1 of 1

DECLASSIFIED

GENERAL ELECTRIC
COMPANY

HW-33454

Page 1

This document consists of
15 pages. No. 1 of
177 copies. Series ~~MA~~

T PLANT FIRST CYCLE WASTE SCAVENGING

RECORD CENTER FILE

Prepared by

J. O. Ludlow and F. W. Poucher

December 23, 1954

RECEIVED

JUL 26 1993

OSTI

Classification Cancelled and Changed To

DECLASSIFIED

Process Engineering Sub-Section

By Authority of CG-PR-2
DS Lewis 7-31-92
By PM Eck 7-7-93
Verified By Wells 7-7-93

Design Section

Engineering Department

General Electric Company

Hanford Atomic Products Operations

This document has been reviewed and approved by the appropriate members of the Process Engineering Sub-Section as a scope basis for the preparation of detailed designs for nickel ferrocyanide scavenging of the T-Plant first cycle wastes.

W. P. Ingalls
Separations Design & Development

W. M. Hartley
Head, Separations Design & Development

W. P. Shaw
Manager, Process Engineering

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

RECEIVED

JUL 6 1956
300 AREA
CLASSIFIED FILES

MASTER

~~RESTRICTED DATA~~

DECLASSIFIED

DISTRIBUTION RESTRICTED TO U.S. ONLY

DECLASSIFIED

HW-33454

- 2 -

DISTRIBUTION

1. R. H. Beaton
2. R. S. Bell
3. J. L. Boyd/C. E. Kent
4. W. G. Browne
5. H. A. Carlberg
6. H. V. Clukey
7. V. R. Cooper
8. E. S. Day
9. W. J. Dowis
10. W. R. Felts
11. W. F. Garetson
12. R. B. Richards
13. C. T. Groswith
14. D. R. Gustavson
15. W. M. Harty
16. L. O. Hasselblad
17. T. W. Hauff
18. J. M. Heffner
19. O. F. Hill
20. W. P. Ingalls
21. E. M. Johnston
22. A. R. Keene
23. G. P. Kesel
24. C. A. Lynneis
25. D. McDonald
26. J. E. Maider
27. J. S. McMahon
28. H. F. Petersen
29. T. H. Prudich
30. T. Prudich
31. H. P. Shaw
32. O. V. Smiset
33. E. A. Smith
34. J. M. Smith
35. R. E. Smith
36. F. W. Woodfield
37. W. K. Woods
38. J. O. Ludlow
39. F. W. Poucher
40. Yellow File
41. 300 File

DECLASSIFIED

DECLASSIFIED

HW-33454

- 3 -

T-PLANT FIRST CYCLE WASTE SCAVENGING

INTRODUCTION

A scavenging process for the TBP Plant wastes has recently been installed and is expected to result in a considerable reduction in the waste tankage required for storage of TBP Plant Wastes.

A similar process has been developed for scavenging the first cycle waste from the BiPO₄ Plants.⁽¹⁾⁽²⁾ A study of future requirements and availability of tank storage space indicates that in order to avoid an overall plant critical tank shortage, or the necessity of construction of new tanks, a T-Plant waste scavenging program should provide cribbing facilities by February, 1955.⁽³⁾ Since tank storage space is critical and the cost of such storage is a sizeable factor in the overall plant operating costs, an investigation of the feasibility of the installation of this waste scavenging process in T-Plant has been undertaken.

PURPOSE

The purpose of this document is to present the scope, economics, and justification for a nickel ferrocyanide scavenging system for T-Plant first cycle wastes.

SUMMARY AND CONCLUSIONS

T-Plant first cycle wastes can be handled as follows:

- a. Stored in existing tanks (in short supply⁽³⁾) or new tanks (\$0.22 per gallon.)
- b. Cribbed directly (long lived activities are too high.)
- c. Evaporated in the 242-T Waste Evaporator, the distillate cribbed and the "bottoms" stored (pumping of bottoms from the evaporator is difficult and nearby tanks are filled with bottoms.)
- d. Scavenging of wastes with sludge stored and supernatant cribbed.

The best and cheapest method for disposal of T-Plant first cycle wastes is waste scavenging.

