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Cotter Corporation
General Office

[illegible] ALAMEDA PARKWAY SUITE 201
[illegible] COLORADO 80226

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Mail Section

May 1, 1981

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U.S. NUCLEAR REGULATORY COMMISSION

Mr. Ross A. Scarano, Chief
Uranium Recovery Licensing Branch
Division of Waste Management
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Re: Reporting required by Radioactive Materials License #SUA-1370, Amendment No. 1

Dear Mr. Scarano:

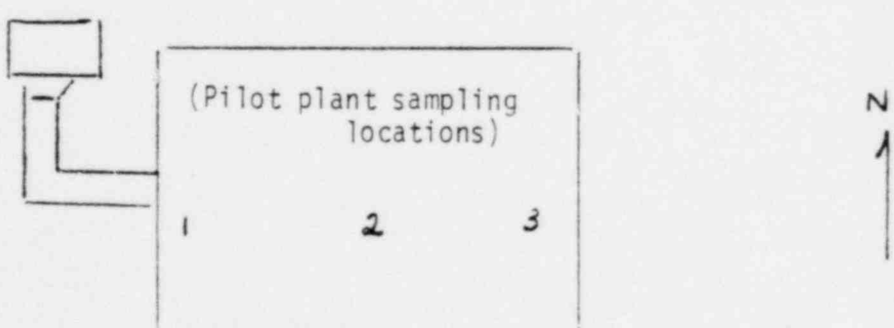
Pursuant to License Conditions 20 and 21, Cotter Corporation submits the enclosed information which pertains to the TL Leach pilot plant at the Charlie Ore Body site, NE¼ Section 36, Township 45 North, Range 77 West, Johnson County, Wyoming.

I. License Conditions 17 and 21 - Radiological and Environmental Sampling Data

In accordance with License Condition 17, a radiological safety and environmental monitoring program was conducted during the 1980 pilot plant operation. The following tables summarize the test procedures and results.

Table 1

Radiological Monitoring Program
For Test No. 2 of the Cotter Uranium Pilot Plant



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THIS DOCUMENT CONTAINS
POOR QUALITY PAGES

A. General Air Monitoring

1. Interior of Pilot Plant Building - One hour high volume air sample taken twice during July and August 1980 at locations 1-3. Analyze for U-nat.

2. Interior of Pilot Plant Building - One hour volume air sample taken once during July and August 1980 at sample locations 1-3. Analyze for Ra-226 and Th-230.

3. Interior of Pilot Plant Building - 48 hour sample taken once during July and August 1980 at location 2. Analyze for Rn-222.

4. Ore Storage Pad/Crusher Area/Ore Feed Hopper - One hour high volume air sample taken once during July and August 1980. Analyze for U-nat.

B. Personnel Monitoring

1. Breathing Zone - An eight hour sample will be collected for the pilot plant front-end loader operator once sometime during July and August 1980. Analyze for U-nat.

2. TLD Badges - Worn by all pilot plant personnel for the entire 45 day test period.

3. Urinalysis - All personnel involved in crushing, precipitating, filtering and packaging will be sampled sometime during July and August 1980. Analyze for U-nat.

4. Gamma Survey - Pilot Plant work stations will be sampled twice sometime during July and August 1980 using nand held scintallometer.

Table 2

Analytical Results of Radiological Monitoring Program
1980 Pilot Plant Operation

A. General Air Monitoring

1. Interior of Pilot Plant Building, Uranium

JULY

SAMPLE NO.	LOCATION	URANIUM CONCENTRATION (U-nat) μCi/ml
1	Pilot Plant 1	6.48×10^{-12}
2	Pilot Plant 2	$<1.38 \times 10^{-13}$
3	Pilot Plant 3	1.15×10^{-12}

AUGUST

SAMPLE NO.	LOCATION	URANIUM CONCENTRATION (U-nat) μCi/ml
1	Pilot Plant 1	1.38×10^{-13}
2	Pilot Plant 2	$<1.38 \times 10^{-13}$
3	Pilot Plant 3	1.43×10^{-13}

The standard for restricted area U-nat exposure according to 10CFR 20, Appendix B ix 1×10^{-10} μCi/ml for insoluble uranium.

A. General

2. Interior of Pilot Plant Building, Th-230 and Ra-226

SAMPLE NO.	LOCATION	THORIUM^{230} μCi/ml	RADIUM^{226} μCi/ml
1	Pilot Plant 1	1.8×10^{-13}	3.5×10^{-13}
2	Pilot Plant 2	2.2×10^{-13}	3.5×10^{-13}
3	Pilot Plant 3	3.1×10^{-13}	2.5×10^{-13}

The standard for Th-230 and Ra-226 are 1×10^{-11} and 5×10^{-11} μCi/ml, respectively, according to 10CFR20, Appendix B.

3. Interior of Pilot Plant Building, Rn-222

Location 2	Rn-222 Concentration
	5.9×10^{-10} μCi/ml

Maximum allowable Rn-222 concentration according to 10CFR20, is 3×10^{-8} μCi/ml.

4. Ore Storage Pad, Crusher & Hopper Uranium

DATE	URANIUM CONCENTRATIONS U-nat in μCi/ml
July	2.76×10^{-13}
August	2.81×10^{-13}

The restricted area standard for U-nat exposure is 1×10^{-10} μCi/ml for insoluble uranium as per 10CFR20.

B. Personnel Monitoring

1. Breathing Zone Samples for Front-end Loader Operator*

	URANIUM CONCENTRATION U-nat µCi/ml
July	3.22×10^{-12}
August	1.56×10^{-12}

*The 10CFR standard is 1×10^{-10}

2. TLD Badges

Inadvertantly, all TLD badges worn by Cotter employees during the 1980 operations were exposed to x-ray radiation during an airport baggage check. Cotter's Radiation Safety Officer has stated that a properly weighted extrapolation of the Gamma Survey information verifies that employee exposures were below the 10CFR20 standard. Using the highest recorded Gamma reading observed, 0.05 Mr/hr, and an unusually long and conservative work schedule of a 10 hour shift and a seven day week, the RSO calculated the following employee exposures.

0.05 Mr/hr x 10 hr/day x 7 day/week = 3.5 Mr/hr week

Given the week project life, yearly gamma exposure extrapolated from these ore data are considered to be low.

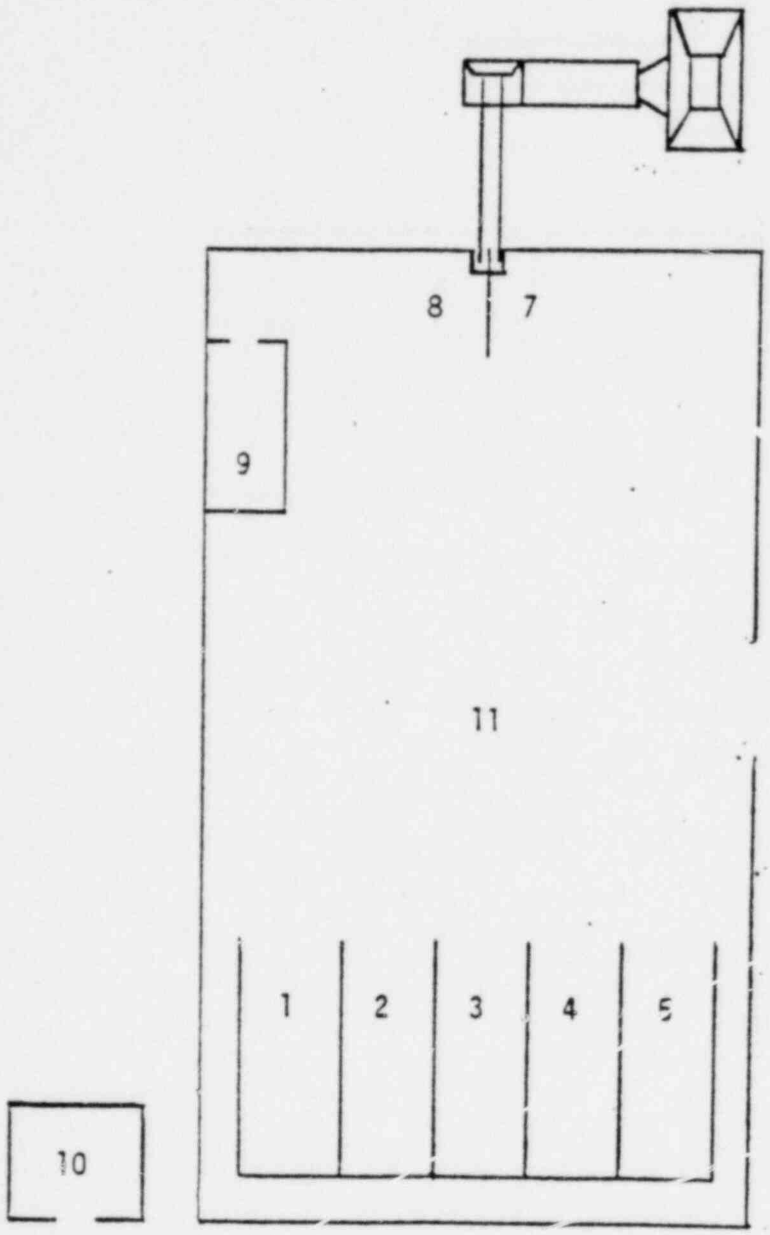
3. Urinalysis Samples Collected in July

EMPLOYEE NAME	U-nat µg/liter
Davis, M	<5
Hamel, B.	<5
Streeter, J.	<5
Hermans, V.	7

4. Gamma Radiometric Survey

Date: July, 1980

Mr/h	
1.	.03
2.	.02
3.	.01
4.	.03
5.	.02
6.	.02
7.	.03
8.	.03
9.	.03
10.	.02
11.	.03



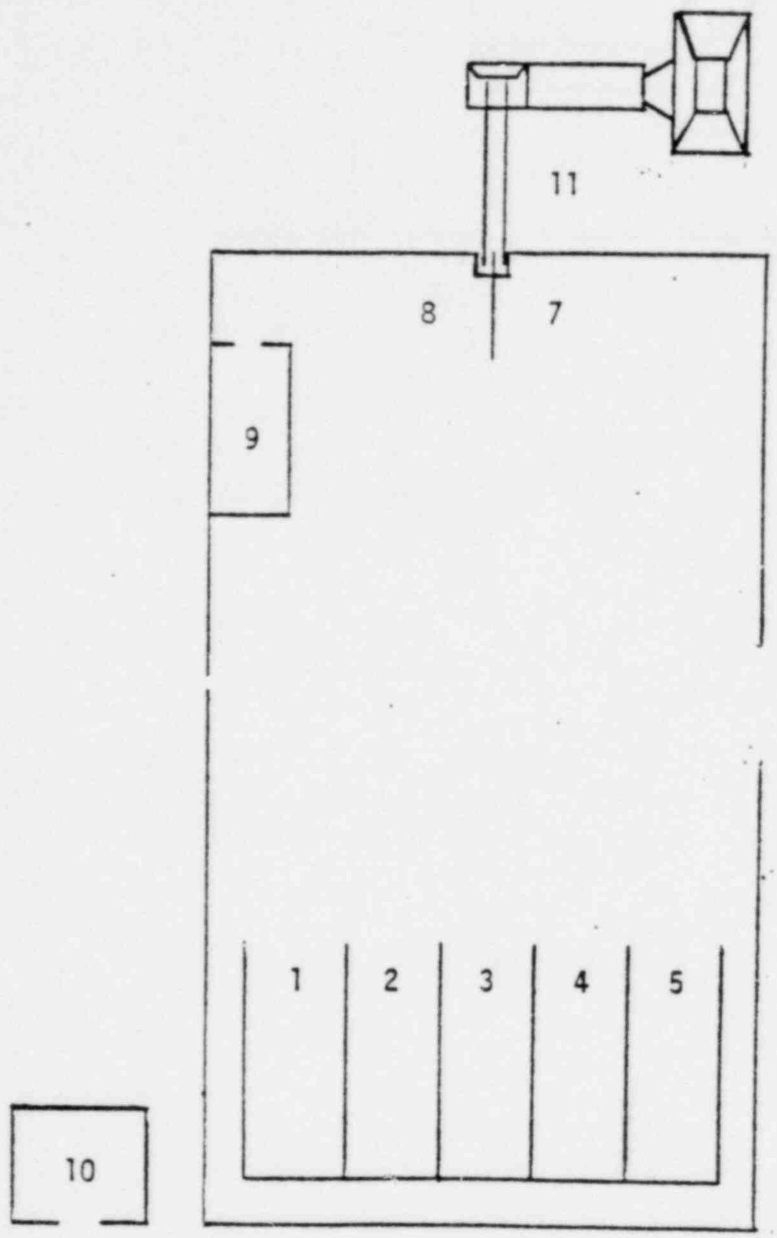
Surveyor:________________

*Pilot Plant was not in operation at this time.

Date: August, 1980

4. Gamma Radiometric Survey

Mr/h	
1.	.03
2.	.03
3.	.04
4.	.04
5.	.05
6.	.03
7.	.03
8.	.05
9.	.04
10.	.03
11.	.04



Surveyor: ____________________

Table 3
Analytical Results of Environmental Montoring

A. Particulate Monitoring

1. Airborne Uranium

Environmental air samples were collected during August, 1980. The analytical results of the environmental air samples are summarized below.

Date	U X 10-15 uCi/ml
8/1/80	1.53
8/3/80	2.12
8/5/80	1.41
8/11/80	1.04
8/13/80	0.71
8/15/80	1.91
8/17/80	1.95
8/19/80	1.54
8/21/80	1.16
8/23/80	1.04
8/25/80	0.91
8/27/80	0.83
8/29/80	0.83
	1.31 ± 0.47

2. Airborne Radium

Date	Ra^{226} X 10^{-16} uCi/ml
8/1/80	1.2 ± 1.8
8/3/80	7.8 ± 8.6
8/5/80	1.8 ± 2.5
8/11/80	3.7 ± 3.1
8/13/80	1.2 ± 4.9
8/15/80	0 ± 7.4
8/17/80	9.2 ± 11.0
8/19/80	2.5 ± 7.4
8/21/80	6.1 ± 6.1
8/22/80	4.7 ± 5.5
8/25/80	3.1 ± 3.7
8/27/80	4.3 ± 9.2
8/29/80	0 ± 6.9
	3.51 ± 6.01

3. Airborne Thorium

Date	$Th^{-230} \times 10^{-16}$ µCi/ml
8/15/80	0 ± 1.8
8/17/80	0 ± 1.8
8/17/80	0 ± 1.8
8/21/80	1.9 ± 2.8
8/23/80	0.7 ± 2.2
8/25/80	0.7 ± 2.2
8/27/80	0 ± 1.8
8/29/80	0 ± 1.8
	0.4 ± 2.03

Data for Pb^{210} and Po^{210} are not available for the Charlie pilot plant operations.

4. Atmospheric Rn^{-222}

Test Period	Station No.	Radon Concentration (pCi/l ± 2 sigma)
6/20-6/30/80	1	0.28 ± 0.05
	2	0.19 ± 0.04
	3	0.31 ± 0.06
	4	0.15 ± 0.03
7/21-8/31/80	1	0.18 ± 0.04
	2	0.29 ± 0.05
	3	0.25 ± 0.05
	4	0.17 ± 0.04
8/21-8/31/80	1	0.18 ± 0.04
	2	0.06 ± 0.01
	3	0.05 ± 0.01
	4	0.14 ± 0.03
(See attached graph)		

Pursuant to the requirements of License Condition 21, Amendment No. 1, a summary of the radiological and environmental monitoring data for the 1979 TL Leach Pilot Plant operation are attached hereto as Exhibit 1.

License Condition 21 - Project Completion Reports

The TL Leach project summary reports prepared by Holmes & Narver for both tests are enclosed herewith.

II. License Condition 22 - Tailings Column Leach Test

The following is a discussion of the leach column tests conducted pursuant to License Condition 22, and is a presentation of the analytical results using tailings samples collected in 1980. This section is submitted without reference to previous submittals. The test procedures and observations are discussed, and the data are summarized.

A. Solubility Test

The column test consisted of three phases; solubility, leach potential and rain tests. The procedure and results for the solubility tests are summarized below.

1. Dry material at 45-50°C overnight.
2. Weigh and pack required amount of solids into columns.
3. Fill column with "Charlie Water" to 2½" above solids and note the liquid level and volume.
4. Drain immediately.
    a) Allow to drain at least a half hour after no visible water level in column.
    b) Add deionized water to effluent to adjust volume to original volume added. This was not done.
    c) Assay effluent for:
        1) Fee Acid (H_2SO_4) - nil.
        2) pH.
        3) Conductivity.
        4) Metals: Ca, K, Na, U, Mg, Se, Ba, Cu, Al, Mo, V, Cd, Fe, Pb, Mn, Ni, Zr, As, Co, and Cr.
        5) Isotopes: Pb210, Po210, Ra226, Th230.

Table 4
Charlie Pit Solubility Tests

Column #1	1st Test Ml H_2O Added	Ml H_2O Drained	2nd Test Ml H_2O Added	Volume Recycled
Column #1 12LPR	2,807 ml	1,520 ml	700 ml	733 ml
Column #2 12LPR #2	3,070 ml	1,845 ml	620 ml	648 ml
Column #3 Run 11 #1	3,150 ml	1,735 ml	700 ml	385 ml
Column #4 Run 11 #2	2,519 ml	1,260 ml	700 ml	338 ml
Column #5 Millers #1	4,525 ml	885 ml	700 ml	300 ml
Column #6	4,500	883 ml	700 ml	______

Table 5
SOLUBILITY TEST RESULTS

(in parts per million)

Sample	Uug /ml	Al	Ni	Co	Cu	Mo	V	Fe	Mg	Ca	Zn	pb	K	Na	Free Acid	Cond	pH	Mr	Cr	Cd	Ba	U_3O_8 %
#1 Miller	0.009	11.4	<.5	<.5	<.5	<.2	1.0	71.8	85.3	645	4.5	<.5	19.52	394.3	NIL	3750	3.7	14.7	<1.0	.1	<1.0	.009
#2 Miller	0.004	<.1	<.5	<.5	<.5	<.2	<.5	<.5	9.3	102	<.5	<.5	3.21	256.1	NIL	1350	8.07	<.5	<1.0	.1	<1.0	
#1 Run II	0.022	22.5	<.5	<.5	<.5	<.2	.5	17.0	57.0	651	<.5	<.5	8.2	321.5	NIL	3450	3.21	9.5	<1.0	.1	<1.0	.032
#2 Run II	0.025	9.4	<.5	<.5	<.5	<.2	<.5	10.3	62.0	650	<.5	<.5	8.85	305.9	NIL	3200	3.2	10.2	<1.0	.1	<1.0	
#1 12LPR	0.041	9.8	<.5	<.5	<.5	<.2	1.9	50.1	95.4	662	<.5	<.5	11.86	370.9	NIL	3900	2.94	10.4	<1.0	.1	<1.0	.025
#2 12LPR	0.034	23.7	<.5	<.5	<.5	<.2	.8	39.3	79.7	671	<.5	<.5	10.91	347.2	NIL	4100	3.04	8.8	<1.0	.1	<1.0	

B. Leach Potential Test

The leach potential tests followed the procedure outlined below.

1. Add known amount of "Charlie Water" back to column.

2. Keep track of drainage to determine "absorption" or "natural per cent moisture" of tails in column.

3. Each day drain one liter of effluent from bottom of the column and pour into the top.

   A) Take a 10 ml sample from the drainage and assay for U_3O_8 and pH.

