NMC
Committed to Nuclear Excellence

Palisades Nuclear Plant
Operated by Nuclear Management Company, LLC

April 3, 2002

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U.S. Nuclear Regulatory Commission
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DOCKET 50-255 - LICENSE DPR-20 - PALISADES NUCLEAR PLANT
NRC BULLETIN 2002-01: REACTOR PRESSURE VESSEL HEAD DEGRADATION AND REACTOR COOLANT PRESSURE BOUNDARY INTEGRITY – 15-DAY RESPONSE

On March 18, 2002, the Nuclear Regulatory Commission (NRC) transmitted Bulletin (BL) 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity." The NRC required that specific information be provided within 15 days of the date of the bulletin. In accordance with this requirement, Nuclear Management Company (NMC), LLC is providing the required 15-day response for the Palisades Plant.

SUMMARY OF COMMITMENTS

This letter contains no new commitments and no revisions to existing commitments.

for
Douglas E. Cooper
Site Vice-President, Palisades

CC Regional Administrator, USNRC, Region III
Project Manager, USNRC, NRR
NRC Resident Inspector - Palisades

Enclosure

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NUCLEAR MANAGEMENT COMPANY, LLC
PALISADES NUCLEAR PLANT
DOCKET 50-255

NRC BULLETIN 2002-01: REACTOR PRESSURE VESSEL HEAD DEGRADATION AND REACTOR COOLANT PRESSURE BOUNDARY INTEGRITY
PALISADES PLANT 15-DAY RESPONSE

To the best of my knowledge, the content of this 15-day response to NRC Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity," is truthful and complete.

By _____
Paul A. Harden
Director, Engineering

Sworn and subscribed to before me this 3rd day of April 2002.

_____
Norma Jean Fowler, Notary Public
Van Buren County, Michigan
My commission expires May 14, 2002

(Seal)

ENCLOSURE 1

NUCLEAR MANAGEMENT COMPANY, LLC
PALISADES NUCLEAR PLANT
DOCKET 50-255

April 2002

NRC BULLETIN 2002-01: PALISADES PLANT 15-DAY RESPONSE

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AND REACTOR COOLANT PRESSURE BOUNDARY INTEGRITY
PALISADES PLANT 15-DAY RESPONSE

Requested Item 1.A

A summary of the reactor pressure vessel head inspection and maintenance programs that have been implemented at your plant.

Response

The reactor head at Palisades is insulated by two layers of insulation blankets, installed at right angles to each other. The blankets fit closely against each other, the upper head surface, and the head penetration nozzles. Reactor head insulation is covered by a stainless steel enclosure. The most recent bare metal visual inspection of the entire reactor head upper surface was conducted in 1995. The permanent insulation was removed; a visual VT-2 examination of the reactor vessel head penetrations was conducted; a visual observation of the reactor vessel head upper metal surface was performed, and removable insulation was reinstalled.

Also in 1995, eddy current examination of the eight incore instrumentation (ICI) nozzles around the perimeter of the reactor head was conducted. The ICI nozzle inspection technique, equipment, and personnel were qualified by B & W Nuclear Technologies. The inside diameters of the nozzles were examined from above.

In 2001, following discovery of leakage from a control rod drive mechanism (CRDM) upper housing, all 45 CRDM upper housings were replaced. During this CRDM upper housing replacement outage, the stainless steel reactor head insulation covers were visually inspected from above for evidence boric acid accumulation. Insulation covers were removed in the vicinity of the known leak from above, and the upper surfaces of the insulation blankets were visually inspected for evidence of boric acid accumulation. Limited inspection was conducted below the upper surface of the insulation at two CRDM nozzle locations that were most susceptible to exposure to leakage from above. A boroscope was inserted in several locations around the perimeter of those two CRDM nozzles to look for evidence of boric acid buildup or metal damage.

Visible portions of the reactor vessel head are visually examined during each refueling outage in accordance with Generic Letter (GL) 88-05, "Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants," commitments. Insulation covers and surrounding areas are examined for evidence of leakage originating from inside the insulation. During refueling outages, insulation is removed from the perimeter of the reactor head, exposing closure studs, the carbon steel reactor head mating flange, and the lower part of the hemispherical reactor closure head. If boric acid is found, it will

be categorized in accordance with the boric acid program. If evidence of leakage is observed, additional examination is conducted including insulation removal, when necessary, to identify the leakage source. Boric acid accumulations are documented and evaluated through the Palisades corrective action and boric acid programs. Boric acid on carbon steel material is evaluated in accordance with the 1989 Edition of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI, Article IWA-5250(b).