The scope of the installation of a nickel ferrocyanide scavenging system for T-Plant first cycle wastes is shown on the following drawings: (attached)

1. SK-2-1774, "Process Flow Diagram, First Cycle Waste Scavenging, 221-T Bldg., Scheme I."
2. SK-2-1776, "Process Flow Diagram, First Cycle Waste Scavenging, 221-T Bldg., Scheme II."
3. SK-2-1770, "Engineering Flow Diagram, First Cycle Waste Scavenging, 221-T Bldg. & 241 Tank Farm."
4. SK-2-1773, "T-Plant First Cycle Waste Scavenging, Waste Disposal, 241-T-TY."

-
- (1) HW-31988, "Nickel Ferrocyanide Scavenging of BiPO₄ Wastes," by E. A. Coppinger and R. J. Sloat, 6/14/54.
 - (2) HW-33184, "BiPO₄ Plant Nickel Ferrocyanide Scavenging Flowsheet for First Cycle Waste Containing No Coating Removal Waste," by E. A. Coppinger and R. E. Smith, 9/30/54.
 - (3) HW-34052, "Waste Tank Scheduling for B and T Plants", by D. E. Peterson, 12/9/54.

DECLASSIFIED

DECLASSIFIED

HW-33454

- 4 -

The capital investment required for T-Plant first cycle waste scavenging is estimated to be ----- \$175,000.

The annual operational savings resulting from the installation of a waste scavenging process for T-Plant first cycle wastes when compared to 242-T waste evaporation is ----- \$120,700.

RECOMMENDATIONS

It is recommended that a nickel ferrocyanide scavenging process be installed for T-Plant first cycle wastes in accordance with the attached scope.

DISCUSSION

I. General

At the present time, a critical shortage of waste storage space exists in the 200 Areas. For this reason, supernatant of settled first cycle waste from the T-Plant was being pumped into open earth disposal trenches to avert a possible shut-down of the T-Plant. However, this method is undesirable since the long-lived fission products that are discharged into these trenches are present in significant concentration and may eventually reach the ground water table. With the start-up of TBP Waste Scavenging, the need for using the 242-T Waste Evaporator for TBP waste is eliminated and it can be used for evaporation of first cycle wastes from the T-Plant. Therefore, it is no longer necessary to pump T-Plant first cycle wastes to open trenches. An alternate to the evaporation method of reducing the first cycle waste volume is a waste scavenging process. A comparison of waste evaporation versus waste scavenging is given in the following paragraphs.

II. Waste Evaporation Process Description

First cycle waste, including coating waste, to be treated in the 242-T Waste Evaporator is sent directly from the T-Plant to underground storage tanks for settling prior to feeding it to the evaporator. After settling, approximately 80 percent of the original waste is sent to the waste evaporator. In the first pass through the waste evaporator, 70 percent of this solution is evaporated and cribbed and the remaining bottoms (30%) are sent to another underground storage tank for accumulation as feed for a second pass through the waste evaporator. In the second pass, a one-third reduction is achieved. The bottoms, or two-thirds of the second pass feed, is returned to the original settling tank for permanent storage. Through the entire waste evaporator process, a 64 percent reduction of the original first cycle waste is achieved.

III. Scavenging Process Description

The T-Plant waste scavenging process is identical to the TBP-Plant waste scavenging process in that the bulk of the long-lived fission products in the first cycle waste is removed on a nickel ferrocyanide carrier precipitate, which is allowed to settle and form a sludge that is stored in underground tanks. After settling, the waste supernatant is decanted and cribbed.

The addition of the scavenging chemicals to the first cycle waste will be made in the 221-T Building of the BiPO₄ Plant. First cycle waste is batch fed to the First

DECLASSIFIED

DECLASSIFIED

HW-33454

- 5 -

Cycle Waste Neutralizer (TK-15-8) where it is sampled and neutralized. Potassium ferrocyanide and nickel sulphate solutions are added batchwise to this tank in amounts which will make the waste 0.005 M in nickel ferrocyanide. The waste solution containing the scavenging chemicals is then jetted to tanks in the 241-TY Tank Farm for settling and decanting of the supernatant. After the scavenger has been allowed to settle for about three weeks, the supernatant, approximately 80 percent of the original waste solution, is pumped to cribs. Freshly scavenged first cycle waste is then jetted into the underground decant tanks to repeat the cycle. Accumulated sludge will be transferred to other tanks in the 241-TY Tank Farm for final storage.