   B) Replace with 10 ml of "Charlie Water".

4. After seven days.

   A) Drain all columns.

   B) Collect and measure volume.

   C) Assay for parmeters in Table 5.

Table 6
Leach Potential Test
Volume Recycled

	12LPR		RUN #11		MILLERS	
Day #	#1	#2	#1	#2	#1	#2
1	350	455	370	302	238	403
2	350	430	318	260	198	375
3	340	472	294	245	175	418
4	420	510	381	285	190	375
5	360	500	423	290	160	170
6	172	330	170	142	70	401
7	420	465	390	300	189	357
8	365	510	315	265	145	390
9	440	500	390	328	160	370
10	452	480	412	330	170	390
11						375
Final Volume	795 ml	705 ml	860 ml	715 ml	640 ml	735 ml

Table 7
LEACH POTENTIAL TEST - EFFLUENT U CONCENTRATION AND pH

Recycle #	Column #1 (12LPR 1)		Column #2 12LPR	2	Column #3 Run 11	1	Column #4 Run 11	2	Column #5 Millers 1		Column #6 Millers	2
1	49.2 ppmU	pH 2.88	42.9	2.93	22.9	2.93	29.1	2.99	11.4	3.66	8.9	3.47
2	46.7	pH 2.85	41.6	2.93	22.4	2.95	23.0	3.01	10.8	3.57	5.4	3.44
3	39.7	pH 2.80	39.7	2.93	19.1	3.04	21.7	3.12	8.9	3.69	12.4	——
4	18.9	pH 2.90	18.9	2.95	9.5	3.18	10.7	3.30	4.7	3.64	11.3	3.43
5	35.7	pH ——	39.2	——	16.9	——	19.4	——	9.3	——	9.8	3.50
6	31.3	pH 2.88	39.5	2.89	18.4	2.99	18.2	3.06	8.4	3.59	9.0	——
7	29.3	pH 2.92	32.7	2.91	18.2	3.20	18.2	3.26	8.5	3.69	10.3	3.66
8	28.5	pH ——	30.8	——	17.3	——	16.8	——	9.0	——	8.8	3.69
9	14.2	pH 3.06	33.7	3.00	16.4	3.21	17.7	3.29	8.3	3.92	12.5	——
10	26.0	pH 3.10	31.0	3.02	17.3	3.35	16.9	3.46	7.8	3.85	7.0	——
11	24.4		28.4		14.8		15.9		6.8		7.1	

C. Precipitation Infiltration Test

"Rain" testing involved the addition of deionized water to duplicate rain water leaching.

1) Fifteen inches of "rain" were added over a period of five days.

2) Constant drainage through the columns was maintained.

3) Each day drainage was collected separately and the pH checked.

4) At the completion of the five days the samples were composited and run for the parameters in H.C.

Table 8
Rain Tests - Volume in Ml

Day #	Col #1	Col #2	Col #3	Col #4	Col #5	Col #6
1	105	90	100	117	56	100
2	81	78	69	79	69	80
3	97	92	90	97	90	98
4	83	81	87	84	80	480
5	160	160	170	175	178	422
Total ml Drained	526	501	516	552	473	1180

Table 8
Rain Tests - pH

Day #	Col #1	Col #2	Col #3	Col #4	Col #5	Col #6
1	2.98	2.93	3.04	3.03	4.23	3.56
2	3.09	2.95	3.18	3.26	4.19	4.56
3	3.00	2.89	3.14	3.16	4.00	3.78
4	3.06	2.96	3.16	3.18	4.07	3.45
5	2.90	2.91	3.05	3.05	3.78	3.64

CHARLIE PIT COLUMN WORK

SOLIDS DATA:

Table 9

	Dry Weight of Soldis	% Natural Moisture End of Test
Column #1 (12LPR 1)	11629.3 g	18.41%
Column #2 (12LPR 2)	11933.6 g	19.41%
Column #3 (Run 11 1)	11068.4g	19.71%
Column #4 (Run 2)	11.311.8g	11.38%
Column #5 (Miller's 1)	13,027.8g	17.65%
Column #6 (Miller's 2)	12,217.0g	19.11%

Pursuant to License Conditions 15, 19 and 20, the tailings have been transported to Rocky Mountain Energy Co.'s Bear Creek Mill, the portable crushing facilities and equipment has been properly decontaminated and removed from the site, and, as of April 27, 1981, plant site clean-up, building removal, and site grading and topsoiling operations were underway.

On September 9, 1980, after contacting and receiving approval from Rocky Mountain Energy Co., Cotter's contractor, TIC, Inc., commenced tailings transport operations from the Charlie test site to the Bear Creek tailings pond. The tailings transport operation was completed on September 17, 1980.

Pursuant to License Conditions 19 & 20 and in accordance with Annex C, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use of Termination of Licenses for Byproduct source or Special Nuclear Material", all equipment and the pilot plant building have been washed down with high pressure water and detergent. The portable equipment, including the crusher, mixing drum and conveyors were removed from the site. Wash solutions were contained and evaporated, and the residue was transported to the waste dump. The pilot plant building is presently being dismantled and will be removed by May 31, 1981. By late fall, 1981, the pilot plant site will have been graded, topsoiled, seeded, fertilized and mulched.

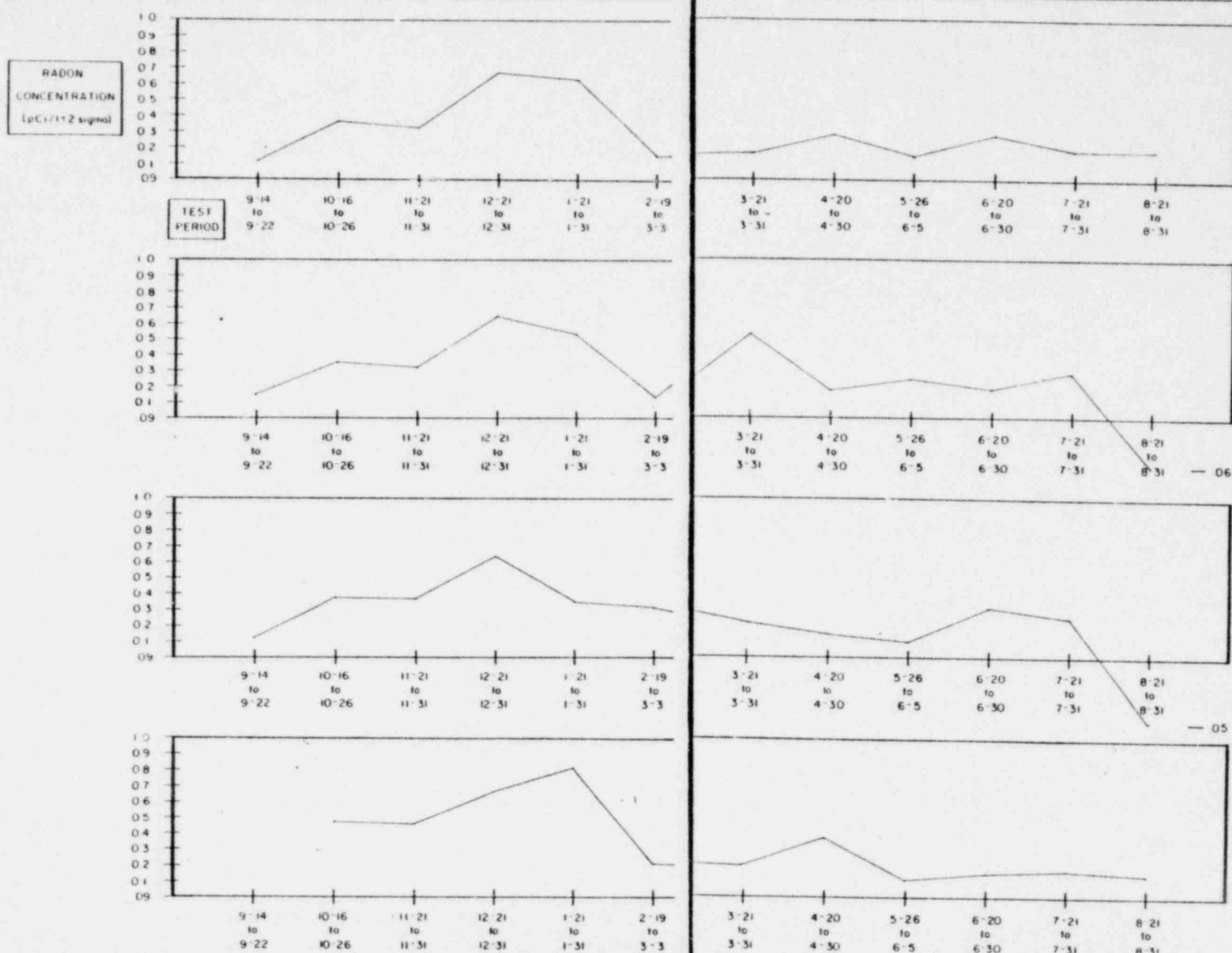
If you have any questions regarding this project completion report, please contact me at your earliest opportunity.

Sincerely,

Tim Smith

Tim Smith
Supervisor of Environmental Activities

TS/cj



COTTER CORPORATION
CHARLIE URANIUM OPERATIONS
JOHNSON COUNTY, WYOMING
ATMOSPHERIC RADON
SEPT. 79 - AUG. 80

DRAWN BY S.W. REVISION #1 BY
DATE 4-29-81 #2 BY
SCALE #3 BY

TL LEACH PILOT PLANT STUDIES OF CHARLIE MINE ORE

INTRODUCTION

In 1977, laboratory-scale TL leach tests were made using core samples of the Charlie ore body. Excellent extractions (97-98%; residual U_3O_8 of 0.003 and less) were obtained in beds 36 to 57 inches high in 3.5 inch Ø columns. The percolation rate permitted rinsing to the high extractions in three to four days. The conclusion of that study was that Charlie ore is amenable to TL leaching and it was recommended that tests be carried out with 8-10 ton batches of ore.

Subsequently, Cotter decided to build and operate a pilot plant capable of processing 25 tons of ore a day. This plant was designed and built by Holmes & Narver in the first half of 1979 and was operated by them during November and December, 1979. This report describes the pilot plant runs and the associated laboratory studies.

PROJECT OBJECTIVES

A plant was designed and built to meet the process conditions of the flow sheet included as Section 3. The general operating criteria were:

Nominal Operating Rate	25 tons per day
Operating Time - Crushing	one half shift
Operating Time - Mixing	1 shift
Operating Time - Leaching	3 shifts
Operating Time, days per week	7
Ore Moisture Content	9.5 percent
Ore Uranium Content	0.102 percent
Ore Bulk Density	84 pounds per cubic foot
Cured Ore Bulk Density	74 pounds per cubic foot

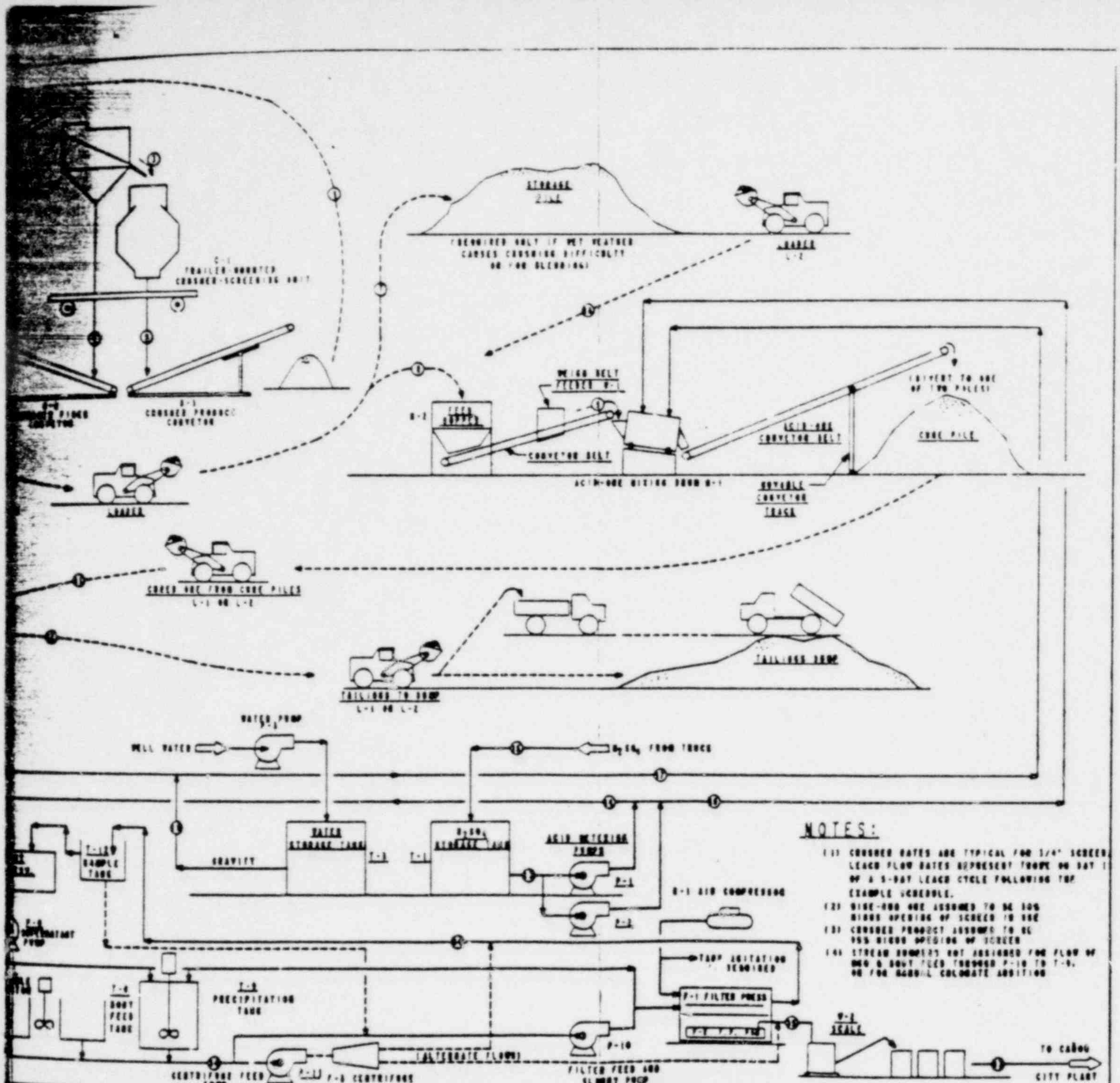
The design included the capability of varying:

Crushed Ore Size (Minus 1 inch, 3/4 inch, and 1/2 inch)
Leaching Schedule
Acid Addition (cure and total)
Rinse Time
Depth of Bed (to 6 foot maximum)
Leach Solution Flow Rate

The plant was to be operated over a 90 day period. The initial plan was to complete operations before freezing weather set in, but the lack of ore from the Charlie deposit until November 4, 1979, forced operation under sub-freezing conditions. The addition of shelters and heaters permitted operation, but the extra attention needed to do so detracted from the experimental program.

In the time available 17 tests were made with 25-ton lots of Charlie ore. Problems were encountered, such as flooding and low percolation rates, but meaningful results were obtained, as described below. By the last few runs, solutions to these problems seemed to have been found. In Section 9 equipment and operating changes that would permit smoother operation are described.

An unexpected problem led to overdosage with sulfuric acid in the curing step in seven of the runs. In the first few runs, high residual uranium contents were reported in the tailings. The colorimetric uranium procedure gave good results with leach liquors, but some component of the ore interfered with the assay of solids. Residual uranium appeared to be 0.02% U_3O_8 or higher, whereas, it was actually in the order of 0.003% U_3O_8. All solids were subsequently analyzed by an alternative procedure.



NOTES:

(1) CRUSHER RATES ARE TYPICAL FOR 3/4" SCREEN. LEACH FLOW RATES REPRESENT THOSE ON DAY 1 OF A 5-DAY LEACH CYCLE FOLLOWING THE EXAMPLE SCHEDULE.
(2) RISE-RUN ORE ASSUMED TO BE 50% BELOW OPENING OF SCREEN IN USE
(3) CRUSHED PRODUCT ASSUMED TO BE 95% BELOW OPENING OF SCREEN
(4) STREAM NUMBERS NOT ASSIGNED FOR FLOW OF ORE & BODY FEED THROUGH P-10 TO T-9, OR FOR NABONIL COLORATE ADDITION

	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	FILTER CAKE TO DRUMS	[illegible]	PKG TO CANON CITY
[illegible]	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	SOLID	SLURRY	[illegible]	LIQUID	SOLID
[illegible]	14	14	14	2	8	10	10	14	14	12	2	—	8	[illegible]	8	
[illegible]	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
[illegible]												0.02%	[illegible]	[illegible]		131
[illegible]												—				
[illegible]												—				
[illegible]	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	20		5		5	
[illegible]	2000	2000	4000	400	1000	2000	2000	4000	4000	2000	2000		2000		2000	
[illegible]	0.5	0.1	0.1	0.1	0.002	2.3	0.3				2.3				.002	
[illegible]														12	—	
[illegible]	10	10	10	10	5-10	5-10	5			5	5-10				5-10	
[illegible]								8				100		100		
[illegible]	1.05	1.05	1.05	1.05	1.05	1.00	1.05	1.00	1.05	1.05	1.05	—	1.10	—	1.05	

[illegible] = 0.155 T 0 = 0.54 [illegible]/DAY = 45 DAYS/TRUCKLOAD. [illegible] SOURCE MATERIAL OR [illegible] = 1000 LBS. [illegible]

EXAMPLE SCHEDULE OF LIQUID PUMPING

HOURS	DAY 1 OR PAD 1	DAY 2 OR PAD 2	DAY 3 OR PAD 3	DAY 4 OR PAD 4	DAY 5 OR PAD 5
08-10	(LOAD PAD)	FROM T.L. PAD TO T.L. PAD	FROM T.L. PAD TO T.L. PAD	FROM T.L. PAD TO T.L. PAD	[illegible]
10-12	(LOAD PAD)	FROM T.L. PAD TO T.L. PAD	FROM T.L. PAD TO T.L. PAD	FROM [illegible] TO T.L. PAD	[illegible]
12-14	FROM T.L. PAD TO P.L. STORAGE	FROM T.L. PAD TO T.L. PAD	FROM T.L. PAD TO T.L. PAD	FROM SUPPL. TESS TO T.L. PAD	[illegible]
14-16	FROM T.L. PAD TO P.L. STORAGE	FROM T.L. PAD TO T.L. PAD	FROM T.L. PAD TO T.L. PAD	FROM SUPPL. TESS TO T.L. PAD	[illegible]
16-18	FROM T.L. PAD TO P.L. STORAGE	FROM T.L. PAD TO T.L. PAD	FROM T.L. PAD TO T.L. PAD	FROM SUPPL. TESS TO T.L. PAD	[illegible]
18-20	FROM T.L. PAD TO P.L. STORAGE	FROM T.L. PAD TO T.L. PAD	FROM T.L. PAD TO T.L. PAD	FROM SUPPL. TESS TO T.L. PAD	[illegible]
20-22	FROM T.L. PAD TO P.L. STORAGE	FROM T.L. PAD TO T.L. PAD	FROM T.L. PAD TO T.L. PAD	(DRAIN TO T.L. PAD)	[illegible]
22-24	FROM T.L. PAD TO T.L. PAD	FROM T.L. PAD TO T.L. PAD	FROM T.L. PAD TO T.L. PAD	(DRAIN TO T.L. PAD)	[illegible]
00-02	FROM T.L. PAD TO T.L. PAD	FROM T.L. PAD TO T.L. PAD	FROM T.L. PAD TO T.L. PAD	(DRAIN TO T.L. PAD)	[illegible]
02-04	FROM T.L. PAD TO T.L. PAD	FROM T.L. PAD TO T.L. PAD	FROM T.L. PAD TO T.L. PAD	(DRAIN TO T.L. PAD)	[illegible]
04-06	FROM T.L. PAD TO T.L. PAD	FROM T.L. PAD TO T.L. PAD	FROM T.L. PAD TO T.L. PAD	(UNLOAD PAD)	[illegible]
06-08	FROM T.L. PAD TO T.L. PAD	FROM T.L. PAD TO T.L. PAD	FROM T.L. PAD TO T.L. PAD	(UNLOAD PAD)	[illegible]

