AIIM

Association for Information and Image Management

1100 Wayne Avenue, Suite 1100
Silver Spring, Maryland 20910

301/587-8202

Centimeter

Inches

MANUFACTURED TO AIIM STANDARDS
BY APPLIED IMAGE, INC.

1 of 1

(CLASSIFICATION)

HW-66104

HANFORD ATOMIC PRODUCTS OPERATION - RICHLAND, WASHINGTON

NOV 15 1960

October 28, 1960

COPY NO. AND SERIES

FIRE DESIGNATION

TECHNICAL INFORMATION FILES

TITLE

EXPANSION TO 4.0 CAPACITY FACTOR - PUREX

ENGINEERING STUDY

AUTHOR

E. Doud

41-201

HANFORD TIMES RECORD

[illegible][illegible]

C-3195-MS (11-54) AEC-GE RICHLAND, WASH

(CLASSIFICATION)

DECLASSIFIED

[REDACTED]

HW-66104
Page 1.

P. Dond

This document consists of
59 pages. No. of
36 copies. Series A.

EXPANSION TO 4.0 CAPACITY FACTOR - PUREX ENGINEERING STUDY

by

E. Doud
Extraction Design and Development
Facilities Engineering
Chemical Processing Department

October 28, 1960

Classification Cancelled and Changed To

DECLASSIFIED

By Authority of DS Lewis

CG-PR2 1-25-94

By JK Lubeck 2-12-94

Verified By J E Savely 2-22-94

document contains classified data as defined by the Atomic Energy Act of 1954. Its transmission or the disclosure of its contents in any manner to an unauthorized person is prohibited.

MASTER

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

875

DECLASSIFIED

HW-66104
Page 2

D I S T R I B U T I O N

1. CR Anderson/PS Kingsley
 2. LP Bupp
 3. GK Carpenter
 4. VR Chapman
 5. VR Cooper
 6. E Doud
 7. JB Fecht
 8. RG Geier
 9. KG Grimm
 10. CT Groswith
 11. DR Gustavson
 12. ER Irish
 13. EM Johnston
 14. HM Jones
 15. BF Judson
 16. CE Kent/CA Lyneis
 17. TG LaFollette
 18. JR LaRiviere
 19. WK MacCready
 20. DW McKee
 21. PR McMurray
 22. AC Morgenthau
 23. GC Oberg/WC Schmidt
 24. HP Shaw
 25. SG Smolen
 26. JH Warren
 27. LL Zahn
 28. Record Center
 29. 300 Files
 - 30-36. Extra
-

DECLASSIFIED

HW-66104
Page 3

EXPANSION TO 4.0 CAPACITY FACTOR - PUREX
ENGINEERING STUDY

I. INTRODUCTION

The Purex Plant was originally designed to operate at an instantaneous rate of 8-1/3 tons of uranium per 24-hour day on a three-cycle flowsheet. Subsequently, the rate was increased to 26-2/3 T/day (C.F. 3.2) and the process changed to a two-cycle flowsheet. Recently, flowsheet changes made for neptunium recovery and replacements of certain critical equipment items have altered the plant's capacity. The status of the plant is discussed in the Continuity of Operations, Plant Improvement Program, Reference 1; wherein, the need for expansion to a capacity factor of 4.0 by January 1, 1962, was envisioned. Reference 2 was prepared to implement that program.

A new chemical flowsheet, Reference 3, was prepared to serve as a basis for the Purex Expansion Program.

II. PURPOSE

The purpose of this engineering study was to determine the changes and capital expenditure needed to obtain a 33-1/3 T/day instantaneous production rate through the Purex Plant.

III. SUMMARY AND CONCLUSIONS

The following equipment additions and modifications are required for the Purex Plant to operate at an instantaneous rate of 33-1/3 tons of uranium per day on the flowsheet, as described in Reference 3, with the exceptions discussed in Sections IV-A, IV-G, and IV-H-3, below.

A. Major Process Equipment

1. A 16,000 gallon D3-D4 tank
2. A 32-inch diameter 1BX Column
3. A 36-inch diameter 1C Column
4. A sandwich cartridge for the spare 2E Column
5. A sandwich cartridge for the spare 1BX Column
6. A demineralizer unit
7. Three concentrator tube bundles, two for J8 and one spare

1. HW-63744, "Continuity of Operations Program Separations and Uranium Conversion Facilities - Chemical Processing Department," by Members of the Chemical Processing Department, March 19, 1960.
2. HW-64162, "Preliminary Project Proposal Expansion to 4.0 Capacity Factor - Purex (Project CGC-895)," by LW Finch, April 4, 1960.
3. HW-64450, "Purex Plant Flowsheet for High Capacity Study," by RG Geier and JP Duckworth, March 28, 1960.

8. A 3,000-gallon stainless steel semi-trailer tank
9. An 8,000-gallon carbon steel sulfuric acid storage tank

B. Minor Process Equipment

1. Five pumps:
 - a. One 30 gpm 40-foot head sulfuric acid pump
 - b. One 60 gpm 60-foot head formalin pump
 - c. One 1 gpm XAF metering pump
 - d. One 60 gpm canyon pump for G2
 - e. One 70 gpm canyon pump for R2
2. Five canyon and eight gallery rotameters
3. Nine canyon and ten gallery control valves
4. Seven canyon and two gallery jets
5. Five steam and one water orifice plates
6. Eighteen canyon jumpers
7. Three burial boxes:
 - a. One for D3 and D4 tanks
 - b. One for the 1BX and 1C Columns
 - c. One for the two tube bundles
8. Two temperature controllers
9. Twelve Gilmont sample carriers and six extra caps

C. Auxiliary Equipment

1. One 800 SCFM air dryer
2. One 430 SCFM, 90 psig Nash Hytor air compressor
3. A building addition to house the new compressor and dryer.

D. Miscellaneous

1. Relocate tank TK-21 adjacent to tank TK-40 for formalin storage
2. Piping additions in the 211-A tank farm for TK-21 and the new sulfuric acid tank
3. Gallery side and contact piping changes:
 - a. Steam and water for 1CX
 - b. Steam for 2EX
 - c. Steam line to E-F11-1 and repair the line through the wall
 - d. Replace two jets and ten control valves
 - e. Replace six orifice plates and eight rotameters
 - f. 225 psig steam through a pressure reducing valve to the condenser vent jet
 - g. Overflow piping from 20 column to centrifuges R3 and R4

Gradual increases in concentrator tube bundle and condenser capacity may be obtained through well-sequenced replacement of failed equipment with higher

capacity equipment. Reference 4 describes the designs of the new replacement tube bundles and condensers.

The estimated construction cost for Purex expansion to 4.0 capacity factor, as defined above, is \$1,580,000 including \$80,000 for design, \$60,000 for escalation, and \$266,000 for contingencies.

Equipment replacements needed for sustained, high-efficiency operation at 3.6 capacity factor are:

1. D3-D4 Solution Tank
2. Formaldehyde storage
3. Sulfuric acid storage
4. An additional water demineralizer unit
5. Additional instrument air compressor and dryer
6. Miscellaneous control valves, rotameters, pumps and instrumentation

IV. DISCUSSION

A. Flowsheet

The flowsheet, Reference 3, prepared by Research and Engineering features continuous neptunium recovery, plutonium anion exchange, and formaldehyde treatment of waste. This study was based on this flowsheet with the following modifications:

1. The 1C Column L/V ratio should be reduced from the Reference 3 flowsheet value of 1.0 to a new value of 0.9. Section G, below, discusses the reason for the change.
2. The acid recovery flows should be balanced between the Formaldehyde Treatment System and the F5-F6 Acid Recovery System to maintain less than 50 inches of water pressure drop through the F5-F6 System. Details of this flowsheet change and its underlying reasons are discussed in Section H-3 below.

B. Flow Charts

The Purex process is depicted on the attached flow charts, SK-2-18417, Sheets 1 through 11. These charts show the primary routings of all process streams. New equipment, jumpers and piping designated by heavy lines are the items required for a 4.0 capacity factor based on the Reference 3 flowsheet without the modifications listed above. The stream numbers correspond to the numbers used on the flowsheet, Reference 3.

-
4. Letter, JB Fecht to EL Reed, "Purex Replacement Concentrator Tube Bundles and Condensers," September 16, 1960.

DECLASSIFIED

HW-66104
Page 6

C. Raw Materials

1. Fuel Elements

The present complement of cask cars and handling equipment could supply adequate fuel elements for C.F. 4.0, or 33-1/3 tons of uranium per day, Reference 5.

2. Chemicals

Existing storage space would be adequate for storage of dry chemicals, Reference 5. Additional tanks would be required for storage of 93 per cent sulfuric acid and formalin (37 per cent formaldehyde - 11 per cent methanol). The proposed size and location of these tanks are shown on attached drawing, SK-2-18426.

The existing sulfuric acid tank, TK-50, has a capacity of 500 gallons. The usage rate at C.F. 4.0 is calculated to be 1,700 gallons per month. The existing tank would require filling about once each week and holds only part of a trailer load. A second sulfuric acid tank of 8,000 gallon capacity should be installed. This would hold a tank car load of 6,560 gallons - enough to last three to four months. Also, a second sulfuric acid pump should be provided as an installed spare for the existing pump.

The existing formalin storage and feed tank, TK-10, has a capacity of 3,500 gallons and will hold one trailer load of solution. At C.F. 4.0, 618 gallons per day of formalin solution would be used. The existing storage would last for less than six days' operation. TK-21 should be relocated inside the concrete barricade adjacent to TK-40. The interior of this 20,000-gallon carbon steel tank is painted with chlorinated rubber paint, Iankote #4362, which is chemically resistant to formalin solution. This tank would provide storage for one month's operation. This large tank would permit receiving the solution in tank cars instead of truck trailer. A new 60 gpm pump should be provided for unloading the tank cars. An existing pump, P-41-1, should be used for transfer of the solution to the feed tank, TK-10.

D. Dissolver and Off-Gas

The capacity of the existing dissolvers and off-gas equipment would be adequate for C.F. 4.0. Plant tests have been made using 12-ton charges and taking two 6-ton cuts on an over-all cycle of 24 hours. This is equivalent to 36 tons of uranium per 24 hours with three dissolvers operating. The bottleneck would be in the metal solution receivers. The two existing receiver tanks, D3 and D4, have an operating capacity of only 4,000 gallons each. At C.F. 4.0, 4,850 gallons of dissolver solution per 12-ton charge would be produced. With the two small

-
5. HW-65812, "Material Handling Study - For Purex 4.0 Capacity Factor Expansion Scope Design," by AC Morgenthaler, Jr., June 1, 1960.

receivers, this quantity of solution could not be handled without splitting dissolver charges. One large 16,000-gallon tank in place of the two small tanks should be provided. The tank should be designed to use existing jumpers and agitators. Five new jumpers would be required, two for the sump jet, one for D4 to D5 jet, and two for D3 to D5 jet. Specifications for these jets are attached. The new tank and cell arrangement are shown on the attached drawings, SK-2-18441 and SK-2-18442.

The metal solution centrifuges G-E2 and G-E4 and associated tanks TK-E1, E3 and E5 have been segregated for fission product recovery and were not considered as part of the Purex system in this study.

E. Solvent Extraction

1. Precycle

HAF Make-up and HAF Tank. Metal solution would be transferred from TK-D5 directly into TK-E6. Samples would be taken in D5 and feed adjustment with nitric acid and/or water made in TK-E6. No changes in equipment or routings would be required for C.F. 4.0.

Columns. The present HA, HS and LBS Columns have adequate capacity to operate at C.F. 4.0. The LBX and LC Columns are limiting below C.F. 4.0 capacity.

The present LBX Column should be replaced with a 32-inch diameter column with an all stainless steel plate remote cartridge as shown on drawing SK-2-18489, attached. The present spare 27-inch diameter LBX Column should be revised to take a remote cartridge. This cartridge would have polyethylene and stainless steel plates as shown on drawing SK-2-18429, attached.

The present LC Column should be replaced with a 36-inch diameter column with an all stainless steel plate remote cartridge as shown on drawing SK-2-18490, attached. The spare for this column would be the smaller spare 2E Column with polyethylene and stainless steel plates. A burial box would be required for disposal of the two removed columns.

The steam injector for heating the LCX is limiting above C.F. 3.2 when the LCX temperature is maintained at 60° C. In addition, since the temperature control afforded by this equipment is currently unsatisfactory, the injector should be replaced by one of proper size with a new temperature control instrument mounted on the main control panel.

2. Final Uranium Cycle

2D and 2E Columns. In order to provide uranium rework capacity while the plant is operating at C.F. 4.0, the capacity of the final uranium

cycle should be equal to C.F. 4.5. Tests have indicated that the 2D Column has an estimated capacity equal to or greater than C.F. 4.5. The present 2E Column cartridge has not had adequate plant operation to firmly define its capacity. A replacement cartridge of greater capacity has been designed. The design for this latter cartridge is shown on drawing H-2-57772, Reference 6. One additional cartridge of the new design for installation in the spare column should be provided.