Using this process scheme, coating waste is not brought into the first cycle Waste Neutralizer (TK-15-8) as is presently done in the BiPO₄ Plant, but is rerouted to the Coating Waste Receiver (TK-15-7.) From this tank it is jetted directly to tanks in the 241-T Tank Farm for final storage. However, future data may indicate that some of the supernatant from settled coating waste can be cribbed.

IV. Scavenging Scope Description

The scope of the installation of a nickel ferrocyanide waste scavenging process in the T-Plant is shown on drawings SK-2-1770, SK-2-1773, SK-2-1774 and SK-2-1776 (attached), and is described below.

Drawings SK-2-1774, "Process Flow Diagram, First Cycle Waste Scavenging, 221-T Bldg., Scheme I", and SK-2-1776, "Process Flow Diagram, First Cycle Waste Scavenging, 221-T Bldg., Scheme II", show the volumes of chemicals to be added, scavenged waste volumes, sludge and supernatant volumes, and the amount of coating waste to be expected with uranium of irradiation levels of 190 MWD/T and 600 MWD/T, respectively. The material balances are based on figures obtained from references 2 (Scheme I) and 1 (Scheme II.)

Drawing SK-2-1770, "Engineering Flow Diagram, First Cycle Waste Scavenging, 221-T Bldg. and 241 Tank Farm", shows the new equipment, jumpers and piping required in both the 221-T Building and the 241-T and TY Tank Farms.

In the 221-T Building, the existing H-307 Tank will be used for nickel sulphate solution make-up. This tank will have to be re-piped to the existing 9-2C Scale Tank for addition of nickel sulphate to the Waste Neutralizer (TK-15-8.) New piping will also have to be provided from the Scale Tank (9-2C) to tie into the existing line from the NaOH Tank 15-8-B to gallery wall nozzle 64 in Section 15. Tank 15-8-B will need to be blanked off from this line. Similarly, the existing M-402 Tank for potassium ferrocyanide solution make-up will need to be re-piped to the existing 9-1E Scale Tank for addition to the waste neutralizer. New piping from this scale tank will tie into the existing line from the NaOH Tank 15-8-C to gallery wall nozzle 60 in Section 15. Caustic for neutralization will also be added through this line as is presently being done. The scales on which Tanks 9-2C and 9-1E sit will require new weight recorders. In Cell 30, Section 15, three new jumpers are required to route coating waste from the dissolvers to Tank 15-7. These jumpers will go from wall nozzle 74 to TK-15-7 nozzle 9, wall nozzle 81 to TK-15-7 nozzle 13 and wall nozzle 84 to TK-15-7 nozzle 16. In addition, a new 75 gpm jet jumper is required

- (1) HW-31988, "Nickel Ferrocyanide Scavenging of BiPO₄ Wastes," by E. A. Coppinger and R. J. Sloat, 6/14/54.
- (2) HW-33184, "BiPO₄ Plant Nickel Ferrocyanide Scavenging Flowsheet for First Cycle Waste Containing No Coating Removal Waste," by E. A. Coppinger and R. E. Smith, 9/30/54.

DECLASSIFIED

DECLASSIFIED

HW-33454

- 6 -

from TK-15-7 nozzle 8 to wall nozzle 53 (steam to jet from wall nozzle 54) for discharge to Tanks 241-T-105 and 106. First cycle waste with scavenging chemicals added will be jetted out of Tank 15-8 through an existing jet jumper. A pH meter will also be provided for on the TK-15-8 sampler.