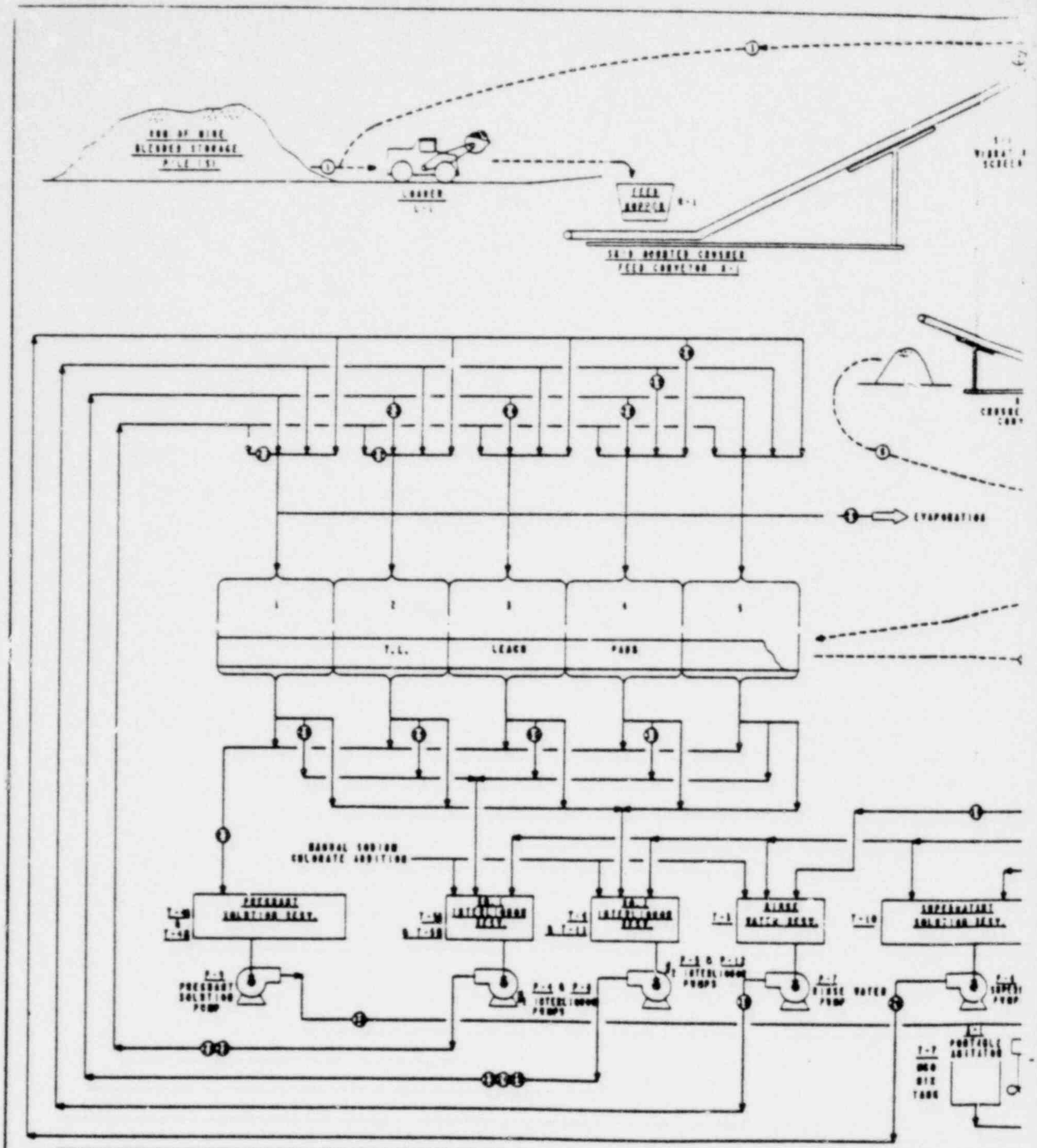
PROCESS FLOWSHEET
T.L. LEACH URANIUM
PILOT PLANT
COTTER CORPORATION

HOLMES & NARVER, INC.

JOB NO. 3052.00

DRAWING NO. F-1

REVISION 0



STREAM NUMBER		1	2	3	4	5	6	7	8 [illegible]	9	10	11	12	13	14	15	16	17	18	19	20	21	22
STREAM DESCRIPTION		RAW ORE TO CRUSHING	SCREEN [illegible]	[illegible] IMPACT CRUSHER FEED	SCREEN UNDERSIZE	CRUSHER PRODUCT	CRUSHED ORE TO TRANSPORT	[illegible] ORE TO STORAGE	FINE ORE [illegible]	ORE TO MIXER	CONC. ACID TO CURE	CURED ORE TO T.L. PADS	TAILINGS TO DUMP	CONC. TO [illegible]	CONC. TO [illegible]	ACID FROM TRUCK	WATER TO [illegible]	WATER TO CURE	WATER TO [illegible]	LEACH PAD [illegible] RINSE	WATER EVAPORATION	[illegible] TO LEACH	[illegible] PAD [illegible]
STREAM MEDIUM		SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	LIQUID	SOLID	SOLID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	VAPOR	LIQUID	LIQUID
OPERATION TIME	HRS/DAY	2	2	2	2	2	7	2	7	8	6	1	1	VARIABLE	VARIABLE	1	1	8	VARIABLE	2	24	20	16
	DAYS/WK	7	7	7	7	7	7	8	7	7	7	7	7	7	7	AS NEEDED	7	7	7	7	7	7	7
SOLIDS FLOW RATE (TYPICAL) (DRY)	TPH	25	45	18	25	18	VARIABLE	VARIABLE	VARIABLE	4.17	—	25	25										
	TPD	25	45	18	25	18	VARIABLE	VARIABLE	VARIABLE	23	—	25	25										
MOISTURE	%	9.5	9.5							9.5	—	10.8	10.8				100	100	100	100			
LIQUID FLOW RATE	GPM	10.5							—	1.75	0.50	3.17	—	VARIABLE	0-20		29	1.42	VARIABLE	3.33	0.10	3.33	3.33
AT 9.8 TPD SOLN/TPD ORE	GPD	829.32							829.32	829.32	179.70	191.59	316.9	32.67	53.30		599.99	12.11	12.2	599.[illegible]	829.32	4800	2880
U_3O_8 CONTENT	GPL																					0.3	0.5
	D.W.%	0.102	0.102						0.102	0.102		0.102	0.017										
H_2SO_4 CONTENT	GPL										985		0.01	93.2	93.2	93.2						10	10
BULK DENSITY	LB/FT³	84	84						84	84		74	74										
SPECIFIC GRAVITY											1.84			1.84	1.84	1.84		1.00	1.00	1.03	1.00	1.05	1.06

(1) 98.5% U_3O_8 RECOVERY (2) INTERSTITIAL SOLUTION (3) DRY WT. = 0.237 TPD @ 12% U_3O_8 + [illegible]

SUMMARY

1. Seventeen 25-ton batches of the first ore exposed at the Charlie ore deposit were treated by the TL leach process.

2. Nine runs resulted in residual uranium contents in the tailings of less than 0.01% U_3O_8. The recoveries ranged from 76% to 91%, depending on the uranium contents of the heads, which were 0.032 to 0.0618% U_3O_8 in these runs.

3. The vanadium contents of the ore samples were about the same as the uranium contents, and vanadium extraction paralleled uranium extraction. Residual vanadium contents were in the range 0.016% to 0.034% V_2O_5 in those runs in which vanadium extraction was good.

4. Rinsing times to get high recovery decreased during the testing period, and 91% recovery (0.006% residual U_3O_8) was obtained in 54 hours of rinsing and 14 hours of draining the the last run.

5. Curing conditions necessary for a high degree of solubilization differed among the ore grades. "High-grade" ore, which is somewhat more refractory, required about 100 pounds of sulfuric acid and less than 8 pounds of sodium chlorate per ton of ore and 24 hours of curing. Higher dosages of acid were not necessary and were even harmful.

6. Laboratory studies corroborated the pilot-plant results.

7. Additional pilot-plant runs are needed to get data for design of a commercial plant.

CONCLUSION

This test program, although cut short by cold weather, has shown that TL leaching can give the uranium extraction on 25-ton batches of ore that had been demonstrated on a bench-scale using core samples from the Charlie ore deposit.

Sulfuric acid and sodium chlorate required in the cure will be in the order of 100 pounds per ton and 4 pounds per ton respectively. Three days of rinsing and draining should be adequate.

Further work is required to obtain detailed design information on productivity of a bed as a function of bed height and spray characteristics. Additional tests should evaluate the recycle of interliquor as a means of leaching additional uranium during the rinse step. Filtrate from the precipitation of crude yellow cake also should be recycled to reduce both the volume of process water required and salt buildup in the system.

LABORATORY STUDIES

Two types of bench-scale studies were made in conjunction with the pilot plant leach tests: (1) cure tests, in which the degree of solubilization of uranium was determined after varying the dosage of reagents and the time and (2) leach tests of ore from a plant cure pile or from a laboratory cure. These tests were designed to show what cure conditions were optimum for the ore being processed and whether a pilot plant test could be expected to give optimum results.

SOLUBILIZATION STUDIES

Procedure. In a typical test, 500g of ore was mixed with the desired amounts of sulfuric acid, water, and sodium chlorate in a plastic bag and set aside to cure for a specified period of time. In one series of tests at the pilot plant, samples were placed in cure piles to solubilize the uranium at the elevated temperatures of the 25 T batches of ore. Temperatures of the cure piles were in the range of 95-135° F throughout the cure step due to the heat of reaction and low heat loss to the surroundings. Cure temperatures for the other solubilization studies at the pilot plant were ambient, 35-50° F, and 70° F at the Holmes & Narver laboratory. After the solubilization step, the ore was slurried in either 500 ml or 1,000 ml of water and filtered under vacuum. The ore was washed twice under vacuum with 250 ml portions of water acidified with sulfuric acid to completely remove soluble uranium. The residue was dried, ground, and analyzed for uranium as U_3O_8 by neutron activation--delayed neutron counting. Combined filtrates were analyzed for uranium as U_3O_8 either spectrophotometrically or by neutron activation. Some filtrates were also titrated to determine acid concentration from which H_2SO_4 consumption was calculated.

Ore. Ore was delivered to the pilot plant and graded as "low", "medium", and "high" grade ore. Samples were removed from these individual piles with a shovel, mixed, and crushed by hand to < 1 inch. Calculated heads of these three grades of ore were in the range:

Low Grade:	0.0354-0.0840% (0.0468% average for 58 tests)
Medium Grade:	0.0800-0.103% (0.0897% average for 9 runs)
High Grade:	0.0715-0.107% (0.0869% average for 9 runs)

"High" grade ore was slightly reddish gray in color. The ore contained a small quantity of carbonaceous material laced with small crystals of pyrites. The organic materials did not contain unusual concentrations of uranium as measured with a radiation counter. The "medium" grade ore was reddish brown in appearance with a smaller amount of carbonaceous material than the "high" grade ore. "Low" grade ore was gray with no organic material or pyrites. All three types of ore were moist and could be easily crushed to a fine sand.

The classification of the ore into three grades was somewhat arbitrary. The range of uranium assays within each group was broad and there was no sharp distinction among the different types of ore. When different samples from the same grade of ore were cured under identical conditions, significant differences in % U_3O_8 recoveries and tails analyses were observed. Hence, in comparing results of different tests, the overall trend was more significant than small variations among a limited set of data. For example, the following tests were conducted in duplicate on different samples of "low" grade ore.

Ore Sample	H_2SO_4 #/T	$NaClO_3$ #/T	$\%U_3O_8$ Tails	% Recovery
A	100	2	.0042	89.0
A	120	2	.0038	89.3
A	140	4	.0025	93.4

Ore Sample	H_2SO_4 #/T	$NaClO_3$ #/T	$\%U_3O_8$ Tails	% Recovery
B	100	2	.0063	84.0
B	120	2	.0084	82.5
B	140	4	.0051	88.0

Within each set, the trend was identical. Solubilization of uranium was about the same at 100 and 120 #/T sulfuric acid but increased at 140 #/T sulfuric acid and twice the oxidant concentration. Overall, the uranium recovery was 5-7% lower for the second set of data than the first. Since the ore was heterogeneous and the sample was coarsely crushed but not ground, variations in composition were to be expected among small, 500g samples.

Temperature. A second complicating feature was the lack of precise temperature control during the cure step of tests conducted at the pilot plant. When large batches of ore are cured in commercial operations, the heat of reaction is generally retained by the ore. Temperatures are fairly uniform within the bed. Laboratory cure samples attain the temperature of their surroundings rapidly. Uranium solubilization is temperature dependent below about 70° F.

Therefore, absolute comparison of extraction tests conducted at different times (and different temperatures) could not be made. However, trends emerged from these studies which guided the selection of optimum conditions for uranium solubilization.

Uranium Extraction from Different Grades of Ore. Table I summarizes results of curing the three grades of ore at 70° F. Uranium was solubilized with 90+% recovery from "low" and "medium" grades of ore with 60 #/T sulfuric acid, 8 #/T sodium chlorate, and 24 hour cure time. With uranium so easily extracted, increasing severity of the cure conditions was not productive.

Indeed, extremely high acid levels, 265 #/T, decreased solubilization of uranium. With the more refractory "high" grade ore, higher levels of acid and longer cure times, 100 #/T for 72 hours or 140 #/T for 24 hours, were required to achieve the desired 90% minimum uranium solubilization and maximum 0.01% U_3O_8 in the tails. For a given set of cure conditions, ease of extracting uranium followed the order "low" grade > "medium" grade > "high" grade.

Two trends emerged from examining the data in Table II for solubilization of the three grades of ore at high acid concentrations and low temperatures. "High" grade ore required more severe conditions for extracting uranium than either "low" or "medium" grades. Increasing acid concentrations from 200 #/T to 300 #/T was counter-productive.

Prior to receiving Charlie ore at the pilot plant, solubilization tests were conducted on Colorado-Western Slope ore, Table III. Recoveries were extremely low. Increasing the moisture content of the ore from 5% to 17% was more important for solubilizing uranium than a moderate increase in acid concentration from 160 #/T to 180 #/T. The need for sodium chlorate oxidant was obvious for this highly reduced ore.

Acid Concentration. The effect of sulfuric acid concentration on recovery of uranium can be seen more clearly upon examination of Table IV and Figures 1 and 2 . Table IV is a selection of data from the solubilization of "low" grade ore samples at 5 ± 1 #/T sodium chlorate, and 48 hours cure time at 95-135° F. Essentially, the same recoveries were observed in the range of 100-210 #/T sulfuric acid. At higher acid concentrations, 230-300 #/T, however, uranium solubility was reduced. The same phenomenon was observed in a series of cure tests at 70° F on three grades of Charlie ore, Table

The relationship between acid concentration and uranium recovery can also be seen from two graphs. The first is a plot of % U_3O_8 Residual *versus*

Sulfuric Acid Concentration for solubilization of low grade ore, Fig. 1 . Figure 2 is a graph of % U_3O_8 Solubilization of "low" grade ore <u>versus</u> Sulfuric Acid Concentration. Percent U_3O_8 in the tails and % recovery were relatively constant from 100-200 #/T. Above 200 #/T sulfuric acid concentration, recoveries decreased with a corresponding increase in uranium in the tails.

Acid consumption for samples cured at 95-135° F increased steadily with sulfuric acid concentration in the cure to 150 #/T, Figure 3 . At that level acid consumption was 102 #/T. Acid consumption was independent of sodium chlorate concentration. Acid consumptions for samples cured at 35-50° F were generally lower than for samples cured at 95-135° F. Only at 300 #/T sulfuric acid in the low temperature cure was acid consumption above 100 #/T. At this extremely high acid level, the heat of reaction itself may have been sufficient to raise the temperature of the cure, and, hence, increase acid consumption.

<u>Sodium Chlorate</u>. Sodium chlorate was required for solubilization of uranium in Charlie ore at 95-135° F, Table V . For "low" grade ore, 2 #/T sodium chlorate was sufficient to reduce U_3O_8 in the tails below 0.01%. The more refractory "high" grade ore required higher concentrations of sodium chlorate to solubilize uranium, although the minimum amount needed was not determined.

<u>Cure Time</u>. A 24 hour cure time was sufficient for solubilization of "low" grade ore at 60-200 #/T sulfuric acid concentration (Table I). At higher acid levels, which suppressed uranium solubilization, both longer cure times and higher sodium chlorate concentrations were marginally effective (Table VI).

COLUMN RINSING STUDIES

Procedure. Ore was cured at ambient temperature and placed in columns to a predetermined column height. The columns were provided with adequate drainage. Rinse solution was dripped onto the surface of the ore at a known rate by means of a peristaltic pump. A fine mesh screen was placed on the surface of the ore to evenly disperse the droplets of rinse solution. Effluent was collected at recorded time intervals and analyzed for uranium as U_3O_8 by neutron activation--delayed neutron counting.

Three rinse solumns were used with cross-sectional areas of 0.067 ft.^{2} (3.5 in. I.D. X 5 ft. tube), 1 ft.^{2} (12 in. X 12 in. X 48 in. box) and 2.5 ft.^{2} (18 in. X 18 in. X 48 in. box). The two boxes were constructed of 3/4 inch plywood and mounted on legs. One-eighth inch holes were drilled into the floor at two inch intervals for drainage.

Rinse solution was added to the center of the ore bed in the 0.067 ft.^{2} column through a single tube. A set of nine equally spaced nozzles was placed over the center of the 1 ft.^{2} and 2.25 ft.^{2} columns to be certain that rinse solution was evenly distributed over the bed.

Results. "High" grade ore, < 1 inch after passing through the crushing circuit, was used in tests 1-5. "Low" grade ore < 3/4 inch mesh, was rinsed in tests 6-9. The ore rinsed in the 1 ft.^{2} column was taken from the cure pile for Run 16 at the pilot plant after completion of the curing step. For the other tests, ore was mixed with the desired quantities of reagents by hand either with a shovel or a scoop depending on the size of the batch. Cure conditions are shown below.

Test	Ore Grade	Wt. Ore lb.	H_2SO_4 #/T	$NaClO_3$ #/T	Cure hour
1	High	12.8	175	10	48
2	High	13.6	175	10	72
3	High[1]	67.0	77	1.9	37
4	High	485	175	10	24
5	High	461	175	10	72
6	Low	8.4	240	10	72
7	Low	5.1	180	8	24
8	Low	5.5	180	8	24

1) Sample was taken from the ore for Run 16 after it was cured in the pile.

