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QUALITY AND AVAILABILITY OF FISSION PRODUCTS

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BY

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The information contained in this report was copied from charts used for discussions at Richland on May 4-6, 1965. Representatives of the Martin Company, U. S. Rubber Company, General Electric - HAPO, and AEC-RLOO were present. The data represent the best current information on the quantity, quality, and availability of each fission product considered, i. e., strontium-90, cesium-137, promethium-147, and cerium-144.

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FISSION PRODUCTS AVAILABILITY

Current Waste (3 reactor shutdown case)

	<u>Available Feed</u> <u>Megacuries/Year</u>	<u>Recoverable*</u> <u>Megacuries/Year</u>
Strontium-90	16	15
Cesium-137	17	16
Promethium-147	64	48
Cerium-144	350	310

* Strontium and Cesium - 95% recovery
Promethium - 75% recovery
Cerium - 90% recovery

All material aged 180 days.

[REDACTED]

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MISSION PRODUCTS AVAILABILITY

STORED WASTE - MID FY 1967

Strontium-90

	<u>Quality - Mole % Sr-90</u>	<u>Megacuries*</u>
East Area	≥ 50	30
	20 - 49	33
	< 20	5
West Area	< 20	35

Cesium-137

	<u>Gallons</u>	<u>Megacuries**</u>
East Area	10×10^6	90
West Area	36×10^6	50

* Strontium - 90% recovery
** Cesium - 95% recovery

50 in RFP seems to
have been an estimate
for late '57 or '58,

STRONTIUM PRODUCTION CAPABILITY

Program Basis

- (a) Process current waste as produced.
- (b) Process all stored waste in 5 -7 years.

Current Strontium	15	megacuries/yr
Stored Strontium		
East Area Feed	10 - 30	megacuries/yr
West Area Feed	5 - 18	megacuries/yr

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CESIUM PRODUCTION CAPABILITY

Program Basis

- (a) Process stored waste in 5 - 7 years
- (b) Delay current waste recovery 2 - 4 years

Cesium Ion Exchange Capacity	12,000,000	gallons/year
West Area Feed	15	megacuries/year
East Area Feed	100	megacuries/year
Current Cesium - (delayed 2 - 4 yrs.)	16	megacuries/year*

* Limited by feed availability

FISSION PRODUCT QUALITIES

TYPICAL FLOWSHEET VALUES

Strontium-90

Concentration:		1000 Ci/liter
Purity:	Sr-90/Total Sr	50 Mole %
	Sr/Sr + Divalents	90 Mole %
	Ca/Sr-90	10 Mole %
	Sr-89/Sr-90	10 Curie %

Cesium-137

Concentration:		330 Ci/liter
Purity:	Cs-137/Total Cs	35 Weight %
	Cs/Cs + Alkali metals	40 Weight %
	Cs-134/Cs-137 (current)	7 Curie %
	(4 year aged)	2 Curie %

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FISSION PRODUCT QUALITIES

TYPICAL FLOWSHEET VALUES

Promethium-147

(Aged One-Half Life)

Concentration:		1900 Ci/liter
Purity:	Pm/Pm + TRE	3 Weight %
	Pm-148/Pm-147	1×10^{-4} Curie %
	Ce-144/Pm-147	10 Curie %

Cerium-144

Concentration:		370 Ci/liter
Purity:	Ce-144/Ce	20 Weight %
	Ce/Ce + TRE	85 Weight %

STRONTIUM QUANTITIES AND QUALITIES

<u>Tank Number</u>	<u>Strontium-90/Total Strontium Weight Per Cent</u>	<u>Megacuries</u>
101-A	33	10.6
102-A	37)	19.3
103-A	16, 19) (13. (6.3	
104-A	41, 44	12.6
105-A	>50 (Estimate)	14.6
106-A	50, 52	10.6
103-AX	Receiving Waste >50 (Estimate)	2.7

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STRONTIUM-90 INVENTORY

(As of 5-1-65)

Crude Sr-90

Tank 003 CR	1100 Kilocuries
B-Plant (In Process)	650 "
Tank 002 CR	<u>1250</u> "
	3000 Kilocuries

Purified Sr-90

Tank E-4	<u>1880</u> Kilocuries
	4880 Kilocuries

SECRET

PROMETHIUM-147 INVENTORY

(As of 5-1-65)

003-CR Vault Crude:	4460 (Through Run A-04-18)	
B-Plant Crude:	TK 6-1	1470 Kilocuries
	7-1	1880 "
	8-1	890 "
	In Process	1450 Kilocuries
	In Process	310 "
Semiworks:	200-Gal Cask	125 Kilocuries
	40-Gal Cask	45 "
222-S	In Process	16 Kilocuries

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