NMC's Inservice Inspection (ISI) Program for the Palisades Plant is the 1989 Edition of the ASME B&PV Code, Section XI. The examination requirements are defined in Section XI, Table IWB-2500. A visual, VT-2 examination is required for reactor head partial penetration welds and all pressure retaining components within the Class 1 pressure boundary. The examination of insulated components allows completion of the activity without removal of the insulation as defined in ASME Section XI, IWA-5242. This examination is performed each refueling outage in accordance with the requirements of Technical Specification (TS) section 5.5.7 and ASME Section XI. ASME Section XI, IWB-3522, provides acceptance criteria for these examinations.

Requested Item 1.B

An evaluation of the ability of your inspection and maintenance programs to identify degradation of the reactor pressure vessel head including, thinning, pitting, or other forms of degradation such as the degradation of the reactor pressure vessel head observed at Davis-Besse.

Response

The activities described below reflect the ability of the inspection and maintenance programs to identify the subject reactor pressure vessel head degradation.

The reactor head bare metal inspection conducted in 1995 exposed the entire upper surface of the reactor head. Active leakage through a penetration nozzle wall would have been indicated by boric acid originating at the leak. Head thickness measurements were not taken, so minor generalized thickness changes were not detectable. Reactor head thinning and pitting would have been detectable if visible deformation existed. If boric acid or corrosion product buildups had been found, they would have been removed to facilitate categorization and investigation. Any boric acid or corrosion product buildups would have

been removed from the reactor head before placing it back in service. Metal degradation similar to Davis Besse would have been discovered during removal of the buildup.

Eddy current examinations conducted on the eight ICI nozzles in 1995 would have detected primary stress corrosion cracking (PWSCC), with or without accompanying leakage, if it existed.

NMC considers visually inspecting the reactor head insulation covers during the 2001 CRDM replacement housing outage a reliable method to determine if leakage from CRDM housings and seals may have made contact with the reactor head. CRDM housing and seal leakage must pass through the stainless steel covers before reaching the insulation. Unless there is evidence on the covers or insulation that water has flowed through openings in the cover, it can be concluded that the reactor head insulation has not been wetted by leakage.

Visual inspections of the upper surface of the insulation blankets conducted during the 2001 CRDM housing replacement outage would not have revealed thinning or pitting before leakage occurred, because the reactor head metal was not directly examined. Inspection of the upper insulation surface inside the enclosure is a reliable method for detecting leakage onto the reactor head. Leakage originating from above the insulation would contact the insulation blankets before flowing downward onto the carbon steel reactor head, leaving a stain and/or boric acid buildup. It is NMC's position, based on experience with other insulated components, that leakage originating from below the insulation blankets sufficient to cause degradation similar to Davis-Besse would be detectable above the insulation blankets because leakage products would pass through the insulation, displace the insulation, and/or flow down to the mating flange, which is exposed during refueling outages.

The boroscopic inspection during the 2001 CRDM upper housing replacement outage was capable of detecting pitting, boric acid accumulation, or other degradation at the few, discrete locations that were directly observed. Thinning would not be expected unless accompanied by observable conditions.

GL 88-05 examinations identify boric acid on external surfaces so further examination can be performed. Surface thinning, pitting, or other degradation would be detected by initial visual examination or by follow-up examination when the pressure retaining components were cleaned to bare metal. Thickness measurements are not normally taken. These examinations would detect degradation if surfaces are visibly affected.

The ISI Program VT-2 visual examinations conducted on reactor head partial penetration welds and all pressure retaining components within the Class 1 pressure boundary would lead to follow-up examinations if leakage indications were observable on insulation.

Requested Item 1.C

A description of any conditions identified (chemical deposits, head degradation) through the inspection and maintenance programs described in 1.A that could have led to degradation and the corrective actions taken to address such conditions.

Response

No indication of leakage or reactor head degradation was detected during the 1995 reactor head bare metal visual observation.

No ISI reportable nozzle indications were identified during the ICI nozzle examination conducted in 1995.

There were no indications in 2001 that the insulation blankets had been wetted since the last reactor head bare metal visual inspection in 1995. Visual inspection of the stainless steel insulation covers during the 2001 CRDM upper housing replacement outage indicated CRDM leakage had been stopped by the insulation covers before reaching the insulation blankets or the reactor head. Insulation covers were removed in the vicinity of the known leak from above, and the upper surfaces of the insulation blankets were visually inspected for evidence of boric acid accumulation. A small amount of loose, white granular material was found on top of the blankets. However, there was no discoloration of the insulation and the observed material did not adhere to the insulation or the CRDM nozzles where they passed through the insulation. The material appeared to have dried before falling through the cover, and placement showed that the most likely source was dry surface material on the covers that slid onto the insulation as the stainless steel covers were moved for inspection.

No indications of boric acid accumulation or degradation were detected in the locations that were observed by the boroscopic inspection conducted during the 2001 CRDM upper housing replacement outage on the reactor head and penetration nozzles.

GL 88-05 examinations revealed no indications of leakage onto the reactor head metal since the 1995 bare metal head inspection.