The procedures followed for rinsing the cured ore and a summary of results are also presented. Tabulated data and graphs of % Extraction vs. Volume of Rinse Solution and U_3O_8 Concentration vs. Volume are presented in Tables VII through XIV and Figures 4 through 17 .

Test	Bed Area $Ft.^2$	Column Height In.	Flow Rate-ml/min Ave.	Flow Rate-ml/min Max.	% U_3O_8 Tails	% U_3O_8 Calc. Heads	% Extraction
1	0.067	36	5.	10	.00558	.0880	93.8
2	0.067	36	6.0	26.0	.0093	.0760	88.0
3	1.00	12	64	250.	.0073	.0536	86.8
4	2.25	36	48	140	.00374	.0851	95.6
5	2.25	36	83	125	.0043	.0603	93.0
6	0.067	24-1/4	5.5	19.0	.00173	.0418	96.9
7	0.067	14-1/2	19.9	28.0	.00347	.0456	92.4
8	0.067	14-1/4	18.8	38.0	.00342	.0473	92.7

Even though relatively high acid concentrations, 175 #/T, were used for curing ore in Tests 1 and 2, addition of sulfuric acid to the rinse solution was beneficial. The percent extraction of U_3O_8 in Test 1 was about 6% higher than it was in Test 2. Ore was rinsed with 5 g/l H_2SO_4 in Test 1 but with only 1 g/l H_2SO_4 in Test 2. Comparing the slope of the curve for % Extraction vs. Volume at the end of the run for Test 1 (Figure 4) and Test 2 (Figure 6), equilibrium was achieved more rapidly in Test 1 in which a more acidic rinse was used. While much of the uranium solubilization in TL leaching occurs in the cure step, additional leaching may also take place during rinsing.

Test 3 confirmed the fact that uranium, solubilized in the cure pile in Run 16, could be rinsed from the bed, and that additional extraction occurred during rinsing.

Test	% U_3O_8 Tails	% U_3O_8 Heads	% Recovery
Lab Solubilization For Run 16	.0176	.0557	68.4
Test 3	.0073	.0537	86.8
Run 16	.005	.0551	90.9

Only 68.4% of the U_3O_8 was solubilized in the cure step for Run 16. An additional 18.4% was recovered upon rinsing the ore in Test 3 with 5 g/l H_2SO_4. Recovery of U_3O_8 was further enhanced in the 25 T plant run upon rinsing with 12 g/l H_2SO_4. Since the ore was originally cured with an insufficient amount of acid to solubilize all the uranium, the amount of acid in the rinse was very important.

Tests 4 and 5 were run under identical conditions with the exception of cure time, 24 hours vs. 72 hours. The data on Tables X and XI and Figures 10 and 12 indicate that a 24 hour cure was adequate for this level of acid and oxidant.

Productivities, g U_3O_8/ft.^{2}/hour @ 90% extraction, were calculated for several rinse tests. Qualitatively, productivities were greater for ore rinsed in 0.067 ft.^{2} columns than for ore rinsed in 2.25 ft.^{2} columns. In the small diameter columns, the walls may support the ore and help to maintain its permeability. Average flowrates, ml/min/ft.^{2}, were greater in the 0.067 ft.^{2} columns than in the 2.25 ft.^{2} columns which also could have contributed to a higher productivity.

Run	Flow Rate ml/min/ft.^{2} Ave.	Max.	Bed Area ft.^{2}	Column Height inches	90% Recovery Time hours	Vol. l.	Productivity g U_3O_8/ft^2/hour @ 90% Recovery
1	75	150	.067	36	29.3	8.0	2.6
4	21	62	2.25	36	67	194	1.1
5	37	56	2.25	36	60	255	0.8
6	82	284	.067	24-1/4	7.6	3.3	3.7
7	280	418	.067	14-1/4	4.4	3.8	3.6
8	297	418	.067	14-1/2	3.0	2.8	4.8

COMPARISON OF LABORATORY AND PILOT PLANT RINSES

A fundamental objective of this study was to measure both the amount of uranium solubilized in the ore and the amount rinsed from the bed. For seven plant runs, samples of ore were removed from the cure piles just prior to loading the cured ore onto the rinse pads. These samples were slurried, filtered, and rinsed rapidly and completely with acidified water under vacuum. Samples of heads and tails were analyzed to determine % U_3O_8 solubilized in the cure. At the conclusion of the plant run, samples of the rinsed tailings were analyzed to determine an overall recovery for the run. Results are summarized in Table XV.

In Runs 10 and 15, uranium was largely solubilized in the cure but rinsing was not complete. Acid and oxidant concentrations were well above the minimum levels required for satisfactory extraction. Ore was incompletely solubilized in Runs 11, 14, 16, and 17. The uranium that was extracted in Runs 11 and 14 was not completely washed from the bed.

In Runs 16 and 17, the levels of sulfuric acid and sodium chlorate used in the cure were not sufficient to solubilize the uranium. However, the plant interliquor contained sufficient acid and chlorate to leach the uranium during the 58 hour rinse in Run 16 and 78 hour rinse in Run 17. Acid concentrations in the rinse liquor were 12 g/l and 19 g/l in Runs 16 and 17 respectively.

Curing conditions were more severe in Run 18 compared with Runs 16 and 17. Uranium was both largely solubilized in the cure and efficiently rinsed from the bed.

TABLE I

SOLUBILIZATION OF COTTER CHARLIE ORE[a)]

Ore Grade	H_2SO_4 lb/ton	$NaClO_3$ lb/ton	Cure hours	% U_3O_8 tails	% U_3O_8 calc. heads	% Recovery
Low	60	8	24	.0020	.0664	97.0
Low	100	8	72	.0012	.0602	98.4
Low	140	8	24	.0024	.0602	96.7
Low	265	8	24	.0096	.0635	84.6
Med	60	8	24	.0056	.0602	90.0
Med	100	8	72	.0055	.0616	92.1
Med	140	8	24	.0051	.0663	92.6
Med	265	8	24	.0132	.0688	82.2
High	60	2	24	.0129	.0680	80.9
High	60	8	24	.0107	.0686	83.9
High	100	0	24	.0152	.0751	82.9
High	100	2	24	.0101	.0674	85.0
High	100	8	72	.0057	.0706	92.2
High	140	8	24	.0088	.0686	87.0
High	190	8	72	.0050	.0636	92.2
High	265	8	24	.0204	.0737	73.4

a) H_2O added to give 14% moisture in the cured ore. Temperature of the cure was 70° F.

TABLE II

SOLUBILIZATION OF CHARLIE ORE.

Effect of High Acid Concentration and Low Temperature on Recovery with Different Grades of Ore [a)]

Ore Grade	H_2SO_4 #/T	$NaClO_3$ #/T	Cure hours	% U_3O_8 Tails	% U_3O_8 Calc. Heads	% Recovery
Low[1]	210	10	48	.0047	.0565	91.7
Low	230	10	24	.0080	.0530	84.8
Low	230	10	48	.0099	.0570	82.5
Low	265	10	24	.0080	.0513	84.4
Low	265	10	48	.0093	.0489	81.0
Low	300	10	24	.0078	.0445	82.4
Low	300	10	48	.0103	.0549	81.3
Med[2]	200	10	48	.0058	.0805	92.8
Med	250	5	48	.0113	.0858	86.8
Med	250	10	48	.0134	.1034	87.0
Med	250	15	48	.0068	.1002	93.2
Med	300	10	48	.0118	.0849	86.2
High[3]	190	9	24	.0128	.0837	84.8
High	236	5	24	.0138	.0809	82.9
High	236	9	24	.0281	.1070	73.7
High	236	14	24	.0179	.0942	81.0
High	284	9	24	.0173	.0800	78.4

a) Cure temperature = 35-50°F,

1) Total moisture in ore = 15.8%, $<$ 3/4" mesh

2) Total moisture in ore = 18.4%, $<$ 1" mesh

3) Total moisture in ore = 13.5%, $<$ 1" mesh

TABLE III

SOLUBILIZATION OF COLORADO WESTERN SLOPE ORE[1]

H_2SO_4 #/T	$NaClO_3$ #/T	Total Moisture W %	Cure Time Hours	% U_3O_8 Tails	Calc. Heads	% Recovery
160	0	5.4	48	.0638	.148	56.9
160	0	11.0	48	.0616	.161	61.7
160	0	17.6	48	.0565	.166	65.9
160	0	25.0	48	.0476	.143	66.8
180	0	5.4	48	.1414	.233	39.5
180	0	11.0	48	.0415	.138	69.9
180	0	17.6	48	.0813	.186	56.2
180	0	25.0	48	.0504	.162	69.0

1) % Moisture as received = 2.2%

TABLE IV

SOLUBILIZATION OF "LOW" GRADE CHARLIE ORE

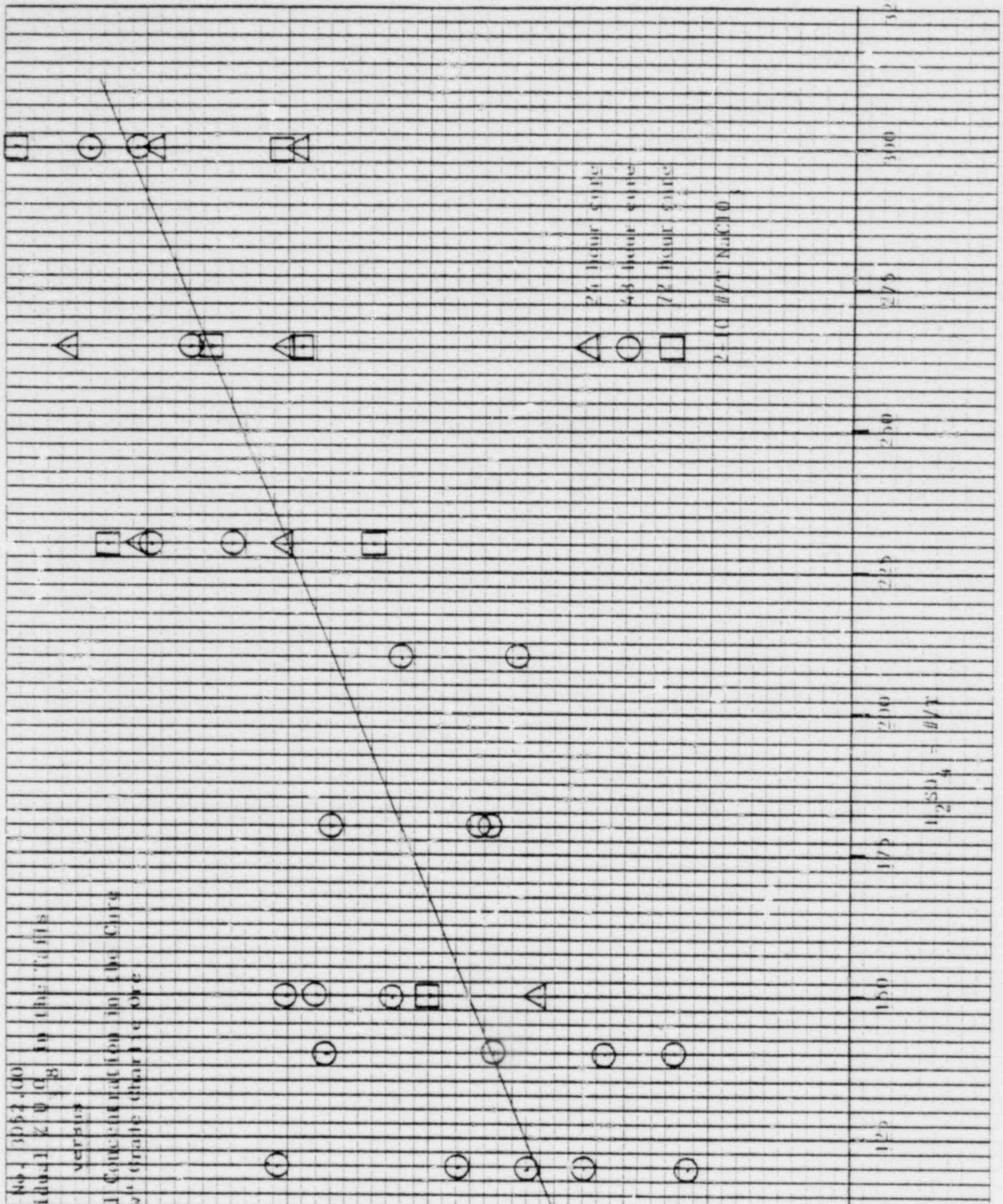
Effect of H_2SO_4 on Recovery[1]

H_2SO_4 #/T	$NaClO_3$ #/T	H_2SO_4 Consumed #/T	% U_3O_8 Tails	% U_3O_8 Calc. Heads	% Recovery
100	4	85.9	.0031	.0359	85.9
100	4	64.5	.0045	.0424	89.4
120	4	88.5	.0046	.0431	89.3
120	4	89.1	.0056	.0458	87.7
140	4	101.	.0025	.0376	93.4
140	4	96.7	.0051	.0419	88.0
150	6	103.	.0076	.0477	84.0
180	6	101.	.0052	.0432	88.2
210	6	116.	.0049	.0474	89.6
230[2]	5	88.0	.0087	.0522	83.4
265[2]	5	85.6	.0157	.0544	71.6
300[2]	5	89.2	.0108	.0477	77.5

1) < 3/4" Ore, 15.8% total moisture, 48 hours cure. Ore cured in cure pile, 95-135°F, unless otherwise stated.

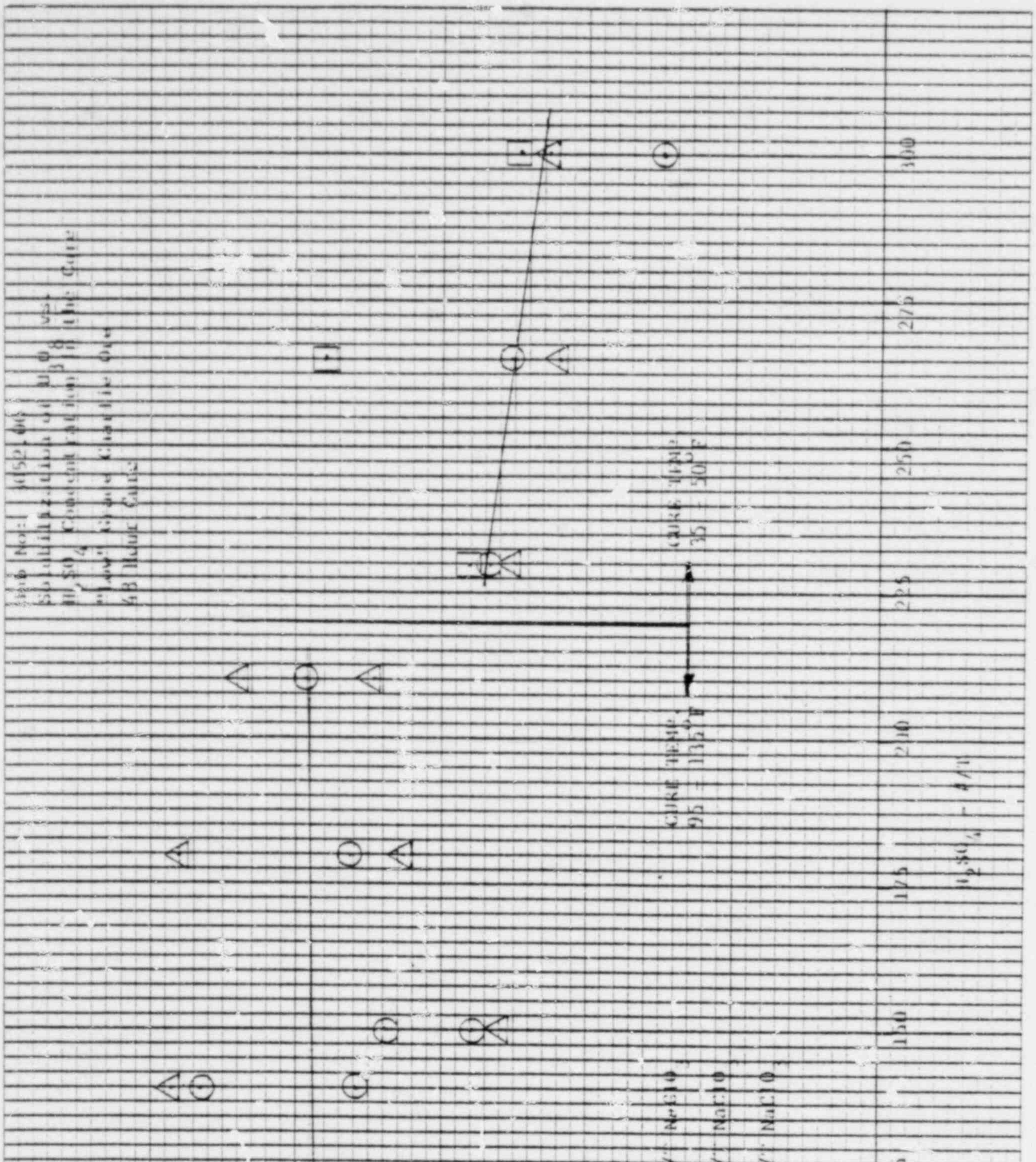
2) Ore cured at ambient temperature, 35-50°F.

