

Distribution: Docket 50-302
 DCS
 PDR
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 RWell
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August 2, 1982

Mr. Bob Flournoy
 Nuclear Support Services
 8208 Blairton Road
 Springfield, VA 22152

Dear Mr. Flournoy:

SUBJECT: CONCENTRATIONS OF TRANSURANICS ON SDS AND EPICORE-II RESINS

This letter is in response to a telephone conversation on July 19, 1982, with you. In that conversation your requested information about transuranic (TRU) deposits on zeolite and organic resins resulting from waste water processing at TMI-2. It should be noted that organic resins were used primarily during the processing of auxiliary building water. The licensee estimates that of the forty-nine (49) prefilter resin liners generated during processing of auxiliary building water, five (5) have greater than 100 nCi/gm of TRU contamination, fifteen (15) greater than 10 nCi/gm, and the remainder less than 10 nCi/gm. However, due to the unique loadings of cesium and strontium on these liners, they will be transferred to DOE for storage and disposal regardless of the level of TRU contamination.

All of the liners used with the EPICOR system to polish reactor building sump water have concentrations less than 10 nCi/gm and are being disposed of in commercial disposal sites. Based on analyses of waste water samples, most of the TRU materials have tended to remain in the sludge. For your information and use, you will find attached copies of sample results from the sump water/sludge, the RCS, and the reactor coolant bleed tanks prior to processing. The amount of sludge in the reactor building sump and in various tanks is not known at this time. During SDS processing the licensee sampled for gross alpha concentration downstream of the final filter and at the inlet and outlet of each resin bed. The reported values were at LLD levels.

If you have any other questions, forward them to Larry Bell of my staff on 492-7441.

Sincerely,

Bernard J. Snyder, Program Director
 TMI Program Office
 Office of Nuclear Reactor Regulation

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 PDR ADOCK 05000320
 P PDR

Enclosure: As stated

OFFICE	TMIP0:NRR	TMIP0:NRR	TMIP0:NRR			
SURNAME	LBellamy	RWell	BJSnyder			
DATE	8/2/82	8/2/82	8/2/82			

ABSTRACT

Two liquid samples from the Three Mile Island Unit 2 (TMI-2) Reactor Coolant System (RCS) and three liquid samples from the three Reactor Coolant Bleed Tanks (RCBT) were taken during the time period March 29, 1979 to August 14, 1980. The samples were analyzed for radionuclide concentrations by two independent laboratories, Exxon Nuclear Idaho Co., Inc. (ENICO) and EG&G Idaho, Inc. at the Idaho National Engineering Laboratory (INEL). The RCS sample taken on March 29, 1979 was also analyzed by Science Applications, Inc. (SAI). This report presents the methods used and the results of these analyses.

Tables 1-5 contain the measurement data for the solids associated with the five samples from TMI Unit 2. Table 1 presents the total solids and the particle size distributions for the five samples. Table 2 lists the XRD measurements to determine the presence of crystalline compounds and the DCES measurements of the cation (elemental) content of the samples. Tables 3, 4, and 5 show results of the gamma-ray spectrometry and of the beta and alpha isotopic measurements. In all cases noted, uncertainties are at a one-sigma confidence level.

TABLE 1. TMI-2 RCS AND RCBT FILTER SAMPLE VOLUMES: TOTAL SOLIDS AND PARTICLE SIZE DISTRIBUTIONS

Sample	Filtered Sample Volumes (ml)	Total Solids (mg)	Particle Size Distribution		
			>5 μ (mg)	1.2-5 μ (mg)	0.45-1.2 μ (mg)
RCS-1	63	4.3	2.1	0.9	1.3
RCS-2	74	9.5	0	1.4	8.1
RCBT-A	78	12.2	3.2	6.4	2.6
RCBT-B	78	12.3	4.7	5.0	2.6
RCBT-C	78	20.7	8.4	5.6	6.7

TABLE 2. TMI-2 RCS AND RCBT SOLID SAMPLE ANALYSES: X-RAY DIFFRACTION AND DIRECT CURRENT EMISSION SPECTROMETRY MEASUREMENTS
(M = major [$\geq 5\%$]; m = minor [$< 5\%$ $> 0.1\%$]; T = trace [$< 0.1\%$]; A = amorphous; -- = not detected)

Sample	Particle Size (μ)	XRD Analysis ^a	Elemental Analysis by Direct Current Arc Emission Spectroscopy (wt%)													
			Ag	Al	Ca	Cr	Cu	Fe	In	Mg	Mn	Na	Ni	Si	Sn	Zr
RCS-1	5	Fe ₃ O ₄ ^b	T	--	--	m	--	M	m	--	m	--	m	--	m	m
RCS-1	1.2	A	--	m	m	--	--	M	--	m	--	m	--	m	--	--
RCS-1	0.45	A	--	--	m	m	T	M	--	m	m	--	--	m	--	m
RCS-2	1.2	A	--	T	T	--	T	M	--	m	m	--	--	m	--	--
RCBT-A	5	A	--	T	--	--	--	M	--	--	m	--	--	--	--	m
RCTB-B	5	A	--	m	m	--	T	M	--	T	m	--	--	m	--	--
RCBT-B	1.2	A	--	--	--	--	--	M	--	T	--	--	--	m	--	--
RCBT-C	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RCBT-C	1.2	A	--	m	--	--	--	M	--	m	--	--	--	M	--	--

a. There was insufficient sample on the other filter samples for XRD and DCES analysis.

b. In₂O₃, Ag₂O, and ZrO₂ were possibly present.

