NMC
Committed to Nuclear Excellence

Palisades Nuclear Plant
Operated by Nuclear Management Company, LLC

August 25, 2005

10 CFR 50.54(f)

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
11555 Rockville Pike
Rockville, Maryland 20852

Palisades Nuclear Plant
Docket 50-255
License No. DPR-20

Nuclear Management Company Response to Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors," for Palisades Nuclear Plant

By letter dated September 13, 2004, the Nuclear Regulatory Commission (NRC) issued Generic Letter (GL) 2004-02. By letter dated March 7, 2005, Nuclear Management Company, LLC (NMC) provided Part 1 of the required response.

In GL 2004-02, the NRC required that the Part 2 response be provided by September 1, 2005. NMC is providing the Part 2 response to GL 2004-02. Enclosure 1 contains the NMC response for the Palisades Nuclear Plant.

Summary of Commitments

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

1. NMC will implement all corrective actions to resolve GSI-191 prior to plant restart following the Fall 2007 refueling outage at Palisades Nuclear Plant.

2. NMC will submit license amendment requests on the safety injection refueling water tank volume and on the replacement strainer surveillance requirements, no later than September 1, 2006, for the Palisades Nuclear Plant.

3. NMC will complete operator training determined to be necessary prior to the start of the 2007 refueling outage at Palisades Nuclear Plant.

4. NMC will review and revise the programmatic controls on debris loading in containment as part of the replacement strainer detailed design. Programmatic controls will be revised prior to plant restart following the Fall 2007 refueling outage at Palisades Nuclear Plant.

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27780 Blue Star Memorial Highway • Covert, Michigan 49043-9530
Telephone: 269.764.2000

5. NMC will provide an update to the generic letter response for Palisades Nuclear Plant, within 60 days of acceptance of the final screen design.

I declare under penalty of perjury that the foregoing is true and correct. Executed on August 25, 2005.

Paul A. Harden
Site Vice President, Palisades Nuclear Plant
Nuclear Management Company, LLC

Enclosure (1)

CC Administrator, Region III, USNRC
Project Manager, Palisades, USNRC
Resident Inspector, Palisades, USNRC Document Control Desk

Nuclear Regulatory Commission (NRC) Request

2. Addressees are requested to provide the following information no later than September 1, 2005:

NRC Request

(a) Confirmation that the ECCS and CSS recirculation functions under debris loading conditions are or will be in compliance with the regulatory requirements listed in the Applicable Regulatory Requirements section of this generic letter. This submittal should address the configuration of the plant that will exist once all modifications required for regulatory compliance have been made and this licensing basis has been updated to reflect the results of the analysis described above.

Nuclear Management Company, LLC (NMC) Response

(a) NMC has completed several actions to date to confirm that the emergency core cooling system (ECCS) and containment spray system (CSS) recirculation functions under debris loading conditions at Palisades Nuclear Plant (PNP) will be in compliance with all applicable regulatory requirements.

NRC regulations in 10 CFR 50.46 require that the ECCS have the capability to provide long-term cooling of the reactor core following a loss of coolant accident (LOCA). In addition, General Design Criteria (GDC) 38 and GDC 41 apply to PNP, as described in the FSAR and other plant specific licensing requirements.

NMC has completed the following activities to confirm compliance with the above regulatory requirements at PNP:

- Containment walkdown surveillance
- Debris generation and transport analysis
- Calculation of required and available net positive suction head (NPSH)
- Planned modifications identified
- Preliminary downstream effects analyses
- Strainer vendor selected

NMC plans to perform the following activities in support of finalizing the required analyses and modifications at PNP:

- Latent debris walkdowns
- Finalized detail design of replacement strainer
- Finalized downstream analyses on potential fuel clogging and ECCS pump issues

The planned configuration of the PNP that would exist once all modifications required for regulatory compliance have been made includes replacing the original sump flat-screen strainers with two patented active strainers supplied by General Electric (GE), modifying the control room to include the addition of active strainer motor controls and instrumentation, and lastly, throttling the CSS pump discharge flow to increase the available NPSH to the ECCS pumps.

NRC Request

(b) A general description of and implementation schedule for all corrective actions, including any plant modifications, that you identified while responding to this generic letter. Efforts to implement the identified actions should be initiated no later than the first refueling outage starting after April 1, 2006. All actions should be completed by December 31, 2007. Provide justification for not implementing the identified actions during the first refueling outage starting after April 1, 2006. If all corrective actions will not be completed by December 31, 2007, describe how the regulatory requirements discussed in the Applicable Regulatory Requirements section will be met until the corrective actions are completed.

NMC Response

(b) A general description of and implementation schedule for the corrective actions that have been identified thus far, based on the results from the debris generation and transport analyses include:

1. Strainer Modification: NMC is currently pursuing an active strainer approach for PNP. NMC is working with GE, the active strainer vendor, and AREVA, the PNP fuel supplier, to finalize the necessary additional analyses and tests required for the active strainer design. NMC recognizes the GE active strainer has not been used in a commercial nuclear plant. Therefore, the installation of the active strainer at PNP would be subject to the acceptance of the design basis testing, which is currently scheduled to begin in late August 2005. The results of this testing are expected from GE no later than December 2005.

