U.S. NUCLEAR REGULATORY COMMISSION
REGION I

DOCKET/REPORT NO.: 50-220/95-02

LICENSEE: Niagara Mohawk Power Corporation
Lycoming, NY 13093

FACILITY: Nine Mile Point, Unit 1 (NMP1)

DATES: February 13-16, 1995

INSPECTOR:

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SUMMARY: From February 13 to February 16, 1995, the NRC staff conducted an inspection of NMP1's hardened wetwell vent to determine the licensee's compliance with commitments made in response to NRC Generic Letter (GL) 89-16, "Installation of a Hardened Wetwell Vent."

The torus vent system was found to be: 1) designed and evaluated in accordance with the requirements of 10 CFR 50.59 and the NRC-approved Boiling Water Reactor Owners' Group (BWROG) guidelines, 2) installed as per the design, and 3) appropriately tested. Appropriate emergency operating procedures (EOP) guidance was available to direct the initiation of venting. Operators were trained on and knowledgeable of the design and function of the system.

However, in reviewing documentation associated with the modification, the inspector identified two minor problems. While the Q-list print, which designates safety-related piping and components in the plant, was updated to show the newly installed piping, the portions of the piping designated in the safety evaluation as safety-related were not appropriately color-coded. Also, the licensee was not able to locate a work order requested by the inspector. The licensee initiated prompt corrective actions in each case, as discussed in the inspection report. Because these violations had no safety impact and met the requirements for non-cited violations, the inspectors have documented them as such, in accordance with NRC Enforcement Policy, Section VII.B(1).

DETAILS

1.0 INTRODUCTION

As part of a comprehensive plan for closing severe accident issues, the NRC staff undertook a program to determine if any actions should be taken, on a generic basis, to reduce the vulnerability of BWR Mark I containments to severe accident challenges. At the conclusion of the Mark I Containment Performance Improvement Program, the staff identified a number of plant modifications that would substantially enhance the plants' capability to both prevent and mitigate the consequences of severe accidents. Recommended improvements included improved hardened wetwell vent capability. On September 1, 1989, the NRC issued Generic Letter (GL) 89-16, "Installation of a Hardened Wetwell Vent," requesting licensees with Mark I containments to consider installation of hardened wetwell vent systems under the provisions of 10 CFR 50.59. In an October 30, 1989, letter the licensee committed to install a hardened wetwell vent at Nine Mile Point 1. This inspection was conducted to verify the licensee's implementation of commitments made in response to GL 89-16 and was based on guidance provided in Temporary Instruction (TI) 2515/121, "Verification of Mark I Hardened Vent Modifications (GL 89-16)."

2.0 INSPECTION FINDINGS

2.1 Plant Modification Review

The hardened vent path was installed at Nine Mile Point 1 (NMP1) during the spring 1993 outage. The modification added a hardened vent path to the drywell and torus vent and purge system, around the portion of the path that contained duct work that would not withstand pressures expected during use of the hardened vent, as specified in GL 89-16, providing beyond-design-basis overpressure protection for the Mark I primary containment. The hardened vent path originates in the normal vent and purge line out of the torus air space. It passes through two previously existing containment isolation valves. The newly installed piping taps off of the line to the containment vent and purge fan upstream of the inlet block valve to the fan. The new piping is Schedule 10 carbon steel, with two in-series rupture disks installed. The vent path downstream of the rupture disks connects to a previously existing plenum leading to the plant stack.

The inspector reviewed several documents that were part of the hardened vent modification package including: 1) conceptual engineering package; 2) safety evaluation; and 3) final design verification. The documents contained sufficient detail of the modification and discussed the appropriate codes pertaining to the modification. The inspector verified that appropriate changes to the plant Final Safety Analysis Report were identified and completed. In addition, the 50.59 safety evaluation addressed the appropriate questions to determine that no unresolved safety question existed.

The inspector verified that all valves in direct communication with the vent system are periodically tested in accordance with their function. The containment isolation valves are included in the licensee's in-service testing

(IST) program and are tested in accordance with the requirements of the program. The rupture disks were initially tested by the vendor and proven to burst at the design pressures and temperatures. The inspector considered the testing appropriate.