In the 241 Tank Farms, two new 100 gpm floating suction pumps will be required on Tanks 241-TY-101 and 103. These pumps will be manifolded to pump the supernatant to a new 7,480 gallon flush tank and the sludge to Tank 241-TY-104 with future piping to Tanks 241-TY-105 and 106. One spare pump will be provided. From the flush tank the supernatant will be piped to three cribs (216-TY-1, 216-TY-2 and 216-TY-3.) Three cribs were provided to allow sequential filling and provide a margin for increased supernatant cribbing. Drawing SK-2-1773, "T-Plant First Cycle Waste Scavenging, Waste Disposal, 241-T-TY", shows the plot plan of the approximate location of the piping, flush tank and cribs in the 200 West Area. The three cribs are located directly to the east of the 241-TY Tank Farm and arranged in a row east to west.

V. Capital Cost for Scavenging

The capital investment necessary for the installation of a first cycle waste scavenging process in the T-Plant is estimated to be \$175,000, as shown on Table I, Parts A, B and C. This includes all new items listed in Part IV (Discussion) and included on the above mentioned drawings.

VI. Operational Costs of Scavenging Versus Evaporation

An economic comparison of first cycle waste treatment using scavenging versus evaporation in the 242-T Evaporator is developed and shown on Tables II and III. The tables are based on an annual production rate of an expected 1800 tons of uranium (150 tons per month) at an irradiation level of 190 MWD/T, since larger volumes need to be handled at this lower irradiation level and also this is the rate and irradiation level near which the plant is expected to operate. The 600 MWD/T of uranium flowsheet was included in this document to show that the volume loads will not change appreciably if the plant is operated using uranium at this higher irradiation level. As is shown on the table, the annual operational savings resulting from using the scavenging process is \$120,700.

J. O. Lineer-Ludlow
Separations Design & Development
Design Section
ENGINEERING DEPARTMENT

J. W. Pouches Jr.
Separations Design & Development
Design Section
ENGINEERING DEPARTMENT

JOL:FWP:js

DECLASSIFIED

DECLASSIFIED

HW-33454

- 7 -

REFERENCES

- (1) HW-31988, "Nickel Ferrocyanide Scavenging of BiPO_4 Wastes," by E. A. Coppinger and R. J. Sloat, 6/14/54.
- (2) HW-33164, "BiPO₄ Plant Nickel Ferrocyanide Scavenging Flowsheet for First Cycle Waste Containing No Coating Removal Waste," by E. A. Coppinger and R. E. Smith, 9/30/54.
- (3) HW-34052, "Waste Tank Scheduling for B and T Plants", by D. E. Peterson, 12/9/54.
- (4) HW-31789, "Separations Plant Engineering Report No. 114, Estimated Operating Cost of TBP Wastes," by R. H. Silletto, 4/27/54.

DECLASSIFIED

~~DECLASSIFIED~~

PROJECT NO.						CONSTRUCTION BY						GENERAL ELECTRIC COMPANY - HANFORD WORKS						TYPE OF ESTIMATE																																																																																			
00-101010						MINOR CONSTR. & PLANT IMPROVEMENT						G E. COOLIDGE						(A) STUDY STAGE																																																																																			
ESTIMATED BY						DATE PREPARED						TITLE						(B) FULLY SCOPED																																																																																			
Estimating Unit/IBM						10/15/54						T PLANT FIRST CYCLE WASTE SCAVENGING						(C) FINAL DESIGN / COMPI.																																																																																			
PROPERTY ACCOUNTS						WORK PERFORMED BY:						WORK PERFORMED BY:						JOB TOTALS																																																																																			
DESCRIPTION						LABOR						MATERIAL						EQUIP.						TOTAL																																																																													
						NO.																																																																																															
Temporary Construction						2,500						400						500						3,400						3,400																																																																							
Outside Buried Line						8,500						10,000						4,500						23,000						23,000																																																																							
Flash Tank, Grib &																																																																																																					
Related Work						21,000						28,000						5,000						54,000						54,000																																																																							
221-T Plant Mod.												3,000												3,000						6,700						9,700																																																																	
Dumper Feb.												7,200												7,200						4,050						11,250																																																																	
SUB-TOTAL DIRECT CONST. COSTS						32,000						48,600						10,000						90,600						7,500						3,250						10,750						101,350																																																					
(A) OTHER DIRECT COSTS 5-36-5						1,600						11,520						1,600						14,720																																																																													
(B) PAYROLL BURDEN																																																																																																					
(C) CLOSE OUT RESERVE																																																																																																					
TOTAL DIRECT CONST. COSTS						35,200						60,120						11,600						106,920						7,500						3,250						10,750						127,670																																																					

ITEM (1) INCLUDES \$ _____ FOR EQUIPMENT PURCHASED BY G. E.