   NMC is actively working with GE to ensure the test bounds the PNP conditions. Key parameters from this testing are: (1) characterization of the size and concentration of debris downstream of the active strainer, (2) the change in these characteristics over time until equilibrium is reached, (3) head loss across the strainer, (4) performance of the active strainer in the presence of chemical effects, and (5) assurance that the active strainer operation is not affected by signs, placards, lead blanket covers, etc. that might be transported to the containment sump.

NMC plans to replace the original sump flat-screen strainers with two patented active strainers supplied by GE. The new active strainers would be floor mounted, external to the sump, with discharge pipes connected to the sump down-comer pipes. These down-comer pipes provide flow passages from the containment ground floor, through the reactor pedestal, to the containment sump. Each strainer would be powered from a separate Class 1E safeguards electrical source, and have design capacity to accommodate maximum ECCS recirculation flow rate. NMC plans to have the final design of the active strainer completed by August 2006.

The following are additional modifications that would be necessary if the active approach is implemented at PNP:

a. The remaining sump down-comer pipes, not connected to the active strainers, would be covered with a collar and flat screen. This would create additional passive strainer surface area, assist sump venting, and provide additional assurance that excessive differential pressure does not develop between the sump and the containment atmosphere.

b. All other sump penetrations, including vents and drains, would be modified to ensure the size distribution of the bypass debris meets the requirements of the active strainer design analyses.

c. Control room modifications would be necessary, including the addition of active strainer motor controls and instrumentation. The control room panel insert would provide the operator with automatic and manual control of the active strainer motor. The insert would also provide control room operators with motor operating status indicator lights and a motor amp meter.

d. CSS pump discharge flow would likely require throttling to increase the available NPSH to the ECCS pumps. The evaluation shows an existing small positive NPSH margin for these pumps. The results of the upcoming GE active strainer design basis testing would provide the head loss across these strainers that, combined with the existing margin, would determine the amount of margin recovery required to ensure the pumps do not cavitate. The amount of throttling and the throttling method (e.g., using an active or passive throttling device) would then be determined.

e. NMC plans to determine if there is a need for trash racks and missile shields, once the detailed design of the active strainer is finalized.

The modifications identified above would be implemented during the 2007 refueling outage at PNP.

2. Latent Debris Sampling Walkdown: NMC has already performed containment walkdowns of the PNP containment in support of the analysis of the susceptibility of the ECCS and CSS recirculation functions to the adverse effects of debris blockage. NMC previously committed to perform a containment latent debris sampling walkdown during the next refueling outage in the spring of 2006. This walkdown is to confirm the 200 lbs latent debris assumed in the debris loading calculation is conservative.

3. Submit License Amendment Requests: NMC will submit License Amendment Requests to the NRC no later than September 1, 2006.

4. Licensed Operator Training: NMC will complete operator training for the new strainer system prior to the beginning of the Fall 2007 refueling outage.

5. Downstream Effects Modifications: The corrective actions associated with the downstream effects will be implemented prior to plant restart following the Fall 2007 refueling outage.

6. Programmatic controls on debris loading in containment will be reviewed and revised, if required, as part of the replacement strainer detailed design.

NMC will implement the corrective actions described above during the Fall 2007 refueling outage at PNP. It is not feasible for NMC to implement the corrective actions during the Spring 2006 refueling outage, currently scheduled to begin in early April 2006, due to a number of factors including:

1. Additional testing of the active strainers is required to ensure satisfactory performance.
2. The downstream effects analysis cannot be completed until the GE test results are provided.
3. Throttling of the CSS pump discharge flow would likely be required to recapture NPSH margin, but the required amount of NPSH recovery cannot be quantified until the GE testing is complete. Therefore, a determination cannot be made to the most appropriate method of throttling (active or passive), then design and install the required modification during the April 2006 outage.
4. There is insufficient time to incorporate the GE test and analysis results and for GE to fabricate the strainers before the April 2006 outage.

NRC Request

(c) A description of the methodology that was used to perform the analysis of the susceptibility of the ECCS and CSS recirculation functions to the adverse effects of post-accident debris blockage and operation with debris-laden fluids. The submittal may reference a guidance document (e.g., Regulatory Guide 1.82, Rev. 3, industry guidance) or other methodology previously submitted to the NRC. (The submittal may also reference the response to Item 1 of the Requested Information described above. The documents to be submitted or referenced should include the results of any supporting containment walkdown surveillance performed to identify potential debris sources and other pertinent containment characteristics.)