Since 1995 there have been several instances of CRDM leakage from mechanical seals and seal housings above the reactor vessel head. When this leakage was observed above the reactor head, visual examinations of CRDM housings and other exposed surfaces below them were conducted to determine if liquid migrated to the reactor head metal. For each of these cases, it was determined that leakage did not reach the bare metal of the reactor head.

Requested Item 1.D

Your schedule, plans, and basis for future inspections of the reactor pressure vessel head and penetration nozzles. This should include the inspection method(s), scope, frequency, qualification requirements, and acceptance criteria.

Response

NMC is planning to perform a 100% effective visual examination of the reactor head upper metal surface during the next refueling outage, currently planned for Spring 2003. NMC has committed to this examination in an updated response to NRC BL 2001-01, "Circumferential Cracking of Reactor Head Penetration Nozzles" dated March 29, 2002. This type of examination during the next refueling outage is consistent with BL 2001-01 expectations for plants susceptible to PWSCC in five to thirty effective full power years (EFPY). Qualification requirements will be to the 1989 Edition of ASME Section XI. The acceptance criterion will be zero leakage from the reactor head and penetration nozzles. If leakage is detected it will be investigated and repaired as needed in accordance with the current NMC repair/replacement program at Palisades including applicable codes and standards. Any indication of leakage or cracks will be evaluated and characterized using a combination of surface and/or volumetric examinations. Additional future examinations will be evaluated based on industry experience.

Requested Item 1.E

Your conclusion regarding whether there is reasonable assurance that regulatory requirements are currently being met (see the Applicable Regulatory Requirements, above). This discussion should also explain your basis for concluding that the inspections discussed in response to Item 1.D will provide reasonable assurance that these regulatory requirements will continue to be met. Include the following specific information in this discussion:

(1) If your evaluation does not support the conclusion that there is reasonable assurance that regulatory requirements are being met, discuss your plans for plant shutdown and inspection.

(2) If your evaluation supports the conclusion that there is reasonable assurance that regulatory requirements are being met, provide your basis for concluding that all regulatory requirements discussed in the Applicable Regulatory Requirements section will continue to be met until the inspections are performed.

Response

NMC has determined, through the results described in response to item 1.C, that there is reasonable assurance that the applicable regulatory requirements described in NRC Bulletin 2002-01, Applicable Regulatory Requirements section, are currently being met. There have been no indications that boric acid has accumulated upon the reactor head metal from sources above the reactor vessel head since the metal surface was last inspected in 1995. Since 1995, there have been no identified reactor head penetration nozzle leaks at the Palisades Plant.

NMC has determined that all regulatory requirements discussed in the Applicable Regulatory Requirements section of NRC Bulletin 2002-01 will continue to be met until the planned 100% effective visual examination of the reactor head upper metal surface is performed during the next refueling outage, currently planned for Spring 2003. This is based on the following:

Leak investigations since 1995 have not revealed reactor head penetration nozzle leakage.

Leak investigations since 1995, including visual inspections of the insulation covers and upper surface of the insulation blankets conducted in 2001, have determined that boric acid has not accumulated onto the reactor head.

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The current Palisades' reactor coolant pressure boundary leakage is low. Stable three-hour unidentified primary coolant system (PCS) operational leakage rates at stable power conditions since the CRDM upper housing replacement outage have averaged between 0.0 and 0.1 gpm. Plant procedures require initiation of a condition report when unidentified PCS operational leakage exceeds 0.1 gpm. Unidentified PCS operational leakage levels at or above 0.3 gpm will result in increased management involvement. These action levels are well below the Technical Specification value of 1.0 gpm for unidentified PCS operational leakage.

There is reasonable assurance that a CRDM nozzle leak would not develop at Palisades before the next refueling outage. As reported in the integrated response contained in Materials Reliability Program (MRP) -48, "PWR Materials Reliability Program Response to NRC Bulletin 2001-01," the Davis-Besse plant was considered susceptible to PWSCC nozzle leakage within five EFPY following March 2001. Palisades was initially identified within the greater than 30-year susceptibility group. NMC recently reevaluated the Palisades reactor head temperature. As a result, Palisades was re-categorized into the five to thirty year susceptibility group, with 22.5 EFPY calculated from March 2001 until the Oconee 3 condition.

In addition, NMC has reviewed MRP-48, Section 3, with respect to the regulatory requirements addressed by BL 2002-01. MRP-48 addresses compliance with all the regulatory requirements described in BL 2002-01 for reactor head degradation in an equivalent manner to BL 2001-01 for reactor vessel head penetrations, except for the requirements of GL 88-05. NMC has a boric acid leak program in accordance with GL 88-05 as described in response to items 1.A and 1.B. Palisades was designed, fabricated, erected, and tested as described in the Final Safety Analysis Report to specific general design criteria for nuclear plants; is inspected to ASME B&PV, Section XI Code requirements as described in responses to items 1.A through 1.C; and is operated in accordance with 10 CFR 50 Appendix B and Palisades Technical Specifications requirements.