

March 20, 2007

MEMORANDUM TO: William H. Ruland, Chairman  
Petition Review Board

FROM: James R. Hall /RA/  
Petition Manager

SUBJECT: NRC STAFF RESPONSE TO COMMENTS ON PROPOSED  
DIRECTOR'S DECISION REGARDING PALISADES INDEPENDENT  
SPENT FUEL STORAGE INSTALLATION (DOCKET NO. 07200007)

This memorandum documents the NRC staff's response to comments received on the proposed Director's Decision (DD), issued on November 28, 2006, with regard to the petition submitted under 10 CFR 2.206 by Mr. Terry Lodge, on behalf of five organizations and 30 individuals (the petitioners), dated April 4, 2006. The petitioners requested that the NRC take enforcement action against the licensee for the Palisades Nuclear Plant, Nuclear Management Company, LLC (NMC), by condemning and stopping the use of the two independent spent fuel storage installation (ISFSI) concrete pads holding dry spent fuel storage casks on the plant site. As the basis for their request, the petitioners stated that the concrete cask storage pads do not conform with NRC regulations for earthquake stability, as required by 10 CFR 72.212(b)(2)(i)(B) and 72.212(b)(3), and therefore pose a hazard in case of an earthquake. The NRC transmitted the proposed DD in a November 28, 2006, letter to the petitioners, and requested comments within 30 days. Mr. Lodge subsequently requested two extensions of time, by emails dated January 4 and 18, 2007. The staff agreed to the extensions and the petitioners submitted comments on the proposed DD on February 2, 2007.

In general, we have made some minor editorial changes to the proposed DD for clarification; however, the conclusions of the proposed DD are unchanged, as the petitioners' comments did not warrant any significant revisions. Note that some of the petitioners' comments were not related to the requested actions, or were otherwise considered outside the scope of the staff's review of the petition, which was specifically identified in NRC's letter to the petitioners, dated June 27, 2006. In that letter, the NRC accepted the petition for review, in part, only with respect to the slope stability analyses of the concrete pad constructed in 2003 (newer pad). Those portions of the petition concerning the older concrete pad constructed in 1992, and soil amplification related to the newer pad were not accepted for review, because those issues were previously reviewed by the NRC staff and were resolved. The staff's review of the older pad is documented in the "Palisades Plant - NRC Final Safety Assessment of ISFSI Support Pad," dated September 20, 1994. In that assessment, the staff concluded that the location of the older storage pad at the Palisades site was acceptable to support the concrete storage casks against all effects of the design basis earthquake for the site. The staff resolution of the issue regarding potential amplification effects from seismic events for the newer pad was documented in NRC Inspection Report 05000255/2006002, dated May 11, 2006. In that evaluation, the staff determined that the licensee used the correct horizontal acceleration input values in its seismic analysis for the newer ISFSI pad, and that the licensee's results are bounded by the cask design limits.

NRC Management Directive (MD) 8.11, "Review Process for 10 CFR 2.206 Petitions," states that the NRC staff will not review a petition under 2.206 if the petitioner raises issues that have already been the subject of NRC staff review on that facility and the issues have been resolved, unless the request presents significant new information. The staff determined that the petition presented no significant new information on the two issues discussed above. A copy of MD 8.11 was provided to the petitioners by letter dated May 4, 2006.

The petitioners' sole issue accepted for review by the staff under 10 CFR 2.206 deals with the stability of slopes beneath and above the newer ISFSI pad. This issue was under review by NRC at the time the petition was submitted, as it was documented as an unresolved item (URI) in NRC Inspection Report 07200007/2004-002, dated September 3, 2004. On October 19, 2006, NMC completed a revised slope stability analysis for the newer ISFSI pad [NMC Calculation (Doc) No. EA-EC7408-02, Revision 0, "Re-evaluation of Slope Stability under ISFSI Pad for Revised Load Due to 24PTH System"]. NMC performed the re-evaluation to address NRC questions associated with the unresolved inspection item, and to confirm the stability of the newer pad for the possible use of a cask design heavier than that currently in service. Based on its review of that revised evaluation, the NRC staff concluded that the concerns about the stability of the newer ISFSI pad during an earthquake have been adequately resolved such that no further action by the licensee is needed. This URI was closed in NRC Inspection Report 050000255/2006013, dated January 24, 2007, which stated, "the licensee's revised evaluation appropriately considered the weight of the as-built pad, the weight of the casks..., and the in-situ soil properties in response to a seismic event." Therefore, the staff has determined that NMC has performed written evaluations that establish that the newer cask storage pad at the Palisades ISFSI has been designed to adequately support the static and dynamic loads of the stored casks, considering potential effects of earthquakes, in compliance with 10 CFR 72.212(b)(2)(i)(B) and 72.212(b)(3).