NMC Response

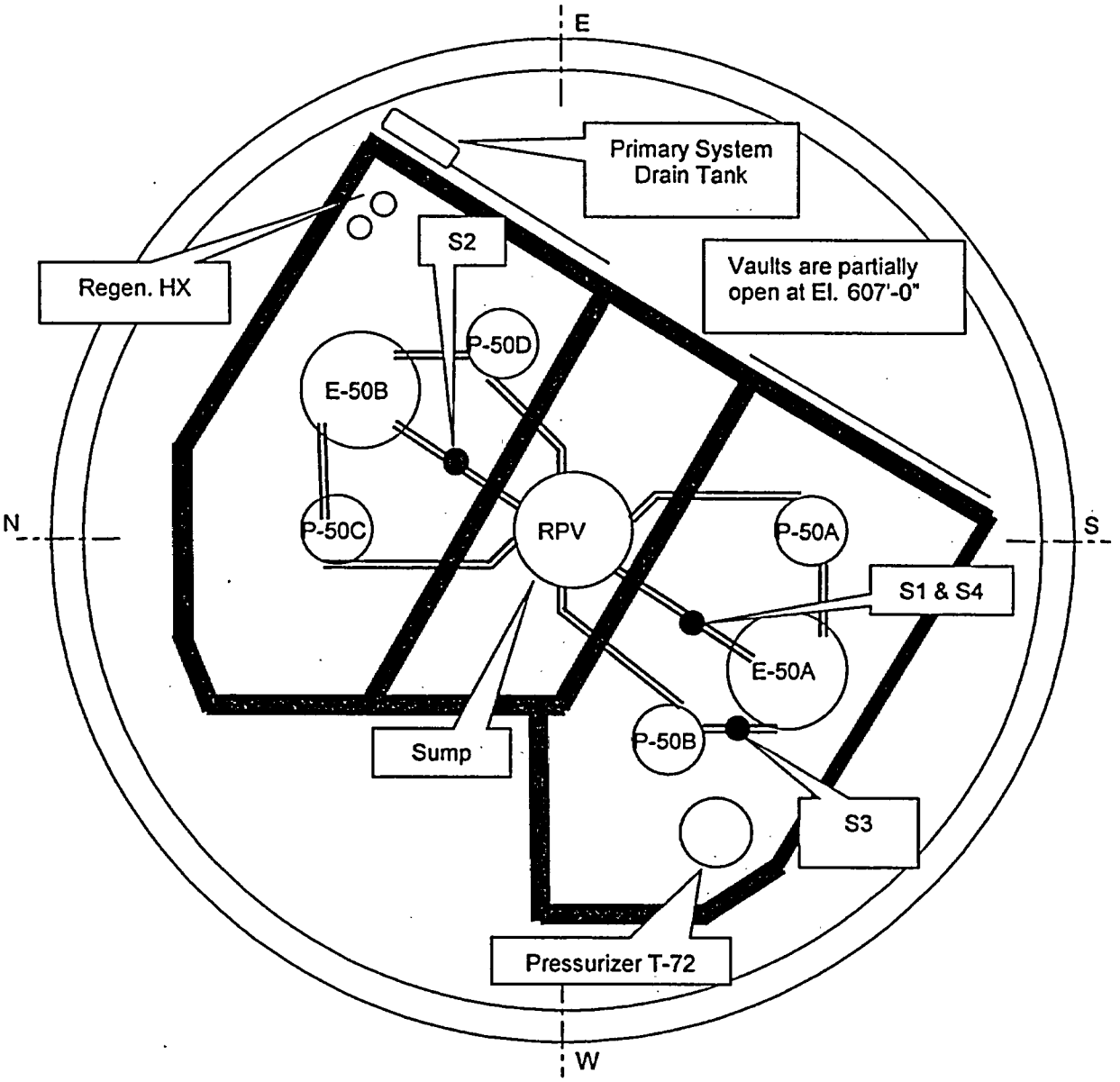
(c) The methodology that was used, to perform the analysis of the susceptibility of the ECCS and CSS recirculation functions to the adverse effects of post-accident debris blockage and operation with debris-laden fluids, is the NEI Guidance Document, NEI 04-07, "Pressurized Water Reactor Sump Performance Methodology," dated December 2004, as modified by the NRC safety evaluation, "Safety Evaluation by the Office of Nuclear Reactor Regulation Related to NRC Generic Letter 2004-02, Nuclear Energy Institute Guidance Report (Proposed Document Number NEI-04-07)." The downstream effects evaluations for blockage were performed using the guidance of WCAP 16406-P, "Evaluation of Downstream Sump Debris Effects in Support of GSI-191," dated June 2005. The results of the analyses and walkdowns are documented as follows:

Debris Generation Calculation

This engineering analysis (EA), performed by Sargent and Lundy, documents the results of the containment walkdowns and the debris generated under LOCA scenarios. NMC performed a review and acceptance of this EA. There were four limiting cases of breaks considered.

Break Name	Break ID	Piping
S1	42-inch	Hot Leg A
S2	42-inch	Hot Leg B
S3	30-inch	Cold Leg Suction 1B
S4	11.19-inch	Hot Leg A (Alternate)

Top View of Containment Showing Analyzed Break Locations



The following table summarizes the results of the LOCA generated debris.

