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TITLE
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PROPOSED PUREX PHASE II EXPANSION PROGRAM

AUTHOR

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PROPOSED PUREX PHASE II EXPANSION PROGRAM

BY

L. R. Michels

March 8, 1957

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CG-PR-2, 11-3-92

By J E Savely 8-20-93

Verified By PM Eick 8-26-93

Extraction Design & Development
Facilities Engineering Operation
CHEMICAL PROCESSING DEPARTMENT
General Electric Company - Hanford Atomic Products Operation

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L. I. Zahn, Supervisor
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271-T Bldg., 200-W Area

PROPOSED PUREX PHASE II EXPANSION PROGRAM

- References: 1. HW-47889, "Purex Plant Phase II Proposed Flowsheet", by ER Irish, dated February 1, 1957.
2. HW-48336, "Budget Study Report, FY-1959 Plant and Equipment Budget, Separations Plant Expansion, Budget Item No. 659-023", by LR Michels, dated February 6, 1957.

This letter summarizes the results of preliminary studies on the stepwise expansion of Purex facilities to the ultimate rate of 4.0 capacity factor, using the two-cycle flow-sheet of Reference 1. Briefly, it is suggested that Purex be expanded to the intermediate capacity of 3.5 capacity factor using available FY-1958 funds insofar as possible; decision to expand Purex to 4.0 capacity factor can be deferred for subsequent budgetary consideration.

As delineated in Reference 2, expansion of Purex to 4.0 capacity factor would entail a total project cost of about \$3,000,000; beneficial use could not be achieved prior to August 1959, due in part to the availability of funds of only \$2,000,000 in the FY-1958 budget to finance the expansion of 202-A Building facilities.

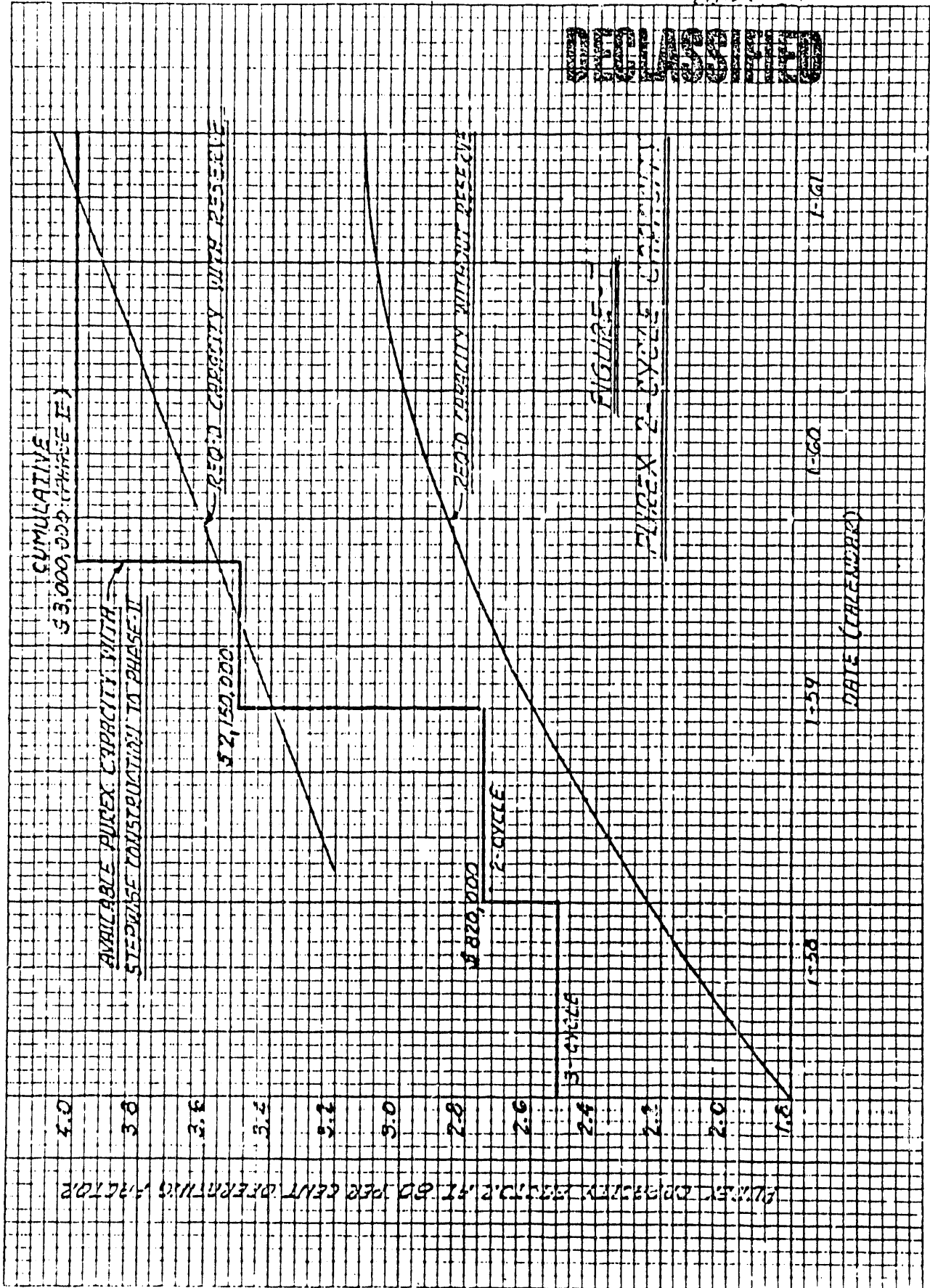
The attached Figure I and Tables I to III, inclusive, present data on the cost and scheduling to achieve 2.75 and 3.5 C.F. rates with two-cycle operation. The above capacity factors are only approximate because of uncertainties in extraction column flooding data. Briefly, the minimum cost to convert to reasonable two-cycle operation would be about \$800,000, with a beneficial use date of about April 1958. Following this changeover, the capacity of Purex would be between 2.5 and 3.0 C.F. and would be limited by the 2A Column. The next logical expansion would require the replacement of the 1BX, 1BS, 1C and 2A Columns (in addition to HA and HC) and would be limited by 2E Column capacity to about 3.5 capacity factor. The cost for achieving the 3.5 C.F. rate would be about \$2,150,000; a beneficial use date of January 1959 would be possible if the facility were financed with FY-1958 funds.

