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VARGA,S.A. Division of Reactor Projects - I/II (Post 870411)

SUBJECT: Forwards "Root Cause Rept for Exide Uninterruptible Power Supplies 1A,B,C,D & G Trip Event of 910813." Responses to root cause analysis,short term corrective action plan,loads lists & procedures & training also encl.

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NIAGARA MOHAWK

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B. Ralph Sylvia
Executive Vice President
Nuclear

September 10, 1991
NMP2L 1315

Mr. Steven A. Varga
Director Division of Reactor Projects-I, II
U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

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

Dear Mr. Varga:

Pursuant to our conversation of September 5, 1991, this letter forwards Niagara Mohawk's responses to your requests for information in the following five areas with regard to our uninterruptible power supplies (UPS's) 1A, 1B, 1C, 1D, and 1G:

1. Root Cause Analysis
2. Short Term Corrective Action Plan
3. Load Lists
4. Procedures and Training
5. Breaker Reliability and Coordination

It is important to note that the changes we are making in our site emergency plan and procedures, prior to restart, will reduce the offsite impact of failure of any of these power supplies in the future. Specifically, we are changing our plan and its attendant procedures to not require declaration of a site area emergency based solely on the existing general guidance of "loss of all control room annunciation coincident with a plant transient." Our intent is to avoid entering a site area emergency for situations where we are assured that there are no imminent radiological consequences based on the availability of control room indication of reactor pressure, reactor water level, reactor power and containment pressure. This change is beneficial in that the availability of station and support personnel will not be unnecessarily impacted. In addition, this change will avoid unnecessary offsite responses.

Advance copies have been provided to Mr. Don Brinkman, as the material became available over the last few days. We appreciate the extra effort made by you and your staff to review this material over the past weekend.

Very truly yours,

B. Ralph Sylvia
Executive Vice President-Nuclear

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Mr. R. A. Capra, Project Directorate No. I-1, NRR
Mr. D. S. Brinkman, Project Manager, NRR
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Mr. D. R. Haverkamp, Chief, Reactor Projects, Section 1B
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NINE MILE POINT UNIT 2

Request for Information on UPS Issues

1. Root Cause Analysis and Relevant Test Results

The report entitled "Root Cause Report for the Exide UPS 1A, B, C, D, G Trip Event of August 13, 1991", Rev. 1, dated September 9, 1991, is attached for your review. We have also included test summaries for the onsite and offsite test activities associated with troubleshooting. The documents entitled "Test Summary" for each of the identified UPS units cover the troubleshooting activities conducted by Niagara Mohawk. The document entitled "Testing Results as of 9/5/91" summarizes the testing performed by Failure Prevention, Inc. as of 9/5/91. Failure Prevention is continuing to perform testing as described in the Root Cause Report. The final results will be provided when that work is completed.

Nuclear Engineering has carefully evaluated the possibility of an elevated ground mat voltage during this event. Engineering has determined that the ground potential elevation within the station would be negligible for the following reasons:

1. Measurements taken during the event were used to determine that the ground fault current was a maximum of 1300 amperes. The grounding system is designed to accept 30,000 amperes.

2. The elevation of ground voltage would usually result in random failures of equipment. During the August 13 event, only 5 UPS's were affected in a very uniform fashion and no other equipment failures that may have been associated with elevated grounds were noted.

3. Testing has shown that elevated ground voltages would result in extensive failure of electronic circuit board components. This was not observed.

Therefore, Niagara Mohawk has concluded that the elevated ground voltage is not a credible failure mode for the five UPS's.

2. Short Term Corrective Action Plan

The short term corrective action plan to address problems associated with UPS units 1A, B, C, D, and G is addressed in the Root Cause Report dated September 9, 1991. Specifically, corrective actions include:

- Modification of the UPS logic power supply to be inverter preferred with maintenance backup.

- Replacement of all UPS logic backup batteries.

- Process appropriate changes to the UPS vendor manual to address identified deficiencies.

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In addition, a review was conducted of other plant hardware which utilizes internal batteries. This review included a determination of battery function, design life, and actual in-service time for currently installed batteries. Where it was determined that the in-service life had expired, batteries were either replaced, scheduled for future replacement, or determined not to require replacement until an equipment outage is incurred for other reasons. The Preventive Maintenance program computer database will be revised to include periodic battery replacement schedules.

A previous modification (i.e., PN2Y89MX042) to reduce the loading on and replace UPS1C and 1D is scheduled to be complete by May 1992. Additionally, the loads of all five UPS units will be evaluated with respect to plant impact resulting from the loss of a single UPS. It is expected that a combination of load redistribution and providing diverse power for the UPS units will be the result of this evaluation. The schedule for implementation will depend on the nature and complexity of these changes.