Summary of LOCA Generated Debris					
Debris Type	**Units**	**Break S1**	**Break S2**	**Break S3**	**Break S4**
					Alternate Break
INSULATION					
Nukon / Thermal Wrap	[ft^3]	1224.6	1129.8	866.5	295.2
Calcium Silicate	[ft^3]	35.5	61.0	21.9	0
Transco RMI Foil	[ft^2]	1095.5	500.8	1427.8	501.5
Fiberglass	[ft^3]	159.1	49.2	158.2	0.1
Unjacketed Calcium Silicate - (on RGHX E-56, various piping, affected by spray)	[ft^3]	50.8	50.8	50.8	50.8
Unjacketed Fiberglass - (various piping, affected by spray)	[ft^3]	0.6	0.6	0.6	0.6
Unjacketed Nukon - (on RGHX E-56, various piping, affected by spray)	[ft^3]	2.6	2.6	2.6	2.6
COATINGS					
Carboline - Phenoline 300 Primer	[ft^3]	2.4	1.8	2.4	0.6
Carboline - Phenoline 300 Finish	[ft^3]	2.5	1.9	2.5	0.7
Carboline - Carbozinc 11	[ft^3]	1.7	1.2	1.7	0.5
Inorganic Zinc Silicate	[ft^3]	1.4	1.5	1.4	0.4
Aluminum Paint	[ft^3]	0.008	0.008	0.008	0.002
Zinc Chromate	[ft^3]	0.006	0.006	0.006	0.002
Carboline 3912	[ft^3]	0	0.1	0	0
QUALIFIED COATINGS TOTAL	[ft^3]	8.014	6.514	8.014	2.204
UNQUALIFIED COATINGS	[ft^3]	17.4	17.4	17.4	17.4
LATENT DEBRIS	[lb_m]	200	200	200	200
Marinite Board Fiber	[ft^3]	12.8	12.8	12.8	12.8
FOREIGN MATERIALS					
Miscellaneous	[ft^2]	113.4	113.4	113.4	113.4
Signs (metal) (75% area)	[ft^2]	1.6	1.6	1.6	1.6
Signs (plastic) (75% area)	[ft^2]	9.9	9.9	9.9	9.9
Stickers (75% area)	[ft^2]	31.0	31.0	31.0	31.0
Tags (metal) (75% area)	[ft^2]	12.62	12.62	12.62	12.62
Tags (plastic & paper) (75% area)	[ft^2]	19.5	19.5	19.5	19.5
Tape (75% area)	[ft^2]	346.9	346.9	346.9	346.9
Lead Blankets (Alpha-Maritex cloth)	[ft^2]	4156	6364	4156	4156
TOTAL FOREIGN MATERIALS	[ft^2]	**4690.92**	**6898.92**	**4690.92**	**4690.92**

Debris Transport and Head Loss Calculation

This EA, performed by Sargent and Lundy, was a parametric study of the head loss through a flat screen based on the debris loading determined in the debris generation calculation with the current sump screen configurations. NMC performed a review and acceptance of this EA.

The current sump screen configurations were applied in determining the susceptibility of the ECCS and CSS recirculation functions. A summary of the parametric study is tabulated below. The head losses considered the transport effects in accordance with the Guidance Report, NEI 04-07.

Summary of Head Loss Calculations for Existing Sump Screen

Break	Fiber/Particulate Bed Head Loss [ft]	RMI Head Loss [ft]	Total Debris Bed Head Loss [ft]
S1	85,226	0.028	85,226
S2	103,847	0.017	103,847
S3	76,321	0.039	76,321
S4, Alternate Break	60,884	0.017	60,884

Downstream Effects Evaluation – Flow Clearance

This EA, performed by Sargent and Lundy using the overall guidance provided in NEI 04-07 and Safety Evaluation, identified the flow clearances for components in the ECCS recirculation flow path. NMC performed a review and acceptance of this EA. The evaluation is based on the sump screen mesh size of 1/8-inch x 1/8-inch, which is the current screen configuration. This screen mesh size is larger and thus bounds the downstream effects of a smaller screen mesh design. The evaluation concluded that the nuclear fuel, CSS and HPSI pumps require a detailed flow blockage/wear evaluation.

Downstream Effects Evaluations

This EA, performed by NMC, considered the inputs from the flow clearance evaluation mentioned above and analyzed the downstream effects in accordance with the methodology provided in WCAP-16406-P. The results are summarized in Section 2.d(vi) of this document.

Fuels Evaluations for Downstream Effects

This EA, performed by AREVA, is the Phase 1 analysis of the fuel clogging evaluation. NMC performed a review and acceptance of this EA. The analysis assessed the potential core blockage due to debris that enters the primary coolant system. The framework of this analysis was based on the guidance provided in WCAP-16406-P. The analysis established acceptance criteria for the head loss across the fuel guard plate of the fuel assembly. Further analysis of the fuel clogging is planned as an integral part of the strainer detailed design.