DECLASSIFIED

DECLASSIFIED

PROJECT NO.
DS-101010

TITLE

T PLANT FIRE- CYCLE WASTE SCAVENGING

-

Q

HW-13454

DATE PREPARED

10/15/54

TABLE I. PART B

WORK PERFORMED BY: Mindor Construction				WORK PERFORMED BY: Plant Forces				JOB TOTALS			
LABOR	MATERIAL	EQUIP.	TOTAL	LABOR	MATERIAL	EQUIP.	TOTAL	LABOR	MATERIAL	EQUIP.	TOTAL
35,200	60,120	11,600	106,920	7,500	3,250		10,750				117,670
(A) CPFF SUB-CONTRACTOR INDIRECT COSTS											
(B) C. E. CONSTRUCTION DEPT. INDIRECT COSTS											
(C) G. E. FORCES INDIRECT COSTS											
(110 % OF LABOR - ITEM 3)											
(A) FEE FOR CPFF SUB-CONTRACTOR											
(B) FEE FOR LABOR SERVICE GROUP											
(1 % OF LABOR - ITEM 3)											
CONSTRUCTION FIELD SUPV. AND INSPECTION											
(1 % OF ITEM 3)											
SUB - TOTALS											
GENERAL OVERHEAD											
(2 % OF ITEM 7)											
OPERATION AND MAINT. OF NO. RICHLAND CAMP											
(1 % OF ITEM 7)											
10. Test Wells											
MISCELLANEOUS WORK ORDERS											
CONSTRUCTION CONTINGENCY											
(10 % OF ITEM 3)											
TOTAL CONSTRUCTION COST											
ADJUSTED TOTAL CONSTRUCTION COST											
ADJUSTED TOTAL DESIGN - ENG. COST (FORM F-1240 -G)											
ADJUSTED TOTAL PROJECT COST											

APPROVED (ENGINEERING)

10/18/54

APPROVED (TESTING)

DATE

APPROVED (ACCOUNTING)

DATE

DECLASSIFIED

DECLASSIFIED

PROJECT DESIGN ESTIMATE

Page 10

GENERAL ELECTRIC COMPANY
HANFORD ATOMIC PRODUCTS OPERATION

PROJECT First Cycle Waste Scavenging 221-T & 241 Tank Farm		TYPE OF ESTIMATE	
DATE PREPARED 10-4-54	ESTIMATED BY O. O. Webb	(A) ☐ STUDY STAGE	
		(B) ☒ DESIGN SCOPE	\$ COMPLETE
		(C) ☐ FINAL DESIGN	\$ COMPLETE

ENGINEERING, INCLUDING SCOPING,
DETAILED DESIGN, AND DESIGN
SERVICES IN THE FIELD

ENGINEERING DESIGN	5,600
DRAFTING	3,150
PROJECT MANAGEMENT	1,000

ARCHITECT ENGINEERS

ENGINEERING ASSISTANCE TO HANFORD,
INCLUDING CONSULTANTS, ENGINEERING
ASSISTANCE CONTRACTORS, KAPL, GEL, ETC.

ENGINEERING SERVICES (HANFORD)

TRAVEL AND LIVING	-
REPRODUCTION	250
ESTIMATING	-
LAYOUT AND SURVEY	-
OTHER	-

SUB-TOTAL	250
-----------	-----

TEST MATERIALS AND EXPERIMENTAL TESTS

CONTINGENCIES	1,000
---------------	-------

TOTAL	11,000
-------	--------

DISTRIBUTION BY DESIGN STAGE

DESIGN SCOPE	-
DETAILED DESIGN	9,250
DESIGN SERVICES IN THE FIELD	750
CONTINGENCIES	1,000
TOTAL	11,000

DECLASSIFIED

TABLE II
SUMMARY OF QUANTITIES OF WASTE

Basis: Annual production rate = 1800 tons of 190 MWD/T Uranium in the T-Plant.

