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OFFICE MEMORANDUM

TO : Tom Keenan, Group Leader, H-7, MS 518 DATE: November 2, 1977

THRU : R. D. Baker, CMB-Division Leader, MS 756

FROM : G. R. Waterbury & Al Zerwekh

SUBJECT: TRANSURANIC WASTE RESEARCH & DEVELOPMENT PROGRAM (A412) MONTHLY REPORT FOR OCTOBER, 1977

SYMBOL : CMB-1

1499 Report

ANALYTICAL CHEMISTRY

Radiolysis Studies: Samples of the gaseous contents of seven drums of ^{238}Pu-contaminated waste in LASL interim covered-trench storage were analyzed, and the results were compared with previous analyses from the same drums (Table I). Three years after burial, the gaseous contents of Drums 223 & 224 are essentially stabilized. The percentage of hydrogen has stayed well below the explosive level. Oxygen has decreased slightly, the total of CO_2 and CO has gradually increased, and the percentage of nitrogen has failed to decrease. These data, particularly the nitrogen levels, indicate that air diffuses into the container; then certainly gases diffuse out. Also supporting this conclusion is the fact that none of the instrumented drums has ever pressurized. Drum 232 appeared to achieve an explosible gas mixture in 1.2 yrs, but was not explosible. The hydrogen content of the gas mixture has continued downward with time, and there is evidence of inward diffusion of air. There must be less effective contact of contaminant and matrix in this drum because the CO_2+CO percentage has decreased although there continues to be oxygen present. By contrast, Drums 301 and 330 (particularly the former) indicate much more effective contact because the hydrogen and CO_2+CO percentage increased in the gas mixture. Drum 301 had achieved an explosive mixture after 36 days and Drum 330 after 200. Neither contains an explosive mixture now either because of O_2 depletion in 301 or to H_2 decrease in 330. Clearly a potential hazard exists because of the generation of a combustible gas mixture

TABLE I

Data from ^{238}Pu-Contaminated Waste in Covered-Trench Storage

Latest Measurement Taken October 18, 1977

Drum Number	^{238}Pu Content g	Waste Content KG		Days in Storage	Temperature, °C				Gas Composition (Mol %)					
					In-side Drum	Out-side Drum	Ambient	Soil Under Cask	H_2	CH_4	O_2	CO_2	CO	N_2
223	14.9	17.9		(Dec) 41	12.5	11.5	2.0	7.0	0.8	0.1	16.0	6.3	2.0	74.0
				(Jul) 626	23.5	24.0	23.0	19.0	0.9	0.1	11.2	7.5	0.8	78.6
				(Oct)1078	23.5	23.5	23.0	15.0	0.8	<0.1	11.0	8.0	2.0	78.0
224	22.1	14.5		(Dec) 41	18.0	12.5	2.0	7.0	0.2	<0.1	19.0	1.4	0.7	77.0
				(Jan) 434	21.0	18.0	4.0	12.0	0.2	<0.1	18.5	1.0	0.2	78.5
				(Oct)1078	31.5	23.5	23.0	15.0	0.2	<0.1	17	1.0	0.5	80
232	29.4	10.2		(Jan) 434	23.5	17.5	4.0	12.0	6.0	0.3	6.6	12.0	3.0	71.0
				(Jul) 626	32.5	27.0	23.0	19.0	2.9	0.2	10.0	8.8	0.9	76.4
				(Oct)1081	32.0	25.5	23.0	15.0	2.0	<0.1	9.0	8.0	1.0	79
281	19.7	26.0		(Jul) 229	--	24.5	23.0	19.0	1.3	0.2	15.9	4.1	0.8	76.8
				(Jan) 400	--	17.5	4.0	15.5	3.4	0.1	13.3	7.1	<0.1	75.1
				(Oct) 677	--	23.0	23.0	15.0	2.0	0.1	13.0	6.0	1.0	77.0
301	18.7	23.6	*	(Jan) 36	--	15.0	4.0	11.0	11.0	0.5	10.0	11.0	4.0	62.0
				(Jul) 222	--	25.0	23.0	19.0	41.9	1.4	< 0.1	23.2	10.1	22.9
				(Oct) 683	--	23.0	23.0	15.0	55.0	2.0	< 0.1	25.0	13.0	5.0
330	17.4	10.9		(Jun) 23	20.5	21.0	19.0	19.0	1.7	<0.1	18.1	3.0	1.2	75.0
			*	(Jan) 200	15.5	15.5	4.0	15.5	9.1	0.4	11.0	12.4	<0.1	66.3
				(Oct) 457	23.5	23.5	23.0	15.0	4.0	0.3	12.0	10.0	4.0	69
380	27.5	27.7		(Apr) 15	16.0	12.0	13.5	15.0	1.8	0.2	18.5	3.9	2.6	72.1
				(May) 35	22.0	20.0	21.0	10.5	1.7	0.2	17.9	3.9	2.0	73.5
				(Oct) 195	25.0	23.0	23.0	15.0	1.0	0.2	18.0	3.0	2.0	75.0

*These samples were tested and found to be explosive

in some of these drums. It appears to be a problem that diminishes with time, and in no case has it been demonstrated to be insurmountable.

Meetings & Discussions. On October 11, discussions were held with Harvey Soule, Chief, Civilian Program Branch, DOE Waste Management & Production, Washington, concerning the LASL contaminated waste incinerator.

Glenn R Waterbury

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GRW:tb

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