Chemical Effects Evaluations

This EA, performed by NMC, determined the applicability of the Westinghouse Test Plan, "Characterization of Chemical and Corrosion Effects Potentially Occurring Inside a PWR Containment Following a LOCA," Revision 12.b., to the PNP specific post-LOCA conditions. The Test Plan provides a list of materials to be tested, as well as their volume ratios. The Test Plan also provides a list of chemical parameters for the testing. An inventory of the test materials has been developed in the analysis for the PNP containment. Pending the results of the active strainer design basis testing, further evaluation of the chemical parameters may be required to demonstrate the conformity to the parameters in the Test Plan.

ESS Pump NPSH and Flow Rate

This piping network flow analysis, performed by NMC using the FLO-Series PIPE-FLO program, determined the acceptable throttled ECCS flow rate and pump NPSH margins during recirculation mode. PNP plans to throttle the spray flow to increase the pump NPSH margin.

GOTHIC LOCA Analysis of Containment

This transient EA, performed by NMC, was to evaluate the effect of throttling the spray flow during recirculation mode. The analysis demonstrated that the containment responses of the throttled ECCS flow condition are acceptable for the planned throttling operation.

NMC has not taken exceptions to the methodologies used in the analyses at PNP.

NRC Request

(d) The submittal should include, at a minimum, the following information:

(i) The minimum available NPSH margin for the ECCS and CSS pumps with an unblocked sump screen.

NMC Response

(i) The PNP ECCS pumps consist of low pressure safety injection (LPSI), high pressure safety injection (HPSI), and CSS. The LPSI pumps are not used during recirculation and therefore were not analyzed. The recirculation mode of the ECCS operation at PNP aligns the HPSI pump suction to the sub-cooled water which is supplied by the CSS pumps through the shutdown cooling heat exchangers. As a result of this system lineup, the NPSH available to the HPSI pumps is in excess of 300 feet of water.

Once the active strainer is installed, the NPSH margin is predicted to be at least 2.2 feet of water, which includes credit for throttling containment spray flow and includes reserving 1 foot of margin for head loss across the active strainer.

The NPSH pump margins described above were determined by a conservative evaluation. The NPSH margin includes the negative effects of the emergency diesel generator frequency variation, and the resulting potential pump performance degradation. The NPSH margin excludes the available positive effects of containment over pressure, fluid sub-cooling and partial air pressure in containment.

NRC Request

(ii) The submerged area of the sump screen at this time and the percent of submergence of the sump screen (i.e., partial or full) at the time of the switchover to sump recirculation.

NMC Response

(ii) The sump screens of the replacement strainer system would be fully submerged at the time of the switchover to sump recirculation. The replacement strainer designed height would be based on a minimum flood level of 3.5 feet above the containment ground level.

NRC Request

(iii) The maximum head loss postulated from debris accumulation on the submerged sump screen, and a description of the primary constituents of the debris bed that result in this head loss. In addition to debris generated by jet forces from the pipe rupture, debris created by the resulting containment environment (thermal and chemical) and CSS washdown should be considered in the analyses. Examples of this type of debris are disbonded coatings in the form of chips and particulates and chemical precipitants caused by chemical reactions in the pool.

NMC Response

(iii) The maximum head loss through the GE active strainer, for the limiting design condition, is expected to be less than 1 foot of water column. This head loss is based on GE's proof of design testing and GE's conceptual design for the PNP installation. The actual head loss would be verified during the strainer design basis testing that begins in late August 2005. The results of that testing would be provided by GE to the PNP in December 2005. NMC would then incorporate the results of the test and make any additional design adjustments required. However, based on information available at the time of this submittal, NMC expects negligible head loss impact.

The PNP post-LOCA containment contains debris which includes reflective metal insulation, fibrous insulation, calcium silicates and coatings. NMC is planning on implementing the GE active strainer because the testing performed to date has shown that the performance is relatively independent of debris type and quantity under the postulated accident conditions. In addition, GE has determined through engineering evaluation that the active strainer is not adversely affected by chemical effects. The GE active strainer performance was demonstrated by the boiling water reactor owners group testing. In addition, negligible head loss was further demonstrated by the proof of concept testing GE conducted in January 2005. The design basis testing of the active strainer is expected to validate the efficacy of these strainers in the PNP postulated accident conditions.

NRC Request

(iv) The basis for concluding that the water inventory required to ensure adequate ECCS or CSS recirculation would not be held up or diverted by debris blockage at choke-points in containment recirculation sump return flowpaths.

NMC Response

(iv) NMC performed an evaluation on the recirculation flow paths and potential hold up areas of the PNP containment. This evaluation was performed as part of the NMC response to NRC Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis-Accidents at Pressurized-Water Reactors." The analysis concluded that two choke points existed in the PNP containment. Modifications were performed to address both choke points during the 2004 refueling outage. Therefore, the water inventory required to ensure adequate ECCS or CSS recirculation would not be held up or diverted by debris blockage at choke-points in the containment recirculation sump return flow paths.