3. Final Plutonium Cycle

2A and 2B Columns. The 2A Column is capable of being operated at C.F. 4.0, although operation without the use of the pulse generator may be necessary. However, the presently installed column has given indications of being restricted, which could be a result of radiation damage to the fluorothene Raschig rings. The present column is being replaced with a column with stainless steel nozzle plates which will have C.F. 4.0 capacity. The 2B Column has adequate capacity to operate at C.F. 4.0.

4. Plutonium Ion Exchange

All equipment in the Plutonium Ion Exchange Unit either has or will have C.F. 4.0 processing capability upon completion of the N cell modifications, except the XAF Pump No. 1. In order to attain C.F. 4.0, this pump should be replaced or modified to give 1.0 gpm. The XAS and XCS pumps (1,300 ml/min capacity) and the waste jet all have adequate capacity. Operating experience has shown the XCP concentrator has adequate capacity to handle a C.F. 4.0 rate.

5. Palm Recovery

All the equipment for the Palm Recovery project was scoped to be adequate for a plant processing rate of C.F. 4.0.

F. Solvent Treatment

1. No. 1 Solvent Treatment System

Based on the proposed flowsheet, the capacities of the present G Cell vessels would be adequate for C.F. 4.0. However, two deficiencies exist in the equipment as follows:

- a. Pump G2 which transfers 10SR from Tank G-2 to Tower G-2 should be replaced with a larger capacity (60 gpm) pump. The specifications are given in the Appendix.
- b. At the high solvent flow rates (70 gpm) experienced when the three-cycle process was in use, the solvent flow into the G3 and G4 centrifuges was restricted by the 2-inch feed inlet nozzles. As a result,

6. H-2-57772 - 2E Column Cartridge

the solvent backed up into the vent on the IO Column. This solvent flow corresponds to C.F. 3.3 on the present flowsheet. Since complete elimination of solvent centrifugation cannot be assured, and since each centrifuge should be capable of processing the entire solvent flow, two new three-connector feed jumpers would be required, one for G-3 and one for G-4 centrifuge, as shown on drawing SK-2-18363, attached.

2. No. 2 Solvent Treatment System

The presently installed R cell equipment has adequate capacity to reprocess the solvent flow from the 2E Column at C.F. 4.5 except for the recycle Pump R2. A new pump of 70 gpm capacity should be provided. The specifications for this pump are given in the Appendix. Also, the overflow from the 20 Column to Centrifuges R3 and R4 should be repiped to two nozzles on each centrifuge similar to that shown on SK-2-18363 for G Cell.

G. Concentrators and Condensers

The duties and capacities of the three primary concentrators are as follows.

Service Equipment No.	<u>Purex Concentrators</u>				
	1CU		2EU		2BW
Strip Column L/V	E-J8-1		E-K4-1		E-H4-1
Percent Recycle	1.0	0.9	1.0	1.0	-
Heat Duty	-	-	0	12.5	-
C.F. 4.0	BTU/hour x 10 ⁶				
Ref. 3 Flowsheet	41.9	-	32.7	36.8	15.6
Revised Flowsheet	-	37.7	-	-	-
C.F. 3.6					
Ref. 3 Flowsheet	37.7		29.4	33.0	14.0
Revised Flowsheet		33.9			
Concentrator Capacity					
Existing Bundles	31.7		33.0		19.8
Ref. 4 Bundles	38.0		39.5		-
SK-2-18479 Bundles	46.0		48.0		-

From these data it was concluded that: (1) for the 1CU Concentrator (E-J8-1) new tube bundles would be required, for C.F. 4.0 on Reference 3 flowsheet the SK-2-18479 tube bundles would be needed, for C.F. 4.0 on the revised flowsheet (1C L/V of 0.9) or for C.F. 3.6 on the Ref. 3 flowsheet (1C L/V of 1.0) the Ref. 4 tube bundles would be adequate; (2) for the 2EU Concentrator (E-K4-1) new tube bundles would not be required for C.F. 4.0 without recycle or for C.F. 3.6 with 12.5 percent recycle, but Ref. 4 tube bundles would be required for C.F. 4.0 to permit 12.5 percent recycle; and (3) for the 3BW backcycle concentrator (E-H4-1) new tube bundles would not be required for C.F. 4.0.

The review of the uranium concentrator condensers, centered around the limiting case of E-J8-2, revealed no limitation in either heat transfer capacity or

DECLASSIFIED

HW-66104
Page 10

pressure drop under the revised flowsheet condition. The maximum heat transfer capacity of the existing E-J8-2 condenser is 34.2×10^6 BTU/hour and the required duty at a capacity factor of 4.0 is 36.2×10^6 BTU/hour using Reference 3 flowsheet and 32.6×10^6 BTU/hour using the revised flowsheet with LC L/V of 0.9. Vapor-side pressure drop using the existing E-J8-2 condenser at a capacity factor of 4.0 will be 38 and 35 inches of water, respectively, with the Reference 3 and revised flowsheets. If the revised flowsheet is not used, the condenser shown on the attached drawing, SK-2-2733, would be required.

H. Waste Concentration and Acid Recovery System

No change in the waste concentration and acid recovery system would be required for C.F. 4.0 capacity on the revised Reference 3 flowsheet.

1. Waste Concentrators, F11 and F6

The reboilers have sufficient surface area to provide the necessary concentration for C.F. 4.0 operation. Using 39 psig steam, F11 and F6 require an over-all coefficient based on outside area of 170 BTU/hour/ft²/°F and 140 BTU/hr/ft²/°F, respectively. Steam consumption was calculated to be 32,900 lbs/hour for F11 and 29,900 lbs/hour for F6. At least three (3) steam supply lines should be used for each tube bundle to lower the erosion of the steam piping. One existing jumper would need to be installed to E-F11-1 and the line through the concrete wall repaired with a plastic insert.

Downcomer flooding or entrainment would not be a problem in the towers. Pressure drop through the towers was calculated to be 10 inches of water.

2. No. 1 Acid Condenser, E-F11-2

E-F11-2 could be used for C.F. 4.0 operation. A required over-all coefficient of 180 BTU/hr/ft²/°F was calculated. Shell side pressure drop was calculated to be 29 inches of water. The total pressure drop through the No. 1 acid concentrator, F11, would be 39.0 inches of water.

3. Acid Absorber, T-F5 and Condenser T-F6

The pressure drop through T-F5 was calculated to be 16.5 inches of water at C.F. 4.0 giving a total pressure drop through F6, the demister, and T-F5 of 32 inches of water. The shell side pressure drop for the present condenser E-F5 was calculated to be 29 inches of water at C.F. 4.0 at Reference 3 flowsheet flows. The total pressure drop through F6 and the demister and F5 would then be 61 inches of water. Because of this excessive shell-side pressure drop at the 4.0 C.F. rate, the E-F5 Condenser should be replaced with the condenser described in Reference 4.

DECLASSIFIED

HW-66104
Page 11

By decreasing the amount of LWF dilution water by 1,650 lbs/hour, the amount of overheads from F11 and the subsequent load on F6-F5 could be decreased by about 2,000 lbs/hour. This decreased load would bring the pressure drop through F6-F5 within the allowable limit of 50 inches of water. Decreasing the overheads from F11 would increase the LWF flow by about 325 lbs/hour. The composition of the LWF stream would change from about 1.28 M HNO_3 to 1.4 M HNO_3 . This is the only stream composition which should change from the original flowsheet, Reference 3. With this flowsheet change the new condenser would not be required.

4. Vacuum Fractionator - U6

At C.F. 4.0 the vacuum fractionator would be operating very close to the design basis. Liquid velocity in the downcomers and pressure drop through the tower check closely with the design values. The barometric condenser would require 500 gpm of cooling water.

A required coefficient of 230 BTU/hr/ft²/°F was calculated for the reboiler. Steam consumption was calculated to be 13,850 lbs/hour.

5. Formaldehyde Waste Treatment

The formaldehyde waste treatment system with the changes being made in detail design will handle the increased LWF flow. The DOV's and lines are suitable as scoped. No changes to the in-canyon system would be required for C.F. 4.0.

I. Aqueous Make-Up

The aqueous make-up facilities would be adequate for preparation of flow-sheet volumes of all cold chemical solutions for C.F. 4.0.

J. Flow Control Systems and Instrumentation

1. Process Stream

The capacities and characteristics of all process rotameters, control valves and continuous jets were checked for C.F. 4.0 flowsheet requirements. The ones which should be changed are listed below. The process specifications for each new item are given in the Appendix.

	<u>Canyon Side</u>	<u>Gallery Side</u>
Rotameters	FT-G7-2	FT-H2-4
	FT-H2-1	FT-J7-2
	FT-K1-2	FT-K3-1
	FT-J3	FT-L1-1
	FT-G2-3	FT-R1-3
		FT-R2-4
		FT-U6-2
		FT-G7-3

DECLASSIFIED

HW-66104
Page 12

	<u>Canyon Side</u>	<u>Gallery Side</u>
Control Valves	DOV-K3-2 DOV-J7-1 DOV-K1-2 DOV-H2-1 DOV-G2-4 DOV-K2-3 DOV-K3-3 DOV-J7-3 DOV-G7-1	DOV-I1-1 DOV-J7-9 DOV-R2-6 DOV-J7-10 DOV-K3-9 DOV-H2-4 DOV-G7-7 DOV-K2-6
Jets	J-K3-1 J-D3-3 J-D4-2 J-SD J-K3-2 J-J7-2 J-J7-1	SI-K3 SI-J7

2. Service Streams

The piping and controls for all heat exchange units with increased duty at C.F. 4.0 were checked for capacity and characteristics. The following gallery side pipe changes should be made:

New 4" line to G114-F731 (2) to E-F11-1, this line through the concrete wall has a leak and should be repaired by inserting a plastic liner.

The 2-inch steam lines to 1CX and 2EX should be replaced with 3-inch lines.

The following valves and orifice plates should be replaced. Specifications for these are given in the Appendix.

Control Valves

Gallery Side
DOV-J8-2
DOV-K4-2

Orifice Plates

<u>Gallery Side</u>	
<u>Steam</u>	<u>Raw Water</u>
FE-J8-1	FE-J8-2
FE-J8-3	
FE-K4-1	
FE-K4-3	
FE-U6-3	

DECLASSIFIEDHW-66104
Page 13**K. Jumpers**

A total of 18 new jumpers would be required for C.F. 4.0. These are:

<u>Jumper No.</u>	<u>From Nozzle</u>	<u>To Nozzle</u>	<u>DOV</u>	<u>Jet</u>	<u>Rotameter</u>	<u>Drawing No.*</u>
D-T28-D3	"K"-D3	D-T28	-	J-D3-3	-	H-2-57524
D-G15-D4-D5	"W"-D3	"J"-D5	-	J-D4-2	-	H-2-53606
D-T20-SD	Sump SD	D-T20	-	J-SD	-	H-2-53591
D-G29-T20	D-G29	(D-T20-SD)	-	-	-	H-2-53597
D-G46-T28	D-G46	(D-T28-D3)	-	-	-	H-2-57525
G-G2-G2B	Pump G2	"M"-T-G2	DOV-G2-4	-	FT-G2-3	H-2-53856
G-G7-3-G6	Pump G7-3	"E"-TK-G6	DOV-G7-1	-	FT-G7-2	H-2-53749
G-T71-G3	G-T71	"N"&"K"-G-G3	-	-	-	H-2-54035
G-T61-G4	G-T61	"N"&"K"-G-G4	-	-	-	H-2-54035
H-T36-H2	H-T36	"K"-T-H2	DOV-H2-1	-	FT-H2-1	H-2-53943
J-T64-J3	Pump J3	J-T64	-	-	FT-J3	H-2-57237
J-J7-J8B	"F"-T-J7	"V"-E-J8-1	DOV-J7-1	J-J7-1	-	H-2-53709
K-K1-K2	Pump K1	"H"-T-K2	DOV-K1-2	-	FT-K1-2	H-2-53928
K-K3-K4B	"F"-T-K3	"V"-T-K4	DOV-K3-2	J-K3-1	-	H-2-53700
K-K3-K4-A	"A"-T-K3	"U"-E-K4-1	DOV-K3-3	J-K3-2	-	H-2-53709
J-J7-J8-A	"A"-T-J7	"U"-E-J8-1	DOV-J7-3	J-J7-2	-	H-2-53709
K-G102-K2	K-G102	"K"-T-K-2	DOV-K2-3	-	-	H-2-53944
J-G41-J7	J-G41	"B"-T-J7	-	-	-	H-2-56481

* Drawing numbers listed are for existing jumpers. These will require revision or redrawing to meet requirements of C.F. 4.0.

L. Vent Systems

No changes would be required in the vessel or condenser vent canyon equipment. This study is based on 10 inches of water vacuum in the vessel vent header and 50 inches of water vacuum in the condenser vent header. New jets are being installed by Operations. If it is impossible to maintain 50 inches of water vacuum in the condenser vent header, the K4 Condenser may become limiting due to pressure drop at a capacity factor below C.F. 4.0. The condenser vent jet should be connected to the 225 psig steam supply with a pressure reducing valve in the line which can be manually set to supply 100 to 200 psig steam to the jet.