The petitioners' comments and NRC staff responses are discussed below in more detail.

#### Comment (introduction):

The petitioners disagree with the conclusion of the proposed Director's Decision and restate their initial position and request; that both ISFSI concrete pads at Palisades do not conform with NRC regulations for earthquake stability and should be removed from further usage immediately.

#### Response:

This comment provides no new information, and no revision to the proposed DD is warranted. In addition, the staff informed the petitioners on June 27, 2006, that the seismic issues concerning the older ISFSI pad and the amplification issues for the newer pad would not be considered under Section 2.206, as they had been previously evaluated and resolved.

#### Comment 1:

The petitioners claim that the proposed DD mischaracterized the issue of slope stability of the concrete pad constructed in 2003, by stating that it was under review as an "unresolved item" during a dry cask storage inspection at the Palisades site in August 2004. The petitioners claim that, in fact, the licensee, NMC, had been cited for a violation of NRC regulations.

Response:

The comment provides no new information affecting the conclusion of the proposed DD; however, the statement will be clarified in the final DD. It is a fact that NRC designated the slope stability issue for the newer pad as an unresolved item in NRC inspection report IR 07200007/2004-002, dated September 3, 2004. The cover letter of that report indicates that the NRC did not identify any violations. The language in the DD will be revised to reflect the fact that the NRC designated this issue as an unresolved item in the inspection report, not during the on-site inspection.

Comment 2:

The petitioners cite an internal NRC memorandum, dated November 7, 2005, from E. Hackett, NRR, to M. Dapas, Region III, that discusses the licensing basis and the seismic analyses of the Palisades Nuclear Power Plant and the Palisades ISFSI pads. That memorandum reflects comments provided by NRC Region III on a previous draft memorandum, and provides the final responses of NRC headquarters staff in the Offices of Nuclear Reactor Regulation (NRR) and Nuclear Materials Safety and Safeguards (NMSS) to the initial questions and followup comments from NRC Region III staff.

In this comment, the petitioners suggest that the licensee intended to remove an overburden of sand prior to constructing the ISFSI pad(s) at their current location(s), and imply that any subsequent calculation of horizontal acceleration did not account for the presence of the compacted sand for the seismic analysis of the as-built pad(s). The petitioners claim that NRC maintains that the resulting calculated horizontal acceleration at the ISFSI pad(s), constructed on a layer of sand, would be the same as that calculated for the ground surface (on the underlying glacial till material). The petitioners cite NRC Information Notice (IN) 95-28, which states:

“The effects of a postulated earthquake based on the earthquake ground motion used for the plant design-basis SSE [safe shutdown earthquake] is valid for the storage casks without further analysis only if the foundation geology for the cask pad is the same as that for the plant. A different soil amplification resulting from SSE ground motion at the pad site could result in exceeding the cask design basis.”

The petitioners then postulate a scenario where an earthquake at Palisades could cause casks to tumble into Lake Michigan, breaching inner containment, exposing the fuel to lake water, causing moderation and criticality of the fuel, resulting in a catastrophic radiation release.

Response 2:

The cited memorandum provided recommendations from NRC headquarters staff (NRR and NMSS) to NRC Region III, on the unresolved item, URI 0720007/2004-002-01, which was closed in NRC Inspection Report 050000255/2006002, dated May 11, 2006. As noted above, this item raised in the petition was not accepted for review under 10 CFR 2.206, as it had been previously resolved.

