below and in Text, NRC Form 366A)*
20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	Voluntary
20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
Robert Beller, Fire Protection Program Manager	AREA CODE 3 1 5 4 2 8 - 7 1 2 1

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	

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 fifteen single-space typewritten lines)* (16)

On October 27, 1989, with Nine Mile Point Unit 1 (NMP1) in cold shutdown and the core off-loaded, it was discovered that an assumption made in the Appendix R Safe Shutdown Analysis (SSA) could not be verified. This condition was identified during corrective actions being carried out as part of the NMP1 Restart Action Plan (RAP), Specific Issue 18 (125 VDC system concerns). Niagara Mohawk Power Corporation (NMPC) feels it prudent to report this issue as a voluntary LER.

NMPC is unable to provide conclusive documentation for the actions assumed in the Appendix R SSA.

The cause of this condition was the Fire Protection Program's failure to provide detailed procedural instructions for implementing operator actions credited by the Appendix R SSA.

Corrective actions included revision and development of new procedures, development of station battery load profiles and replacement of station batteries.

I. DESCRIPTION OF CONDITION

On October 27, 1989, with Nine Mile Point Unit 1 (NMP1) in cold shutdown and the core off-loaded, it was discovered that an assumption made on the Appendix R Safe Shutdown Analysis (SSA) could not be verified. Specifically, operator actions to complete specific load shedding; to ensure battery capacity to start a Diesel Generator (DG) at the conclusion of the 8 hour Appendix R scenario; was not identified in applicable procedures. This condition was identified during corrective actions being carried out as part of the NMP1 Restart Action Plan (RAP), Specific Issue 18 (125 VDC system concerns).

The NMP1 Appendix R SSA, Rev. 0 and Rev. 1, dated October 1982 and September 1985, respectively, describes NMP1's ability to satisfy the specific requirements of 10CFR50 Appendix R Section III.G. The event in question is any postulated fire that has the potential to cause a loss of both emergency diesel generators (concurrent with a simultaneous Loss Of Off-Site Power (LOOP) for up to 72 hours). The analysis credits the redundant emergency condenser system as providing hot shutdown capability automatically (via the shutdown supervisory control system) for up to eight hours without make-up and the Reactor Protection System (RPS) Motor Generator (MG) Sets powered from the Station's 125 VDC battery system for monitoring the shutdown process.

There are two long term safe shutdown functions which are dependent upon the availability of the 125 VDC system as a part of Niagara Mohawk Power Corporation's (NMPC's) defense-in-depth approach for addressing potential Appendix R fire events. These two functions are:

1. Minimum required process monitoring instrumentation, and
2. The ability to start a diesel generator following repairs.

In order for the 1500 amp-hour batteries to survive the full eight hours, it was necessary to perform load shedding actions within the early stages of an Appendix R event. The load shedding requirements were contained in the 115 KV Power Failure Special Operating Procedure (N1-SOP-1 and N1-SOP-5). These procedures did not provide specific guidance on which loads to shed. Instead, a "target" of 100 amps for Battery 11 and 460 amps for Battery 12 was considered adequate to meet the design basis load shedding objectives. N1-SOP-1 and N1-SOP-5 did not provide a specific time frame for the required load shedding objectives. Battery load profile calculations were not performed to verify that the load shedding targets and the times required to achieve these load sheds assumed by the Appendix R SSA would have ensured sufficient battery

capacity existed to start a diesel generator following the postulated 8-hour Appendix R scenario. The 1500 amp-hour battery load profile calculations performed in August 1988 (NMPC Calc. 125DC-Batt-11-ES) demonstrated that a 30-minute time frame to complete the target load shed would have satisfied the battery capacity requirements imposed by the postulated 8-hour Appendix R scenario for station battery 11 only. Current battery calculations indicate that the 1500 amp-hour Battery 12 would have only survived for three minutes under assumed normal loads. Therefore, the electrical maintenance supervisor would have directed all Damage Repair Procedure (DRP) actions for restoring a diesel generator and providing 125 VDC safe shutdown loads to be performed at battery board 11. Consequently this analysis focuses on the capability to restore and restart a diesel generator from station battery 11.

To reach the 100 amp discharge rate for Battery 11, the operators would have to shed battery charger MG Set 161, computer MG Set 167, and individual non-essential instrumentation and control loads. Credit was taken for the operators plant systems knowledge and operator training to provide the necessary guidance to remove the non-essential battery loads.

Current industry standards regarding the level of procedural guidance required to achieve the procedural objectives have increased since the issuance of N1-SOP-1 Rev. 5, 6, and N1-SOP-5 Rev. 0, 1, and 2. In the past many procedures were less specific and certain procedural objectives were satisfied by crediting operator training.

Since these procedures did not specify which loads were required to be shed in order to reach the 100 amp discharge current within the required time frame, the assumed eight-hour battery capacity cannot be demonstrated. Also, NMPC is unable to provide documentation to support the operator training assumption.

II. CAUSE OF CONDITION

The cause of this condition was the Fire Protection Program's failure to provide detailed procedural instructions for implementing operator actions credited by the Appendix R Safe Shutdown Analysis.

Since the detailed procedural instructions were not provided, procedures N1-SOP-1 and N1-SOP-5 were potentially insufficient to mitigate the postulated Appendix R fire scenario(s). If the technical content of the existing loss of 115 KV power Special Operating Procedures (SOP) was questioned, the need to identify

specific load shedding actions and required time frames would have resulted. This would have mandated the development of duty cycles (load profiles) and capacity calculations required to ensure an eight hour battery capacity.