M. Product Handling**1. Plutonium**

The present supply of PR cans would be adequate to handle all of the plutonium nitrate solution on a C.F. 4.0 flowsheet provided the 234-5 Building can keep pace with the separations plants, Reference 5.

DECLASSIFIED

HW-66104
Page 14

2. Uranium

At C.F. 4.0 a third 3,000-gallon semi-trailer tank for transferring UNH solution would be required if all transfers were to be made on day shift, Reference 5. The new semi-trailer tank should be the same as described in BPF-8901.

N. Services

The following estimates of the utility services required for C.F. 4.0 operation at Purex are based on the actual consumption at Purex during FY-1960, with suitable escalation for throughput. A definite correlation between the amounts used and the season, plant C.F., or percent of time operated is not apparent and therefore these figures are only best approximations. Actual usages should not be greater than the estimates. The monthly usage figures are based on the assumption that the plant would operate at full capacity for 80 percent of the time. Based on these estimates, the utility services at Purex would be adequate for C.F. 4.0 operation except for demineralized water and compressed air.

1. Steam

It is estimated that steam consumption would vary from about 192 MM lbs/month during the winter to about 148 MM lbs/month during the summer. The winter load represents a peak usage of about 333,000 lbs/hour. High pressure steam is supplied to the 202-A Building by an 18-inch line from 284-E to the Purex area and then through two 14-inch lines into the P&O Gallery. Steam is supplied to the process vessels from a 16-inch header in the P&O Gallery. The steam is supplied to the main supply line at 284-E at 225 psig. The steam pressure is reduced to 185 psig at the end of the 18-inch line and then is reduced to 100 psig as it enters the 16-inch process supply header. Pressure drop in the 18-inch line from 284-E was calculated to be about 25 psi for the peak load. Therefore, adequate steam pressure would be available at Purex for C.F. 4.0 operation.

2. Raw Water

Raw water usage would be about 450 MM gal/month during the summer and about 320 MM gal/month during the winter. Peak usage would be about 13,000 gpm. Raw water is supplied to the 202-A Building by a 24-inch line from the 282-E Building to the Purex area and then through two 18-inch lines into the P&O Gallery. Raw water is supplied to the supply line at 282-E at 115 to 120 psig. Pressure drop during the peak usage is calculated to be 25 psi in the supply lines. Raw water would be available in the supply header at 90 to 95 psig during C.F. 4.0 operation.

3. Sanitary Water

Sanitary water consumption would be about 23 to 25 MM gal/month or about 580 gpm. Past consumption data indicate that usage will not vary very much from summer to winter. Pressure drop in the piping is negligible as the maximum velocity in the piping is about 1.8 fps. The sanitary water is supplied to the Purex area from 283-E by a 12-inch line.

4. Electricity

The electrical demand load for Purex would not increase substantially as only a small portion of the total load is directly connected to the process. The new compressor and pumps would increase the connected load by 150 KVA from 5,200 to 5,350 KVA. The plant is supplied by two 3,750 KVA transformers for a total of 7,500 KVA available. The average demand load is 2,200 KVA at C.F. 3.2. With the added connected load the demand load would not exceed the capacity of one transformer at C.F. 4.0.

5. Demineralized Water

At C.F. 4.0, 250 gallons per minute of demineralized water would be required. The two existing units have a maximum operating rate of 100 gpm each for a total of 200 gpm. A third unit of the same size as the two existing units would be required to provide the capacity needed for C.F. 4.0. The new unit should be as described in BPF-7875. Also, a new 400-gallon sulfuric acid mix tank would be required for regeneration of the units. The proposed location of the new equipment is shown on drawing SK-2-18426, attached.

6. Compressed Air

One of the two installed 1,000 SCFM Joy air compressors would supply adequate process air for operation at C.F. 4.0. The second compressor would be required during plant shutdowns and to serve as an installed spare during plant operation.

The capacity of the two installed Nash Hytor air compressors was increased from 370 SCFM each to 430 SCFM each in 1958. Presently both compressors are required to operate to supply adequate instrument air. A third unit, as an installed spare, would be required to maintain C.F. 4.0 operation. Also, the instrument air dryer is operating above peak capacity of 850 SCFM. A second dryer would be required for continuity of operation. An addition to the compressor room would be required to house the new compressor and dryer. The units should be installed as shown on drawings SK-2-18586 and 18587, attached.

O. Buildings and Structures

The only change in buildings and structures for C.F. 4.0 would be an addition to the compressor room for housing the new compressor and dryer. The new room is shown on drawing SK-2-18587, attached. It is approximately 10' wide by 22' long with a 12' high ceiling. New water and drain lines to tie into the present headers would be required.

P. Sampling Equipment

It is estimated that the sampling frequency would increase fifteen percent when operating at C.F. 4.0. Twelve (12) additional Gilmont sample carriers

DECLASSIFIED

HW-66104
Page 16

complete with caps plus six (6) additional caps should be provided. The carriers and caps should be as shown on drawing H-2-3913, Reference 7, "Flask Carrier Details." This will make a total of 92 sample carriers for the Purex operation including 12 for Fission Product Recovery and 80 for normal operation.

Q. Wastes

The waste storage and disposal facilities would be adequate for handling the effluent streams at C.F. 4.0 within the concepts of the Waste Management Plant Improvement Program, Reference 8.

V. COSTS

Construction cost estimates based on this engineering study were prepared by Cost Estimating CE&U. The total project cost for the complete facility based on the revised flowsheet was estimated to be \$1,580,000 including \$80,000 for design; \$60,000 for escalation; and \$266,000 for contingencies. This estimate is based on a straight day, 40-hour work week and does not include funds for overtime or shift work.

Since initiation of this study in June 1960, it has been demonstrated that the Purex Plant can operate at an instantaneous rate of 30 tons of uranium per day, which would correspond to a capacity factor of 3.6.

The following equipment additions would permit reliable operation at 3.6 capacity factor:

1. D3-D4 solution tank
2. Formaldehyde storage
3. Sulfuric acid storage
4. Additional water demineralizer units
5. Additional instrument air compressor and dryer
6. Auxiliary equipment (jets, pumps, rotameters, control valves and instruments) identified as limiting below C.F. 4.0.

VI. ACKNOWLEDGEMENTS

This engineering study represents the integrated effort of personnel in Research and Engineering and Facilities Engineering. Special acknowledgement is extended

7. H-2-3913 - Flask Carrier Details.
8. HW-63958, "CPD Waste Management Plant Improvement Program," by ER Irish, March 10, 1960.

DECLASSIFIED

HW-66104
Page 17

to HL Caudill, JR LaRiviere, AC Morgenthauer, GC Oberg, WC Schmidt, and
CW Smith each of whom made major contributions to the development of this study.

E. Doud

Extraction Design and Development
Facilities Engineering
Chemical Processing Department

E. Doud bp

REFERENCES

1. HW-63744, "Continuity of Operations Program Separations and Uranium Conversion Facilities - Chemical Processing Department," by Members of CPD.
2. HW-64162, "Preliminary Project Proposal Expansion to 4.0 Capacity Factor - Purex (Project CGC-895)," by LW Finch, April 4, 1960.
3. HW-64450, "Purex Plant Flowsheet for High Capacity Study," by RG Geier and JP Duckworth, March 28, 1960.
4. Letter, JB Fecht to EL Reed, "Purex Replacement Concentrator Tube Bundles and Condensers," September 16, 1960.
5. HW-65812, "Material Handling Study - For Purex 4.0 Capacity Factor Expansion Scope Design," by AC Morgenthauer, Jr., June 1, 1960.
6. H-2-57772 - 2E Column Cartridge.
7. H-2-3913 - Flask Carrier Details
8. HW-63958, "CPD Waste Management Plant Improvement Program," ER Irish, March 10, 1960.

ATTACHMENTS

- A. Specifications for
- Rotameters
 - Orifices
 - Control Valves
 - Jets
 - Pneumatic Temperature Transmitter
 - Pumps
- B. Drawings:
- SK-2-18517, Sh. 1-11 - Purex Flow Sketch
 - SK-2-18426 - 211-A Tank Farm Alterations
 - SK-2-18587 - New Compressor Room
 - SK-2-18586 - EFD New Compressor and Dryer
 - SK-2-18442 - Tank D3-D4, 16,000 Gallons
 - SK-2-18441 - Cell Arrangement Tank D3-D4
 - SK-2-2733 - Replacement Condenser
 - SK-2-18479 - Replacement Tube Bundle
 - SK-2-18363 - G3-G4 Cell Arrangement
 - SK-2-18489 - 1BX Column
 - SK-2-18490 - 1C Column
 - SK-2-18429 - 1BX Cartridge

CANYON SIDE

ITEM NO. (FLOW DIAGRAM SYMBOL)	FT-H2-1	FT-K1-2	FT J3	FTG2-3
NEW INSTRUMENT PARTS REQUIRED	Rotameter	Rotameter	Rotameter	Rotameter
SERVICE	HAX	2DF	1BXF	10SR (TK-G2 to T-G2)
LOCATION	H Cell	K Cell	J Cell	G Cell
OPERATING CONDITIONS				
FLUID	TEP Diluent	UNH Soln.	TBP Diluent	0.1 M HNO ₃
CORROSIVE COMPOUNDS	None	HNO ₃	HNO ₃	HNO ₃
OPERATING TEMPERATURE, °F	113	122	131	122
DESIGN TEMPERATURE, °F	150	150	150	150
OPERATING PRESSURE, PSIG	28.0	42.0	50	45.0
DESIGN PRESSURE, PSIG	150	150	150	150
LIQUID				
FLOW AT FULL METER DIFF. & OPER. COND. GPM	88.0	19.0	115.0	78.0
NORMAL FLOW AT OPER. COND. GPM	66.3	13.0	86.5	58.8
±% DEVIA. FROM NORM. FLOW, NORM. PLANT OPER.	±0 -50	±0 -50	±0 -50	±0 -50
SPECIFIC GRAVITY AT OPER. COND.	0.85	1.67	0.95	1.0
VISCOSITY AT OPER. COND., CP	2.2	1.6	3.0	0.9
STEAM				
FLOW AT FULL METER DIFF. & OPER. COND., LBS/HR				
NORMAL FLOW AT OPER. COND., LBS/HR				
±% DEVIA. FROM NORM. FLOW, NORM. PLANT OPER.				
QUALITY AT OPER. COND., %				
SUPERHEAT AT OPER. COND., °F				
GENERAL				
TYPE OF PRIMARY ELEMENT	Rotameter	Rotameter	Rotameter	Rotameter
TYPE OF INSTRUMENT	Transducer	Transducer	Transducer	Transducer
TYPE OF CONTROL ACTION	Prop. & Reset	Prop. & Reset	Prop. & Reset	Prop. & Reset
DIFF. RANGE, INCHES WATER, DRY	0 - 30	0 - 30	0 - 30	0 - 30
TRANS. TO BOARD OR LOCAL	Board	Board	Board	Board
WITH AIR FAILURE, VALVE	Closes	Closes	Closes	Closes
WITH INCREASE IN FLOW, VALVE	Closes	Closes	Closes	Closes
LINE SIZE, INCHES	2	2	2	2
JUMPER NO.	H-T36-H2	K-K1-K2	J-T64-J3	G-G2-G2 B
ORIFICE BETA	-	-	-	-
SPECIAL REQUIREMENTS	Remote	Remote	Remote	Remote

FLOWMETERS AND FLOWCONTROLLERS
PROCESS SPECIFICATIONS

CANYON SIDE

ITEM NO. (FLOW DIAGRAM SYMBOL)	FT-G7-2			
NEW INSTRUMENT PARTS REQUIRED	Rotameter			
SERVICE	MOD (TKG7 to TK-G6)			
LOCATION	G Cell			
OPERATING CONDITIONS				
FLUID	0.51M NaOH			
CORROSIVE COMPOUNDS	NaOH			
OPERATING TEMPERATURE, °F	113			
DESIGN TEMPERATURE, °F	150			
OPERATING PRESSURE, PSIG	58.0			
DESIGN PRESSURE, PSIG	150.0			
LIQUID				
FLOW AT FULL METER DIFF. & OPER. COND. GPM	4.2			
NORMAL FLOW AT OPER. COND. GPM	3.1			
±% DEVIA. FROM NORM. FLOW, NORM. PLANT OPER.	40 -50			
SPECIFIC GRAVITY AT OPER. COND.	1.02			
VISCOSITY AT OPER. COND., CP	Approx. 20.0			
STEAM				
FLOW AT FULL METER DIFF. & OPER. COND., LBS/HR				
NORMAL FLOW AT OPER. COND., LBS/HR				
±% DEVIA. FROM NORM. FLOW, NORM. PLANT OPER.				
QUALITY AT OPER. COND., %				
SUPERHEAT AT OPER. COND., °F				
GENERAL				
TYPE OF PRIMARY ELEMENT	Rotameter			
TYPE OF INSTRUMENT	Transducer			
TYPE OF CONTROL ACTION	Prop. & Reset			
DIFF. RANGE, INCHES WATER, DRY	0 - 30			
TRANS. TO BOARD OR LOCAL	Board			
WITH AIR FAILURE, VALVE	Closes			
WITH INCREASE IN FLOW, VALVE	Closes			
LINE SIZE, INCHES	2			
JUMPER NO.	G-G7-3-G6			
ORIFICE BETA	-			
SPECIAL REQUIREMENTS	Remote			

