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HANFORD RADIOACTIVE WASTE MANAGEMENT PLANS

January 15, 1969

HANFORD CODE C-65

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ADDENDUM
Page 3

HANFORD WASTE MANAGEMENT PLANS

This addendum provides primarily the information relative to waste management as called out in the unclassified report. This information is provided in the following tables.

In addition to the gaseous radionuclides (Ar-41, I-131, H-3) noted in the unclassified report, krypton and xenon are also released during dissolution of fuel. The chemically inert character of these elements prevents their removal by the usual off-gas treatment, but at the same time also prevents their uptake by biological species. Thus, these radionuclide contribution to personnel dose is only through direct exposure to stack effluent. Dilution by the atmosphere effectively reduces the concentrations of all these gases so that they are undetectable beyond the reservation boundaries. Radioactive krypton and xenon contribute essentially nothing to radiation dose off-site and very little on-site.

TABLE 1
COMPOSITION OF C AND K
REACTOR EFFLUENT

Radionuclide	Concentration pCi/ml	Radionuclide	Concentration pCi/ml
⁵⁶ Mn	7000	⁶⁵ Ni	2
³¹ Si	700	⁴⁶ Sc	2
²⁴ Na	550	⁵⁹ Fe	1
⁶⁴ Cu	450	¹⁴⁰ Ba	1
⁵¹ Cr	350	¹⁴³ Ce	1
²³⁹ Np	150	¹⁴¹ Ce	1
⁷⁶ As	100	¹³¹ I	0.7
¹³⁹ Ba	100	⁸⁹ Sr	0.5
¹³⁴ I	90	¹⁴⁹ Pm	0.6
^{152m} Eu	60	⁴⁵ Ca	0.7
⁹² Sn	50	⁶⁰ Co	0.5
^{69m} Zn	40	¹⁴³ Pr	0.5
⁷² Ga	25	⁵⁴ Mn	0.4
¹⁵³ Sm	25	¹⁴⁷ Nd	0.4
³² P	18	¹⁵¹ Pm	0.4
¹³² I	17	¹⁴⁴ Ce	0.3
¹⁴⁰ La	15	¹⁵⁶ Eu	0.3
³ H	10	¹²⁴ Sb	0.3
¹³⁵ I	10	¹⁵² Eu	0.2
⁶⁵ Zn	10	¹⁶⁰ Tb	0.09
⁹¹ Sr	10	¹⁴⁷ Pm	0.07
¹²² Sb	10	¹⁶¹ Tb	0.06
¹³³ I	8	¹⁰³ Ru	0.04
^{87m} Sr	6	⁹⁰ Sr	0.02
¹⁴² Pr	5	¹⁰⁶ Ru	0.01
		¹³⁷ Cs	0.006

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TABLE 2

AVERAGE RADIONUCLIDE TRANSPORT RATE

GASEOUS STREAMS

<u>Area</u>	Curies Per Year	
	<u>Particulate</u>	<u>Gaseous</u>
300	<1 ¹	0
100 C and K	<1	600,000 ²
100-N	<1	<1,000 ²

¹Uranium-238

²Argon-41

TABLE 2

TABLE 3
HIGH-LEVEL LIQUID WASTE
MONTHLY RATE OF GENERATION (1968)

<u>Volume (gal)</u>		<u>Plutonium (gms)</u>		<u>Long-Lived Fission Products</u>	
<u>Max.</u>	<u>Avg.</u>	<u>Max.</u>	<u>Avg.</u>	<u>Max.</u>	<u>Avg.</u>
9×10^5	7.5×10^5	900	600	3×10^6	2.2×10^6

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TABLE 4
INVENTORY OF WASTE IN UNDERGROUND TANKS - 7/1/68

Tank Farm	Total Volume, gal x 10 ⁶	Supernatant Volume, gal x 10 ⁶	Sludge & Salt Cake Volume, gal x 10 ⁶	¹³⁷ Cs Content, MCi	⁹⁰ Sr Content, MCi	Pu Content, Kg	Salt Cake Generated ⁽¹⁾ Volume, gal x 10 ⁶	Weight, tons x 10 ³
<u>Self-Boiling Wastes</u>								
A	3.51	2.86	0.65	45	60	75	-	-
AX	3.76	N.A.	N.A.	59	35	45	-	-
SX	3.69	2.94	0.75	15	30	40	-	-
Total	10.96	N.A.	N.A.	119	125	160	-	-
<u>Nonboiling Wastes</u>								
C	5.50	4.08	1.42	8	2	†	-	-
P	6.33	4.02	2.31	†	†		-	-
BX	5.71	3.77	1.94				0.85 ⁽²⁾	5.7
EY	6.23	4.76	1.47				-	-
S	9.07	8.59	0.48	27	8	160	-	-
SX	3.48	2.57	0.91				-	-
T	5.67	3.75	1.92				0.95 ⁽³⁾	6.3
TX	12.22	9.79	2.43				-	-
TY	2.73	2.27	0.46				-	-
U	4.83	4.41	0.42	†	†	†	-	-
Total	61.77	48.01	13.76	35	10	160	1.80	12.0

(1) Through November 1968

(2) Generated by ITS-1 and ITS-2 Units

(3) Generated by 242-T Evaporator

N.A. - Not Available

TABLE 4

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TABLE 5
QUANTITIES AND COMPOSITION OF WASTE
TO BE PLACED OR IN LONG-TERM STORAGE*

<u>Storage Location</u>	<u>Waste Characteristics</u>			<u>Projected Inventory, 1985</u>			<u>Projected Inventory, 2070</u>		
	<u>Form</u>	<u>Confinement</u>	<u>Volume, ft³</u>	<u>⁹⁰Sr, Ci</u>	<u>¹³⁷Cs, Ci</u>	<u>Pu, Kg</u>	<u>⁹⁰Sr, Ci</u>	<u>¹³⁷Cs, Ci</u>	<u>Pu, Kg</u>
Water-Cooled Basin	CsCl	Metal container	200 Cs		2.0x10 ⁸	-	-	-	-
	SrF ₂		100 Sr	1.5x10 ⁸					
On-Site Vault	CsCl	Metal container	200 Cs	-	-	-		2.7x10 ⁷	-
	SrF ₂		100 Sr				1.7x10 ⁷		
Existing Tanks	Salt Cake	Earth	6 x 10 ⁶	3.5x10 ⁷	2.5x10 ⁷	830	4.1x10 ⁶	3.4x10 ⁶	830
Ground Cribs and Specific Retention	Adsorbed on soil	Earth	3.0x10 ⁸	2.0x10 ⁴	3.0x10 ⁴	250	2.3x10 ³	4.1x10 ³	250
Swamps			8.0x10 ⁸	4.0x10 ²	3.0x10 ²	9.0	4.5x10 ¹	4.1x10 ¹	9.0

*Quantities assume Purex shutdown after FY-80.

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