	First Cycle Waste Scavenging	First Cycle Waste Evaporation
Total Gallons of Waste to Storage per Year		
1. First Cycle Waste	2,860,000	
2. Coating Waste	<u>438,000</u>	
3. First Cycle Waste + Coating Waste	3,298,000	3,263,000
Total Gallons of Cribbed Waste per Year		
1. First Cycle Waste	2,302,000	
2. First Cycle Waste + Coating Waste		2,088,000
Total Gallons of Permanently Stored Wastes per Year		
1. First Cycle Waste	558,000	
2. Coating Waste	<u>438,000</u>	
3. First Cycle Waste + Coating Waste	996,000	1,175,000

TABLE III
ECONOMIC COMPARISON OF WASTE SCAVENGING VS. WASTE EVAPORATION

Basis: Annual production rate = 1800 tons of 190 MWD/T Uranium in the T-Plant.

	First Cycle Waste Scavenging	First Cycle Waste Evaporation
Permanent Waste Storage Cost at \$0.22 per gallon stored		
1. First Cycle Waste	\$122,800	
2. Coating Waste	<u>96,500</u>	
3. First Cycle Waste + Coating Waste	219,300	\$258,500
Annual Chemical Cost at \$12.17/ton U	22,000	
Annual Waste Evaporator Cost of 242-T Bldg.(4)		145,200
Annual 242-T Bldg. Overhead Chargeable to Separations Section, Not Eliminated by Shut-Down of 242-T Bldg.(3)	49,200	
Annual Reduction in Maintenance Cost to Waste Return Lines (Direct Labor.)(4)		<u>7,500</u>
Annual Incremental Operation Cost	<u>\$290,500</u>	<u>\$411,200</u>

(4) HW-31789, "Separations Plant Engineering Report No. 114, Estimated Operating Cost of TBP Wastes," by R. H. Silletto, 4/27/54.

DECLASSIFIED

COATING WASTE

FIRST CYCLE WASTE

TRANSMEMBRANE STORAGE TANK EFFLUENT

CHEM. ADD.

CHEM. ADD.

CHEM. ADD.

TR-10-1

TR-10-2

COATING WASTE RECEIVER

FIRST CYCLE WASTE NEUTRALIZER

1,100 GAL.

2,500 GAL.

STREAM	①		②		③		④		⑤		
COMPONENTS	g/DAY	%	g/DAY	%	g/DAY	%	g/DAY	%	g/DAY	%	g/DAY
1 FIRST CYCLE WASTE OIL											
CHEMICALS	5.000	2.1									
2 COATING SOLUTION											
MIXED CHEMICALS			10.00	10.0	1.000	10.0					
3 MIXED O.D.O.											
4 50% (C/L) - 50% S							0.10	50			
5 50% S			2.00	20	1.00	10			1.000	10.0	
6 50% S	10.000	21.0	2.000	20.0	4.000	40.0	10.00	50	1.000	10.0	
7 50% (C/L)											
8 50% S											
9 TOTAL WASTE	15.000	30.0	12.00	20.0	5.000	10.0	10.00	50.0	2.000	10.0	
10 TOTAL SPS			1.0	10	1.0	10					
11 TOTAL SOLIDS	0.10		2.00	20.0			1.0		0.00		

PAGE 12

(7)		(8)		(9)		(10)	
W	%	O/BATCH	W	%	O/BATCH	W	%
		2.090	14.1	24.048	8.0	288.643	14.1
						13.348	14.1
9	48	62	2.15	6.524	6.34		
		1.047	3.88		10.1425	14.1	6.238
8	78	18.123	77.75	1.275.880	25.2	2.778.129	77.7
		18	2.867	8.866	6.38		60.167
		12	2.48		4.187	26.1	80
10000	1.000	200.1	1.473.43	100.0	8.483.253	100.0	80.157
		18	2.86		6.60		1.488
		8.243	146.201		211.410		8.276