FLOWMETERS AND FLOWCONTROLLERS
PROCESS SPECIFICATIONS

GALLERY SIDE

ITEM NO. (FLOW DIAGRAM SYMBOL)	FT H2-4	FT J7-2	FT K3-1	FT-L1-1
NEW INSTRUMENT PARTS REQUIRED	Rotameter	Rotameter	Rotameter	Rotameter
SERVICE	Dem. Water to HSS	Dem. Water to ICX	Dem. Water to 2EX	2AS
LOCATION	P&O	P&O	P&O	P&O
OPERATING CONDITIONS				
FLUID	Dem. Water	Dem. Water	Dem. Water	0.75M HNO ₃
CORROSIVE COMPOUNDS	None	None	None	HNO ₃
OPERATING TEMPERATURE, °F	75.0	75.0	75.0	95.0
DESIGN TEMPERATURE, °F	125.0	125.0	125.0	125.0
OPERATING PRESSURE, PSIG	7.6	7.6	7.6	9.0
DESIGN PRESSURE, PSIG	150.0	150.0	150.0	150.0
LIQUID				
FLOW AT FULL METER DIFF. & OPER. COND. GPM	15.0	112.0	92.0	1.1
NORMAL FLOW AT OPER. COND. GPM	11.2	83.8	69.1	0.81
±% DEVIA. FROM NORM. FLOW, NORM. PLANT OPER.	±0 -50	±0 -50	±0 -50	±0 -50
SPECIFIC GRAVITY AT OPER. COND.	1.0	1.0	1.0	1.02
VISCOSITY AT OPER. COND., CP	1.0	1.0	1.0	0.9
STEAM				
FLOW AT FULL METER DIFF. & OPER. COND., LBS/HR				
NORMAL FLOW AT OPER. COND., LBS/HR				
±% DEVIA. FROM NORM. FLOW, NORM. PLANT OPER.				
QUALITY AT OPER. COND., %				
SUPERHEAT AT OPER. COND., °F				
GENERAL				
TYPE OF PRIMARY ELEMENT	Rotameter	Rotameter	Rotameter	Rotameter
TYPE OF INSTRUMENT	Transducer	Transducer	Transducer	Transducer
TYPE OF CONTROL ACTION	Prop. & Reset	Prop. & Reset	Prop. & Reset	Prop. & Reset
DIFF. RANGE, INCHES WATER, DRY	0 - 30	0 - 30	0 - 30	0 - 30
TRANS. TO BOARD OR LOCAL	Board	Board	Board	Board
WITH AIR FAILURE, VALVE	Closes	Closes	Closes	Closes
WITH INCREASE IN FLOW, VALVE	Closes	Closes	Closes	Closes
LINE SIZE, INCHES	1	3	2	1
JUMPER NO.	-	-	-	-
ORIFICE BETA	-	-	-	-
SPECIAL REQUIREMENTS	-	-	-	-

FLOWMETERS AND FLOWCONTROLLERS

PROCESS SPECIFICATIONS

GALLERY SIDE

ITEM NO. (FLOW DIAGRAM SYMBOL)	FT R1-3	FT R2-4	FT U6-2	FT-G7-3
NEW INSTRUMENT PARTS REQUIRED	Rotameter	Rotameter	Rotameter	Rotameter
SERVICE	20F	20SR	AAR	10C
LOCATION	R Cell	R Cell	U Area	P&O
OPERATING CONDITIONS				
FLUID	TBP Diluent	0.1 M HNO ₃	Dem. Water	0.51 M NaOH
CORROSIVE COMPOUNDS	None	HNO ₃	None	NaOH
OPERATING TEMPERATURE, °F	122	122	75	86.0
DESIGN TEMPERATURE, °F	150	150	125	125
OPERATING PRESSURE, PSIG	46.0	40.0	60.0	
DESIGN PRESSURE, PSIG	150	150	150	150
LIQUID				
FLOW AT FULL METER DIFF. & OPER. COND. GPM	92	92	12	4.2
NORMAL FLOW AT OPER. COND. GPM	69.2	69.2	9.4	3.1
±% DEVIA. FROM NORM. FLOW, NORM. PLANT OPER.	±0 -50	±0 -50	±0 -50	±0 -50
SPECIFIC GRAVITY AT OPER. COND.	0.85	1.0	1.0	1.02
VISCOSITY AT OPER. COND., CP	2.2	0.9	1.0	20.0
STEAM				
FLOW AT FULL METER DIFF. & OPER. COND., LBS/HR				
NORMAL FLOW AT OPER. COND., LBS/HR				
±% DEVIA. FROM NORM. FLOW, NORM. PLANT OPER.				
QUALITY AT OPER. COND., %				
SUPERHEAT AT OPER. COND., °F				
GENERAL				
TYPE OF PRIMARY ELEMENT	Rotameter	Rotameter	Rotameter	Rotameter
TYPE OF INSTRUMENT	Transducer	Transducer	Transducer	Transducer
TYPE OF CONTROL ACTION	Prop. & Reset	Prop. & Reset	Prop. & Reset	Prop. & Reset
DIFF. RANGE, INCHES WATER, DRY	0 - 30	0 - 30	0 - 30	0 - 30
TRANS. TO BOARD OR LOCAL	Board	Board	Board	Board
WITH AIR FAILURE, VALVE	Closes	Closes	Closes	Closes
WITH INCREASE IN FLOW, VALVE	Closes	Closes	Closes	Closes
LINE SIZE, INCHES	2	2	2	1
JUMPER NO.	-	-	-	-
ORIFICE BETA	-	-	-	-
SPECIAL REQUIREMENTS	-	-	-	-

FLOWMETERS AND FLOWCONTROLLERS
PROCESS SPECIFICATIONS

GALLERY SIDE

ITEM NO. (FLOW DIAGRAM SYMBOL)	FE-J8-1	FE-J8-3	FE-K4-1	FE-K4-3
NEW INSTRUMENT PARTS REQUIRED	Orifice Plate	Orifice Plate	Orifice Plate	Orifice Plate
SERVICE	Steam to E-J8-4	Steam to E-J8-1	Steam to E-K4-1	Steam to E-K4-1
LOCATION	P&O Gallery	P&O Gallery	P&O Gallery	P&O Gallery
OPERATING CONDITIONS				
FLUID	Steam	Steam	Steam	Steam
CORROSIVE COMPOUNDS	None	None	None	None
OPERATING TEMPERATURE, °F	305	305	305	305
DESIGN TEMPERATURE, °F	350	350	350	350
OPERATING PRESSURE, PSIG	55	55	55	55
DESIGN PRESSURE, PSIG	100	100	100	100
LIQUID				
FLOW AT FULL METER DIFF. & OPER. COND. GPM				
NORMAL FLOW AT OPER. COND. GPM				
±% DEVIA. FROM NORM. FLOW, NORM. PLANT OPER.				
SPECIFIC GRAVITY AT OPER. COND.				
VISCOSITY AT OPER. COND., CP				
STEAM				
FLOW AT FULL METER DIFF. & OPER. COND., LBS/HR	24,000	24,000	24,000	24,000
NORMAL FLOW AT OPER. COND., LBS/HR	22,600	22,600	19,800	19,800
±% DEVIA. FROM NORM. FLOW, NORM. PLANT OPER.	+0 -50	+0 -50	+0 -50	+0 -50
QUALITY AT OPER. COND., %	Varies ~100%	Varies ~100%	Varies ~100%	Varies ~100%
SUPERHEAT AT OPER. COND., °F	0	0	0	0
GENERAL				
TYPE OF PRIMARY ELEMENT	Orifice	Orifice	Orifice	Orifice
TYPE OF INSTRUMENT	Force Balance	Force Balance	Force Balance	Force Balance
TYPE OF CONTROL ACTION	Prop. & Reset	Prop. & Reset	Prop. & Reset	Prop. & Reset
DIFF. RANGE, INCHES WATER, DRY	0 -100	0 - 100	0 -100	0 - 100
TRANS. TO BOARD OR LOCAL	Board	Board	Board	Board
WITH AIR FAILURE, VALVE	Closes	Closes	Closes	Closes
WITH INCREASE IN FLOW, VALVE				
LINE SIZE, INCHES	8	8	8	8
JUMPER NO.				
ORIFICE BETA	0.650	0.650	0.650	0.650
SPECIAL REQUIREMENTS				

FLOWMETERS AND FLOWCONTROLLERS
PROCESS SPECIFICATIONS

GALLERY SIDE AND 202-A BUILDING

ITEM NO. (FLOW DIAGRAM SYMBOL)	FE-U6-3	FE-J8-2		
NEW INSTRUMENT PARTS REQUIRED	Orifice Plate	Orifice Plate		
SERVICE	Steam to E-U6-2	Cooling Water to F-J8-2		
LOCATION	202-A Vac. Frac. Bldg.	F&O Gallery		
OPERATING CONDITIONS				
FLUID	Steam	Raw Water		
CORROSIVE COMPOUNDS	None	None		
OPERATING TEMPERATURE, °F	350	70		
DESIGN TEMPERATURE, °F	450	100		
OPERATING PRESSURE, PSIG	100	95		
DESIGN PRESSURE, PSIG	150	125		
LIQUID				
FLOW AT FULL METER DIFF. & OPER. COND. GPM		1660		
NORMAL FLOW AT OPER. COND. GPM		1550		
±% DEVIA. FROM NORM. FLOW, NORM. PLANT OPER.		±0 -50		
SPECIFIC GRAVITY AT OPER. COND.		1.00		
VISCOSITY AT OPER. COND., CP		0.90		
STEAM				
FLOW AT FULL METER DIFF. & OPER. COND., LBS/HR	16,000			
NORMAL FLOW AT OPER. COND., LBS/HR	13,850			
±% DEVIA. FROM NORM. FLOW, NORM. PLANT OPER.	±0 -50			
QUALITY AT OPER. COND., %	~100%			
SUPERHEAT AT OPER. COND., °F	0			
GENERAL				
TYPE OF PRIMARY ELEMENT	Orifice	Orifice		
TYPE OF INSTRUMENT	Force Balance	Force Balance		
TYPE OF CONTROL ACTION	Prop. & Reset	Prop. & Reset		
DIFF. RANGE, INCHES WATER, DRY	0 - 100	0 - 100		
TRANS. TO BOARD OR LOCAL	Board	Board		
WITH AIR FAILURE, VALVE	Closes	Opens		
WITH INCREASE IN FLOW, VALVE	Opens	Opens		
LINE SIZE, INCHES	6	8		
JUMPER NO.				
ORIFICE BETA	0.620	0.775		
SPECIAL REQUIREMENTS				

FLOWMETERS AND FLOWCONTROLLERS
PROCESS SPECIFICATIONS

CANYON SIDE

ITEM NO. (FLOW DIAGRAM SYMBOL)	DOV K1-2	DOV H2-1	DOV G7-1	DOV G2-4
SERVICE	2DF	HAX	10D (67 to 66)	10SR (TK-G2 → T-6-2)
LOCATION	K Cell	H Cell	G Cell	G Cell
OPERATING CONDITIONS				
FLUID	UNH Soln.	TBP Diluent	0.51M NaOH	0.1M HNO ₃
CORROSIVE COMPOUNDS	HNO ₃	None	NaOH	HNO ₃
OPERATING TEMPERATURE, °F	122	113	113	122
DESIGN TEMPERATURE, °F	150	150	150	150
OPER. UPSTREAM PRESSURE, PSIG	42.0	28.0	58.0	44.0
DESIGN PRESSURE, PSIG	150.0	150.0	150	150
PRESS. DROP ACROSS VALVE AT MAX. FLOW, PSI	24.0	11.8	51.2	27.9
PRESS. DROP ACROSS VALVE AT MIN. FLOW, PSI	33.7	12.8	59.0	54.6
PRESS. DROP ACROSS VALVE AT NORM. FLOW, PSI	24.0	11.8	51.2	27.9
LIQUID				
NORM. FLOW AT OPER. COND., GPM	14.6	66.3	3.1	58.8
±% DEVIA. FROM NORM FLOW, NORM. PLANT OPER.	+0 -50	+0 -50	+0 -50	+0 -50
SPECIFIC GRAVITY AT OPER. COND.	1.67	0.85	1.02	1.0
VISCOSITY AT OPER. COND., CP	1.6	2.2	20.0	1.0
STEAM				
NORM. FLOW AT OPER. COND., LBS./HR.				
±% DEVIA. FROM NORM. FLOW, NORM. PLANT OPER.				
QUALITY AT OPER. COND., %				
SUPERHEAT AT OPER. COND., °F				
GENERAL				
FLOW COEFF. REQUIRED (SEE NOTE 1)	5.6	48.0*	0.63	28.0*
VALVE POSITIONER	No	No	No	No
WITH AIR FAILURE, VALVE	Closes	Closes	Closes	Closes
LINE SIZE, INCHES	2	2	2	2
JUMPER NO.	K-K1-K2	H-T36-H2	G-G7-3-G6	G-G2-G2B
SPECIAL REQUIREMENTS	Remote	Remote	Remote	Remote

NOTE 1 - FLOW COEFF. = WATER FLOW, GPM, THROUGH WIDE OPEN VALVE WITH 1 PSI ΔP. IF VALVE SIZES AVAILABLE DO NOT HAVE COEFF. BETWEEN 90 AND 100% OF FIGURE GIVEN, SUPPLY NEXT LARGEST SIZE VALVE.