III. ANALYSIS OF CONDITION

Due to changes to the Special Operating Procedures that now specify the required load shedding steps (and equipment location), the required time frame, and the operator training on these procedures, NMPC is unable to provide conclusive documentation that the actions assumed in the Appendix R SSA would have occurred. Since the operator bias (revised procedures and training) would support the postulated load shedding actions, NMPC feels it prudent to report this issue as a voluntary LER.

As described above, the event in question is an Appendix R fire which causes the loss of both diesel generators, or prevents their initial operation, coincident with LOOP. The LOOP, combined with the lack of diesel generators results in a station blackout, and requires the operators to enter and implement the 115 KV Power Failure Procedure.

The NMP1 Safe Shutdown Analysis credits operator load shedding actions under the guidance criteria of the 115 KV Power Failure Special Operating Procedure. In order to achieve the desired battery discharge rate (100 amp), the operator is credited with removing all nonessential instrumentation loads (which are not required to monitor the Safe Shutdown Process). The first operator action in this direction would be to trip the major non-essential loads, e.g., battery charger MG Set 161 and computer MG Set 167. This would have reduced the load on Battery 11 to approximately 190 amps.

It is NMPC's contention that the operators would have continued reducing loads by removing all non-essential instrumentation (by the removal of fuses and tripping of breakers from instrument and control loops) until the 100 amp goal was reached. It is not conclusive whether these actions would have been taken within a sufficient time frame to ensure eight-hour battery capacity. Battery calculation 125 VDC-Battery-App-R shows that after shedding MG Sets 161 and 167, without shedding any loads off the RPS MG Set instrumentation busses, Battery 11 capacity is sufficient for approximately 5.18 hours. Time lines used to evaluate the tasks described in the DRP's and field walkdowns indicated that the steps required to restore and restart a diesel generator can be completed

within 4.5 hours. Additional actions would still be required to initiate cold shutdown within the prescribed eight hours in accordance with the DRPs.

The above analysis of an incomplete load shedding which provides 5.18 hours of capacity for Battery 11, still assumes MG Sets 161 and 167 are shed within 15 minutes. NMPC cannot document this assumption in an unbiased fashion. Although NMPC feels that this would have occurred, and furthermore feels that load shedding to reach 100 amps at 30 minutes would also have been performed, the operators would have been made aware of a battery capacity problem from the remote battery voltage indication at the Control Room. Even if no load shedding occurred, the operator would eventually lose all RPS instrumentation. This is because the AC output from RPS MG Set 162 has an under frequency protective breaker which trips the AC output. Although Engineering calculations to show when this point would have been reached have not been performed; the larger the load on a battery, the more quickly the voltage would drop, and decreasing voltage would eventually cause the AC output frequency to drop to the set point of the protective breaker. At this point the operators would lose all RPS instrumentation (Reactor Coolant System pressure level can be monitored locally). NMPC considers it credible that the operators would note the loss of instrumentation and quickly identify the under-voltage problem (battery voltage is monitored in the Control Room) and shed all remaining loads on Battery 11. This would have preserved adequate capacity to restart a diesel indefinitely (with all loads shed) until the diesel generator DRPs were complete and the diesel could be restarted. NMPC feels that adequate capacity would be preserved regardless of whether the under-frequency trip occurred at high load or at the "target" load of 100 amps since a diesel start requires a maximum load of only 60 amps.

Therefore, NMPC concludes that there was no adverse safety consequences to the lack of detailed load shedding procedures because:

1. Operator knowledge was sufficient to ensure load shedding to preserve a battery capacity of 8 hours. Thus, the battery would have the capacity required to start a Diesel Generator at the end of the 8 hour Appendix R scenario.

2. Operators would have continued load shedding below the 190 amps necessary to achieve a 5.18 hour capacity while the DRPs credit a diesel start at 4.5 hours; and

3. Even if no load shedding occurred, operators would have had unmistakable evidence of a battery capacity problem (via the MG Set 162 AC output trip) well before battery capacity decreased to the level which would impact the ability to start a diesel, and would have shed all remaining loads on Battery 11.

IV. CORRECTIVE ACTION

NMPC has acknowledged certain programmatic and/or isolated deficiencies in some of NMP1's Station Operating Procedures. NMPC has committed to upgrading the quality and detail of the station procedures. As a result, new Procedure Writers Guides (AP-2.0, AI-1.0) were developed, and many procedures have been revised and updated in accordance with the new guidelines.

The 115KV Power Failure Special Operating Procedure (N1-SOP-5) was revised to incorporate the Appendix R load shedding assumptions that were questioned during the RAP Specific Issue 18 effort. A new special operating procedure "Station Blackout" (N1-SOP-18) was developed to mitigate the effect of an Appendix R Station Blackout event as postulated in the Appendix R Safe Shutdown Analysis. This procedure specifies the non-essential loads, the location of these loads, and the time frame at which these loads are required to be shed to satisfy the Appendix R and Station Blackout submittals.

To ensure that the post repair safety margin (2 hours) assumed to be provided for the DRPs will be maintained, to resolve other 125VDC system deficiencies and to ensure the 125VDC System will satisfy all NMP1 design basis commitments, NMPC replaced the two 1500 amp-hour batteries with two 2300 amp-hour batteries.

To ensure compliance to Appendix R as well as other NMP1 analysis and commitments, NMPC performed detailed load profile calculations for the 1500 amp-hour and the new 2300 amp-hour station batteries.

V. ADDITIONAL INFORMATION

A. Identification of components referred to in this LER:

COMPONENT	IEEE 803 FUNCTION	IEEE 805 SYSTEM ID
Emergency Diesel Generator	DG	EK
Battery	BTRY	EJ
Emergency Condenser System	NA	BL
Battery Board	BYBD	EJ
Motor Generator Set	MG	EF
Reactor Protection System (RPS)	NA	JC

B. Failed components: none.

C. Previous similar events: none.