TABLE 3. TMI-2 RCS AND RCBT SOLID SAMPLE ANALYSIS: GAMMA-RAY SPECTROMETRY MEASUREMENTS
 ($\mu\text{Ci/ml}$ of filtered solution corrected to T_0)

Sample	^{134}Cs	^{137}Cs	^{144}Ce	^{60}Co	^{125}Sb	^{106}Ru	^{54}Mn
RCS-1	$3.32 \pm 0.03\text{E-1}$	1.212 ± 0.005	$1.834 \pm 0.005\text{E-1}$	$2.0 \pm 0.2\text{E-3}$	$2.4 \pm 0.5\text{E-2}$	$7 \pm 1\text{E-2}$	--
RCS-2	$1.08 \pm 0.03\text{E-2}$	$4.94 \pm 0.04\text{E-2}$	$5.760 \pm 0.005\text{E-2}$	$7 \pm 1\text{E-5}$	--	--	$4 \pm 1\text{E-4}$
RCBT-A	$1.10 \pm 0.08\text{E-1}$	$5.06 \pm 0.01\text{E-1}$	$1.5 \pm 0.2\text{E-2}$				
RCBT-B	$9.05 \pm 0.07\text{E-2}$	$4.52 \pm 0.02\text{E-1}$	$5.6 \pm 0.8\text{E-4}$				
RCBT-C	$1.64 \pm 0.03\text{E-2}$	$7.56 \pm 0.05\text{E-2}$	$1.47 \pm 0.03\text{E-3}$	$4.6 \pm 0.8\text{E-5}$	--	--	--

TABLE 4. TMI-2 RCS AND RCBT SOLID SAMPLE ANALYSIS: BETA ISOTOPIC MEASUREMENTS ($\mu\text{Ci/ml}$ of filtered solution corrected to T_0)

Sample	^{90}Sr	^{89}Sr	^{91}Y	^{55}Fe	^{64}Ni
RCS-1	$9.4 \pm 0.9\text{E-}3$	<10	<2E-3	$1.0 \pm 0.1\text{E-}2$	$3.1 \pm 0.3\text{E-}6$
RCS-2	$3.8 \pm 0.3\text{E-}1$	<9	<7E-5	$1.2 \pm 0.1\text{E-}3$	$8.2 \pm 0.8\text{E-}7$
RCBT-A	$2.0 \pm 0.1\text{E-}1$	<2E-1	<9E-6	$2.1 \pm 0.2\text{E-}4$	$1.0 \pm 0.1\text{E-}6$
RCBT-B	$4.4 \pm 0.6\text{E-}2$	<5E-1	<1E-5	$6.3 \pm 0.6\text{E-}5$	$2.6 \pm 0.4\text{E-}7$
RCBT-C	$1.4 \pm 0.1\text{E-}2$	<2E-1	<2E-5	$3.1 \pm 0.4\text{E-}5$	$4.3 \pm 0.4\text{E-}7$

TABLE 5. TMI-2 RCS AND RCBT SOLID SAMPLE ANALYSIS: ALPHA ISOTOPIC MEASUREMENTS
 ($\mu\text{Ci}/\text{ml}$ of filtered solution corrected to T_0)

Sample	^{238}Pu	$^{239,240}\text{Pu}$	^{241}Am	^{242}Cm	^{244}Cm	^{235}U	^{234}U	^{238}U
RCS-1	$3.7 \pm 0.2\text{E-}6$	$3.25 \pm 0.09\text{E-}5$	$5.7 \pm 0.3\text{E-}7$	$7 \pm 2\text{E-}7$	$<6\text{E-}9$	$5 \pm 2\text{E-}7$	$2.2 \pm 0.2\text{E-}5$	$4 \pm 1\text{E-}7$
RCS-2	$9 \pm 5\text{E-}8$	$2.4 \pm 0.8\text{E-}7$	$4.5 \pm 0.6\text{E-}7$	$<3\text{E-}7$	$<4\text{E-}8$	$<2\text{E-}8$	$<5\text{E-}8$	$4 \pm 1\text{E-}8$
RCBT-A	$1.3 \pm 0.2\text{E-}6$	$1.04 \pm 0.05\text{E-}5$	$2.1 \pm 0.1\text{E-}7$	$8 \pm 2\text{E-}8$	$<5\text{E-}9$	$<2\text{E-}8$	$<5\text{E-}8$	$6 \pm 3\text{E-}8$
RCBT-B	$<5\text{E-}8$	$1.4 \pm 0.5\text{E-}7$	$<6\text{E-}8$	$<1\text{E-}7$	$<4\text{E-}8$	$<2\text{E-}8$	$<8\text{E-}8$	$<2\text{E-}8$
RCBT-C	$<6\text{E-}8$	$3.9 \pm 0.5\text{E-}7$	$1.3 \pm 0.6\text{E-}8$	$<1\text{E-}8$	$5 \pm 3\text{E-}9$	$<9\text{E-}8$	$4 \pm 2\text{E-}7$	$5 \pm 1\text{E-}7$