* Larger valve being placed here to handle smaller pressure drop if needed. Valves are being replaced since rotameters have to be replaced.

DIAPHRAGM OPERATED VALVES
PROCESS SPECIFICATIONS

CANYON SIDE

ITEM NO. (FLOW DIAGRAM SYMBOL)	DOV K3-2	DOV J7-1	DOV K3-3	DOV J7-3	DOV K2-3
SERVICE	2EU	1CU	2EU (spare)	1CU (spare)	2DX
LOCATION	K Cell	J Cell	K Cell	J Cell	K Cell
OPERATING CONDITIONS					
FLUID	UNH Solution	UNH Solution	UNH Soln.	UNH Soln.	TBF Diluent
CORROSIVE COMPOUNDS	HNO ₃	HNO ₃	HNO ₃	HNO ₃	None
OPERATING TEMPERATURE, °F	122	122	122	122	113
DESIGN TEMPERATURE, °F	150	150	150	150	150
OPER. UPSTREAM PRESSURE, PSIG	3.2	2.9	2.9	2.9	20
DESIGN PRESSURE, PSIG	150	150	150	150	150
PRESS. DROP ACROSS VALVE AT MAX. FLOW, PSI	1.9	1.9	1.9	1.9	3.6
PRESS. DROP ACROSS VALVE AT MIN. FLOW, PSI	4.5	4.5	4.5	4.5	14.0
PRESS. DROP ACROSS VALVE AT NORM. FLOW, PSI	1.9	1.9	1.9	1.9	3.6
LIQUID					
NORM. FLOW AT OPER. COND., GPM	71.5	86.3	71.5	86.3	69.0
± % DEVIA. FROM NORM FLOW, NORM. PLANT OPER.	±12.5 -50	±0 -50	±0 -50	±0 -50	±0 -50
SPECIFIC GRAVITY AT OPER. COND.	1.1	1.1	1.1	1.1	0.85
VISCOSITY AT OPER. COND., CP	1.0	1.0	1.0	1.0	2.2
STEAM					
NORM. FLOW AT OPER. COND., LBS./HR.					
± % DEVIA. FROM NORM. FLOW, NORM. PLANT OPER.					
QUALITY AT OPER. COND., %					
SUPERHEAT AT OPER. COND., °F					
GENERAL					
FLOW COEFF. REQUIRED (SEE NOTE 1)	87.5	93.7	87.5	93.7	48.0
VALVE POSITIONER	No	No	NO	NO	NO
WITH AIR FAILURE, VALVE	Closes	Closes	Closes	Closes	Closes
LINE SIZE, INCHES	3	3	3	3	2
JUMPER NO.	K-K3-K4B	J-J7-J8-B	K-K3-K4A	J-J7-J8 A	K-G102-K2
SPECIAL REQUIREMENTS	Remote	Remote	Remote	Remote	Remote

NOTE 1 - FLOW COEFF. = WATER FLOW, GPM, THROUGH WIDE OPEN VALVE WITH 1 PSI Δ P. IF VALVE SIZES AVAILABLE DO NOT HAVE COEFF. BETWEEN 90 AND 100% OF FIGURE GIVEN, SUPPLY NEXT LARGEST SIZE VALVE.

DIAPHRAGM OPERATED VALVES
PROCESS SPECIFICATIONS

GALLERY SIDE

ITEM NO. (FLOW DIAGRAM SYMBOL)	DOV-J7-10	DOV-K3-9	DOV-J8-2	DOV-K4-2
SERVICE	1CX Steam	2EX Steam	Raw Water	Raw Water
LOCATION	P&O	P&O	P&O	P&O
OPERATING CONDITIONS				
FLUID	Steam	Steam	Raw Water	Raw Water
CORROSIVE COMPOUNDS	Steam	Steam	Raw Water	Raw Water
OPERATING TEMPERATURE, °F	330	330	70	70
DESIGN TEMPERATURE, °F	500	500	125	125
OPER. UPSTREAM PRESSURE, PSIG	90 (Max.)	90 (Max.)	86.0	86.0
DESIGN PRESSURE, PSIG	150	150	150	150
PRESS. DROP ACROSS VALVE AT MAX. FLOW, PSI	Approx. 90	Approx. 90	67.0	71.7
PRESS. DROP ACROSS VALVE AT MIN. FLOW, PSI	Approx. 90	Approx. 90	90.0	91.0
PRESS. DROP ACROSS VALVE AT NORM. FLOW, PSI	Approx. 90	Approx. 90	67.0	71.7
LIQUID				
NORM. FLOW AT OPER. COND., GPM			1550	1442
± % DEVIA. FROM NORM FLOW, NORM. PLANT OPER.			+0 -50	+0 -50
SPECIFIC GRAVITY AT OPER. COND.			1.0	1.0
VISCOSITY AT OPER. COND., CP			1.0	1.0
STEAM				
NORM. FLOW AT OPER. COND., LBS./ HR.	6000	6000		
± % DEVIA. FROM NORM. FLOW, NORM. PLANT OPER.	+0 -50	+0 -50		
QUALITY AT OPER. COND., %				
SUPERHEAT AT OPER. COND., °F	None	None		
GENERAL				
FLOW COEFF. REQUIRED (SEE NOTE 1)	55.0	55.0	270	245
VALVE POSITIONER	No	No	No	No
WITH AIR FAILURE, VALVE	Closes	Closes	Closes	Closes
LINE SIZE, INCHES	3	3	8	8
JUMPER NO.				
SPECIAL REQUIREMENTS				

NOTE 1 - FLOW COEFF. = WATER FLOW, GPM, THROUGH WIDE OPEN VALVE WITH 1 PSI Δ P. IF VALVE SIZES AVAILABLE DO NOT HAVE COEFF. BETWEEN 90 AND 100% OF FIGURE GIVEN, SUPPLY NEXT LARGEST SIZE VALVE.

DIAPHRAGM OPERATED VALVES
PROCESS SPECIFICATIONS

ITEM NO. (FLOW DIAGRAM SYMBOL)	DOV L1-1	DOV J7-9	DOV R2-6	DOV-H2-4	DOV G7-7	DOV K2-6
SERVICE	2AS	1CX (HNO ₃)	20SR(T-R2 to TK-R2)	HSS Dem Wtr	10C	2DS
LOCATION	P&O	P&O	R Cell	P&O	P&O	P&O
OPERATING CONDITIONS						
FLUID	0.1N HNO ₃	13.0M HNO ₃	0.1M HNO ₃	Dem. Wtr	0.5M NaOH	Dem. Wtr
CORROSIVE COMPOUNDS	HNO ₃	HNO ₃	HNO ₃	Dem. Wtr	NaOH	Dem. Wtr
OPERATING TEMPERATURE, °F	95	75	90	75	86	90
DESIGN TEMPERATURE, °F	125	125	125	125	125	125
OPER. UPSTREAM PRESSURE, PSIG	8.0	10.0	12.0	10	6.0	14.0
DESIGN PRESSURE, PSIG	150	150	150	150	150	150
PRESS. DROP ACROSS VALVE AT MAX. FLOW, PSI	6.2	11.0	7.9	2.1	5.0	3.8
PRESS. DROP ACROSS VALVE AT MIN. FLOW, PSI	7.10	11.0	9.5	8.4	5.5	6.8
PRESS. DROP ACROSS VALVE AT NORM. FLOW, PSI	6.2	11.0	7.9	2.1	5.0	3.8
LIQUID						
NORM. FLOW AT OPER. COND., GPM	0.81	0.13	69.2	11.2	3.1	15
± % DEVIA. FROM NORM FLOW, NORM. PLANT OPER.	+0 -50	+0 -50	+0 -50	+0 -50	+0 -50	+0 -50
SPECIFIC GRAVITY AT OPER. COND.	1.02	1.37	1.05	1.0	1.02	1.0
VISCOSITY AT OPER. COND., CP	0.9	1.6	0.9	1.0	20.0	1.0
STEAM						
NORM. FLOW AT OPER. COND., LBS / HR.						
± % DEVIA. FROM NORM. FLOW, NORM. PLANT OPER.						
QUALITY AT OPER. COND., %						
SUPERHEAT AT OPER. COND., °F						
GENERAL						
FLOW COEFF. REQUIRED (SEE NOTE 1)	0.47	0.066	35.0	11.0	2.0	11
VALVE POSITIONER	no	No	No	No	No	No
WITH AIR FAILURE, VALVE	Closes	Closes	Closes	Closes	Closes	Closes
LINE SIZE, INCHES	1	1	2	1	1	1
JUMPER NO.	-	-	-			
SPECIAL REQUIREMENTS	-	-	-			

NOTE 1 - FLOW COEFF. = WATER FLOW, GPM, THROUGH WIDE OPEN VALVE WITH 1 PSI Δ P. IF VALVE SIZES AVAILABLE DO NOT HAVE COEFF. BETWEEN 90 AND 100% OF FIGURE GIVEN, SUPPLY NEXT LARGEST SIZE VALVE.

DIAPHRAGM OPERATED VALVES

PROCESS SPECIFICATIONS

CANYON SIDE

ITEM NO. (FLOW DIAGRAM SYMBOL)	J-J7-1	J-J7-2		
SERVICE	LCU	LCU (spare)		
LOCATION	J Cell	J Cell		
OPERATING CONDITIONS				
FLUID	UNH Solution	Same		
CORROSIVE COMPOUNDS	HNO ₃	Specifications		
OPERATING TEMPERATURE, °F	122	as		
DESIGN TEMPERATURE, °F	175	J-J7-1		
STEAM PRESSURE, PSIG	90 (Max.)			
BACK PRESSURE, PSIG	6.4 (@ Max. Flow of	86.3 GPM)		
DESIGN PRESSURE, PSIG	150			
SUCTION HEAD AT NORM. FLOW, FT.	2.1 (Max. Allowable Positive Suction Head)			
SUCTION HEAD AT MAX. FLOW, FT.	2.1 (Max. Allowable Positive Suction Head)			
SUCTION HEAD AT MIN. FLOW, FT.	0.0 (Max. Allowable Positive Suction Head)			
LIQUID				
NORM. FLOW AT OPER. COND., GPM	86.3			
± % DEVIA. FROM NORM. FLOW, NORM. PLANT OPER.	±0 -50			
SPECIFIC GRAVITY AT OPER. COND.	1.1			
VISCOSITY AT OPER. COND., CP	1.0			
VAPOR PRESSURE AT OPER. COND., PSIA	1.0			
GENERAL				
LINE SIZE, INCHES	3	3		
JUMPER NO.	J-J7-J8B	J-J7-J8A		
SPECIAL REQUIREMENTS	Continuous and Remote			

Note: Flow is controlled by throttling upstream of jet. To insure necessary system flow rangeability and control, jet supplied must meet both maximum and minimum conditions noted.

STEAM EJECTORS
PROCESS SPECIFICATIONS

CANYON SIDE

ITEM NO. (FLOW DIAGRAM SYMBOL)	J-K3-1	J-K3-2		
SERVICE	2EU	2EU (spare)		
LOCATION	K Cell ¹	K Cell		
OPERATING CONDITIONS				
FLUID	UNH Solution	Same		
CORROSIVE COMPOUNDS	HNO ₃	Specifications		
OPERATING TEMPERATURE, °F	122	as		
DESIGN TEMPERATURE, °F	175	J-K3-1		
STEAM PRESSURE, PSIG	90 (Max.)			
BACK PRESSURE, PSIG	6.1 (@ Max. Flow of	80.5 GPM)		
DESIGN PRESSURE, PSIG	150			
SUCTION HEAD AT NORM. FLOW, FT.	3.6 (Max. Allowable	Positive Suction Head)		
SUCTION HEAD AT MAX. FLOW, FT.	2.7 (Max. Allowable	Positive Suction Head)		
SUCTION HEAD AT MIN. FLOW, FT.	0.0 (Max. Allowable	Positive Suction Head)		
LIQUID				
NORM. FLOW AT OPER. COND., GPM	71.5			
± % DEVIA. FROM NORM. FLOW, NORM. PLANT OPER.	±12.5 -50			
SPECIFIC GRAVITY AT OPER. COND.	1.1			
VISCOSITY AT OPER. COND., CP	1.0			
VAPOR PRESSURE AT OPER. COND., PSIA	1.0			
GENERAL				
LINE SIZE, INCHES	3	3		
JUMPER NO.	K-K3-K4B	K-K3-K4-A		
SPECIAL REQUIREMENTS	Continuous and Remote			

Note: Flow is controlled by throttling upstream of jet. To insure necessary system flow rangeability and control, jet supplied must meet both maximum and minimum conditions noted.