In addition, the volume of sumps and other holdup volumes not directly connected to the recirculation sump have been excluded in the minimum water level calculation and therefore, the minimum water level calculation is conservative.

NRC Request

(v) The basis for concluding that inadequate core or containment cooling would not result due to debris blockage at flow restrictions in the ECCS and CSS flowpaths downstream of the sump screen, (e.g., a HPSI throttle valve, pump bearings and seals, fuel assembly inlet debris screen, or containment spray nozzles). The discussion should consider the adequacy of the sump screen's mesh spacing and state the basis for concluding that adverse gaps or breaches are not present on the screen surface.

NMC Response

(v) The flow paths downstream of the containment sump strainers were analyzed to determine the potential for blockage due to debris bypassing the strainers. Evaluations were performed on components in the recirculation flow paths downstream of the strainers including, but not limited to, throttle valves, flow orifices, spray nozzles, pumps, heat exchangers, and valves. The evaluations were performed based on the existing sump screen mesh size of 1/8-inch x 1/8-inch. NMC has requested GE to design an active strainer system with 1/16-inch mesh size, because of the potential adverse effects identified in the preliminary downstream analysis.

Adverse gaps and breaches on the screen surface is not a concern with the active strainer, the concern is bypass flow. To minimize the adverse effects of strainer bypass flow, the vents and drain paths to the containment sump would be modified with a screen of 1/16-inch mesh size. NMC plans to update the downstream analysis to reflect a 1/16-inch mesh size, when GE provides the results of the upcoming test on the active strainers. This reactor core analysis would be performed by the PNP fuel vendor, AREVA.

NRC Request

(vi) Verification that close-tolerance subcomponents in pumps, valves and other ECCS and CSS components are not susceptible to plugging or excessive wear due to extended post-accident operation with debris-laden fluids.

NMC Response

(vi) NMC performed a downstream analysis using the methodology provided in WCAP-16406-P. This analysis evaluated the blockage potential and wear/erosion effects on downstream components in the ECCS recirculation flow path including, but not limited to: pipes, orifices, heat exchangers, valves, pumps and containment spray nozzles.

The detailed downstream effects analysis identified that corrective actions are required for the following components:

Pump Erosion Issues: HPSI and CSS pumps have wear ring and shaft bushing wear issues. These issues were identified using the very conservative assumption of a constant downstream debris concentration over mission time. These conservative analyses indicated the pumps may not support continuous operation for the required 30-day mission time. NMC expects the upcoming GE active strainer design basis testing would show decreasing downstream debris concentrations over time. Reanalysis at that time, using the GE test results, is expected to significantly increase HPSI and CSS pump mission time, as preliminary industry testing has shown that debris settlement will take place.

HPSI Pump Seal Cooling: The centrifugal separator in the HPSI pump seal cooling path may be subject to debris plugging. NMC plans to work with the pump vendor to determine the approach to resolve the issue, including removing the centrifugal separator or installing a bypass valve, if necessary.

NMC plans to implement corrective actions to resolve the HPSI and CSS pump erosion issue, and the HPSI pump seal cooling issue at PNP. These corrective actions would be defined when the GE active strainer design basis test results are incorporated into the downstream component analyses. The corrective actions will be completed prior to plant restart following the refueling outage in 2007.

NRC Request

(vii) Verification that the strength of the trash racks is adequate to protect the debris screens from missiles and other large debris. The submittal should also provide verification that the trash racks and sump screens are capable of withstanding the loads imposed by expanding jets, missiles, the accumulation of debris, and pressure differentials caused by post-LOCA blockage under predicted flow conditions.

NMC Response

(vii) The PNP containment sump does not currently have trash racks. The preliminary locations for the replacement strainer system are subject to the jet and missile forces under a LOCA scenario. An evaluation of the need for trash racks would be performed as a part of the detailed design of the replacement strainer system, once the results of design basis testing are provided by GE.

The structural integrity of the replacement strainer system is a key design requirement of the GE active strainer. The PNP strainers would be designed to withstand post-LOCA conditions including debris induced differential pressures and other forces (e.g., seismic, etc.).

NRC Request

(viii) If an active approach (e.g., backflushing, powered screens) is selected in lieu of or in addition to a passive approach to mitigate the effects of the debris blockage, describe the approach and associated analyses.

NMC Response

(viii) NMC has determined that an active approach is the best solution for PNP because of the limiting NPSH margin, the significant containment debris loadings, and the limited amount of containment space available for passive strainer installation.

NMC plans to replace the existing sump screens at PNP with two GE patented active, self-cleaning strainer systems. The active components of these strainers are a motor driven rotating plow and comb assembly that sweeps over the perforated plate surface at the strainer inlet maintaining a debris-free, low head loss sump inlet flow. Below the strainer inlet, the perforated plenum box is connected to the sump inlet through a 16-inch nominal size pipe.