FIGURE 1



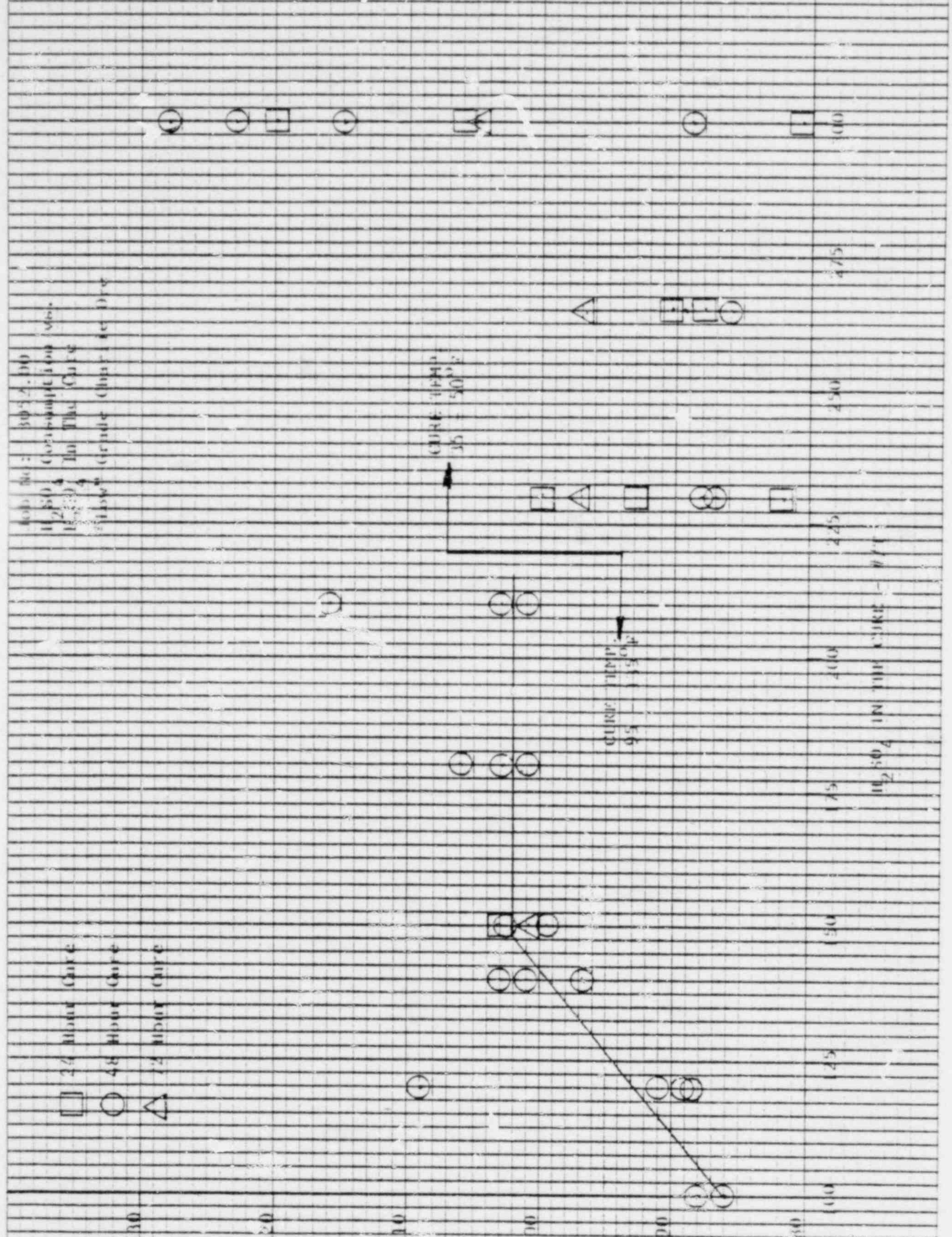
Residual % U_3O_8 in the Tails
versus
Acid Concentration in the Cure
24 hour cure
48 hour cure
72 hour cure
H_2SO_4 = #/T
% U_3O_8 IN THE TAILS
.010
.008
.006
.004
.002
0
100
125
150
175
200
225
250
275
300
325

FIGURE 2



5 WT% NaClO
10 WT% NaClO
15 WT% NaClO
CURE TEMP 95 - 135°F
CURE TEMP 35 - 50°F
100
125
150
175
200
225
250
275
300
95
90
85
80
75
70

FIGURE 3



24 Hour Cure
48 Hour Cure
72 Hour Cure
H_2SO_4 Consumption vs.
H_2SO_4 In The Cure
CURE TEMP. 35 - 50°F
CURE TEMP. 95 - 115°F
130
120
110
100
90
80
H_2SO_4 CONSUMED - #/T
100
125
150
175
200
225
250
275
300
H_2SO_4 IN THE CURE - #/T

TABLE V

SOLUBILIZATION OF "LOW" GRADE CHARLIE ORE

Effect of $NaClO_3$ on Recovery[1]

$NaClO_3$ #/T	H_2SO_4 #/T	% U_3O_8 Tails	Calc. Heads	% Recovery
0	100	.0084	.0429	80.6
0	120	.0074	.0478	84.5
0	140	.0093	.0457	79.6
2	100	.0044	.0401	89.0
2	120	.0038	.0354	89.3
2	140	.0035	.0413	91.6
6	150	.0076	.0477	84.0
6	180	.0052	.0432	88.2
6	210	.0049	.0474	89.6
10	120	.0023	.0402	94.3
10	150	.0080	.0481	83.3
10	180	.0074	.0536	86.3
10	210	.0047	.0565	91.7
10[2]	230	.0099	.0570	82.5
10[2]	300	.0103	.0549	81.3
15[2]	230	.0082	.0518	84.1
15[2]	265	.0055	.0500	88.9
15[2]	300	.0088	.0492	82.2

1) < 3/4" ore, 15.8% total moisture, 48 hours cure. Ore cured in cure pile, 95-135°F unless otherwise specified.

2) Cured at ambient temperature, 35-50°F

TABLE VI

SOLUBILIZATION OF "LOW" GRADE CHARLIE ORE

Effect of Cure Time on Recovery

Cure Time Hours	H_2SO_4 #/T	$NaClO_3$ #/T	Cure Temp. °F	% U_3O_8 Tails	% U_3O_8 Calc. Heads	% Recovery
24	230	5	a	.0101	.0557	81.9
48	230	5	a	.0087	.0522	88.0
72	230	5	a	.0105	.0602	82.5
24	230	10	a	.0080	.0530	84.8
48	230	10	a	.0099	.0570	82.5
72	230	10	a	.0068	.0524	87.1
24	230	15	a	.0065	.0485	86.7
48	230	15	a	.0082	.0518	84.1
72	230	15	a	.0038	.0559	93.2
24	300	10	a	.0078	.0445	82.4
48	300	10	a	.0103	.0549	81.3
72	300	10	a	.0079	.0505	84.2
24	100	8	b	.0020	.0429	95.6
72	100	8	b	.0012	.0602	98.4
24	265	8	b	.0096	.0635	84.6
79	270	10	b	.0030	.0500	94.4
48	150	8	c	.0066	.0494	86.8
72	150	8	c	.0060	.0481	87.4

a) 35-50° F

b) 70°F

c) 95 - 135°F

Test #1

Job No: 3052.00

TABLE VII

Ore: Charlie High Grade

Weight Ore: 5790g

Cure Conditions: 175 lb/T H_2SO_4, 10 lb/T $NaClO_3$, 48 hours

Bed Area: 0.067 Ft^2

Bed Height: 36 inches

Rinse Solution: 5 g/l H_2SO_4, 1 g/l $NaClO_3$

EXTRACTION SUMMARY

	Wt. Ore	% U_3O_8	g U_3O_8	% Distribution
Effluent	--	--	4.757	93.8
Residue	5616 g	0.00558	0.313	6.2
Calculated Heads	5790 g	0.088	5.070	100.0

DATA

Cumulative Hours	Volume (l)	Cumulative Volume (l)	g/l U_3O_8	Cumulative g U_3O_8	% Extraction
3.00	0.440	0.440	3.321	1.461	28.8
17.00	4.077	4.517	0.733	4.450	87.8
28.00	2.210	6.727	0.042	4.542	89.6
39.50	3.430	10.157	0.021	4.617	91.0
51.00	3.390	13.547	0.016	4.669	92.1
64.50	4.100	17.647	0.013	4.722	93.1
72.00	5.800	23.447	0.006	4.757	93.8

FIGURE 4

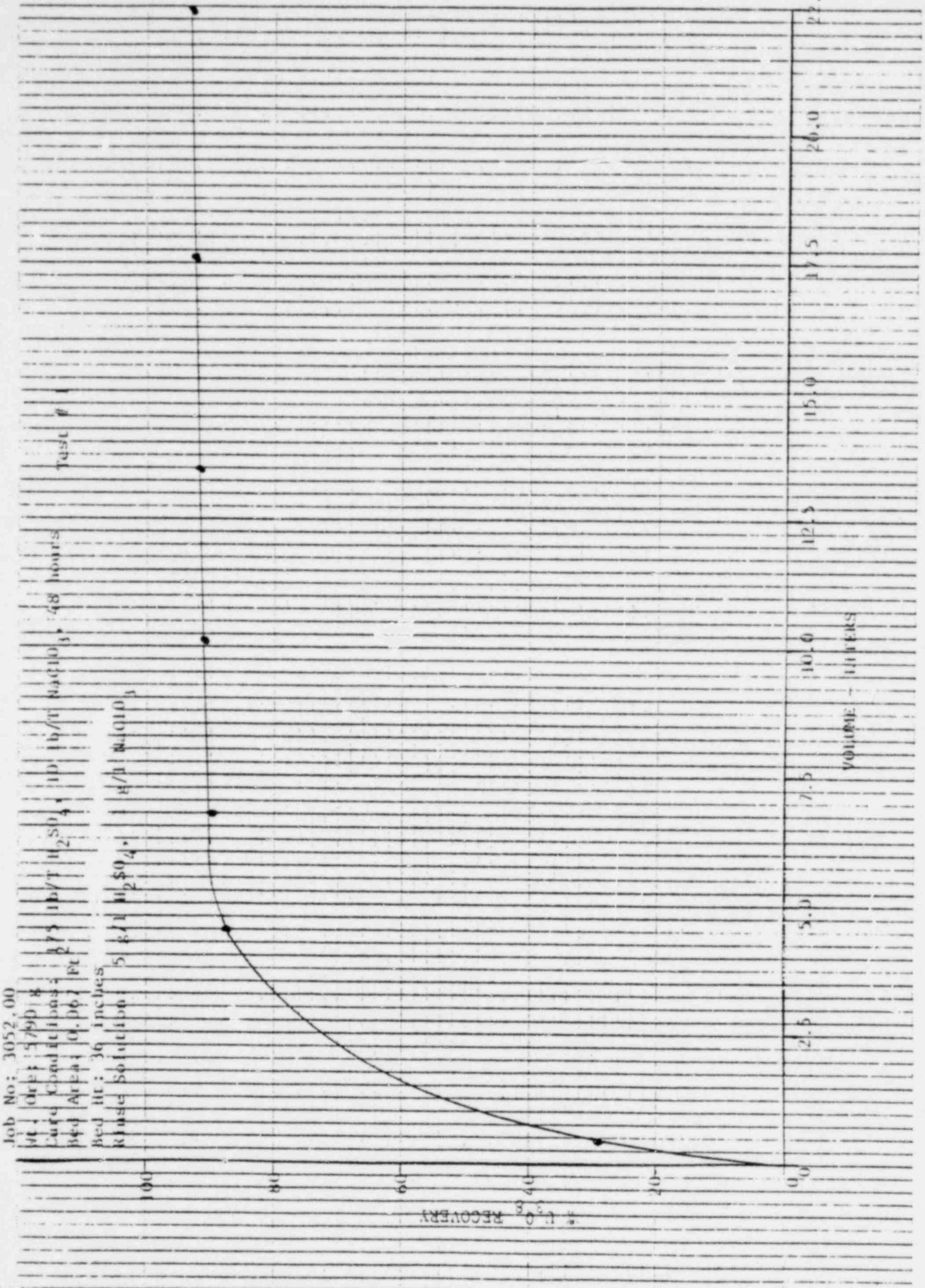
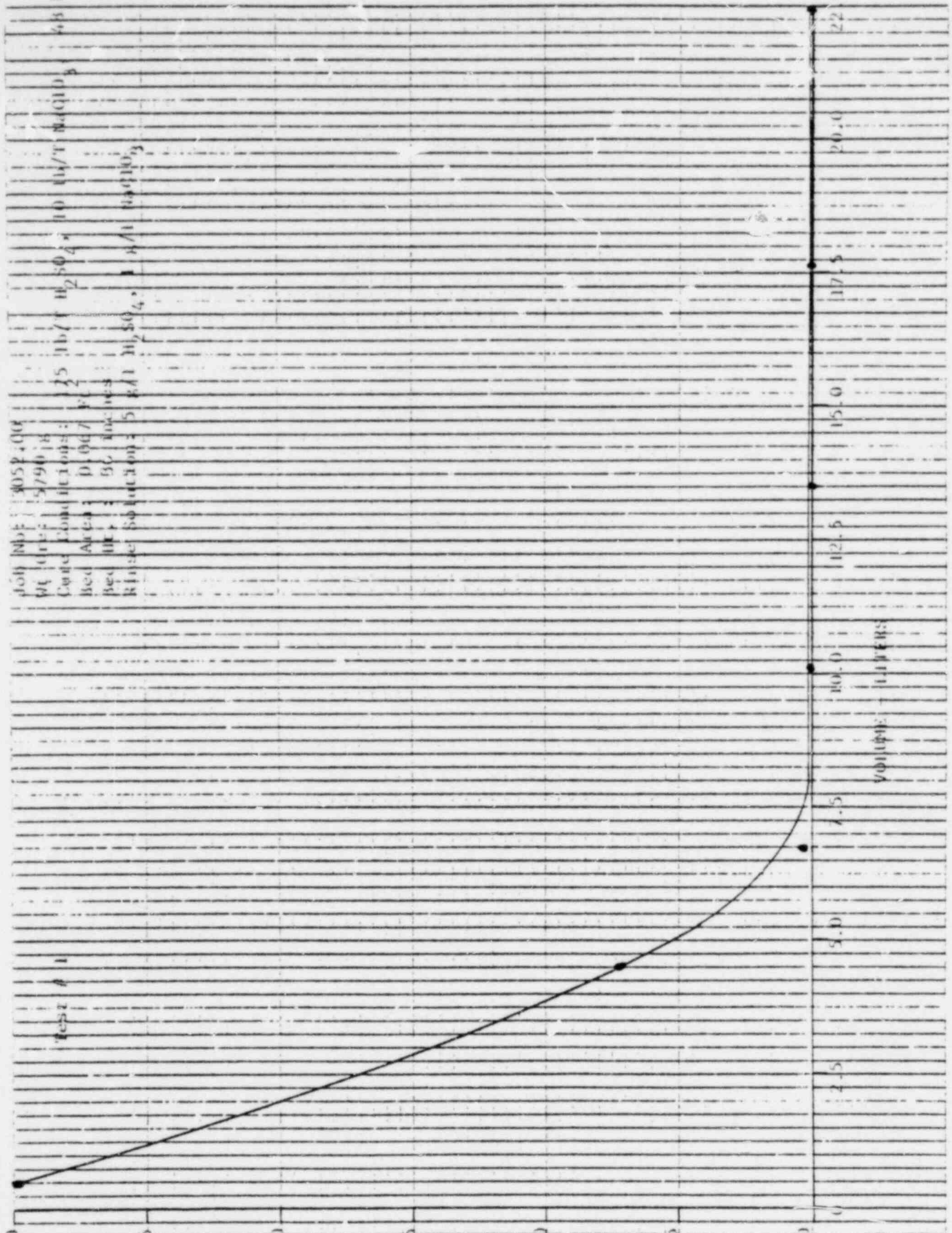

Job No: 3052.00
Wt. Ore: 5790 g
Cure Conditions: 175 lb/T H_2SO_4, 10 lb/T $NaClO_3$, 48 hours
Bed Area: 0.067 Ft^2
Bed Ht: 36 inches
Rinse Solution: 5 g/l H_2SO_4, 1 g/l $NaClO_3$
Test #
% U_3O_8 RECOVERY
VOLUME - LITERS
0
20
40
60
80
100
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
22.5

FIGURE 5


Test # 1
VOLUME - LITERS
0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
22.5
0.5
1.0
1.5
2.0
2.5
3.0

Test #2

TABLE VIII

Job No: 3052.00

Ore: Charlie High Grade

Weight Ore: 6200g

Cure Conditions: 175 lb/T H_2SO_4, 10 lb/T $NaClO_3$, 72 hours

Bed Area: 0.067 Ft^2

Bed Height: 36 inches

Rinse Solution: 1 g/l H_2SO_4, 1 g/l $NaClO_3$

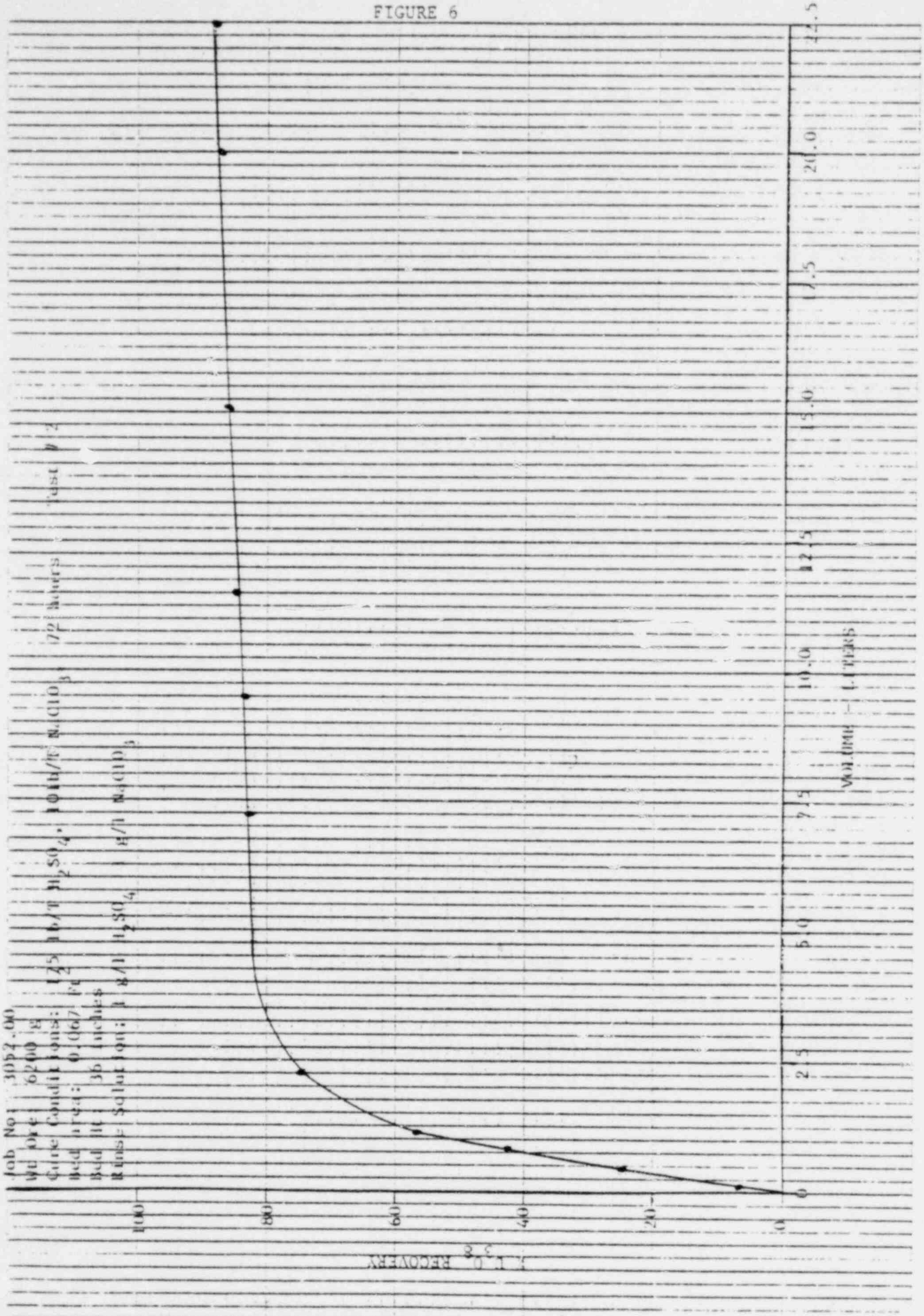
EXTRACTION SUMMARY

	Wt. Ore	% U_3O_8	g U_3O_8	% Distribution
Effluent	--	--	4.127	88.0
Residue	6017 g	0.0093	0.560	12.0
Calculated Heads	6200 g	0.076	4.687	100.0

