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November 8, 1985

NRC/TMI-85-086

Docket No. 50-320

Mr. F. R. Standerfer  
 Vice President/Director, TMI-2  
 GPU Nuclear Corporation  
 P. O. Box 480  
 Middletown, PA 17057

Dear Mr. Standerfer:

Subject: Resolution of Quality Assurance Issues Relating to Use of  
 Defueling Canisters

In my letter of November 5, 1985 (reference 1) the Nuclear Regulatory Commission (NRC) staff approved General Public Utilities Nuclear Corporation's (GPUN) design of canisters proposed for use during defueling. This letter is provided to document our review and to grant approval for the use of the initial four defueling filter canisters (F401 - 404). Additionally, with the provision that GPUN complies with the requirements set forth in this letter, we are granting approval for use of the remaining defueling canisters.

An NRC inspection at the Nuclear Energy Services (NES) Manufacturing facility in Greensboro, North Carolina, identified numerous deficiencies in the implementation of the Quality Assurance (QA) program applicable to the fabrication of defueling canisters for the TMI-2 project. Audits and surveillances by GPU Nuclear and Bechtel personnel at NES both prior to and after the NRC inspection identified similar deficiencies. These QA program deficiencies have raised questions on the conformance of NES fabricated canisters with the design specifications. For the first four filter canisters received from NES GPUN/Bechtel implemented an extensive QA review program to verify that the canister's as-built critical attributes met the design specification. References 2, 3, and 4 describe the verification program and its results in detail. Based on a review of those references, discussions with your staff, and an independent NRC inspection of selected portions of the document package associated with the subject canisters, we concluded that the QA issues relating to the use of these canisters have been satisfactorily resolved. Most of the issues involved poor record keeping and inattention to detail by NES, but had only minor safety significance when examined individually. However, we determined that there were four potentially significant issues (viz. material receipt inspection, upper head material traceability, catalyst loading traceability and poison loading traceability), that hold a potential for unacceptable operational risk. These issues required more extensive review and evaluation including direct inspections by the NRC staff. The attachment to this letter discusses these four potential safety significant issues, the safety implications of each, and the resolution determined acceptable to the NRC staff.

Based on the evaluations discussed in the attachment, the NRC staff has determined there is reasonable assurance that defueling filter canisters F-401, F-402, F-403, and F-404 have been constructed so they can

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safely perform their intended functions. The NRC staff has determined that use of these canisters will not pose a significant risk to the health and safety of the workers or the public. We therefore approve the use of these four filter canisters for their intended defueling functions.

With regard to the adequacy of other defueling canisters fabricated by NES, the NRC staff understands that GPUH plans to evaluate, based on vendor performance and/or detailed QA reviews, the need for continuing their augmented QA review program. The staff concurs in this approach and will continue to monitor its effectiveness in assuring that canisters meet their design specifications.

With the following provisions the staff approves the use of defueling canisters provided to GPUH by its vendors.

- (1) Submittal to NRC of independent verification of catalyst loading in both upper and lower heads of all defueling canisters.
- (2) Submittal to NRC of independent verification of all poison (B<sub>2</sub>C) tube loading and installation for all filter and knockout canisters.
- (3) Completion of action items and commitments established in reference 5.
- (4) Notification to NRC of any planned reduction of your augmented QA review program for NES supplied canisters.

If you have any questions, please call me.