3. Availability of UPS Load List to Control Room Operators

A detailed load list for UPS 1A, B, C, D, and G has been developed by Engineering and is being reviewed with the Operations staff. The review is necessary to ensure an appropriate level of detail for each UPS and that the information provided is of value to the Operators. The load list document will be finalized and issued as a controlled document for the Control Room Operators' use prior to plant restart.

The documentation provides a sketch of the panels powered from each UPS followed by detailed load tables for each of the panels. The tables break down, by circuit number, the devices fed by each respective UPS and panel, the devices' location in the plant (i.e., building and elevation), and a brief description of the plant impact for loss of power to the device. In addition, each table provides references to applicable design documents for the specific circuit if further information is desired.

In general, devices may be defined as individual components or sub-panels. For example, a number of instrument control loops may be powered from a sub-panel. In such a case, an additional attachment has been included to describe in greater detail what the plant impact is for loss of power to the loops on that sub-panel. The plant impact description indicates what functions would be lost. It also indicates what backup coverage is available where applicable. For example, in many areas of the plant, normal lighting may still be available in the event an essential lighting load powered from a UPS is lost.

Niagara Mohawk is continuing to refine the UPS load lists based on Operations' needs. We will continue to monitor the effectiveness of this document to ensure that the load list is an effective tool for Operations' use.

4. Procedure and Training Changes

Niagara Mohawk's Operator Response evaluation concluded that all appropriate actions were taken with respect to the EOP's for the given set of conditions during the event. It also concluded the EOP's themselves called for the appropriate level of operator response for the event sequence.

Having reviewed the EOP's with respect to specific concerns about an ATWS scenario and possible actuation of the Standby Liquid Control System, we have determined that changes to the procedures are not required. Means (e.g., nuclear instrumentation) were available to the operators to verify that the reactor was shutdown. The decision to inject boron is based on a challenge to the suppression pool during an ATWS event (pool temperature of 110°F). The procedures address appropriate action to be taken during ATWS events both with and without control rod position available. During the event had the loss of control rod position indication continued, operators would have continued in the EOP's and 1) maintained RPV water level, 2) continued RPV cooldown, and 3) continued attempts to insert control rods until all control rods were inserted to at least position 02, or it was determined that the reactor would remain shutdown without boron, at which time the EOP's would have been exited.

Niagara Mohawk believes that the event proved the EOP's and EPG's to be sound as written, and therefore no procedure changes need to be made. However, we will evaluate an alternate method to determine control rod position and when finalized, it will be added to existing procedures. Training for the Operators on this event is standard practice to ensure everyone benefits from lessons learned.

5. UPS Breaker Reliability and Coordination Problems

Molded Case Circuit Breakers and Switches are manufactured in accordance with NEMA AB-1 and UL 489 standards. These standards require endurance testing to specified limits for cycles of operation based on the frame size. The combined number of test cycles (i.e., with and without current) ranges from 3,500 to 6,000 for CB-2 and CB-3 type breakers. Based on the endurance testing standard compared to the limited number of cycles experienced during normal operation, it is not expected that a circuit breaker would need to be replaced except in the event of a circuit breaker fault trip or breaker failure by some other mechanism.

A few circuit breaker problems were experienced during the August 13, 1991 event and during subsequent troubleshooting activities on three specific UPS units. First, on UPS1A the feeder breaker tripped twice while the damage control team was attempting to restart the unit. In February 1991, the overcurrent adjustable trip setting on the AC feeder breaker was adjusted down to the lowest setting. This was done as part of a program to define trip settings on each plant breaker with an adjustable trip. Further, this was done in accordance with standard practice of estimating inrush current based on six times the normal UPS load of 90 amps. The UPS supplier has subsequently advised Niagara Mohawk that inrush current can actually be six to ten times normal load. Consequently, the overcurrent trip setpoint has been revised to setting 3 (i.e., 1175+/-10% amps). The

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same changes have been made to UPS1B and 1G. This situation is not applicable to UPS1C and 1D due to a different breaker coordination scheme for those units.

The second problem occurred on UPS1B when CB-3 would not close. This switch had previously been identified as worn and in need of replacement at the next opportunity. The replacement has been completed as a corrective maintenance activity.

Failure of switch CB-2 on UPS1D was the third problem experienced. This particular switch has experienced a greater number of operations in its lifetime than other switches. During troubleshooting activities, it was cycled an additional fifteen times (minimum) and finally would not close. The switch has been replaced as a corrective maintenance activity.

Switch CB-3 on UPS1D binds on closure. This switch has been replaced as a corrective maintenance activity.

Niagara Mohawk will perform a root cause analysis for the failures. Notwithstanding the failures described above and considering the overall good performance of the UPS breakers, it is Niagara Mohawk's determination that the breakers are reliable. No further actions are intended at this time pending outcome of the root cause analysis.