DATA

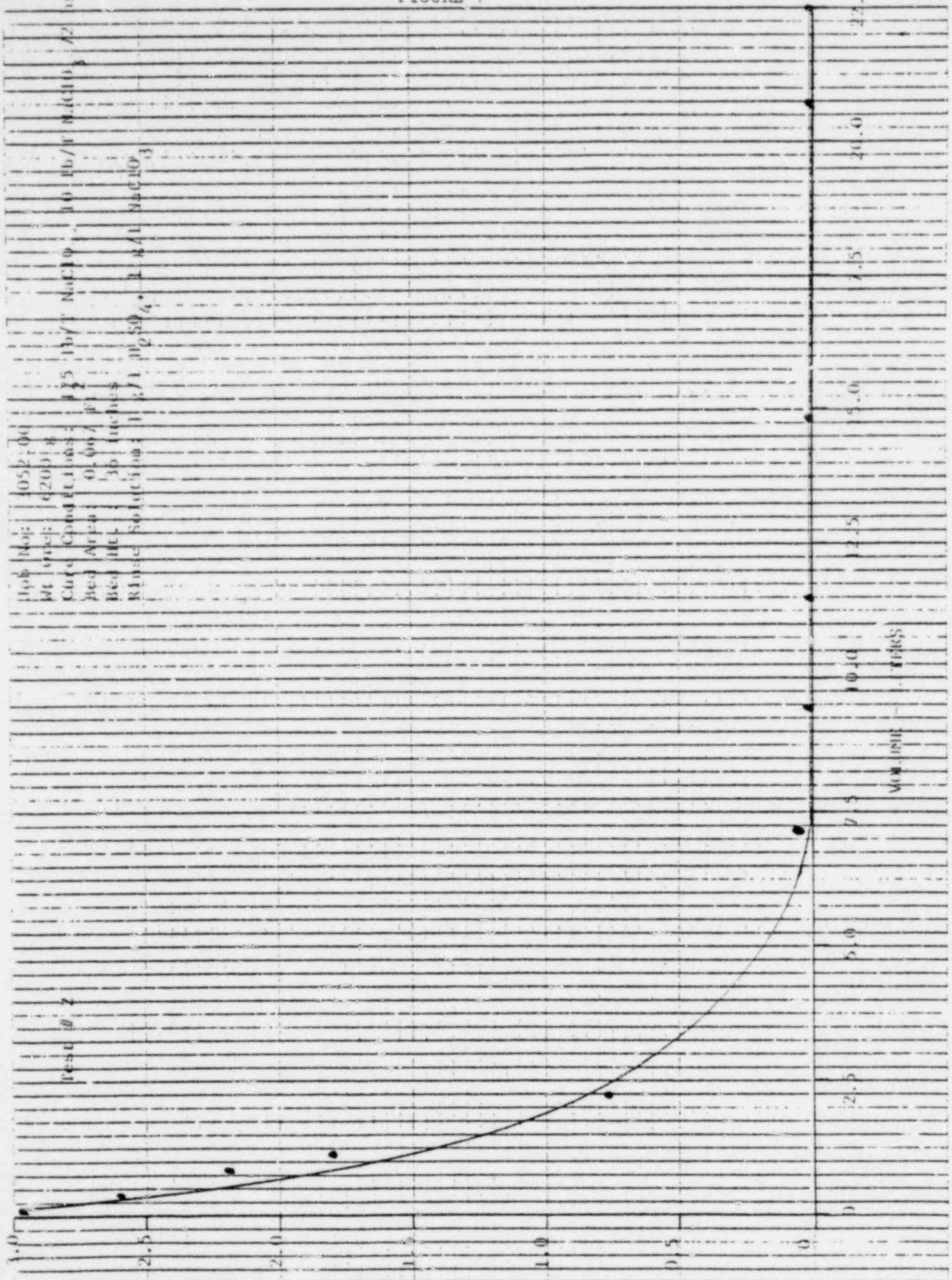
Cumulative Hours	Volume (l)	Cumulative Volume (l)	g/l U_3O_8	Cumulative g U_3O_8	% Extraction
3.0	0.118	0.118	2.966	0.350	7.5
4.0	0.327	0.445	2.600	1.200	25.6
5.0	9.360	0.805	2.243	2.008	42.8
6.0	0.362	1.167	1.846	2.676	57.1
9.0	1.095	2.262	0.775	3.524	75.2
23.0	4.930	7.192	0.071	3.874	82.6
29.0	2.250	9.442	0.023	3.926	83.8
35.0	2.040	11.482	0.023	3.973	84.8
49.0	3.400	14.882	0.019	4.038	86.2
71.0	6.200	21.082	0.0121	4.113	87.8
96.0	2.080	23.162	0.0068	4.127	88.0

FIGURE 6



Job No: 3052.00
Wt Ore: 6200 g
Cure Conditions: 125 lb/T H_2SO_4, 10lb/T $NaClO_3$, 72 hours Test # 2
Bed area: 0.067 Ft^2
Bed Ht: 36 inches
Rinse Solution: 1 g/l H_2SO_4 1 g/l $NaClO_3$
% U_3O_8 RECOVERY
0
20
40
60
80
100
0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
22.5
VOLUME - LITERS

FIGURE 7


Test # 2
Job No: 3052.00
Wt Used: 6200 g
Cure Conditions: 175 lb/T NaClO, 10 lb/T NaClO3, 72 hrs
Bed Area: 0.067 ft
Bed Ht.: 36 inches
Rinse Solution: 1 g/l H2SO4, 1 g/l NaClO3
3.0
2.5
2.0
1.5
1.0
0.5
0
0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
22.5
VOLUME - LITERS

Test # 3

TABLE IX

Job No: 3052.00

Ore: Charlie High Grade from test #16

Weight Ore: 67 lb

Cure Conditions: 77 lb/T H_2SO_4, 1.9 lb/T $NaClO_3$, 37 hours

Bed Area: 1.0 Ft^2

Bed Height: 12 inches

Rinse Solution: 5g/l H_2SO_4, 1g/l $NaClO_3$

EXTRACTION SUMMARY

	Wt. Ore	% U_3O_8	g U_3O_8	% Distribution
Effluent	--	--	14.148	86.8
Residue	65 lb.	.0073	2.157	13.2
Calculated Heads	67 lb.	.0536	16.304	100.0

DATA

Cumulative Hours	Volume (l)	Cumulative Volume (l)	g/l U_3O_8	Cumulative g U_3O_8	% Extraction
3.00	5.30	5.30	1.565	8.294	50.9
5.70	10.00	15.30	0.312	11.414	70.0
8.50	10.00	25.30	0.093	12.344	75.7
11.33	10.00	35.30	0.057	12.914	79.2
14.33	10.00	45.30	0.043	13.344	81.8
17.00	10.00	55.30	0.034	13.684	83.9
18.50	10.00	65.30	0.023	13.914	85.3
19.75	10.00	75.30	0.015	14.064	86.3
22.00	7.00	82.30	0.012	14.148	86.8

FIGURE 8

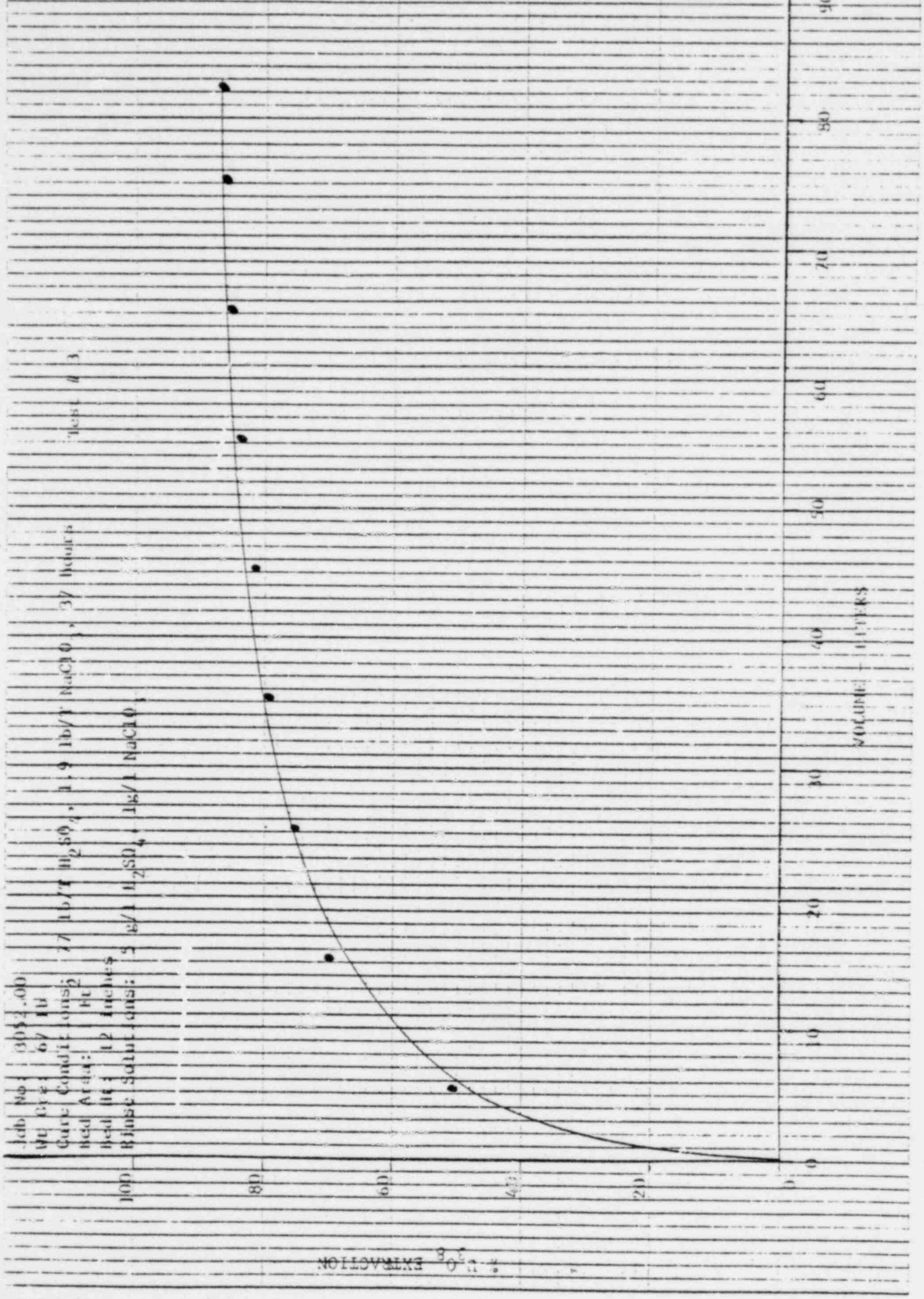
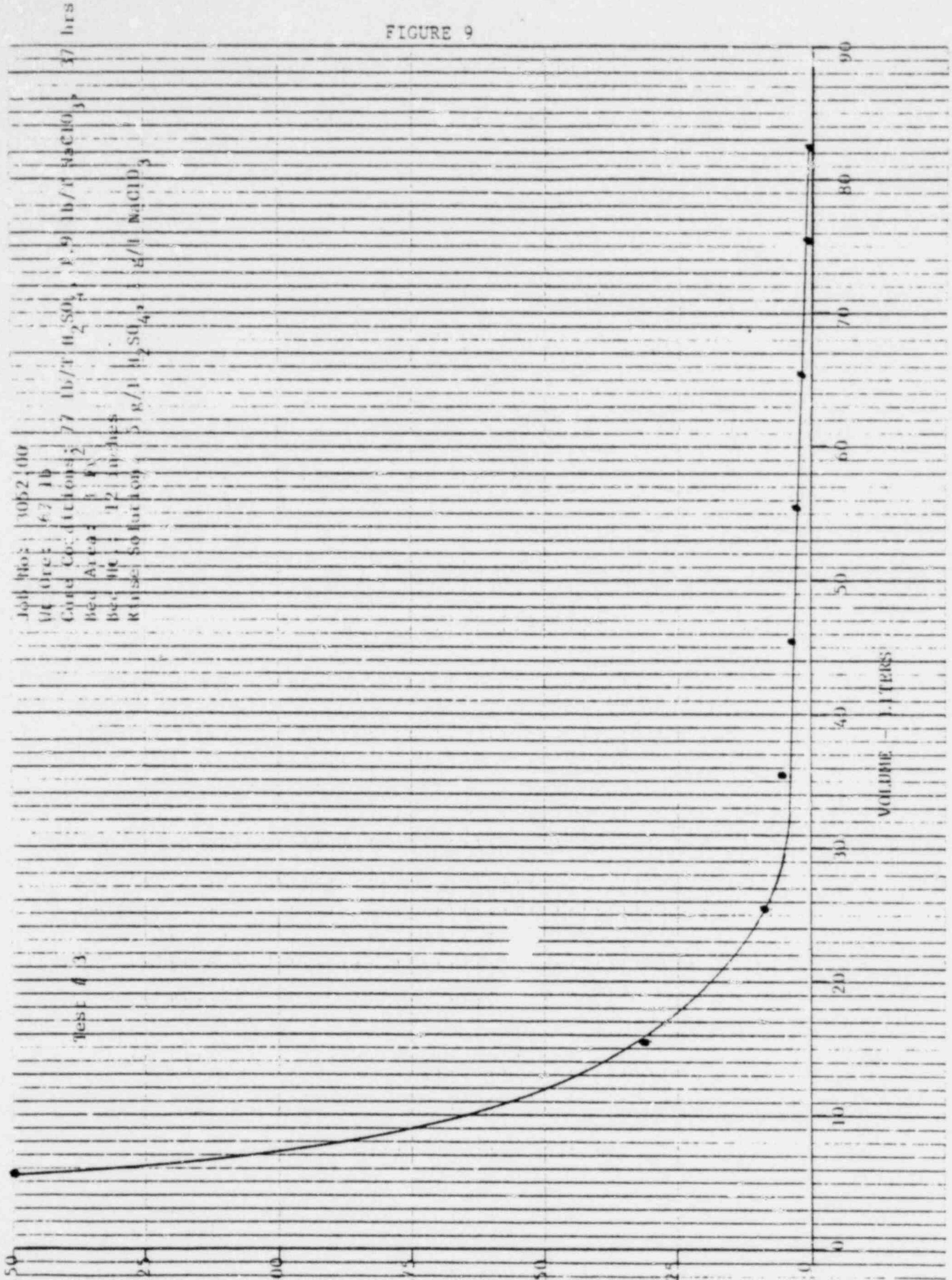

Job No: 3052.00
Wt Ore: 67 lb
Cure Conditions: 77 lb/T H_2SO_4, 1.9 lb/T $NaClO_3$, 37 Hours
Bed Area: 1 Ft^2
Bed Ht: 12 inches
Rinse Solutions: 5 g/l H_2SO_4, 1g/l $NaClO_3$
Test # 3
% U_3O_8 EXTRACTION
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
VOLUME - LITERS

FIGURE 9



Test # 3
Job No: 3052:00
Wt Ore: 67 lb
Cure Conditions: 77 lb/T H_2SO_4, 8.9 lb/T $NaClO_3$, 37 hrs
Bed Area: 1 ft^2
Bed Ht: 12 inches
Rinse Solution: 5 g/l H_2SO_4, 1 g/l $NaClO_3$
1.50
1.25
1.00
0.75
0.50
0.25
0
0
10
20
30
40
50
60
70
80
90
VOLUME — LITERS

TABLE X

Test # 4
Job No: 3052.00

Ore: Charlie High Grade

Weight Ore: 485 lb.

Cure Conditions: 175 lb/T H_2SO_4, 10 lb/T $NaClO_3$, 24 hours

Bed Area: 2.25 Ft^2

Bed Height: 36 inches

Rinse Solution: 5 g/l H_2SO_4, 1 g/l $NaClO_3$

EXTRACTION SUMMARY

	Wt. Ore	% U_3O_8	g U_3O_8	% Distribution
Effluent	--	--	179.261	95.6
Residue	474 lb	0.00374	8.172	4.4
Calculated Heads	485 lb	.0851	187.433	100.0

DATA

Cumulative Hours	Volume (l)	Cumulative Volume (l)	g/l U_3O_8	Cumulative g U_3O_8	% Extraction
2.5	1.200	1.200	3.351	4.021	2.1
16.00	62.00	63.200	1.671	107.623	57.4
24.00	31.000	94.200	0.594	126.037	67.2
50.00	62.300	156.500	0.483	156.128	83.3
73.00	50.000	206.500	0.325	172.378	92.0
96.50	58.850	265.350	0.067	176.321	94.1
120.80	65.000	330.350	0.039	178.856	95.4
138.00	15.00	345.350	0.027	179.261	95.6

