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REPLACEMENT PLUTONIUM CONCENTRATION EQUIPMENT - PUREX DEFINITION OF SCOPE

Prepared By: J. R. LaRiviere & L. L. Zahn

November 30, 1956

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By JE Savely 8-17-93
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Extraction Design & Development
Facilities Engineering Operation
CHEMICAL PROCESSING DEPARTMENT
General Electric Company - Hanford Atomic Products Operation

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November 30, 1956

C. E. Kent, Manager
Project Engineering
2704-W Bldg., 200-W Area

REPLACEMENT PLUTONIUM CONCENTRATION EQUIPMENT - PUREX
DEFINITION OF SCOPE

References: 1. HW-45168, "Preliminary Project Proposal - L Cell Equipment Replacement, Purex", by DA Snyder, November 15, 1956.

2. HW-45038, "Scope Design, Remote Equipment For Final Plutonium Product Concentration and Recovery in the Purex Plant", by HG Johnson, August 29, 1956.

The reference 1 project proposal requests final design and advanced procurement for replacement Purex plutonium concentration equipment to be located in "L" Cell. Reference 2 summarizing an earlier study of the process design for this equipment served as the basis for preparation of the preliminary project proposal.

Recent plant experience and flowsheet developments have dictated minor changes to the Reference 2 report. No significant change in project cost is apparent.

1. The acidity in the 2BP feed to the stripper was increased in order to increase the acid molarity of the concentrator product stream.

2. The alternate overflow line from the product concentrator to the product receiver was eliminated together with its associated specific gravity controller on steam to the concentrator.

3. Provisions were included to permit routing the prototype ion exchange product into the product concentrator for concentration.

The following summary lists the exceptions to the Reference 2 document necessary for definition of the proposed scope design. This summary, together with Reference 2, is presented as the proposed scope basis for the project.

1. The new process flow diagram, SK-2-2777, covering the flowsheet modification referred to above should be substituted for the process flow diagram, SK-2-2739, which was a part of the Reference 2 process design.

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2. The alternate overflow line, L204-2"-TI-P, from the product concentrator, E-L4, to the product receiver, TK-L6, appearing on SK-2-2741, Engineering Flow Diagram, Sheet 2 should be deleted. The new SGRC to control the flow of steam to the concentrator in overflow operation should also be deleted and replaced with the existing SGR.

3. The prototype ion exchange product piping will extend as far as gallery nozzle, G3. In order for the Product Concentrator, E-L4, to process this material, the piping must be extended from nozzle, G3, to jumper, L056-1"-M21-P, shown on SK-2-2741, Engineering Flow Diagram, Sheet 2 downstream of DOV L4-4. This will be accomplished in the following manner:

   a. Install a permanent 1-inch line in the support dunnage to slope towards E-L4 with terminal 2-inch male nozzles in the vicinity of gallery nozzle, G3, at the west end and E-L4 at the east end. This line to be designated L130B-1"-M21-P.

   b. Revise jumper, L130-1-½"-M21-P, shown on SK-2-2741, Engineering Flow Diagram, Sheet 2 to a 3-headed jumper, L130-2-½"-M21-P. One head on the new L130 jumper to be a 3-½-inch female connector engaging gallery nozzle, G3; the second head to be a 2-inch female connector for installation on the Product Receiver Tank, TK-L6, nozzle AK; the third head to be a 2-inch female connector engaging the male nozzle at the west end of the permanent piping referred to above.

   c. The jumper, L056-1"-M21-P, shown on the Engineering Flow Diagrams, SK-2-2740 and SK-2-2741, is to be revised to include a tee down stream of DOV L4-4 in the 2 inch section of pipe, the tee to contain new 1-inch DOV L4-6 and a terminal 2-inch male nozzle.

   d. Jumper, L201-1-½"-M21-YA, is to be revised to include a second control air supply to be directed to DOV L4-6. The new designation will be L201-2-½"-M21-YA. A VS and control air piping in the operating gallery to nozzle G-18A is required for actuation of DOV L4-6.