Notwithstanding that fact, the key issue is not whether the licensee removed the sand layer from the ISFSI pad location, but whether they correctly analyzed the seismic behavior of the

pad considering the actual soil upon which it rests. The comment misstates the NRC's position on the correct method of calculating the resulting seismic horizontal acceleration at the Palisades ISFSI pad surface. In the cited memorandum, NRC concludes that a horizontal acceleration of 0.2g is associated with the safe shutdown earthquake (SSE) for the site, and that the SSE is anchored to the free ground surface. Thus, this is the "starting" value for calculating horizontal acceleration upon which an appropriate amplification factor is applied. NRC has determined that the licensee has correctly accounted for the amplification effects of the actual soil (compacted sand) underneath the Palisades ISFSI pad, and that the resulting horizontal acceleration at the pad surface (0.25g) was correctly calculated, which meets the requirement of the storage cask Certificate of Compliance. Therefore, the staff has concluded that the storage casks at Palisades can safely withstand the postulated seismic events for the site, and that the accident scenario raised in the comment is not credible.

#### Comment 3:

The petitioners assert that the weights of the ISFSI pad(s) and casks were not considered in slope stability calculations.

#### Response 3:

On page 5, the proposed Director's Decision states, "The licensee's revised evaluation appropriately considered the weight of the as-built pad, the weight of the heavier cask system, and the in-situ soil properties, in response to an earthquake. A similar statement appears in NRC Inspection Report 050000255/2006013, dated January 24, 2007, which discusses the licensee's revised slope stability analysis, dated October 19, 2006. The petitioners' assertion is incorrect.

#### Comment 4:

The petitioners question the "margin of safety," and point out that the licensee's calculation of the resulting horizontal acceleration of a spent fuel canister is 0.25g, the design limit for the storage cask system. The petitioners suggest that the casks are at the outer edge of safety, without a margin, reposing on slabs which rest on soils which at least partially fall below unity, based on calculations that did not account for the dead weight of either the casks or the slabs. The petitioners cite the NRC's 1994 Safety Assessment, implying that the "factor of safety" is below unity, not 1.15.

#### Response 4:

The comment is unclear as to whether the petitioners are concerned about the safety margin of the cask, or the factor of safety for the design of the supporting pad. NRC-approved spent fuel storage casks currently are analyzed and designed to withstand a 0.25g seismic horizontal acceleration without jeopardizing cask stability, i.e. sliding or overturning. This design limit has an inherent margin and as such, a system that meets this design limit is not "at the outer edge of safety."

Under NRC regulations, the licensee must evaluate the resulting seismic horizontal acceleration based on the particular site characteristics (SSE and any amplification factors) to confirm that the design limit of 0.25g is met and that the cask stored on the ISFSI pad will remain stable.

The NRC staff reviewed NMC's calculation for the soil-structure interaction, which shows that the maximum acceleration at the top of the pad does not exceed 0.25g, accounting for soil amplification effects. Therefore, the cask stability is maintained. With respect to slope stability, NMC calculation (Doc) No. EA-EC7408-02, Revision 0, "Re-evaluation of Slope Stability under ISFSI Pad for Revised Load Due to 24PTH System," showed that the minimum factor of safety against slope instability is 1.15, for all locations beneath and in the vicinity of the pad, which is in compliance with the accepted commercial standards and practices, and conforms with the NRC Standard Review Plan, NUREG-0800.

"Liquefaction potential" has to do with identifying soil conditions (properties) that would tend to liquefy, or lose stability, during seismic ground motion excitation. NMC calculations reviewed by the staff presented the results of the investigation of liquefaction potential for the soil under the pad, and showed that the potential for liquefaction does not exist for that soil, following the soil densification. The laboratory tests performed on the samples taken from the actual compacted sand at the location of the ISFSI pad, indicated no liquefaction potential for these soils. Therefore, based on a review of NMC calculations, the staff has concluded that both cask stability and slope stability are ensured for the design basis seismic event at the Palisades site.

The dead weights of the pad and casks were considered in the calculations, as discussed in the response to Comment number 3 above. The 1994 Safety Assessment addresses the older ISFSI pad, which is outside the scope of the issue accepted for review under this 10 CFR 2.206 petition. Nevertheless, in that assessment, the staff concluded that the location of the storage pad at the Palisades site was acceptable to support the concrete storage casks against all effects of the design basis earthquake for the site.

In the "Conclusions" section of petitioners' comments, the petitioners make several assertions that fail to relate to the actions requested in their petition. They mention the New Madrid earthquake of 1811-1812, but provide no basis for why that earthquake should be considered for the Palisades site. Similarly, they suggest that there is an incrementally increasing potential for a moderate or severe earthquake near Palisades, without any supporting information. The staff has considered these comments and determined that they do not warrant any changes to the proposed Director's Decision.

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