The motor and gear box are mounted on a support assembly directly over the strainer and located above the maximum containment post-LOCA recirculation water level. The motors would be powered from separate 1E safeguard electrical sources.

GE would supply NMC the associated analyses of the active strainer system, including the hydraulic sizing report, the structural design report and the environmental qualification report. The analyses must demonstrate that the strainer is designed to withstand the conditions of the postulated worst case design basis accident.

NRC Request

(e) A general description of and planned schedule for any changes to the plant licensing bases resulting from any analysis or plant modifications made to ensure compliance with the regulatory requirements listed in the Applicable Regulatory Requirements section of this generic letter. Any licensing actions or exemption requests needed to support changes to the plant licensing basis should be included.

NMC Response

(e) NMC plans to implement the PNP design modifications during the 2007 refueling outage, which is currently scheduled to start in September 2007.

NMC has identified two License Amendment Requests (LARs) that will be necessary. NMC will submit the LARs on or before September 1, 2006. In addition, as the detailed design is completed, additional amendments may be necessary. As NMC completes the necessary 10 CFR 50.59 reviews, determinations will be made on the need for additional LARs.

The two LARs determined to be necessary are as follows:

Strainer Surveillance Testing: Palisades Technical Specification 3.5.2 requires the existing sump screen to be inspected every 18 months to verify that the suction inlet screens show no evidence of structural distress or abnormal corrosion. The existing strainers would be replaced by the

new active strainer system. The new strainer system would be periodically tested in accordance with a new Surveillance Requirement (SR). Therefore, a LAR is needed to reflect the appropriate surveillance requirements of the replacement strainer system.

Increased Minimum Allowable Safety Injection Refueling Water Tank (SIRWT) Level Specification: The existing SR 3.5.4.2 requires verifying the water volume is greater than 85% (250,000 gallons) for Modes 1, 2 and 3. To ensure the minimum post-LOCA containment water level is consistent with the strainer design requirements, the SIRWT volume is to be maintained at 92% (275,970 gallons) for Modes 1 and 2. This volume is currently maintained as an administrative requirement in response to Bulletin 2003-01.

NRC Request

(f) A description of the existing or planned programmatic controls that will ensure that potential sources of debris introduced into containment (e.g., insulations, signs, coatings, and foreign materials) will be assessed for potential adverse effects on the ECCS and CSS recirculation functions. Addressees may reference their responses to GL 98-04, "Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System after a Loss-of-Coolant Accident Because of Construction and Protective Coating Deficiencies and Foreign Material in Containment," to the extent that their responses address these specific foreign material control issues.

NMC Response

(f) NMC uses a comprehensive approach to minimize the potential debris available in the PNP containment during LOCA conditions. PNP uses systematic processes to eliminate potential debris from containment and to perform evaluations to determine if it is acceptable for other material to remain in containment during plant operation. These systematic processes provide controls that apply to all affected plant work groups and include general and detailed guidance, expectations and requirements. These processes include administrative controls, specifications, modification controls, inspections, and procedural controls. NMC will review and revise the programmatic controls on debris loading in containment as part of the replacement strainer detailed design. Programmatic controls will be revised prior to plant restart following the Fall 2007 refueling outage at PNP.

The following paragraphs discuss programmatic controls used at PNP.

Administrative and Procedure Controls

Work Instruction, WI-RSD-H-018, "Containment and Auxiliary Posting Plans," provides guidance to the Health Physics Department on the installation of signs in containment during outage conditions and for the removal of the temporary signs prior to entering Mode 1. This work instruction also provides a list of the health physics signs that remain in containment during Mode 1, and provides the appropriate means for securing these signs.

Administrative Procedure 1.10, "Plant System, Structure, and Component Labeling," provides the process, responsibilities and instructions for labeling plant equipment including equipment located in containment. The procedure also addresses the use and limitations for temporary tags installed in containment to ensure they do not become potential debris during a LOCA. These procedural requirements for new and replacement permanent containment labels are very specific for material requirements including tag melting point and other material requirements. The procedure further requires that appropriate methods and materials are used to secure the permanent labels. The procedure specifically precludes using certain installation methods for new labels such as tape, glue, plastic tie wraps, velcro or self-adhesion because of the potential for these items increasing the debris on the containment sump screens during accident conditions.

Administrative Procedure 1.01, "Materiel Condition Standards and Housekeeping Responsibilities," provides standards for housekeeping and material condition inside containment. The procedure provides for the removal of loose material that could potentially cause sump screen plugging including adhesive tape, self-adhesive labels, fibrous materials, rags, fire blankets, plastic bags or sheathing and temporary sign/tags. The procedure also addresses the removal of temporary materials including tools, scaffolding, electrical cords, lights and gang boxes. Specific instructions to clean up dirt, spilled liquids, oil/grease, nails and pop-rivet stems are included. Directions are also provided for the removal of temporary modifications and configurations that have not been authorized to remain in place during power operations.