Sincerely,

ORIGINAL SIGNED BY:  
William D. Travers

William D. Travers  
Acting Director  
Three Mile Island Program Office

Enclosure: As stated

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#### REFERENCES

1. Letter NRC/TMI 85-083, W. Travers to F. Standerfer, dated November 5, 1985, Defueling Canister Technical Evaluation Report.
2. Letter 4410-85-L-0202, F. Standerfer to B. Snyder, dated October 10, 1985, Summary of GPU Nuclear/Bechtel Quality Assurance Surveillance Program for the First Four Filter Canisters, with attachments.
3. Letter 4410-85-L-0210, F. Standerfer to W. Travers, dated October 28, 1985, Resolution of Quality Assurance Issues Relating to the Defueling Canisters, with attachments.
4. Letter 4410-85-L-0219, F. Standerfer to W. Travers, dated November 4, 1985, Canister Checklist Revision 3, with attachments.
5. Letter 4410-85-L-206, F. Standerfer to B. Snyder, dated October 23, 1985, Early Defueling Safety Evaluation Report Response to Comments.
6. Letter 4410-85-L-0221, F. Standerfer to W. Travers, dated November 4, 1985, GPU Nuclear Quality Assurance Acceptance of First Four Filter Canisters.
7. NRC letter from G. Zech to F. Sugar, Nuclear Energy Services, dated July 26, 1985, transmitting Inspection Report 99901018/85-01.
8. Nuclear Energy Services letter from F. Sugar to G. Zech, NRC, dated August 25, 1985, Response to NRC Inspection Report 99901018/85-01.
9. NRC letter from G. Zech to F. Sugar, Nuclear Energy Services, dated October 15, 1985, Regarding Response to Inspection Report 99901018/85-01.
10. Safety Analysis Report for the NUPAC 125-B Fuel Shipping Cask, Docket Number 71-9200, Revision 1, dated October 31, 1985.



## ATTACHMENT

### **Resolution of Potential Safety Issues Pertaining to Defueling Canisters F-401, F-402, F-403, and F-404**

The following is a discussion of four potentially significant quality assurance issues pertaining to defueling filter canisters, serial numbers F-401, F-402, F-403, and F-404, fabricated by NES Manufacturing. Based on review of the results of an NRC inspection and the findings of licensee audits of the fabrication facility (references 7, 8, and 9), these four issues are those considered by the NRC staff to have the greatest potential for influencing the safety performance of the defueling canisters. Included is a discussion of the safety implications and the staff's basis for accepting the resolution of each issue.

#### **I. MATERIAL RECEIPT INSPECTION**

The vendor's material receipt inspection program was determined not to be adequately implemented in that complete records of inspections were not always maintained and that dimensional checks of some components may not have been performed. In addition, the NRC inspection team found that Certified Material Test Reports (CMTR) or Certificates of Compliance (C of C) were unavailable for some material.

The safety implication of this issue is that failure to assure that canister components meet design dimensional specifications could affect proper component fit up during fabrication. This could conceivably result in deviations from the design that was evaluated during extensive structural analysis done to predict the canisters response to external loads applied during postulated accidents. Failure to meet the design material specifications could have negative affects on the canisters structural integrity. It could further affect the canister's integrity during long-term storage in a pool of water.

Based on our review of the information presented in the referenced documents and discussions with GPU Nuclear and Bechtel staff, the staff has determined that there is reasonable assurance that the material used in the fabrication of the four subject filter canisters meets the required specifications.

Review of records by a GPUN/Bechtel team at the vendor's site, as well as further review by the vendor, determined that material not inspected by the vendor had been examined at its source by Bechtel QA personnel. This material had been purchased by Bechtel and shipped directly to NES for installation in the canisters. The inspection team verified that all missing CMTR's and C of C's applicable to the first four filter canisters had been located by NES and that NES personnel had reviewed them to assure the material's conformance to design specifications. The team verified through review of shop travellers and interviews with NES personnel that there had been an adequate level of NES quality control (QC) review to assure proper component fit up during fabrication to assure that the canister's as built dimensions met the design

tolerances. The staff performed an inspection on select documents and verified that the followup activities were appropriate and completed.

## II. UPPER HEAD MATERIAL TRACEABILITY

Traceability to a heat number was not maintained on the material used for fabrication of the canister upper heads.

The safety significance of this issue is similar to that discussed above, in that failure to assure that the materials used in fabrication of the canister's pressure retaining boundary meet the design specifications could affect the overall structural integrity and degrade the performance of the canister during both normal and postulated accident conditions.

The licensee has provided the NRC staff with additional information that provides reasonable assurance that the upper heads for the four subject filter canisters were fabricated from material meeting the design specifications.