STEAM EJECTORS PROCESS SPECIFICATIONS

CANYON SIDE

ITEM NO. (FLOW DIAGRAM SYMBOL)		J-D3-3	J-D4-2	J-SD
SERVICE		D3 to D5	D4 to D5	Sump SD to F18
LOCATION		D Cell	D Cell	D Cell
OPERATING CONDITIONS				
FLUID		2.5M UNH 0.4M HNO ₃	2.5M UNH 0.4M HNO ₃	Waste - D Cell
CORROSIVE COMPOUNDS		HNO ₃	HNO ₃	HNO ₃
OPERATING TEMPERATURE, °F		100	100	100
DESIGN TEMPERATURE, °F		350°	350°	350°
STEAM PRESSURE, PSIG		90	90	90
BACK PRESSURE, PSIG		22	0.5	22
DESIGN PRESSURE, PSIG		125	125	125
SUCTION HEAD AT NORM. FLOW, FT.		10	10	11.5
SUCTION HEAD AT MAX. FLOW, FT.		-	-	-
SUCTION HEAD AT MIN. FLOW, FT.		-	-	-
LIQUID				
NORM. FLOW AT OPER. COND., GPM		75 GPM	75 GPM	75 GPM
± % DEVIA. FROM NORM. FLOW, NORM. PLANT OPER.		± 0	± 0	± 0
SPECIFIC GRAVITY AT OPER. COND.		1.82	1.82	1.82
VISCOSITY AT OPER. COND., CP		1.5	1.5	1.5
VAPOR PRESSURE AT OPER. COND., PSIA		1.0	1.0	1.0
GENERAL				
LINE SIZE, INCHES		2	2	2
JUMPER NO.		H-2-57524	H-2-53606	H-2-53591
SPECIAL REQUIREMENTS		Remote	Remote	Remote

Standard Purex Jets BPF 7920

STEAM EJECTORS
PROCESS SPECIFICATIONS

ITEM NO. (FLOW DIAGRAM SYMBOL)	SI-J7		SI-K3	
SERVICE	1CX - H ₂ O		2EX - H ₂ O	
LOCATION	P&O		P&O	
OPERATING CONDITIONS				
FLUID	Dem. H ₂ O		Dem. H ₂ O	
CORROSIVE COMPOUNDS	Dem. H ₂ O		Dem. H ₂ O	
OPERATING TEMPERATURE, °F	80 to 160		80 to 160	
DESIGN TEMPERATURE, °F	330		330	
STEAM PRESSURE, PSIG	90 (Max.)		90 (Max.)	
BACK PRESSURE, PSIG	2.0*		2.0*	
DESIGN PRESSURE, PSIG	150		150	
SUCTION HEAD AT NORM. FLOW, FT.	2.3		2.3	
SUCTION HEAD AT MAX. FLOW, FT.	2.3		2.3	
SUCTION HEAD AT MIN. FLOW, FT.	0		0	
LIQUID				
NORM. FLOW AT OPER. COND., GPM	83.8		69.1	
± % DEVIA. FROM NORM. FLOW, NORM. PLANT OPER.	±0 -50		±0 -50	
SPECIFIC GRAVITY AT OPER. COND.	1.0		1.0	
VISCOSITY AT OPER. COND., CP	1.0		1.0	
VAPOR PRESSURE AT OPER. COND., PSIA	0.36		0.36	
GENERAL				
LINE SIZE, INCHES	3		2	
JUMPER NO.	-		-	
SPECIAL REQUIREMENTS	Continuous Heating		Continuous Heating	

* Discharge pressure of jet heater.

Note: Range of jet heaters should be 34.0 GPM to 100.0 GPM. Capacity range of jet heater will be achieved by throttling jet steam pressure and flow in suction lines.

STEAM EJECTORS PROCESS SPECIFICATIONS

GALLERY SIDE

ITEM NO. (FLOW DIAGRAM SYMBOL)				
NEW INSTRUMENT PARTS REQUIRED	*Pneumatic temperature transmitter control steam flow to			
SERVICE	1CX and 2EX water heater			
LOCATION	P&O			
OPERATING CONDITIONS				
FLUID	Dem. H ₂ O			
CORROSIVE COMPOUNDS	Dem. H ₂ O			
OPERATING TEMPERATURE, °F	Span of 122° F Adjustable between 103° F and 392° F			
DESIGN TEMPERATURE, °F	with overrange protection of 1022° F			
OPERATING PRESSURE, PSIG	Convert temperature to 3-15 PSI range of air pressure			
DESIGN PRESSURE, PSIG				
LIQUID				
FLOW AT FULL METER DIFF. & OPER. COND. GPM				
NORMAL FLOW AT OPER. COND. GPH				
±% DEVIA. FROM NORM. FLOW, NORM. PLANT OPER.				
SPECIFIC GRAVITY AT OPER. COND.				
VISCOSITY AT OPER. COND., CP				
STEAM				
FLOW AT FULL METER DIFF. & OPER. COND., LBS/HR				
NORMAL FLOW AT OPER. COND., LBS/HR				
±% DEVIA. FROM NORM. FLOW, NORM. PLANT OPER.				
QUALITY AT OPER. COND., %				
SUPERHEAT AT OPER. COND., °F				
GENERAL				
TYPE OF PRIMARY ELEMENT	Temp. Transmitter			
TYPE OF INSTRUMENT	Force Balance			
TYPE OF CONTROL ACTION	Prop. & Reset			
DIFF. RANGE, INCHES WATER, DRY				
TRANS. TO BOARD OR LOCAL	Board			
WITH AIR FAILURE, VALVE				
WITH INCREASE IN FLOW, VALVE				
LINE SIZE, INCHES				
JUMPER NO.				
ORIFICE BETA				
SPECIAL REQUIREMENTS	Convert temperature to standard 3-15 PSI range of air pressure for control valve			
<p>*Note: Two (2) needed One (1) for controlling DOV J7-10 One (1) for controlling DOV K3-9</p>				
TEMPERATURE CONTROLLERS PROCESS SPECIFICATIONS				

PROCESS PUMP SPECIFICATION

Location: G Cell

Service: 10SR from TK-G2 to T-G2

Item: P-G2

Type: Vertical Turbine

Driver: TEFC Motor, non-overloading

Process Requirements

Fluid Handled = 0.1 M HNO_3

Corrosive Compounds = 0.1M HNO_3

Total Flow GPM = 58.8

Pumping Temp. $^{\circ}\text{F}$ = 122

Liquid Sp.G @ 122 $^{\circ}\text{F}$ = 1.0

Liquid Viscosity, CP @ 122 $^{\circ}\text{F}$ = 0.8

Vapor Pressure @ 122 $^{\circ}\text{F}$ = 1.8 PSIA

Suction Head, Ft = -0.5 (Min.), 6.0 (Max.)

Net Positive Suction Head, Ft = 29.3

Discharge Head (referred to suction elevation), Ft. = 42.0

Pump must meet specification for canyon pumps.

Setting Height = 9 feet, 2-3/4 inches

Purex Standard Pump Group No. 2

Maximum differential Head at Pump Shut Off, Ft. of Liquid - 55

Design Press. PSIG - 100

Design Temp., $^{\circ}\text{F}$ - 200

PROCESS PUMP SPECIFICATION

Location: R Cell

Service: 20SR from TK-R2 to T-R2

Item: P - R2

Type: Vertical Turbine

Driver: TE FC Motor, non-overloading

Process Requirements

Fluid Handled = 0.1 M HNO₃

Corrosive Compound = HNO₃

Total Flow GPM = 69.2

Pumping Temp. °F = 122

Liquid Sp.G @ 122° F = 1.0

Liquid Viscosity @ 122° F = 0.8

Vapor Pressure @ 122° F = 1.8 PSIA

Suction Head, Ft. = 0.5 (Min.); 6.0 (Max.)

Net Positive Suction Head, Ft. = 29.3

Discharge Head, Ft. = 43.0

Setting Height = 9 ft., 2-3/4 in.

Maximum Differential Head at Pump Shut Off, Ft. of Liquid - 45

Design Pressure, PSIG - 100

Design Temp, °F - 200

NON-CANYON PUMP SPECIFICATION

Location: 211A

Service: Formalin from tank car to storage tank, TK-21

Equipment No.: P-42

Type: Centrifugal

Driver: TEFC, explosion proof motor

Process Requirements

Fluid Handled: 37.5% Formaldehyde
10.5% Methanol
52% Water

Corrosive Compounds: Formaldehyde

Total Flow GPM: 60

Pumping Temp. °F: 80

Liquid Sp.G @ 80°: 1.1

Liquid Viscosity @ 80°: 1.7 cp

Vapor Pressure @ 80°: 1.47 psia

Suction Head, Ft: -16.9 feet maximum; -7.3 feet minimum

Net Positive Suction Head, Ft: 13.9

Discharge Head, Ft: 60 feet

Special Requirements: Self-priming

Maximum Differential Head at Pump Shut Off, Ft. of Liquid - 80

Design Pressure PSIG - 100

Design Temp. °F - 150

NON-CANYON PUMP SPECIFICATION

Location: 211A

Service: 93% H_2SO_4 from tank car to storage tank, TK-51

Equipment No: P-51

Type: Centrifugal

Driver: TEFC motor

Process Requirements

Fluid Handled: 93 wt % H_2SO_4

Corrosive Compounds: H_2SO_4

Total Flow, GPM: 30

Pumping Temp. °F: 80

Liquid Sp.G. at 80° F: 1.81

Liquid Viscosity @ 80°F: 19.8 cp

Vapor Pressure @ 80° F: 40.1 mm Hg

Suction Head, Ft: -7.3 min.; -16.9 max.

Net Positive Suction Head, Ft: 33.4

Discharge Head, Ft. 40 feet

Special Requirements: Self-Priming

Maximum Differential Pressure at Pump Shut Off, Ft. of Liquid - 52

Design Pressure PSIG - 100

Design Temp., °F - 150

METERING PUMP SPECIFICATION
LAPP PULSA FEEDER

Location: N Cell
Service: XAF Feed
Equipment No: MP-N1
Type: Lapp Pulsa feeder CPS-2, 75 gph capacity
Driver: $\frac{1}{2}$ HP, 110 volts, 60 cycle 1 phase AC - 1725 RPM totally enclosed

Process Requirements

Product Handled: Similar to 40% HNO₃
Corrosive Compounds: HNO₃
Fluid Temp. °F: 150°F
Viscosity @ 150° F CP: 0.66
Vapor Pressure @ 150° F mm/tg: 130
Solids Content: None
Suction: Flooded
Maximum Flow GPH:
Normal Flow GPH: 60
Minimum Flow GPH:
Operating Pressure:

Characteristics and Construction

Theoretical Capacity GPH: 75.0
Design Pressure PSIG: 75.0
Stroke Length, inches: 1.6
Piston Size, inches: 2.0
Strokes/minute: 58
Valve Type: Cone
Number of Suction Valves: 2
Number of Discharge Valves: 1
Valve Material: 316 SST
Seat Material: 316 SST
Valve Housing: 316 SST
Diaphragm: 316 SST w/Teflon Gaskets
Reagent Head: 316 SST
Discharge Spring Loaded: Yes
Suction Spring Loaded: No
In & Out Connections: 3/4"

Special Requirements and Notes

1. Double diaphragm construction per plan B of data sheet number 443.
2. Present pump MP-N1-1 is type CPS-2, 42 GPH maximum capacity. This pump can be converted to 75 GPH capacity by changing only the piston, diaphragm head, and reagent head. This pump will then be identical to the installed spare pump MP-N1-2.

NOTE

1. EXISTING EQUIPMENT & PIPING SHOWN BY LIGHT LINES
2. NEW EQUIPMENT & PIPING SHOWN BY HEAVY LINES
3. STREAM NUMBERS IN PARENTHESES REFER TO NUMBERS IN HW-64450 FOR FLOWS AND COMPOSITION.

