September 16, 1998

MEMORANDUM TO: File

FROM: Ronald B. Eaton, Senior Project Manager
Project Directorate I-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Original signed by

SUBJECT: CORRESPONDENCE FROM GPU NUCLEAR, INC., PROVIDING THE QUESTIONS ASKED BY THE NRC STAFF AND THE ANSWERS FROM THE LICENSEE WITH RESPECT TO THEIR SUBMITTAL TO INSTALL CORE SUPPORT PLATE WEDGES DURING REFUELING OUTAGE 17

Please place the attached subject correspondence received on September 14, 1998, in Docket file 50-219.

Docket No. 50-219

Attachment: Questions and Answers

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Drawings located in Central files

1. Page 3-2 Section 3.3 of the MPR-1957 report states that the wedge jack bolt is used to raise and engage the locking arm of the wedge on the existing shield angle. Shield angles are existing structural angles that are welded to the inside of the shroud to support shield plates at each recirculation line nozzle. From the picture in the submittal, it wasn't clear to me how it is being used. Also, is the shield angle inspected to ensure that it can support the wedge? Is it being used in such a manner that we should be concerned with the wedges not staying in place if they rely on the shield angles for support?

Response:

The wedges will rely on the shield angles for stability however they will not impose significant loads on the angles that might challenge the integrity of the angles or attachment welds.

The shield angles are 12 inches in length and are attached to the shroud with continuous ¼ inch fillet welds on each side. The shield angles provide lateral support for five shield plates; each shield plate is supported by two angles (one at each end). The shield plate itself rests on the core plate (approx. weight of 500 lbs.). Design loads and stresses in the shield angles and welds are low since the only applied load is due to seismic.

During installation of the proposed core plate wedges, a support arm on each wedge will be raised to engage on the bottom of a shield angle. The arm is raised via a 5/8 inch screw, which is torqued to 40±10 in-lbs. The additional load applied to the shield angle and attachment weld from this operation is estimated to be less than 0.4 kips (with an assumed coefficient of friction of 0.2). This is a non-equilibrium (secondary) load, and is not a design reliant feature for the wedges (i.e., the wedges do not need to have any type of installed preload on the shield angles only engagement of the support arm under the shield angle). The calculated weld stress due to this applied load is about 100 psi, which will not have an adverse affect on the structural integrity of the angles or attachment welds.

In addition, GPU Nuclear plans to inspect the accessible areas of the shield angles and their attachment welds (VT-1) prior to the installation of the wedges. These inspections will ensure the integrity of the shield angles and their attachment welds.

2. There are ten tie-rods already installed. Where are the 8 wedges going to be installed in comparison to the tie-rod location? I know the tie-rods are in between the shroud and the vessel, and the wedges are going to be installed between the core plate and the shroud, but are some of the wedges at the same azimuthal location as the tie rods? Provide a more detailed illustration on the proposed wedge installation. This should include the location of the wedges relative to the shroud welds and installed tie-rods and location of the core plate bolts.

Response:

Sketches and drawings previously Fed Ex'ed.

3. Page 6-1 of MPR-1957 states that "the results of these seismic analyses in Table 5-2 show that the maximum calculated fuel/core plate displacement is 0.529 inch which is less than the allowable displacement of 0.75 inch. Also note that the permanent core plate lateral displacement is essentially equal to the seismic bumper clearance of 0.375 inch. Note that the permanent displacement of 0.375 inch is concluded to be acceptable in Section 2.3 of Reference 17." Reference 17 is the NRC SER on the shroud repair dated November 25, 1994. In our SER we concluded that permanent shroud displacement of .375 inch will not significantly affect cooling of the core since the shroud is 1.5 inches thick and the cylindrical section of the shroud will remain overlapped. According to the GE test document which the 0.75 inch displacement (cited above) is based, the allowable permanent displacement for normal and upset conditions is 0.33 inch.

Response:

As discussed in the NRC's Safety Evaluation Report dated November 25, 1994, the shroud repair's lateral restraints (bumpers) limit the total lateral displacement of the reactor fuel lateral support structures (the core plate and the top guide) and the shroud cylinders. For the core plate, an allowable permanent displacement of 0.75 inch was determined from the results of control rod scram tests documented in Report NEDC-32406 (see Section 2.3, pages 5 and 6 of the NRC's SER). The shroud repair lateral restraints, with a total clearance of 0.375 inch between the shroud and reactor vessel, combined with the proposed wedge installation limit the core plate lateral displacement to one-half the allowable permanent displacement (safety factor of 2.0). The allowable displacement given in GENE-771-44-0894 (Rev. 1) of 0.33 inch is based on a safety factor of 2.25. There is no requirement in the Oyster Creek design basis to utilize a specific safety factor. The safety factor of 2.0 provided in the shroud repair is considered by GPU Nuclear and was concluded in the NRC's SER to be acceptable. Also, the 0.375 inch shroud repair clearance combined with the proposed wedge installation limits the shroud lateral displacement to less than 50 percent of the shroud thickness. This ensures that the proposed configuration will perform the design basis functions discussed in Section 2.4 (page 9) of the NRC's SER.

4. Page 6-2 of MPR-1957 states that "the maximum leakage path flow area through a fully-cracked vertical weld in the H5/H6A shroud segment during normal operating conditions is 0.495 in^2. (Reference 16)." The total leakage due to this length is 30 gpm. However, Reference 16, MPR calc 083-248-CBS-01, states in the summary of results that "the maximum leakage path flow area through a fully-cracked vertical weld in the H5/H6A shroud segment during normal operating conditions is 4.67 in^2. This flow area will be used elsewhere to evaluate the effect of reactor coolant flow tha bypasses the core through the cracked vertical weld." Then again, Appendix B of Reference 16, calculates the maximum leakage path flow area and its result is 0.495 in^2. So two places in the same calc give different results. This is my concern; I don't know which is the right number and whether the leakage that was reported in MPR-1957 is correct.

Response:

MPR Calculation 083-248-CBS-01, Rev.1, has been revised to correct the typographical error. Three Revision 2 pages follow.