FIGURE 10

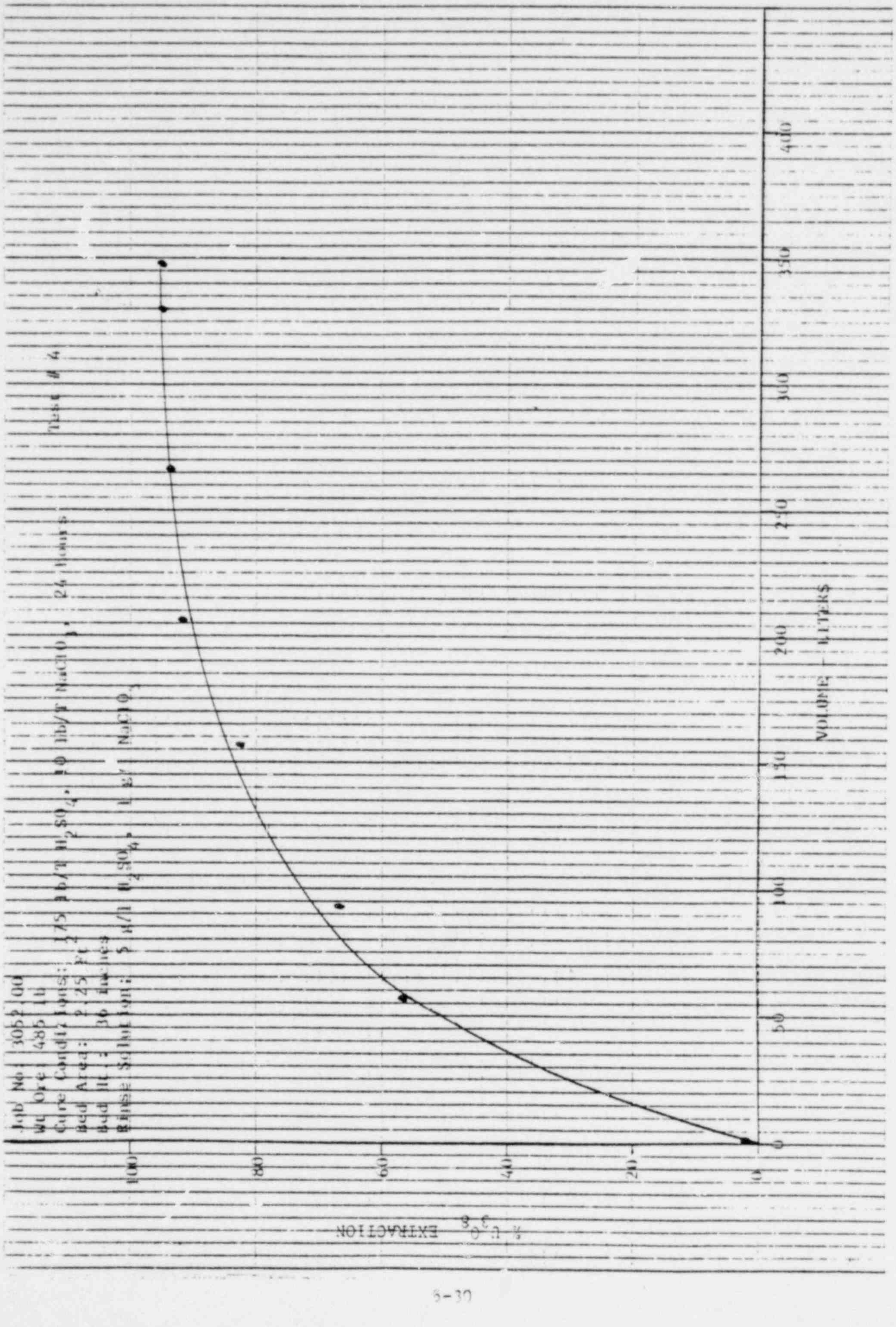
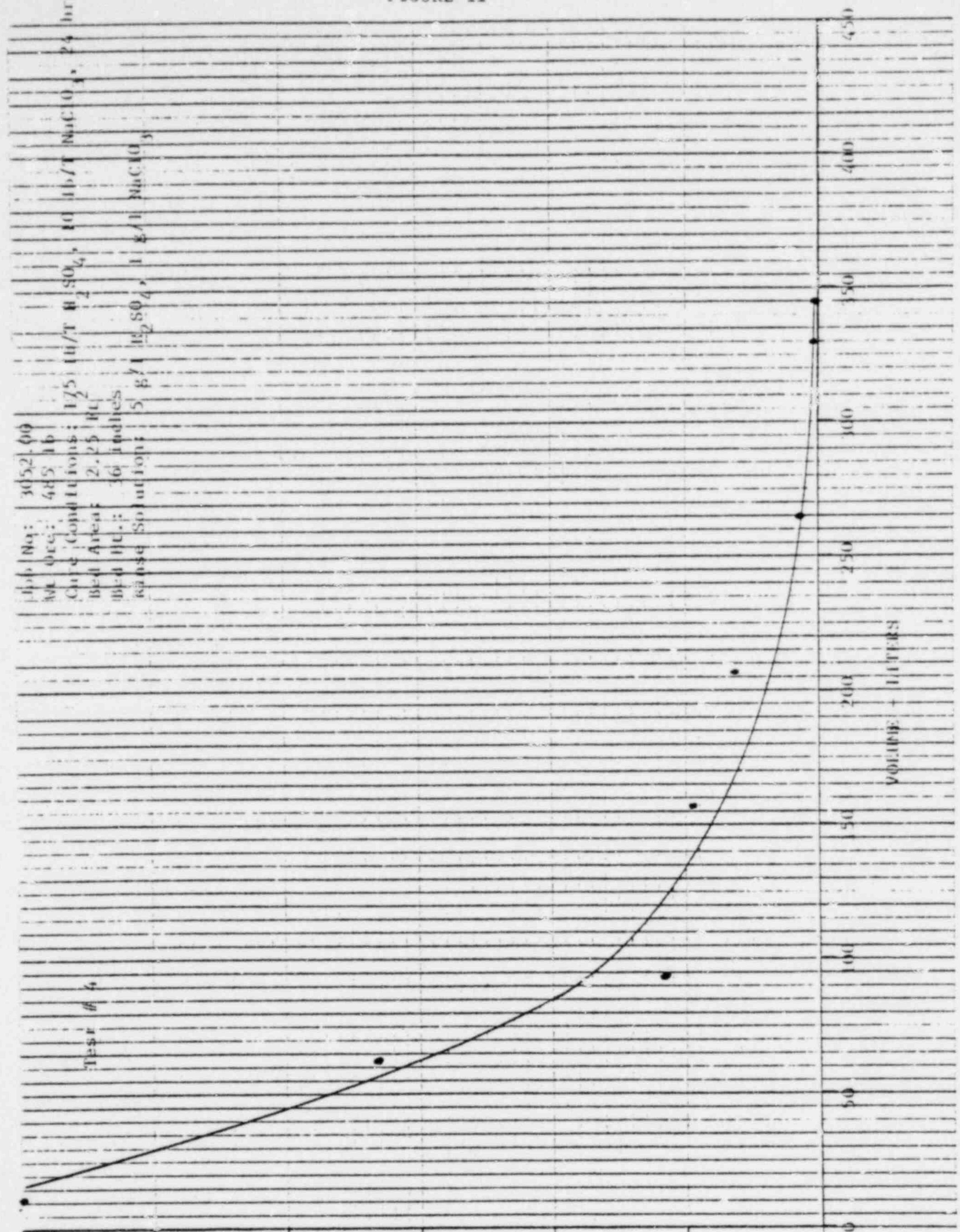

Job No: 3052.00
Wt Ore: 485 lb
Cure Conditions: 175 lb/T H_2SO_4, 10 lb/T $NaClO_3$, 24 Hours
Bed Area: 2.25 ft^2
Bed Ht: 36 inches
Rinse Solution: 5 g/l H_2SO_4, 1 g/l $NaClO_3$
Test # 4
% U_3O_8 EXTRACTION
100
80
60
40
20
0
VOLUME - LITERS
0
50
100
150
200
250
300
350
400

FIGURE 11


Job No: 3052.00
Wt Ore: 485 lb
Cure Conditions: 175 lb/T H_2SO_4, 10 lb/T $NaClO_3$, 24 hrs
Bed Area: 2.25 ft²
Bed Ht.: 36 inches
Rinse Solution: 5 g/l H_2SO_4, 1 g/l $NaClO_3$
Test # 4
$g\ U_3O_8$ /l
3.0
2.5
2.0
1.5
1.0
0.5
0
0
50
100
150
200
250
300
350
400
450
VOLUME - LITERS

Test #5
Job No: 3052.00

TABLE XI

Ore: Charlie High Grade

Weight Ore: 461 lb

Cure Conditions: 175 lb/T H_2SO_4, 10 lb/T $NaClO_3$, 72 hours

Bed Area: 2.25 Ft^2

Bed Height: 36 inches

Rinse Solution: 5 g/1 H_2SO_4, 1 g/1 $NaClO_3$

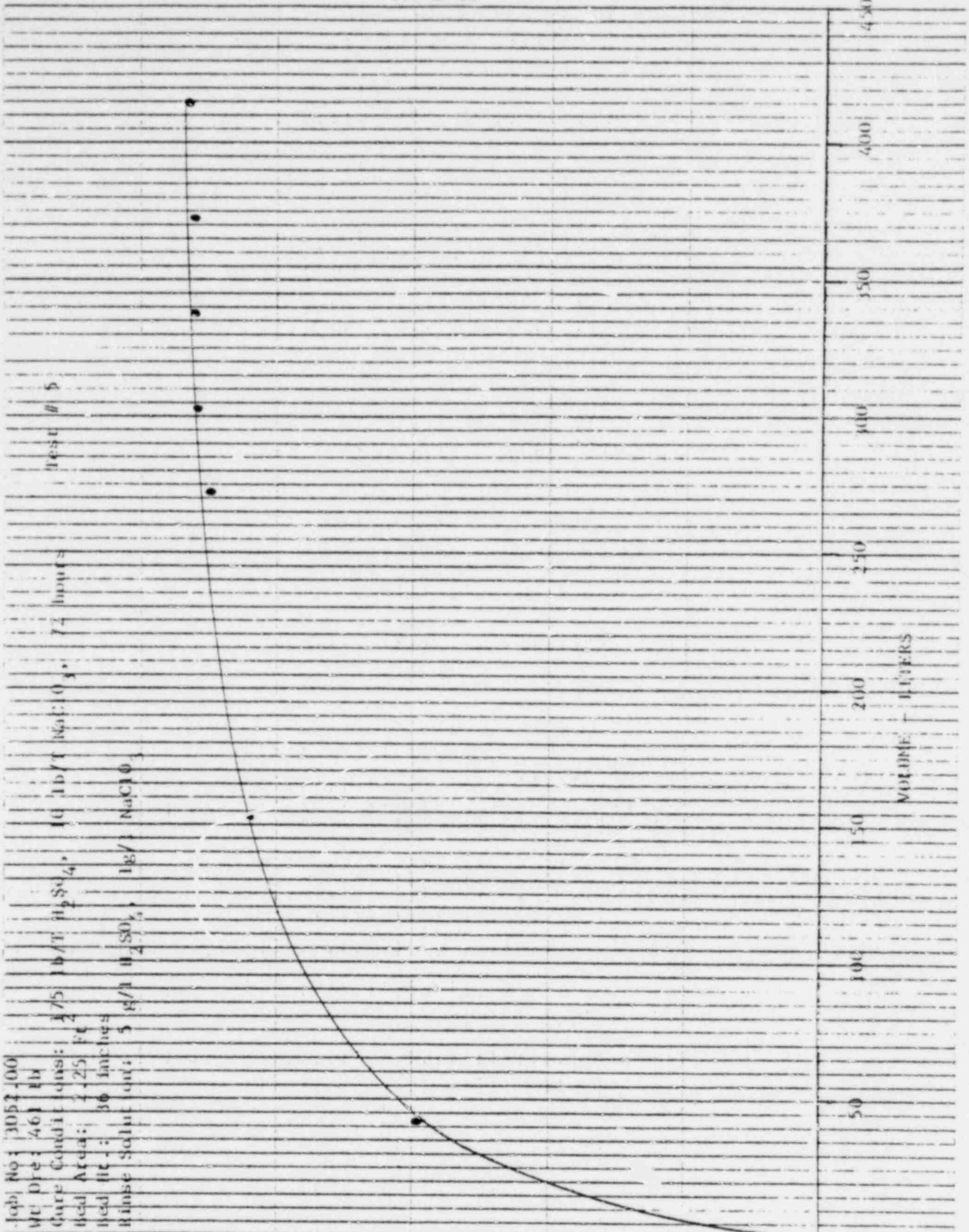
EXTRACTION SUMMARY

	Wt. Ore	% U_3O_8	g U_3O_8	% Distribution
Effluent	--	--	117.498	93.0
Residue	450 lb	0.0043	8.785	7.0
Calculated Heads	461 lb	0.0603	126.283	100.0

DATA

Cumulative Hours	Volume (1)	Cumulative Volume (1)	g/1 U_3O_8	Cumulative g U_3O_8	% Extraction
15.25	42.500	42.500	1.781	75.692	59.9
38.00	110.500	153.000	0.272	105.748	83.7
64.00	120.000	273.000	0.0714	114.316	90.5
68.00	30.000	303.000	0.0436	115.624	91.6
72.00	30.000	333.000	0.0268	116.428	92.2
78.00	40.000	373.000	0.0156	117.052	92.7
96.00	42.000	415.000	0.0106	117.498	93.0

FIGURE 12



Test # 5
Bed Area: 2.25 Ft
Bed Ht.: 36 inches
VOLUME - LITERS
0
50
100
150
200
250
300
350
400
450
0
20
40
60
80
100

FIGURE 13

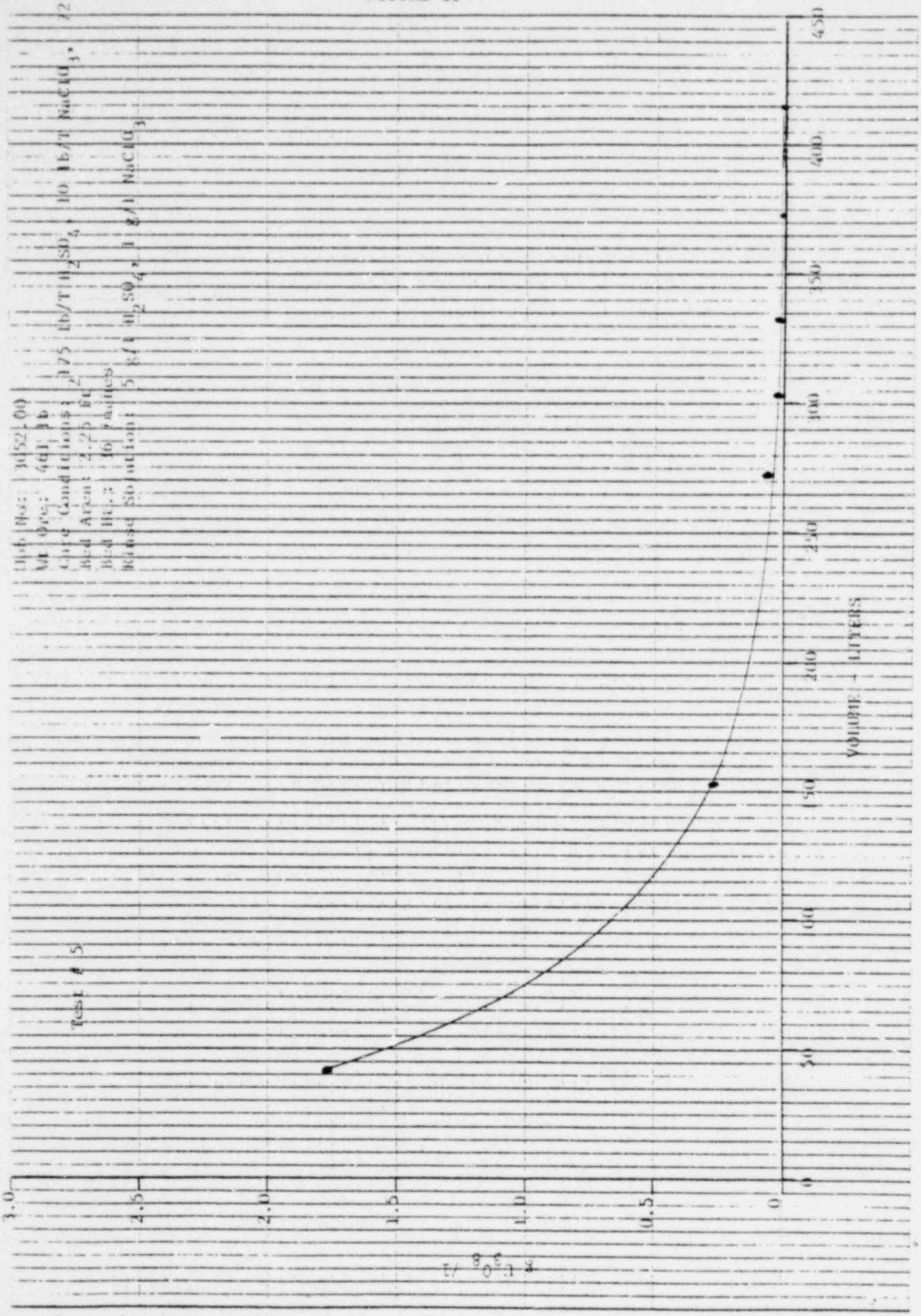
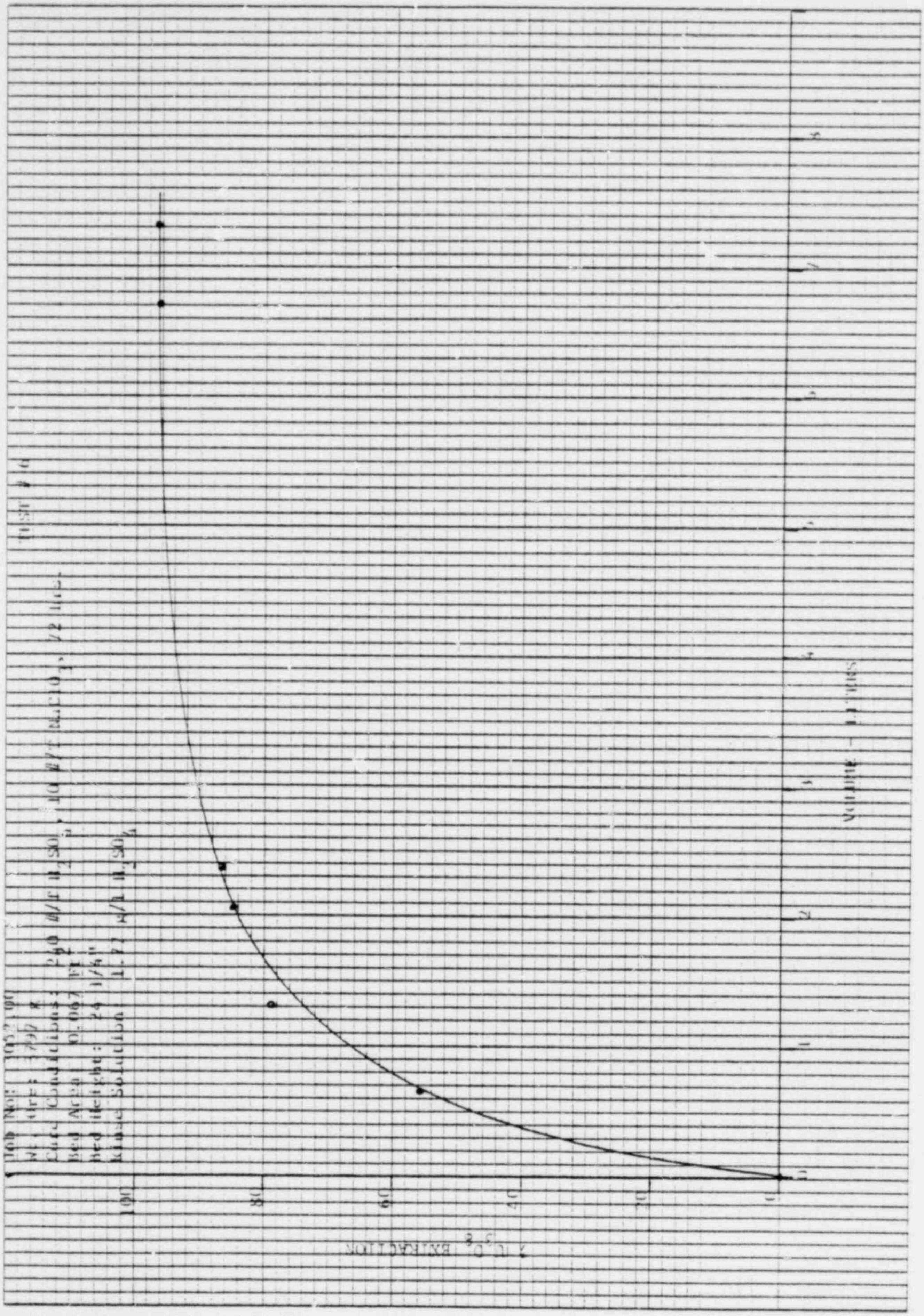
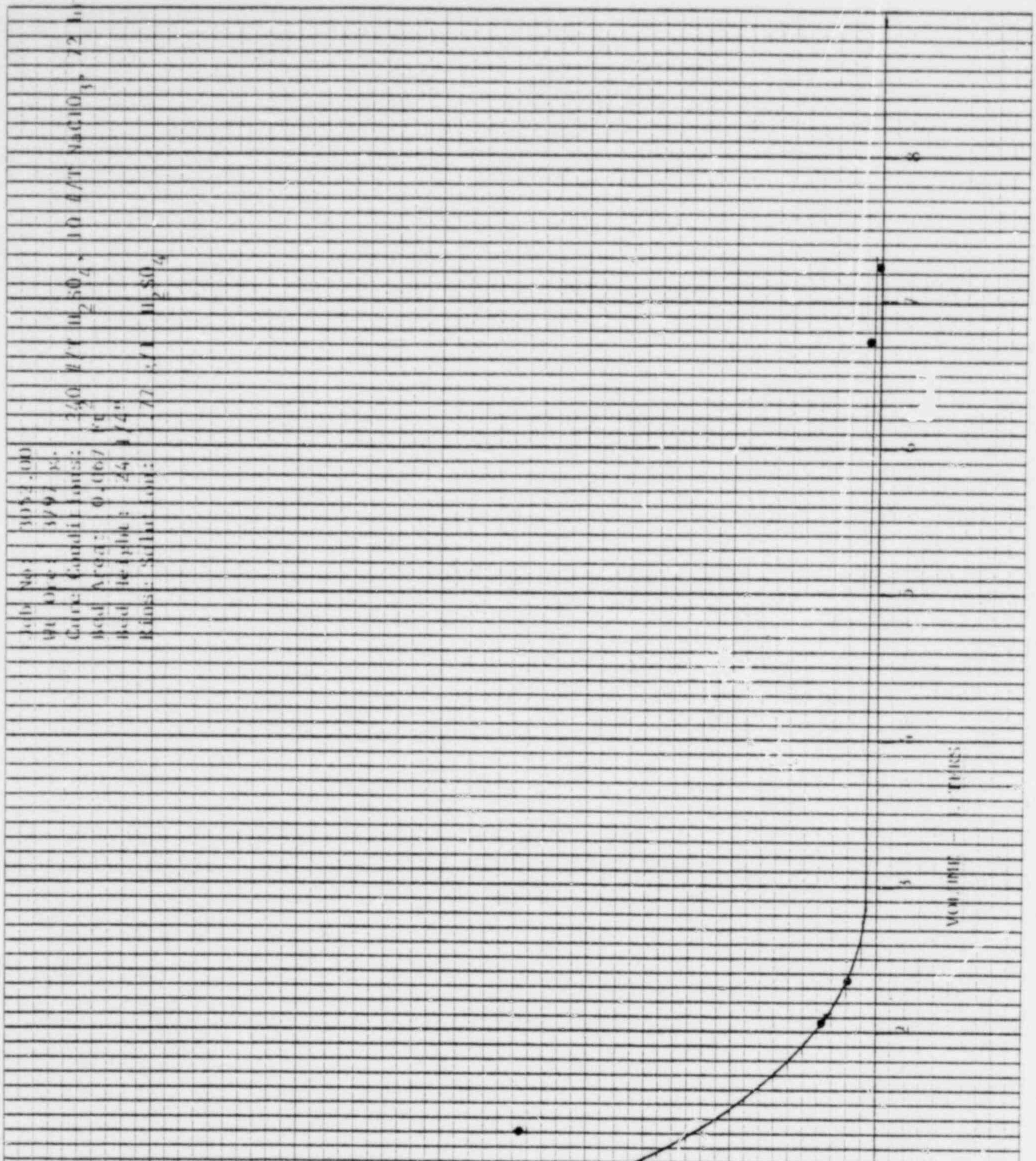