APPROVED
FOR DESIGN
NOT FOR CONSTRUCTION

DESCRIPTION		REV.	DATE	APP'D.	FOR	DATE
REVISIONS						
CLASSIFICATION		NONE				
SK-2-18417		1	11	0		
SCALE:		AS SHOWN				
DESIGNED BY	DATE	APPROVED BY	DATE	FOR	DATE	
CHECKED BY	DATE	APPROVED BY	DATE	FOR	DATE	
U. S. ATOMIC ENERGY COMMISSION		MANFORD ATOMIC PRODUCTS OPERATION				
GENERAL ELECTRIC						
PUREX FLOW SKETCH CHEMICAL MAKE-UP EXPANSION TO 4.0 CAPACITY FACTOR						
202-A		7000				
SK-2-18417		111				

FRESH HNO₃
TK-222 SH. 7
50% NaOH
TK-208 & 212M.
DEMIN. H₂O
TK-223 SH. 1

QTY.	DESCRIPTION
	FRESH HNO ₃
	50 % NaOH
	DEMIN. H ₂ O

HW-66104
PAGE 39

- NOTE**
1. EXISTING EQUIPMENT & PIPING SHOWN BY LIGHT LINES.
 2. NEW EQUIPMENT & PIPING SHOWN BY HEAVY LINES
 3. STREAM NUMBERS IN PARENTHESES REFER TO NUMBERS IN HW-64450 FOR FLOWS AND COMPOSITION

APPROVED
FOR DESIGN
NOT FOR CONSTRUCTION

1. ZONE 50 & 51 ADDED NEW DOY'S		L.A. [initials]	
REVISION		DATE	
NONE		[initials]	
SK-2-18417		2 III I	
SHEET NAME		APPROVAL	
DESIGNED BY [initials]		CHECKED BY [initials]	
DRAWN BY [initials]		DATE [initials]	
1927			
CSC-895			
U. S. ATOMIC ENERGY COMMISSION HANFORD ATOMIC PRODUCTS OPERATION GENERAL ELECTRIC			
PUREX FLOW SKETCH CHEMICAL ADDITION EXPANSION TO 5.0 CAPACITY FACTOR			
202-A		7000	
SK-2-18417		2 III I	

FRESH ACID
RECOVERED ACID
SEMIM. H_2O

TK-204
WASTE
REWORK ADD
500
GALS.

TO F CELL
VESSELS

TK-205
UTILITY
ADD
500
GALS.

TO TK-F13
K5 & K6

TK-221
HEAD END
WASH ADD
500
GALS.

TO D, E, G & U
CHILL VESSELS

TK-N11
XAS

TK-218
NAF ADD
80
GALS.

TO TK-E6

TK-219
UTILITY
 H_2NO_2 ADD
80
GALS.

TO TK-F13

TK-Q21
NO. 1
WASH
20
GALS.

TO TK-Q3
SH. 11

TK-Q22
NO. 2
WASH
250
GALS.

(85) 3AF-CHEM
(85) 3XS
(85) 3XE
TO TK-Q3
SH. 11

1. EXISTING EQUIPMENT & PIPING
SHOWN BY LIGHT LINES

2. NEW EQUIPMENT & PIPING
SHOWN BY HEAVY LINES

3. STREAM NUMBERS IN PARENTS
REFER TO NUMBERS IN MW-54
FOR FLOW & COMPOSITION.

**PUREX FLOW SKETCH
CHEMICAL ADDITION
EXPANSION TO
4.0 CAPACITY FACTOR**

SK-2-10417

NOTE

1. EXISTING EQUIPMENT & PIPING SHOWN BY LIGHT LINES.
2. NEW EQUIPMENT & PIPING SHOWN BY HEAVY LINES.
3. STREAM NUMBERS IN PARENTHESES REFER TO NUMBERS IN HW-64150 FOR FLOWS AND COMPOSITION.

APPROVED
FOR DESIGN
NOT FOR CONSTRUCTION

NO.	DESCRIPTION	REV.	DATE	BY	CHKD.
REVISIONS					
NOTE					
SK-2-18417		5	11		
SCALE: NONE					
DESIGNED BY: [Signature] DATE: 1-18-60					
CHECKED BY: [Signature] DATE: 1-18-60					
APPROVED BY: [Signature] DATE: 1-18-60					
PROJECT NO. 1627					
DRAWING NO. CGC-855					
U. S. ATOMIC ENERGY COMMISSION HANFORD ATOMIC PRODUCTS OPERATION GENERAL ELECTRIC					
PUREX FLOW SKETCH FEED PREPARATION EXPANSION TO 4.0 CAPACITY FACTOR					
202-A		7000			
SK-2-18417		5 11

NOTE

1. EXISTING EQUIPMENT & PIPING SHOWN BY LIGHT LINES.
2. NEW EQUIPMENT & PIPING SHOWN BY HEAVY LINES.
3. STREAM NUMBERS IN PARENTHESES REFER TO NUMBERS IN HW-64450 FOR FLOWS AND COMPOSITION.

APPROVED
FOR DESIGN
NOT FOR CONSTRUCTION

DESCRIPTION	REVISED	DATE	BY
NONE			
SK-2-18417	6	11	0
SCALE: NONE	ACCEPTANCE		
DESIGNED BY: J. D. Smith	DATE: 7/1/60	CHECKED BY: J. D. Smith	DATE: 7/1/60
PROJECT NO: 1627	U. S. ATOMIC ENERGY COMMISSION		
PROJECT NAME: CGC-695	HANFORD ATOMIC PRODUCTS OPERATION		
GENERAL ELECTRIC			
PUREX FLOW SKETCH			
DECONTAMINATION			
AND PARTITION			
EXPANSION TO			
4.0 CAPACITY FACTOR			
DATE: 7/1/60	SCALE: 7000	SK-2-18417	
REVISED: 6	11

FOR BIDDING

NOT FOR CONSTRUCTION

**PUREX FLOW SKETCH
URANIUM PURIFICATION
EXPANSION TO
40 CAPACITY FACTOR**

SK-2-18417

HW-66104
PAGE 45

NOTE

1. EXISTING EQUIPMENT & PIPING SHOWN BY LIGHT LINES.
2. NEW EQUIPMENT & PIPING SHOWN BY HEAVY LINES.
3. STREAM NUMBERS IN PARENTHESES REFER TO NUMBERS IN HW-64450 FOR FLOWS & COMPOSITION.

APPROVED
FOR DESIGN
NOT FOR CONSTRUCTION

DATE		REV	BY	CHKD	DATE
REVISIONS					
NONE					
SK-2-18417		8	11	0	
SCALE: NONE		APPROVALS			
DESIGNED BY: J. J. J. J. J.		CHECKED BY: J. J. J. J. J.			
DATE: 7-10-50		DATE: 7-10-50			
DRAWN BY: J. J. J. J. J.		DATE: 7-10-50			
DATE: 7-10-50		DATE: 7-10-50			
1627					
CGC-895					
U. S. ATOMIC ENERGY COMMISSION MANFORD ATOMIC PRODUCTS OPERATION GENERAL ELECTRIC					
PUREX FLOW SKETCH PLUTONIUM PURIFICATION EXPANSION TO 4.0 CAPACITY FACTOR					
202-A		7000			
SK-2-18417		8		11	

DESIGNER: J. J. J. J. J.
CHECKED: J. J. J. J. J.
DATE: 7-10-50

HW-66104
PAGE 46

NOTE

1. EXISTING EQUIPMENT & PIPING SHOWN BY LIGHT LINES
2. NEW EQUIPMENT & PIPING SHOWN BY HEAVY LINES
3. STREAM NUMBERS IN PARENTHESES REFER TO NUMBERS IN HW-64450 FOR FLOWS & COMPOSITION.

APPROVED
FOR DESIGN
NOT FOR CONSTRUCTION

COND. ZONE 7E ADDED NEW E-F5 JUMPERS ZONE 7E LOADED NEW		L.O.	CU
NONE		Jm	
SK-2-18417		9 11 1	
SCALE: NONE		REVISIONS	
DATE: 1967		BY: CEC-608	
E. I. ATOMIC ENERGY CORPORATION HANFORD ATOMIC PRODUCTS OPERATION GENERAL ELECTRIC		PUREX FLOW SKETCH ACID RECOVERY AND WASTE EXPANSION TO A.O. CAPACITY FACTOR	
SK-2-18417		1000

NO.1 SOLVENT TRE

NO.2 SOLVENT TR

ATMENT SYSTEM

NOTE

1. EXISTING EQUIPMENT & PIPING SHOWN BY LIGHT LINES.
2. NEW EQUIPMENT & PIPING SHOWN BY HEAVY LINES.
3. STREAM NUMBERS IN PARENTHESES REFER TO NUMBERS IN HW-64459 FOR FLOWS AND COMPOSITION.

TREATMENT SYSTEM

NO.		DESCRIPTION		REV. OF		DATE		DATE													
REVISIONS																					
CLASSIFICATION				CLASSIFIED BY		DATE															
NONE				J. M. G. Jones DATE 7-17-68																	
DWG NO.		SK-2-18417		SHEET NO.		10		OF 10													
SCALE:		APPROVALS <table border="1"> <tr> <td>DESIGNED BY</td> <td>DATE</td> <td>BY</td> <td>DATE</td> </tr> <tr> <td>CHANGES BY</td> <td>DATE</td> <td>BY</td> <td>DATE</td> </tr> <tr> <td>ISSUED BY</td> <td>DATE</td> <td>BY</td> <td>DATE</td> </tr> </table>								DESIGNED BY	DATE	BY	DATE	CHANGES BY	DATE	BY	DATE	ISSUED BY	DATE	BY	DATE
DESIGNED BY	DATE	BY	DATE																		
CHANGES BY	DATE	BY	DATE																		
ISSUED BY	DATE	BY	DATE																		
SIZE: ENG. Dwg. UNIT		1627 UNIT: U.S.																			
PROPERTY NO.		CGC-895																			
U. S. ATOMIC ENERGY COMMISSION HANFORD ATOMIC PRODUCTS OPERATION GENERAL ELECTRIC																					
PUREX FLOW SKETCH SOLVENT TREATMENT EXPANSION TO 4.0 CAPACITY FACTOR																					
Dwg No.		202-A		Revision		7000															
Dwg No.		SK-2-18417		SHEET NO.		10		OF 10

HW-66104
PAGE 48

NOTE

- EXISTING EQUIPMENT & PIPING SHOWN BY LIGHT LINES.
- NEW EQUIPMENT & PIPING SHOWN BY HEAVY LINES.
- STREAM NUMBERS IN PARENTHESES REFER TO NUMBERS IN HW-64450 FOR FLOWS & COMPOSITION.

APPROVED
FOR DESIGN
NOT FOR CONSTRUCTION

REV.	DESCRIPTION	REV.	DATE	APP'D.	BY	FOR	DATE
REVISIONS							
CLASSIFICATION		CLASSIFIED BY					
NONE		DATE		07.1.60			
SK-2-18417		11		11		0	
SCALE: NONE		APPROVALS					
DRAWN BY: [Signature]		DATE: 7-7-60		[Signature]		DATE: 7/7/60	
CHECKED BY: [Signature]		DATE: 7-14-60		[Signature]		DATE: 7/14/60	
DESIGNED BY: [Signature]		DATE: 7-14-60		[Signature]		DATE: 7/14/60	
DES. BY: [Signature]		UNIT: E.A.D.					
REV. NO: 1627							
PROJECT NO: C6C-895							
U. S. ATOMIC ENERGY COMMISSION HANFORD ATOMIC PRODUCTS OPERATION GENERAL ELECTRIC							
PUREX FLOW SKETCH PALM PURIFICATION & VENT SYSTEMS EXPANSION TO 4.0 CAPACITY FACTOR							
REV. NO: 202-A		REV. NO: 7000					
REV. NO: SK-2-18417		REV. NO: 11		REV. NO: 11

GENERAL NOTES

1. NEW WALL TO MATCH EXISTING WALL - UTILIZE REMOVED SECTIONS WHERE POSSIBLE.
2. EXISTING PIPING IN VICINITY OF REMOVED WALL SECTION TO BE MOVED AS REQUIRED FOR EASIER MAINTENANCE.
3. EXISTING EQUIPMENT & PIPING SHOWN IN PLAN BY LIGHT LINES & NEW EQUIPMENT & PIPING BY HEAVY LINES.
4. COMPRESSOR C-608-3 TO BE NASH ENG. CO. HYTOR. SIZE 1250 (REF. 4) MODIFIED TO 8050 RPM (REF. 5).
5. DEHUMIDIFIER L-608-2 TO BE PITTSBURGH LECTRODRYER CORP. - WORKING PRESSURE RANGE OF 35 TO 150 P.S.I.G. (REF. 3).

HW 66104
PAGE 50

N

EXISTING WALL

SECTION A-A

FOR
COMMENTS

NOT FOR CONSTRUCTION

SUPERSEDES DWG.
No SK-2-18431

NO.	DESCRIPTION	REV.	DATE	APPROVED BY	FOR	DATE																		
REVISIONS																								
NONE																								
DESIGNED BY: <i>J. M. [Signature]</i>																								
DATE: <i>10-25-60</i>																								
DRAWN BY: <i>[Signature]</i>																								
DATE: <i>10-25-60</i>																								
SCALE: 1/4" = 1'-0"																								
APPROVALS																								
<table border="1"> <tr> <th>NO.</th> <th>NAME</th> <th>DATE</th> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>							NO.	NAME	DATE															
NO.	NAME	DATE																						
U. S. ATOMIC ENERGY COMMISSION HANFORD ATOMIC PRODUCTS OPERATION GENERAL ELECTRIC																								
NEW COMPRESSOR ROOM.																								
PUREX 4.0 CAPACITY FACTOR EXPANSION																								
No. 202-A Revision 5505.01 SK2-18587																								

3	REF 10001	SPEED INCREASE - NASH COMP.
4	REF 0416	NASH - AIR COMPRESSOR
5	REF 0314	PITT. LECTRODRYER CORP. (OWNED)
6	SK-2-18586	EPD NEW DRYERS & COMPRESSOR
7	H-3-33463	PIPING GEN ARRET COMP ROOM
DRAWING TITLE		
REFERENCE DRAWINGS		
NOT USED ON H-3-33463

EXISTING WALL TO BE REMOVED IN WAY OF NEW COMPRESSOR ROOM } SEE NOTE 1
40\"/>

10-25-60

HW-66104
PAGE 51

NOTE 5

PROVIDE SURGE PROTECTION &
CIRCUIT BREAKER FOR NEW UNIT

**FOR
COMMENTS**

NOT FOR CONSTRUCTION

SUPERSEDES DWG
Nº SK-2-18454

[illegible]

1st class
10-25-60

PROVIDE
AGITATOR
(USE EXIST)

100

PROVIDE TRUNNION MALE
4 REQ. NOT SHOWN
TO FIT EXIST. TRUNNION
BRACKETS ON WALLS
PROVIDE BLANK FLG.
(USE EXIST.)