APPROVED

[illegible]

DECLASSIFIED

STREAM	①		②		③		④		⑤	
COMPONENTS	G/DATCH	W	G/DATCH	W	G/DATCH	W	G/DATCH	W	G/DATCH	W
1. FIRST CYCLE WASTE WGL										
CHEMICALS	13.52	4.4								
2. COATING SOLUTION										
MISC. CHEMICALS			12.5	4.5	12.5	4.5				
3. H ₂ O (CH ₂)										
4. H ₂ O (CH ₂)										
5. H ₂ O			13.5	4.5	13.5	4.5				
6. H ₂ O	13.527	4.4	13.52	4.4	13.52	4.4	13.52	4.4	13.52	4.4
7. H ₂ O (CH ₂)										
8. H ₂ O										
9. TOTAL WEIGHT	13.527	4.4	13.52	4.4	13.52	4.4	13.52	4.4	13.52	4.4
10. FLOW, GPM										
11. TOTAL GALLONS	13.527	4.4	13.52	4.4	13.52	4.4	13.52	4.4	13.52	4.4

DECLASSIFIED

The diagram illustrates a wastewater treatment process with two parallel flow paths. At the top, two 'SANITARY WATER' tanks are shown, each with a 'SANITARY WATER' inlet and a 'SOLID ADDITION' outlet. The left path flows through a 'SCALE TANK (EXISTING 3-ECTANK)' and the right path through a 'SCALE TANK (EXISTING 3-ECTANK)'. Both scale tanks have 'NEW BLANK' and 'EXISTING' inlets. The flows then merge into an 'EXISTING ZAV ASSEMBLY'. From the ZAV assembly, the flow splits to two large tanks: 'TK 15-7 COATING WASTE RECEIVER' and 'TK 15-8 FIRST CYCLE WASTE NEUTRALIZER'. Both tanks are labeled '3-6 DIA X 10-0'. The diagram includes various piping, valves, and flow indicators. A legend on the left lists waste sources: 'COATING WASTE PR. 3-5-1 CONN. 6', 'COATING WASTE PR. 3-5-1 CONN. 4', '1ST CYCLE WASTE PR. 15-0 CONN. 13', '1ST CYCLE WASTE FROM 15-0 CONN. 13', '1ST CYCLE WASTE PR. 17-0 CONN. 13', and 'COATING WASTE FROM 3-5-1 CONN. 40'. A 'DECAN' section is shown on the right, with a note '(UNDERGROUND THE 15-17 150,0)'. A 'NEW BLANK' inlet is also shown on the right. The diagram is a technical schematic showing the layout and flow of the wastewater treatment system.

HW-33454
PAGE 14

REPAIR VALVES ON TYPE 14 DISCHARGE LINE TO THE CRISIS & REPLACE THEM WITH POLAR FLANGES H-2-2000		L.A.	10-2000	10-2000
REPAIR 6" LINE FROM PUMP TO 2. ADDED AND REPAIRS & CHANGES REELECTRIFICATION LINE ON PUMP DISCHARGE H-2-2000		L.A.	10-2000	10-2000
SK-2-1770 2 110 66 603 U.S. ARMY CORPS OF ENGINEERS WASHINGTON, D.C. 20315 FEDERAL ELECTRIC ENGINEERING FLOW DIAGRAM FIRST CYCLE WASTE SCAVENGING 221-T BLDG & 241 TANK FARM 221-T SK-2-1770				

DECLASSIFIED

 

PAGE 15

NOTE

1. NEW PILING SHOWN BY HEAVY LINE. NEW EQUIPMENT
INDED. TANKS TO BE USED ARE SHOWN AS GRAY-
MATTER.

2. DISCHARGE LINE TO CONTAIN NO TRAP SECTIONS.

3. COORDINATE LOCATION OF PIPE LINE TO NEW TRAIL,
CONSTANT GAMMA MONITOR STATION, AND CRUISE
SUBJECT TO CHANGE DURING DETAIL DESIGN.

APPROVED

[illegible]

DECLASSIFIED

**DATE
FILMED**

11 / 9 / 93

END