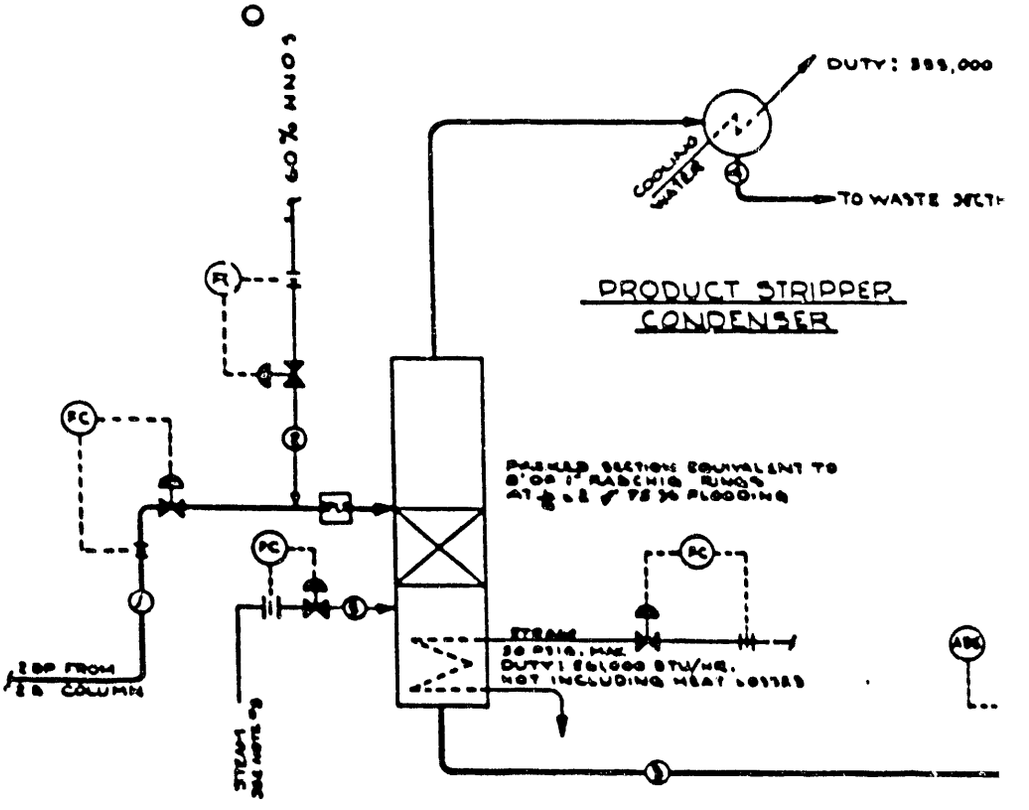
   e. A new 1-inch jumper, L130B-1"-M21-P, with terminal 2-inch connectors is required to engage the new 2-inch male nozzle on jumper L056 referred to in (c) above and the 2-inch male nozzle on the east end of the permanent piping referred to in (a) above.

We are initiating action to secure approval of this document as scope for the replacement plutonium concentration equipment. We assume that when this and the project proposal are approved that this document will serve as the basis for detailed design under the project. The contact engineer for Extraction Design & Development on this project will be J. R. LaRiviere.

Lyle F. Parker, Jr.
Supervisor, Extraction Design & Development
Facilities Engineering
CHEMICAL PROCESSING DEPARTMENT

LL Zahn/JRL:jea

[redacted]



HIGH EXPOSURE URANIUM						
	(1)	(1)	(3)	(4)	(5)	
STREAM	2BP	HNO3 ADDN	P S C	P S P	STEAM	
FLOW, GPM	1.04	0.016	0.69	0.71	———	0
SP GRAVITY	1.0	1.36	1.039	0.98	———	1.
VISCOSITY, CP	0.9	1.8	0.90	0.86	0.012	0.
TEMPERATURE, °F	104	70	212	179	212	1
COMPOSITION:						
HNO_3, LBS/HR	0.6	14.1	22.2	TR.	———	7
H_2O, LBS/HR	307.4	2.2	304.7	231.6	142.0	19
PU, LBS/HR.	2.5	———	2.5	TR.	———	2
TOTAL LBS/HR	310.1	16.3	331.2	231.6	142.0	50

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TU/HR.

DUTY: 311,000 BTU/HR.

COOLING WATER

TO IAF

PRODUCT CONCENTRATOR CONDENSER

GENERAL NOTES

1. SAMPLER, STRIPPER, CONCENTRATOR, CONDENSERS, RECEIVER TO BE SAFE FROM SLOW NEUTRON CHAIN REACTION BY SIZE LIMITATION (AIR TAMPED CONDITION) PU AS NITRATE SALT IN SOLUTION OR AS PRECIPITATE AT ALL CONCENTRATIONS).
2. MATERIAL BALANCE BASED ON INSTANTANEOUS PLANT RATE OF 38.5 TONS U/DAY AND FLOWSHEET IN DOCUMENT HW-47033.
3. USE ADDITIONAL STEAM AT LOW PLANT RATES TO RUN AT 75% FLOODING FOR GOOD STRIPPING OPERATION.

PRIMARY

STEAM
30 PSIG. MAX.
DUTY: 500,000 BTU/HR
NOT INCLUDING HEAT LOSSES.

TO HOLD 14 8 GAL. SOLUTION

DUTY: 5000 BTU/HR.

COOLING WATER

LOAD OUT

CT CONCENTRATOR

PRODUCT RECEIVER

LEGEND

- GAMMA ABSORPTOMETER
- SAMPLER
- ORIFICE OR ROTAMETER

CHECK PRINT

NOT FOR CONSTRUCTION

	PC
	1.41
	<1
	330
	6.1
	13.1
	22.0

REVISIONS

SK-2-2777

SCALE: NONE

APPROVALS

P-55317

U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
GENERAL ELECTRIC

PROCESS FLOW DIAGRAM
PRODUCT CONCENTRATION
PUREX PLANT

SK-2-2777

REFERENCE DRAWINGS

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11/12/93