NOTE

1. TANK IS TO BE DESIGNED TO USE EXISTING JUMPERS IN THE D-3 & D-4 POSITIONS
2. ALL NOZZLES 3" EXCEPT U4, M4, L4, U3, M3 & L3 WHICH ARE 4"
3. FOR EXISTING D3 & D4 TANKS SEE DWG. H-2-52521 & BPP 8024
4. FOR CELL LOCATION SEE H-2-53803 & H-2-53804
5. VESSEL DESIGN SPECIFICATIONS
DESIGN METAL TEMPERATURE 450°F
WORKING TEMPERATURE 230°F
DESIGN PRESSURE 10 PSIG & VAC. 60" WATER
TEST PRESSURE 18 PSIG HYDROSTATIC
- COIL DESIGN SPECIFICATIONS
DESIGN TEMPERATURE 600°F
WORKING TEMPERATURE 340°F
DESIGN PRESSURE 158 PSIG
TEST PRESSURE 220 PSIG
6. VESSEL TO BE FABRICATED FROM 304 L.S.S.T. IN ACCORDANCE WITH SPEC. HWS-5796 REV. 3 FOR CLASS I VESSELS.
7. CORROSION ALLOWANCE - NONE

APPROVED
FOR DESIGN
NOT FOR CONSTRUCTION

REV.	DESCRIPTION	REV. BY	DATE	APP'D BY	DATE
REVISIONS					
CLASSIFICATION		CLASSIFIED BY			
NONE		DATE 7-10-66			
SK-2-18442		0			
SCALE: 1"=1'-0"		APPROVALS			
DESIGNED BY	DATE 7-15-66	APPROVED BY	DATE	APPROVED BY	DATE
CHECKED BY	DATE 7-17-66	APPROVED BY	DATE	APPROVED BY	DATE
REVIEWED BY	DATE 7-18-66	APPROVED BY	DATE	APPROVED BY	DATE
DES. SINGLE DOUB. UNIT		REV. NO.			
REV. NO. 1627					
PROJECT NO. CGC-895					
U. S. ATOMIC ENERGY COMMISSION HANFORD ATOMIC PRODUCTS OPERATION GENERAL ELECTRIC					
TANK D3-D4 16,000 GALLONS					
PUREX 4.0 CAPACITY FACTOR EXPANSION					
CLASS NO. 202-A		REVISIONS 2500.01			
REV. NO. SK-2-18442					

REFERENCE DRAWINGS
NEXT USED ON SK-2-18441 CELL ARRANGEMENT

QTY.	UNIT	DESCRIPTION
------	------	-------------

HW-66104
PAGE 54

GENERAL NOTES

1 VESSEL TO BE CLASS I TYPE FABRICATED AS PER SPEC. NWS-5790, REV. 3

2 DESIGN DATA:

	SHELL SIDE	TUBE SIDE
OPERATING PRESSURE	10-15 PSIA	100 PSIG
DESIGN PRESSURE	7.5-22.5 PSIA	150 PSIG
OPERATING TEMPERATURE	190-210°F	50-155°F
DESIGN TEMPERATURE	300°F	300°F
FLUID	PROCESS VAPORS	RAW WATER
THERMAL SHOCK	ADDITION AT 210°F VAPOR TO 50°F TUBES.	ADDITION AT 50°F WATER TO 210°F TUBES.

3 INSULATION NOT REQUIRED FOR PROCESS CONSIDERATIONS.

4. USE ALL EXISTING JUMPERS 2 NEW JUMPERS REQUIRED ONLY.

5 CARBON STEEL CONDENSER SUPPORTS TO BE PROVIDED USING EXISTING PADS. CARBON STEEL SURFACES TO BE ADEQUATELY COVERED WITH PROTECTIVE COATING.

6. NO CORROSION ALLOWANCE.

SECTION A-A

PLAN
BAFFLE LOCATION

ELEVATION D-D

APPROVED
FOR DESIGN
NOT FOR CONSTRUCTION

SCOPE

DESCRIPTION		REV. BY	DATE	APP'D BY	DATE	FOR	DATE
REVISIONS							
DWG. NO. 5K-2-2733							
CLASSIFICATION		CLASSIFIED BY		DATE			
NONE		214 P. 106		5-15-56			
SCALE:		APPROVALS					
DRAWN 2-2-56 DATE 1-10-56		CHECKED 1-10-56 DATE 1-10-56		DESIGNED 1-10-56 DATE 1-10-56		APPROVED 1-10-56	
ISSUED 1-10-56 DATE 1-10-56		1-10-56		1-10-56		1-10-56	
DWG. ENG. 1-10-56 UNIT: H-10							
INVT. NO. 1627							
PROJECT NO. CGC-895							
2000 U. S. ATOMIC ENERGY COMMISSION							
HANFORD ATOMIC PRODUCTS OPERATION							
GENERAL ELECTRIC							
CONDENSER							
3'6" DIAMETER x 9'-0" LONG							
PUREX FACILITY							
DWG. NO. 5K-2-2733

HW-66104
PAGE 55

DETAIL II

DETAIL III

DETAIL I
TUBE SHEET

APPROVED
FOR DESIGN
NOT FOR CONSTRUCTION

DESCRIPTION		REV BY	APP'D BY	FOR	DATE
REVISIONS					
CLASSIFICATION		CLASSIFIED BY			
NONE		DATE 12-1-66			
SK-2-18479		DESIGN NO.	ENGINEER	REV NO.	
SCALE:		APPROVALS			
DRAWING BY DATE 7-30-60		P. J. 12-1-66			
CHECKED BY DATE 8-10-60		S. J. 12-1-66			
DESIGNED BY DATE 8-10-60		S. J. 12-1-66			
SHEET NUMBER UNIT 50 OF 50		S. J. 12-1-66			
INVT. NO. 1627					
PROJECT NO. CGC-895					
U. S. ATOMIC ENERGY COMMISSION HANFORD ATOMIC PRODUCTS OPERATION GENERAL ELECTRIC					
CONCENTRATOR REBOILER					
SHEET NO. 202-A		SHEET NUMBER 2500			
SK-2-18479					

DOE NO. DRAWING TITLE
REFERENCE DRAWINGS
H-2-57488

HW-66104
PAGE 56

APPROVED
FOR DESIGN
NOT FOR CONSTRUCTION

SCHEMATIC ELEVATION

NOTE

1. NEW JUMPERS SHOWN BY HEAVY LINES
2. EXISTING BYPASS JUMPER H-2-56489 (T-61 TO T-63) TO BE REMOVED
3. INSTALL JUMPER T-63 TO F (USE EXIST. JUMPER) SEE H-2-54089

REV	DESCRIPTION	REV	DATE	APPROVED BY	DATE
1	REVISIONS				
NONE		CLASSIFIED BY			
SK-2-18363		DATE 7-9-60			
SCALE: 1"=1'-0"					
DRAWING NO. 202-A					
CHANGED BY DATE 7-7-60					
REVISED BY DATE 7-9-60					
DESIGN NO. 1627					
PROJECT NO. CGC-895					
U. S. ATOMIC ENERGY COMMISSION HANFORD ATOMIC PRODUCTS OPERATION GENERAL ELECTRIC					
G3-G4 CELL ARRANGEMENT					
PUREX 4.0 CAPACITY FACTOR EXPANSION					
202-A					
8404.01					
SK-2-18363					

DATE	DWG NO.	DRAWING TITLE
		REFERENCE DRAWINGS
		H-2-53817

QTY.	DESCRIPTION
------	-------------

HW-66104
PAGE 58

TYPICAL SPIDER

GENERAL NOTES

1. MAINTAIN ALL NOZZLE LOCATIONS AND ELEVATIONS SO THAT EXISTING TAMPERS MAY BE UTILIZED
2. ALL DIMENSIONS TO BE THE SAME AS ON EXISTING T-J6 EXCEPT AS NOTED
3. FOR EXISTING T-J6 SEE H-2-25541 & 25541N
4. CARTRIDGE SHALL BE REPLACEABLE WITH THE REMOTE CRANE AND SHALL HAVE 1/2 THICK 3. ST. SIEVE PLATES ON 4" SPACING & SIX 1/2 THK. 3. ST. LOUVER PLATES.
5. SIEVE PLATES TO HAVE 33% OPEN AREA WITH 1/2" HOLES ON 1/2" TRIANGULAR SPACING.
6. LOUVER PLATES TO HAVE 24% FREE AREA AND TO BE SPACED AT 4 FT. INTERVALS IN CARTRIDGE.

SECTION A-A

APPROVED
FOR DESIGN
NOT FOR CONSTRUCTION

REV.	DESCRIPTION	BY	DATE
CLASSIFICATION		DATE	
NONE		7/1/66	
SK-2-18489		-	
REVISIONS		APPROVALS	
NO.	DESCRIPTION	BY	DATE
1	AS BUILT		
2			
3			
4			
5			
6			
7			
8			
9			
10			
PROJECT NO. 1027			
PROJECT NAME CIRC-895			
GENERAL CONTRACTOR			
H. & ATOMIC ENERGY CORPORATION			
HARPOUR ATOMIC PRODUCTS OPERATION			
GENERAL ELECTRIC			
TOWER T-J6			
1BX COLUMN			
PROJECT NO. 1027			
PROJECT NAME CIRC-895			
GENERAL CONTRACTOR			
H. & ATOMIC ENERGY CORPORATION			
HARPOUR ATOMIC PRODUCTS OPERATION			
GENERAL ELECTRIC			

NO.	DESCRIPTION
1	MODIFICATIONS TO TOWER T-J6
2	GLASS 2 VESSEL TOWER T-J6
3	AS BUILT TOWER T-J6
4	
5	
6	
7	
8	
9	
10

QTY.	PL. NO.	DESCRIPTION
------	---------	-------------

HW-66104
PAGE 59

PLAN

GENERAL NOTES

1. MAINTAIN ALL NOZZLE LOCATIONS AND ELEVATIONS SO THAT EXISTING JUMPERS MAY BE UTILIZED EXCEPT NOZZLE 'B' WHICH SHALL BE RELOCATED AS SHOWN.
2. ALL DIMENSIONS TO BE THE SAME AS ON EXISTING T-J7 EXCEPT AS NOTED.
3. FOR EXISTING T-J7 SEE M-2-52547
4. CARTRIDGE TO HAVE SAME TYPE PLATES AND PLATE SPACING AS EXISTING T-J7 REM EXCEPT FOR LARGER DIAMETER AND SHALL BE REPLACEABLE WITH THE REMOTE CRANE.
5. NOZZLE 'M' ON EXISTING COLUMN WILL NOT BE REQUIRED ON NEW COLUMN.

APPROVED
FOR DESIGN
NOT FOR CONSTRUCTION

6	W-2544	MODIFICATIONS TO TOWERS T-H3, T-J7 & T-K3 SPARE
5	W-2528	CLASS 2 VESSEL TOWER T-J7
4	W-2526	CARTRIDGE ASSY. IC COLUMN MOD.
3	W-2525	REMOTE PL. & DETS IC COLUMN
2	W-2524	FLANGE RING MODIF. IC COLUMN
1	W-2523	AS BUILT TOWER T-J7

DESCRIPTION		REV. NO.	DATE
REVISIONS			
CLASSIFICATION		APPROVED BY	DATE
NONE		E. Bond	5/20/60
SK-2-18490			
SCALE		APPROVALS	
DESIGNED BY: J. Bond		DESIGNED BY: J. Bond	DATE: 5/20/60
CHECKED BY: J. Bond		CHECKED BY: J. Bond	DATE: 5/20/60
DRAWN BY: J. Bond		DRAWN BY: J. Bond	DATE: 5/20/60
PROJECT NO. 1627		PROJECT NO. 1627	
C.G.C.-895		C.G.C.-895	
U. S. ATOMIC ENERGY COMMISSION HANFORD ATOMIC PRODUCTS OPERATION GENERAL ELECTRIC			
TOWER T-J7 IC COLUMN			
PURCHASE EXTENSION TO 4.0 CAPACITY FACTOR			
SK-2-18490			

DATE

FILMED

8/2/94

END