The conceptual engineering package and safety evaluation described part of the installed piping as safety-related, specifically the section including both rupture disks and downstream piping. Although not specifically required for the hardened torus vent function, the licensee considered this piping safety-related because similar plant piping connecting to the plant stack is also designated as such. The inspector reviewed the Q-list drawing depicting safety-related portions of the plant, Drawing F-61014-C. Although the drawing was updated to show the newly installed piping, the appropriate portion of this piping was not color-coded to designate it as safety-related. Further inquiry uncovered documentation which showed that all installed piping was in fact procured and installed as safety-related. Before the inspector left the site, the licensee initiated a deviation/event report (DER), 1-95-0382, to document the discrepancy. The inspector considered this action to be timely and appropriate. The following week, the inspector received a copy of the approved design change request, generated to update the incorrect print, and found it to be complete. The failure of the licensee to thoroughly update the controlled drawing is a violation of NRC requirements for design control and document control, 10 CFR 50, Appendix B, Criteria III and VI, respectively.

The disk assembly is removed and replaced with a spool piece during the Type A, ILRT testing. This is done because the vent and purge system is used to pressurize the suppression pool and drywell and pressures reach the burst pressure for the disks during this testing. When the rupture disk assembly is removed, it is inspected to assure disk integrity and cleanliness. The licensee has replacement disks onsite if problems are discovered. The inspector requested the work order which removed these disks during the last ILRT. The licensee was unable to locate a hard copy of the document in a timely fashion. The licensee indicated that a search of plant records did not find the document. After the NRC inspection, a hard copy was retrieved from the vendor who completed the work. The licensee has forwarded a copy of this work order to their document management staff for future onsite retrievability. The records management organization has been reorganized in the last few weeks to correct problems internally identified by the licensee. In addition, the licensee appropriately initiated DER 1-95-0459 to resolve the current problem. However, the inability of the licensee to readily retrieve this documentation is a violation of NRC requirements for retrievable quality records, 10 CFR 50 Appendix B, Criterion XVII.

Both of the failures previously described are violations of NRC requirements. These events had no safety impact, were not willful, and were not preventable by licensee corrective actions for previous NRC violations. As described above, the licensee has taken prompt corrective actions to ameliorate the concerns identified during this inspection. In accordance with NRC Enforcement Policy, Section VII.B(1), these items are non-cited violations (NCVs).

2.2 Comparison to Approved Boiling Water Reactors Owners' Group (BWROG) Recommendations

The inspector verified that the licensee considered the NRC-approved BWROG guidance in their hardened vent design as documented in their final design verification dated April 30, 1992. An evaluation of the Nine Mile Point 1 hardened vent design relative to these criteria follows.

Criterion (a): The vent shall be sized such that under conditions of: (1) constant heat input at a rate equal to 1% of rated thermal power (unless lower limit is justified by analysis); and (2) containment pressure equal to the primary containment pressure limit (PCPL), the exhaust flow through the vent is sufficient to prevent the containment pressure from increasing.

The hardened vent piping is 20 inches in diameter. The inspector reviewed previously performed EOP calculations which determined the minimum vent area capable of handling decay heat 10 minutes after shutdown. This calculation used 2.21% of rated power, which is over twice the hardened vent criteria of 1%, and concluded that a suppression chamber vent area of .703 square feet was available. Interpolated data from this calculation shows that the installed 20-inch vent path, at the PCPL of 43.4 psig, is twice the minimum vent size needed assuming a 2.2% heat load. The inspector concluded that Criterion (a) was met.

Criterion (b): The hardened vent shall be capable of operating up to the PCPL. It shall not compromise the existing containment design basis.

The vent uses the previously existing containment isolation valves and vent and purge path, therefore, the existing design basis is not affected by the modification. The additional installed piping is consistent with the upstream piping of the vent path and does not degrade the design basis of the system. The inspector reviewed design specifications for all valves in and connecting to the vent path. All are capable of withstanding pressure of at least 43.4 psig. A review of the piping specifications revealed that the piping from the first containment isolation valve to the discharge to the plant stack had a design pressure of 35 psig. However, industry information indicates that Schedule 10 carbon steel piping with diameters in excess of 20 inches have maximum working pressures of at least 200 psig. Therefore, the hardened vent is capable of operating up to the PCPL. The inspector considered Criterion (b) satisfied.

Criterion (c): The hardened vent shall be designed to operate during conditions associated with the TW (loss of containment cooling) sequence. The need for station blackout venting will be addressed during the individual plant examination (IPE).

The hardened vent is designed to operate during the conditions of the TW sequence (43.4 psig and 300 degrees F). Design package calculations were performed to verify that the hardened vent, from the second isolation valve to the plant stack, is capable of withstanding these venting conditions without the loss of functional capability. The EOP calculations show that the torus and attached piping, up to the second isolation valve, will also remain

functional under these conditions. The licensee has completed their IPE and found no significant benefit in providing operator control of venting during the station blackout scenario. The inspector considered Criterion (c) satisfied.