The licensee's review of the fabrication process at NES determined that heat numbers had been stamped on the "slugs" delivered to NES for manufacture of the upper heads. These slugs were sent by NES to a subcontractor who performed the final machining. The subcontractor maintained traceability of the material throughout the machining process and stamped the heat numbers on the inside surface of the finished heads. These were returned to NES where QA receipt inspections verified the presence of the heat numbers. After installation of the heads, the heat numbers were no longer visible, therefore, an individual canister head cannot be traced back to a specific heat number. However, review of records by GPUN/Bechtel personnel verified that suitable documentation exists to assure that a given canister head was built from material from one of a group of heat numbers. Certified Material Test Reports exist for all heats from which a head could have been made. The staff finding agrees with this determination and this provides reasonable assurance that the material used is in conformance with the design specification.

## III. NEUTRON ABSORBER MATERIAL TRACEABILITY

Neutron absorber material (poison) traceability was not maintained and unapproved procedures were used for poison loading.

Neutron absorber material is installed in the filter canisters to assure that the canisters and their contents remain subcritical under all postulated normal and accident conditions during onsite handling and storage and during transportation.

Based on a review of the documents provided by GPU Nuclear, the NRC staff has determined that there is reasonable assurance that the  $B_4C$  pellets supplied by

Advanced Refractory Technologies, Inc. to NES meet all design specifications. However, the documentation submitted previously had not established an acceptable level of confidence that the B<sub>4</sub>C pellets were installed in the filter canisters poison rod assemblies or that the properly filled assemblies were inserted into the filter canisters. Multiple poison rod assemblies were filled with B<sub>4</sub>C under a single shop traveller and assemblies were installed in all four canisters under a single shop traveller. The travellers did not have multiple signatures indicating that the required procedural steps had been performed or verified by QC personnel for each assembly. Because of the identified inadequacies in the implementation of the vendor's QA program, the travellers used for this process do not provide acceptable documentary evidence. The licensee has stated that the requirement for the Bechtel Supplier Quality Representative (SQR) to witness the installation of the poison rods into the filter canisters was bypassed for these four canisters. However, radiographic examinations were performed by NES to verify the presence of the poison pellets.

The staff has reviewed results of these radiographic examinations and determined this provides adequate assurance that the poison pellets were installed. Additionally the staff has performed an independent review of the filter canister criticality analysis. This analysis, which is part of the licensing review of the NUPAC-125B fuel shipping cask (reference 10) was performed to determine effects from transportation accidents. This analysis determined that for the worst case deformed canister geometry, a single filter canister and an array of canisters would still have greater than a five percent shutdown margin even if the poison material was removed and the space filled with the optimal ratio of fuel and water.

Based on our review, the staff concludes that reasonable assurance exist that the filter canisters and their contents will remain subcritical under all postulated normal and accident conditions.

#### IV. CATALYST MATERIAL LOADING

Review of the vendor's implementation of their QA program raised questions regarding assurance that adequate catalyst quantities were installed in canisters.

Failure of the catalytic recombiners to perform as designed could result in the formation of combustible gas mixture inside a canister due to radiolytic decomposition of residual water.

The NRC staff has determined that the information submitted in the licensee's letter 4410-85-L-0210 (reference 3) to the NRC provides reasonable assurance that the catalytic recombiners have been installed in the four filter canisters. Attachment 1 to that letter stated, "The Bechtel SQR, [Supplier Quality Representative], visually verified the presence of both types of

catalyst in 100% of the bottom heads and upper heads prior to screen installation." Since the design of the recombiner elements are such that the required amount of catalyst (25 grams in each lower head element and 50 grams in each upper head element) will nearly fill the element cartridge, visual verification of its presence would readily detect the loss of a significant amount of catalyst material. Additionally, there is significant conservatism in the design of the recombiner elements. The staff's assessment of this conservatism was documented in the Canister TER approval. Based on the above there is reasonable assurance that sufficient catalyst material has been installed in each element to perform the intended function.

Based on our review of all supporting information and our direct inspections, the staff has determined that the resolution of these issues is acceptable and that there is reasonable assurance that filter canisters F-401, F-402, F-403, and F-404 can be used for their intended purpose without jeopardizing the public health and safety.



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