Administrative Procedure 5.01, "Processing Work Requests/Work Orders," controls the use of the component problem identification tags, which are temporary tags used to identify equipment for which corrective maintenance has been requested. These tags are not allowed to be used in the containment. Administrative Procedure 5.01 also applies to evolutions including painting that are performed at the plant. The use of Administrative Procedure 5.34, "Special Process Control," is specifically required where unanalyzed coating or painting failures could lead to clogging of the containment sump. Administrative Procedure 5.34 requires the use of Palisades Specification number A-130, "Technical Specification for Painting," on site structures, systems and components.

Administrative Procedure 5.09, "Maintenance Cleanliness Standards," applies to all work groups on site and provides work standards and cleanliness requirements at the plant including inside containment. This procedure establishes the containment as a work area with special cleanliness requirements. It further provides conditions for the establishment of material and tool accountability requirements to help ensure material or debris is not inadvertently left in containment during power operations.

Periodic and Predetermined Activity Control MSM084, "Containment Floor Drain PM," is performed during refueling outages. This PM is used to install drain socks during refueling outages to ensure that debris does not inadvertently enter the containment floor drains. The PM is also used to remove the drain socks at the end of a refueling outage which eliminates the potential for them to become debris. Subsequently the floor drains are inspected and cleaned as required to remove debris.

Specifications

Specification A-130, "Technical Specification for Painting," provides the requirements for painting at the plant including inside of containment and provides requirements for both safety related and non-safety related coatings. The specification references ANSI N101.4 for safety related coatings and provides detailed information for qualification, selection, surface preparation, application and inspections to ensure the quality of the completed product.

Specification M-136, "Furnishing and Installing Conventional Type Insulation," delineates the requirements for design, procurement, fabrication, installation, adjustment, modification and inspection of new and permanently installed thermal insulation at the plant including in containment. This specification requires the installation of metal jacketing for thermal insulation on piping, valves, fittings, bends and equipment in a manner best suited to provide moisture tightness. Where shape or size of piping, valves, fittings, or equipment precludes the use of metal jacketing, a reinforced mastic coating may be installed. Consideration of sump screen plugging and head loss issues are also addressed in the specification by recommending a review of Regulatory Guide 1.82, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident," when replacing or modifying insulation in containment.

Modification Controls

Fleet Modification Procedure FP-E-MOD-04, "Design Inputs," references checklists for plant modifications. The design input checklist has two specific questions related to containment debris and sump plugging that requires yes or no responses. The first question determines if the modification introduces material into containment that could affect sump

performance or lead to equipment degradation. The second question determines if painting or coatings are required in containment. The procedure requires that an affirmative answer to the questions be addressed and documented in the modification documents.

Inspection

Fire Protection Surveillance Procedure FPSP-RP-12, "Fire Rated Assemblies and Fire Protection Assemblies," is used to inspect cable tray fire stops located in containment. This surveillance requires that a visual inspection of the integrity of each assembly enclosure be performed every 18 months.

Technical Specification Surveillance Procedure RT-142, "Containment Inservice Inspection-Metal Liner," is used to perform inspections of the containment liner to fulfill Technical Specification surveillance and administrative control requirements. This procedure requires that inspected areas which are painted or coated be examined for flaking, blistering, peeling or discoloration.

Technical Specification Surveillance Procedure RT-92, "Inspection of ECCS Train Containment Sump Suction Inlet," is used to perform an inspection of the ECCS sump suction screens and sump vent line screens for degradation and debris on an 18-month frequency. Surveillance RT-92 also inspects the containment sump for debris. This inspection is performed by a system engineer to verify that the containment sump and vent screens are not restricted by debris and that they do not exhibit evidence of structural distress or abnormal corrosion. This procedure also requires a cleanliness inspection of the containment sump. Any inspection criteria that are not met require evaluation using the plant corrective action process. The scope of this inspection would be changed when the existing sump screen is replaced by the GE active strainer design.

General Operating Procedure GOP-2, "Mode 5 to Mode 3 $\geq$ 525 °F," is used to perform plant start-ups. It contains requirements to remove caution tags from containment and to perform inspections of containment in accordance with System Operating Procedure SOP-1A, "Primary Coolant System." SOP-1A requires the removal of temporary safety signs and safety rope that are routinely installed during refueling outages. This procedure further requires that a Senior Reactor Operator conduct inspections to identify loose debris and unauthorized equipment. These inspections are performed in all accessible elevations of containment to identify and remove loose material that could plug the containment sump screens including: duct tape, masking tape, self-adhesive labels, paper, fibrous material, rags, wood, tags, and plastic. Containment floor drains are inspected for debris and to verify the drain socks have been removed.

The inspection also requires the removal of all temporary unauthorized materials including tools, scaffolding, planking, electrical cords/lights and gang boxes. Equipment that is stored in containment is checked to ensure that it is properly secured and stored. A list of items that have been previously approved to remain in containment during power operations is provided and includes references to the evaluation documents. The inspections also ensure that material spillage, dirt, transient combustibles and flammable materials have been properly removed or cleaned.