March 22, 1993

Docket No. 50-320

Dr. Robert L. Long
Director Corporate Services/
Director, TMI-2
GPU Nuclear Corporation
P. O. Box 480
Middletown, Pennsylvania 17057-0191

Dear Dr. Long:

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION ON THE TMI-2 REACTOR VESSEL FUEL SURVEY AND CRITICALITY REPORTS (TACS M85664 AND M71455)

During our continuing review of the Three Mile Island Nuclear Station Unit 2 (TMI-2) reactor vessel special nuclear material accountability report, dated February 1, 1993, and your reactor vessel criticality safety analysis, dated December 18, 1992, we have determined that additional information or further clarification is required. We request that you respond to the questions contained in the enclosure. Since our review must be completed prior to issuance of the TMI-2 possession only license, we request that we receive the responses within 45 days of receipt of this letter. The NRC staff technical point of contact on this request is Mr. L. Thonus at the TMI site.

The reporting and/or recordkeeping requirements contained in this letter affect fewer than 10 respondents, therefore, OMB clearance is not required under P.L. 96-511.

Sincerely,
original signed by:
Michael T. Masnik, Senior Project Manager
Non-Power Reactors and Decommissioning
Project Directorate
Division of Operating Reactor Support
Office of Nuclear Reactor Regulation

Enclosure:
As stated

cc w/enclosure:
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

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Non-Power Reactors and Decommissioning
Project Directorate
Division of Operating Reactor Support
Office of Nuclear Reactor Regulation

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cc w/enclosure:
See next page

Dr. R. L. Long
GPU Nuclear Corporation Unit No. 2

Three Mile Island Nuclear Station
Docket No. 50-320

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

REQUEST FOR ADDITIONAL INFORMATION OR CLARIFICATION

CONCERNING THE TMI-2 REACTOR VESSEL CRITICALITY SAFETY ANALYSIS

AND THE REACTOR VESSEL SNM ACCOUNTABILITY STUDY

1. Criticality Study Dated December 18, 1992:

a. The study stated that the fissile material used in the study included uranium with 2.67 weight percent U-235. Did the study also consider PU, since the fuel had experienced burnup?

b. The section of the study that dealt with an accidental criticality stated that the fuel available for such a criticality is loose fuel that can be relocated from each reactor vessel zone. The study listed the quantity that would be loose in each zone, but did not explain the methodology by which the value was determined. Additional information is required on how these quantities were determined. Our particular concern is Zone 9, the bottom head region where the criticality is most likely to occur. Only 59 Kg of fuel is assumed to be loose out of 95 kg assumed to be present in this zone. How was this value determined, and what is the justification for considering the remaining 36 Kg as "neutronically decoupled" from the postulated pile of relocated loose fuel?

2. Reactor Vessel PDSR Dated 1 February 1993:

a. In the review performed by the "Rasmussen Committee", several biases were ascribed to the passive neutron measurement study. Two of these biases, boron variations and UO_2 particle size, were attributed to zones 1 through 5 only. The Committee reasoned that the biases were restricted to these five zones based on the nature of the fuel melting during the accident. A substantial amount of work has occurred inside the reactor since the accident possibly causing a considerable amount of fuel relocation. Provide a justification for the limitation of the biases to Zones 1 through 5 that is consistent with what is known about the distribution of fuel debris inside the reactor vessel.

b. The passive neutron study included computer calculations that modeled fuel at positions near the detector and farther from the detector, averaging the two values to arrive at a best estimate. How were the "close" and "far" positions chosen? Was the average of close and far taken as half the distance, or was a more likely "most probable" distance chosen for the averaging?

c. One of the identified biases was inscattering of neutrons (20 percent). If an inscattering effect occurred, it should be partially accounted for by measurement of neutrons emitted by the calibration source that was lowered near the detector. Explain the justification for assuming that this bias was not accounted for by the use of the neutron source.

d. In the passive neutron measurement study, was the contribution of neutrons that were emitted by fuel below the waterline considered by the analysis? If so how?

e. Provide additional detail concerning the nine fuel samples that were measured to determine the neutron emission rate (these samples are now stored at INEL). The masses of uranium in these samples are listed in Table 3 of Calculation Sheet 4249-3211-91-006, Rev No. 1 (sheet No. 17 of 30). Provide any available reports that document these fuel masses, and any other documentation available about the nature of these samples, especially the physical form (large lumps versus powder), and the inclusion of impurities such as steel or boron.