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November 30, 1983
4410-83-L-0277

TMI Program Office
Attn: Mr. L. H. Barrett
Deputy Program Director
US Nuclear Regulatory Commission
c/o Three Mile Island Nuclear Station
Middletown, PA 17057

Dear Sir:

Three Mile Island Nuclear Station, Unit 2 (TMI-2)
Operating License No. DPR-73
Docket No. 50-320
Make Up and Purification Demineralizer Resin Sampling

Attached for your use and information is an addendum to the "Safety Evaluation for Sampling Resins in Make Up and Purification Demineralizers". The original safety evaluation was submitted to you via GPUNC Letter 4410-83-L-0043 dated February 15, 1983. The addendum, like the original evaluation, is being provided to you to facilitate your review of the sampling procedures.

As you are aware, in the demineralizer sampling activities GPUNC obtained samples of the dry "A" demineralizer resins and of the wet resins in the "B" demineralizer. However, sufficient resin was not recovered from the "A" demineralizer to allow performance of desired analyses and tests. As a result, GPUNC is preparing to obtain additional samples of the "A" demineralizer's resin. The sampling evolution to be used differs in some aspects from that used originally. Accordingly, the safety evaluation has been amended to account for the modified sampling evolution.

As before, the sampling evolution will be accomplished utilizing procedures approved pursuant to Technical Specifications and appropriate radiological procedures and Radiation Work Permits.

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If you have any questions, please feel free to contact Mr. J. J. Byrne of my staff.

Sincerely,

B. K. Kanga
Director, TMI-2

BKK/SDC/jep

Attachment

CC: Dr. B. J. Snyder, Program Director - TMI Program Office

ADDENDUM TO SAFETY EVALUATION REPORT FOR SAMPLING RESINS IN MAKE-UP AND PURIFICATION DEMINERALIZERS

Purpose

The purpose of this Addendum is to update the SER transmitted on February 25, 1983, addressing Sampling Resins in Make-Up and Purification Demineralizers. The resin sampling which was addressed in that SER was performed during early 1983 and resulted in the successful acquisition of a sample from the "B" Demineralizer. Sampling of the "A" Demineralizer, however, provided insufficient material to perform the planned characterization of the resin sample by analyses and by subjecting the resins to an elution and sluicability testing program. Subsequently, scientists at the Oak Ridge National Laboratory (ORNL) under sponsorship of the US Department of Energy (DOE), requested additional samples of the "A" Demineralizer to allow characterization studies which were successfully performed on the "B" Demineralizer to be duplicated for the "A" Demineralizer.

GPUNC internal reviews of the techniques employed and conditions encountered led to the determination that the problems encountered in obtaining an adequate sample were not related to the technique employed in sample acquisition, but were related to the difference in conditions within the demineralizers. The "B" Demineralizers, from which a successful sample was obtained, was found to be partially filled with water, whereas the "A" Demineralizer was found to be dry and to contain an encrusted layer of material which is believed to be boron. This encrustment and dry condition allowed only small amounts of resin materials to be acquired. Analysis of this sample and ongoing gas sampling have not substantially altered opinions as to the conditions and contents of the "A" Demineralizer as described in the original SER. Based on the successful acquisition of a sample from the "B" Demineralizer, a determination was made to partially fill the "A" Demineralizer with water in an attempt to duplicate the favorable conditions encountered in the "B" Demineralizer. Furthermore, a

nitrogen sparge evolution would be added as a means of mechanically agitating the resin bed, thus enhancing the ability to dissolve the boron crust and homogenize the bed. This will result in a more representative sample of the bed contents.

The sampling will be accomplished as previously described utilizing the equipment procedures and sampling devices used successfully in the acquisition of the sample from the "B" Demineralizer. Conditions in the Hays Gas Room also remain substantially identical to those described in the original safety evaluation.

A. Fuel Analyses

Fuel quantities based on three independent measurements of the fuel content were discussed in the original SER. Subsequently, Oak Ridge National Laboratory performed analytical chemistry on samples from both the "A" and "B" Demineralizers in May and June of 1983. These results were reported in a letter to EG&G in June. The results of this analysis in general support the earlier fuel estimates. These results are summarized below as well as actual sample results from the initial sampling evolution.

	FUEL CONTENT (UO_2)	
NDA TECHNIQUE	DEMINERALIZER "A"	DEMINERALIZER "B"
Si (Li)	1.3 $\pm$ 0.6 kg	
SSTR	1.7 $\pm$ 0.6 kg	
Be (γ,n)	11 $\pm$ 6 kg	3.9 $\pm$ 1.5 kg
Sample Analysis	.13 kg	.18 kg

The sample analysis,which may not be a fully representative sample, does however support the conclusion that the former techniques were extremely conservative and that no criticality concerns exist.

B. Present Demineralizer Condition

Conditions within the "A" Demineralizer have remained essentially identical to

that described in the earlier SER. The sample acquisition attempt will modify those conditions by adding water to the "A" Demineralizer. The results of the ORNL sample analysis were used to calculate the expected Hydrogen generation rate. The result of those calculations indicate that hydrogen gas generation will be no greater than 0.25 liters per day. This is less than the 0.96 liters reported in the earlier SER. Thus, the pressure increase will be less than 3 psi increase indicated. All other conditions remain as reported earlier.

C. Containment During Sampling

The mechanical sampling method discussed in the original SER will be the technique employed to acquire the sample from the "A" Demineralizer. The experience gained in acquiring a sample from the "B" Demineralizer should allow a better estimate of dose rate. Using the data from the ORNL analytical results on the "A" Demineralizer resin sample solids, a specific activity can be extrapolated in the "A" liquid by assuming the ratios to be the same for liquid to solid activity in both the "A" and "B" Demineralizers.

The "B" Demineralizer analytical results were:

*B2 Liquid		*B2 Solid	
^{134}Cs	101 μ Ci/g	1130 μ Ci/g	
^{137}Cs	1480 μ Ci/g	16900 μ Ci/g	
^{90}Sr	9 μ Ci/g	880 μ Ci/g	*B2 refers to second B sample.
	1590 μ Ci/g	18910 μ Ci/g	

"A" Solid

^{134}Cs	15 μCi/g
^{137}Cs	220 μCi/g
^{90}Sr	200 μCi/g
	435 μCi/g

Using the same ratio of liquid to solid specific activity, we would expect the "A" liquid to be:

"A" Liquid (extrapolated)	
^{134}Cs	2 μCi/g
^{137}Cs	20 μCi/g
^{90}Sr	2 μCi/g
	24 μCi/g

With a 100 gram sample limit, the expected dose rates on the sample bottle shield are 90 mr/hr.

Summary

Evaluations and analytical chemistry performed on the resin samples, venting and sampling of trapped gases, leak checking and experience gained in previous resin sample acquisitions assure minimum exposure to personnel. Previous experience and evaluation have assured that a release pathway has been eliminated.