Criterion (d): The hardened vent shall include a means to prevent inadvertent actuation.

The hardened vent requires operator action to initiate venting by opening the containment isolation valves in the hardened vent path during accident conditions. When the purge and vent system is used during normal operation, the rupture disks isolate the hardened vent path.

The burst pressure range for the disks is between 5 and 10 psig at 150 degrees Fahrenheit. During normal system operation, pressure is less than 1 psig. Maximum pressure in this system during off-normal conditions (i.e. non-accident conditions) would not exceed 3.5 psig or 150 degrees Fahrenheit. Therefore, even if the operators inadvertently opened the isolation valves, the vent's rupture disks will not compromise the plant design basis. The inspector concluded that the rupture disk burst pressure is adequate to prevent inadvertent actuation, thereby satisfying Criterion (d).

Criterion (e): The vent path, up to and including the second containment isolation barrier, shall be designed consistent with the design basis of the plant.

As described in Criterion (b), the hardened vent path uses previously existing containment isolation valves and is designed consistent with the design basis of the plant. The inspector considered Criterion (e) satisfied.

Criterion (f): The vent path shall be capable of withstanding, without loss of functional capability, expected venting conditions associated with the TW sequence.

As discussed under Criteria (b) and (c), the vent path is designed to withstand pressures and temperatures associated with the TW sequence. The inspector considered Criterion (f) satisfied.

Criterion (g): Radiation monitoring shall be provided to alert control room operators of radioactive releases during venting.

The hardened vent at Nine Mile Point 1 discharges to the main plant stack. This release is monitored by the existing stack radiation monitoring system which provides indication and alarms to control room operators. The inspector considered this criterion met.

Criterion (h): The hardened vent shall ensure that no ignition sources are present in the pipeway.

The hardened vent path includes two isolation valves and two rupture disks. The only possible ignition source in the containment vent and purge system flow path is the containment vent and purge fan, which was bypassed with the hardened vent modification. The fan's upstream and downstream block valves are designed to withstand pressures associated with the use of the hardened vent and would isolate the possible ignition source from the hardened vent path. The hardened vent path contains no ignition sources and Criterion (h) was met.

2.3 System Walkdown

The inspector was accompanied by the cognizant mechanical design engineer and a member of the operations support staff familiar with the modification during a plant walkdown of the modified piping. System components located in the turbine building were found to be built in compliance with design documentation and current piping diagrams.

2.4 Emergency Operating Procedures (EOPs)

The licensee's EOP-4, "Primary Containment Control," contained explicit direction on when to initiate containment venting. It directed operators to sections in N1-EOP-4.1, "Primary Containment Venting," to vent the containment via different paths consistent with pressure conditions in primary containment. Section 2 of this procedure contained detailed direction on how to vent the torus through the drywell and torus vent and purge fan. This section also provided operators with a caution statement warning that the rupture disks will blow out before pressures reach 10 psig. While other venting flow path sections also provided direction to the operators on when and how to terminate venting, the section that initiates venting through the hardened vent path did not. The inspector discussed this observation with the licensee. If the rupture disks blew out, the licensee would be in a beyond-design-basis condition. At this severity, the termination of venting would be considered a recovery action and would be decided upon in conjunction with the licensee's emergency organization personnel. The inspector considered the direction given to operators in the EOPs thorough and acceptable.

2.5 Operator Training and Interviews

The licensee trained operators on the modification at the end of the 1993 outage. The lesson plan included a description of the new vent path and its purpose. The initial qualification training package included the same information. Although the training section is brief, the four senior reactor operators interviewed demonstrated an acceptable level of knowledge of the system design basis, flow path, operating pressure, and relevant control room indications. The inspector reviewed training records and verified that all current reactor operators and senior reactor operators received training on the hardened torus vent.

3.0 MANAGEMENT MEETINGS

Licensee representatives were informed of the scope and purpose of this inspection at an entrance meeting conducted on February 13, 1995. The inspector met with the principals listed below to summarize preliminary findings on February 16, 1995. The licensee acknowledged the preliminary findings and conclusions, with no exceptions taken. Further, the bases for the preliminary conclusions did not involve proprietary information, nor was any such information included in the written inspection report. On February 24, 1995, the inspector informed the licensee of the two NCVs documented in this report. No exception was taken to this information.

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