The incremental cost savings for two-cycle operation over present three-cycle operation are estimated at about \$400 per ton, attributed to improved product recovery and decreased use of essential materials, utilities and waste storage capacity. At a Purex 2.75 capacity factor, monthly savings of about \$225,000 could be realized through two-cycle operation. This large cost incentive dictates completion of those portions of design, procurement and construction associated with changeover to a two-cycle process in advance of project completion of those phases of the installation associated strictly with capacity factor increase. On this basis, a beneficial use date of April 1958 could be realized for two-cycle operation.

L.R. Michels

Extraction Design & Development
Facilities Engineering
CHEMICAL PROCESSING DEPARTMENT

LR Michels:jes



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TABLE I
REQUIRED SEPARATIONS PLANT CAPACITY

<u>Tons/Month</u>	<u>DATE</u>		
	<u>1-59</u>	<u>1-60</u>	<u>1-61</u>
U-Metal	780	840	880
E-Metal	50	50	50
20% Reserve (on U)	156	168	176
Total with Reserve	986	1058	1106
Less Redox Phase III	300	300	300
<u>Net, Purex, Including Reserve</u>	<u>686</u>	<u>758</u>	<u>806</u>
Purex capacity factor at 80% operating efficiency			
<u>With Reserve</u>	3.4	3.7	4.0
 <u>Tons/Month</u>			
U plus E-Metal	830	890	930
Less Redox Phase III	300	300	300
<u>Net, Purex, without Reserve</u>	<u>530</u>	<u>590</u>	<u>630</u>
Purex capacity factor at 80% operating efficiency			
<u>Without Reserve</u>	2.6	2.9	3.1

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TABLE II
TOTAL PROJECT COSTS FOR CONVERSION OF PUREX TO A
TWO-CYCLE PROCESS IN ADVANCE OF PHASE II EXPANSION

I. Interim Capacity of 2.5 to 3.0 Capacity Factor as Limited by 2A Column

<u>Changes Required</u>	<u>Direct Cost</u>	<u>Total Project Cost</u>
1. New HS Column plus spare	\$106,000	
2. New XAF Tank plus spare	60,000	
3. New Spare LBSU Tank	40,000	
4. New Jumpers	143,000	
5. Cold Side Modifications	57,000	
6. Burial of 1A & 1C Columns and jumpers	30,000	
Total	\$436,000	\$820,000

II. Interim Capacity of 3.5 Capacity Factor as Limited by 2E Column

1. New HS Column plus spare	} 530,000	
2. New LBS Column plus spare		
3. New LBX Column plus spare		
4. New 1C Column plus spare		
5. New 2A Column plus spare		
6. New XAF Tank plus spare	60,000	
7. New Spare LBSU Tank	40,000	
8. New Jumpers	390,000	
9. Cold Side Modifications	57,000	
10. Burial of 6 columns & jumpers	70,000	
Total	\$1,147,000	\$2,150,000

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TABLE III
COMPARATIVE SCHEDULES - PUREX TWO-CYCLE OPERATION

<u>Project Function</u>	<u>Schedule Dates</u>		
	<u>Interim Purex Capacity Factor</u>		
	<u>2.5 - 3.0</u>	<u>3.5</u>	<u>4.0</u>
<u>Definitive Process Design</u>			
Start			
Complete	Underway	Underway	Underway
<u>Design</u>	8-1-57	9-27-57	9-27-57
Start			
Complete	8-1-57	8-1-57	8-1-57
<u>Procurement (Expedited Basis)</u>	11-15-57	12-1-57	12-1-57
Start			
Complete	10-1-57	10-1-57	10-1-57
<u>Construction</u>	10-1-58	10-1-58(1)	6-1-59
Start			
Complete	11-1-57	11-1-57	1-1-58
<u>Beneficial Use</u>	2-1-59	3-1-59	10-1-59
Complete	4-1-58	1-1-59	8-1-59

(1) Completion of procurement by 10-1-58 would require authorization for project expenditure of \$2,150,000 in FY-1958.

END

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