Test # 5
Job No: 3052.00
Cure Conditions:
Bed Area: 2.25 ft
Bed Ht.: 16 inches
Rinse Solution:
VOLUME - LITERS
0
0.5
1.0
1.5
2.0
2.5
3.0
50
150
200
250
300
350
400
450

FIGURE 14



Job No: 1052.00
Bed Height: 24 1/4"
100
80
60
40
20
0
% EXTRACTION
VOLUME - LITERS

FIGURE 15



TEST # 7

TABLE XIII

Job No: 3052.00

Ore: "Low" Grade Charlie Ore (S-11219-1)

Weight Ore: 2326 g

Cure Conditions: 180 #/T H_2SO_4, 8 #/T $NaClO_3$, 24 hr. cure

Bed Area: .067 Ft^2

Bed Height: 14 1/2" (initial); 12 5/8" (final)

Rinse Solution: H_2SO_4 1.11 g/l

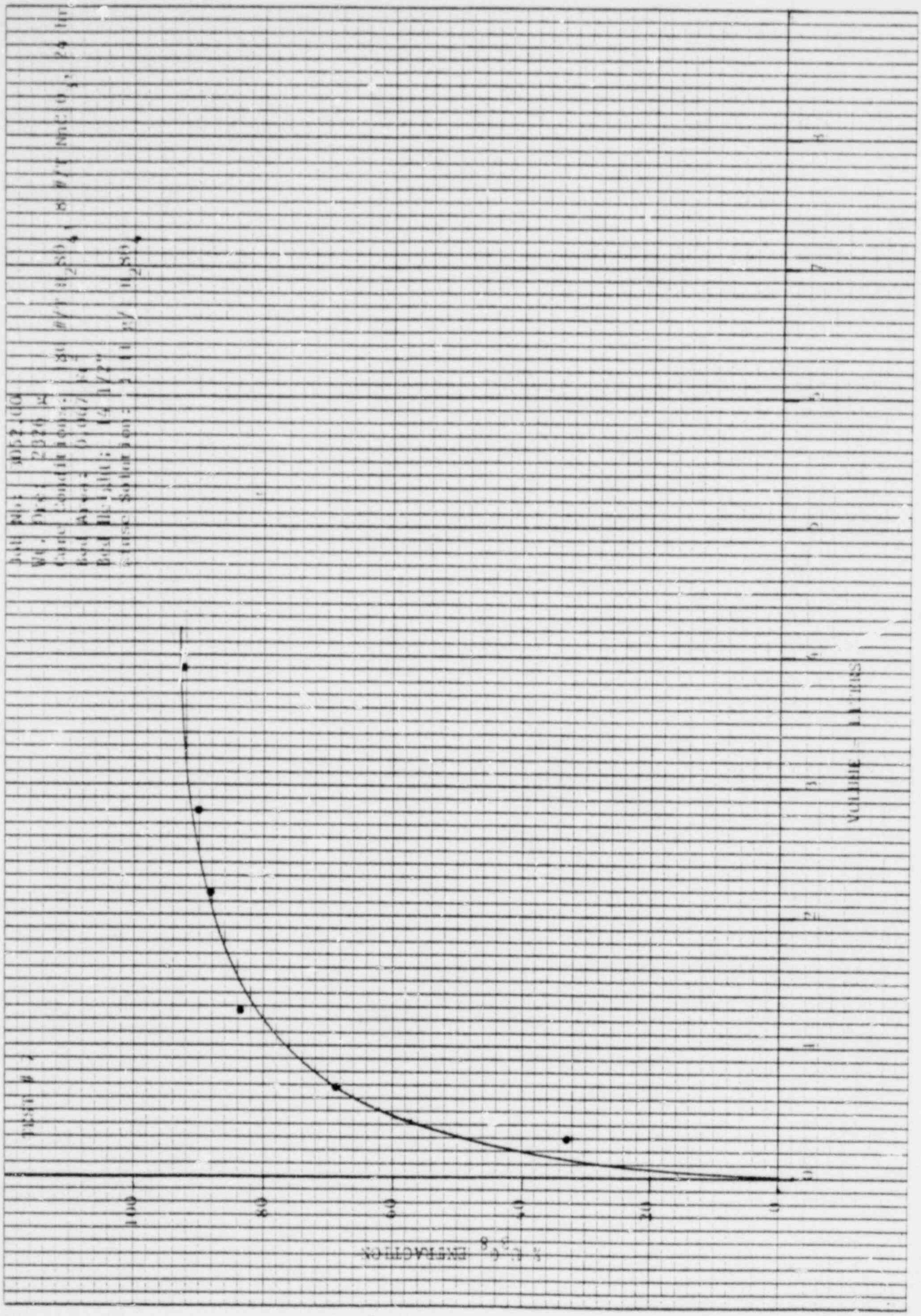
EXTRACTION SUMMARY

	Wt. Ore	% U_3O_8	g U_3O_8	% Distribution
Effluent			0.979	92.4
Residue	2325 g	.00347	0.0807	7.6
Calculated Heads	2326 g	.0456	1.060	100.0

DATA

Cumulative Hours	Volume (l)	Cumulative Volume (l)	g/l U_3O_8	Cumulative g U_3O_8	% Extraction
0.75	0.228	0.228	1.54	0.351	33.1
1.25	0.432	0.660	0.886	0.734	69.2
1.75	0.608	1.268	0.255	0.889	83.9
2.50	0.898	2.166	0.0518	0.935	88.2
3.00	0.640	2.806	0.0332	0.956	90.2
3.75	1.088	3.894	0.0213	0.979	92.4
4.75	1.670	5.564	---		
92.00	0.205	5.769	Drain		

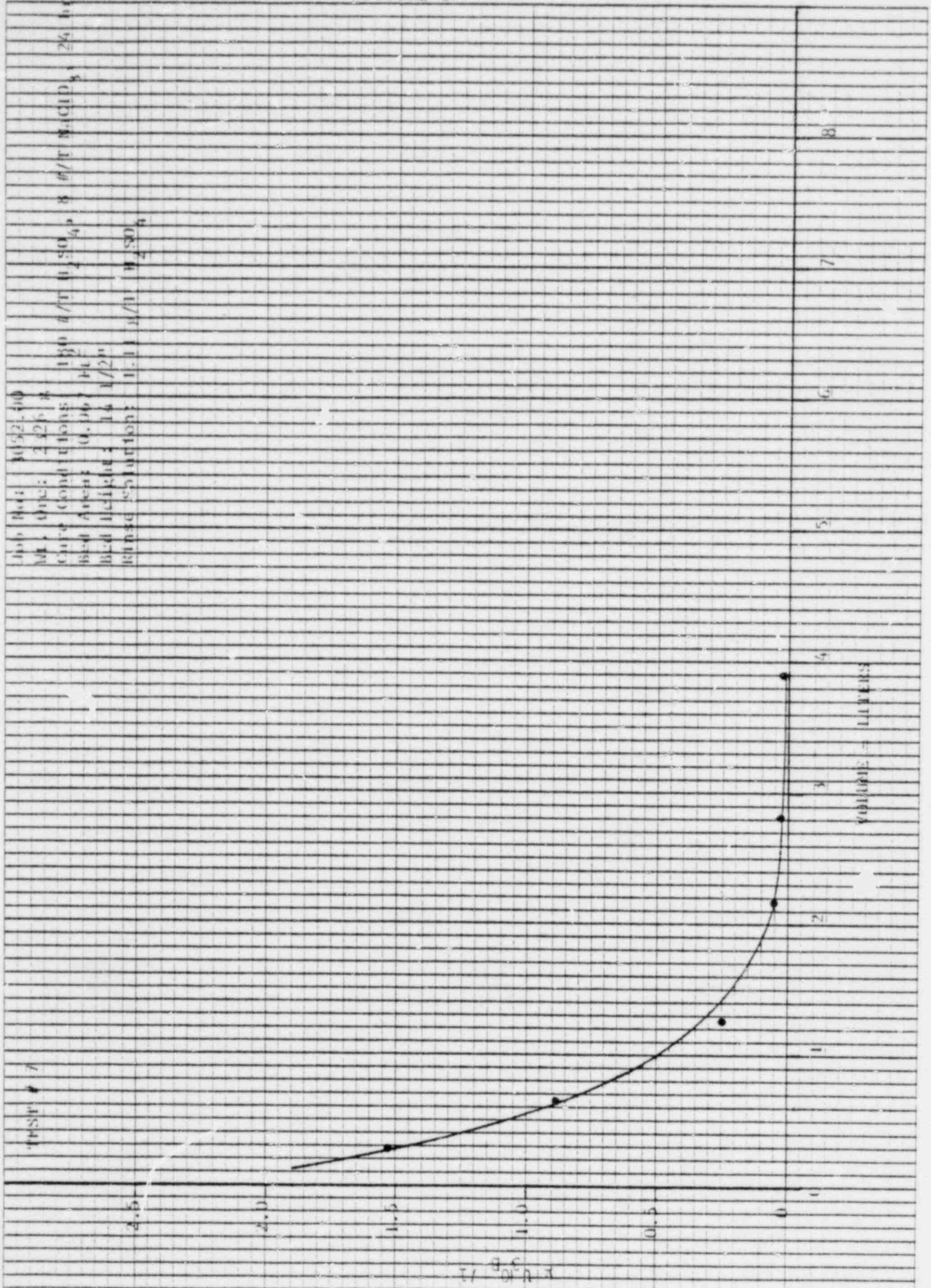
FIGURE 16



K·E 10 X 10 TO THE INCH • 7 X 10 INCHES KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

FIGURE 17



TEST # 8

TABLE XIV

Job No: 3052.00

Ore: "Low" Grade Charlie Ore (S-11219-1)

Weight Ore: 2492 g

Cure Conditions: 180#/T H_2SO_4, 8 #/T $NaClO_3$, 24 cure in the rinse column

Bed Area: 0.067 Ft^2

Bed Height: 14 1/4" (initial); 13 5/8" (final)

Rinse Solution: H_2SO_4 1.11 g/l

EXTRACTION SUMMARY

	Wt. Ore	% U_3O_8	g U_3O_8	% Distribution
Effluent			1.093	92.7
Residue	2482 g	.00342	0.085	7.3
Calculated Heads	2492 g	.0473	1.178	100.0

DATA

Cumulative Hours	Volume (l)	Cumulative Volume (l)	g/l U_3O_8	Cumulative g U_3O_8	% Extraction
.83	0.241	0.241	1.324	0.319	27.1
1.50	0.440	0.681	0.815	0.678	57.6
2.17	0.506	1.187	0.417	0.889	75.5
3.00	0.778	1.965	0.137	0.995	84.5
3.92	0.940	2.905	0.0505	1.042	88.5
5.75	2.790	5.695	0.0180	1.093	92.8
92.00	0.235	5.930	Drain		

TABLE XV

Comparison of the Extraction of Uranium in the Cure Step and the Efficiency of the Rinse Step.[1]

RUN	H_2SO_4 #/T	$NaClO_3$ #/T	CURE TIME HRS.	RINSE TIME HRS.	$\%U_3O_8$ In the Solubilization (cure) Step[2] HEADS	TAILS	% RECOV.	$\%U_3O_8$ In the Rinse Step[3] HEADS	TAILS	% RECOV.
10	164	6.3	393	56	.0368	.00308	91.6	.0349	.0223	36.1
11	168	7.7	29	54	.0751	.0283	62.3	.0754	.0418	44.6
14	247	2.2	31	41	.0542	.0179	67.0	.0488	.0198	59.4
15	207	1.0	43	58	.0632	.0052	91.8	.0943	.045	52.3
16	77	1.9	37	112	.0557	.0176	68.4	.0551	.005	90.9
17	77	2	35	87	.0530	.0170	68.9	.0544	.009	83.5
18	96	2	28	84	.0440	.0041	90.6	.0506	.006	88.1

1) "High" grade ore. Exception, Run 10: "Medium" and "Low" grade ore.

2) Cured samples rinsed with acidified water under vacuum.

3) Heads and tails sampled before and after rinsing.

PILOT PLANT RUNS

Pilot plant runs on Charlie ore were started with a mixture of the "low" and "medium" grade ores described on page 6-2. These portions of the accessible ore required less acid, oxidant, and time than the "high" grade ore (see page 6 - 3) used in Runs 11 to 19. The general characteristics of these samples of the upper portion of the deposit are given on page

Ore was crushed to pass a one-inch screen. After crushing, it was fed to the mix drum, where it was treated with sulfuric acid and a solution of sodium chlorate and then conveyed to a pile in which it was aged for 29 to 60 hours. Bench-scale curing tests indicated that the "high" grade ore should be aged for about 48 hours.

Twenty-five tons of cured ore was loaded onto a pad to a depth of three feet and then sprayed with interliquor, followed by water. The original process flows are given in the flow sheet in Section 3 . In that process scheme the ore would last be rinsed with filtrate from the precipitation of crude magnesium yellow cake. This would provide a bleed of filtrate as interstitial water in the tailings. However, this process was modified at the request of Cotter by having the last rinse with water to give a tailings with low solubles content.

In order to build up the uranium content of the pregnant solution, an interliquor was accumulated and recycled for all of the runs. When an attempt was made to precipitate a crude magnesium yellow cake from pregnant solution made from the recycle interliquor, the solution gelled, and the solids could not be dewatered in a continuous centrifuge. The recommended treatment to get a filterable cake is described in Section 13 . In future runs there will be less recycling of interliquor.

The data for the 17 runs that were made with Charlie ore are summarized in Section 8 . The detailed logs of the runs are given in Section 12 , together with plots of the recoveries and flow rates as a function of time.

In the TL leach process, uranium is removed from the ore by solubilization during the curing step and by reaction with reagents in the rinse solution. The aim was to solubilize all the uranium in the cure step, but in some runs the cure conditions chosen were not severe enough. In some of these latter, uranium was, however, removed by the subsequent rinse.

Nine of the runs gave tailings with residual uranium contents of less than 0.01% U_3O_8. In two of them, Runs 16 and 17, the cure had given insufficient solubilization, but the rinse was effective in extracting the remaining uranium. In other runs, for example, Runs 10 and 15, the uranium had been solubilized in the cure, but rinsing of uranium from the bed was incomplete. Incomplete rinsing was compounded by the use of interliquor containing 1 to 2 gpl U_3O_8, which then had to be rinsed from the bed. The use of a greater number of interliquor stages should decrease this problem.

Comments on individual runs are:

RUN 3 and 4

Run 3 was performed with no sodium chlorate addition to the cure. Run 4 had nearly identical cure conditions but a less favorable rinse condition. Run 3 compared to Run 4 had a lower rate of extraction and a lower total recovery, 58% vs. 84%. Comparison of Run 3 to Run 4 indicates that sodium chlorate added during the cure stage of pilot plant runs improves the rate and total amount of recovery of uranium.

The spray rate was controlled by observation of the leach pad surface or surface cover and adjusted to prevent puddle formation. This method of spray rate control was used for all runs except Run 18.

RUNS 4, 5, 6

Runs 4, 5, and 6 had nearly identical tailings assays, about 0.007% U_3O_8, with similar feed, acid, and chlorate addition rates and rinse times. The final effluent assays showed some solubilized uranium still left in the leach pad. Longer rinse times would have increased the recovery.

RUN 7

Run 7 had twice the chlorate in the cure as Runs 4, 5, and 6, and the rate of recovery was higher. The 0.88 gpl U_3O_8 content of the final effluent from the pad indicates that higher, total recovery could have been obtained by a longer rinse period. Chlorate addition rates above two pounds per ton cause the evolution of extremely irritating white fumes from the mix drum and are not recommended.

RUNS 8, 9, 10, 11, 12, 14, 15

These runs were not washed for a sufficient length of time. Runs 8 and 9 were aborted because the effluent lines froze. The high acid additions to the cure for these runs were not required, for residual uranium contents of less than 0.01% were obtained with 70-100 lb. H_2SO_4 per ton in eight other runs.

RUN 13

Run 13 gave no better rate of recovery, total recovery, and residual U_3O_8 in tailings than Run 16, in which one-third of the cure acid was used.

RUNS 16, 17, 18, 19

These runs were similar in results to Run 4, 5, and 6, with similar cure conditions in that residual U_3O_8 contents of less than 0.01% were obtained. The uranium content in the final effluent indicates that higher recoveries could have been obtained by longer rinsing periods.

The spray rate for Run 18 was set initially by using the maximum spray rate obtainable in other runs. After other runs were terminated and the time period for the spray could be increased, the spray rate was determined by the spray pattern obtained by the nozzles up until the time puddle formation began.

Liquor was removed from the leach pads through drain pipes placed in troughs running the length of the pads. The drainage trenches were thoroughly cleaned and the pipes hosed out prior to Runs 3-6, 10, and 15-19. Only the troughs were cleaned prior to Runs 11-14. Cleaning the troughs was shown to be necessary based on the performance of Runs 7-9. The troughs were not cleaned before these runs. The material in the troughs was difficult to remove because it was cemented, probably by ferrous salts.

COTTER PILOT PLANT - SUMMARY OF PILOT, PLANT TESTS CHARLIE ORE

TEST NO.	WET WT. (TONS)	DRY WT. (TONS)	LB H_2SO_4 TON ORE	LB $NaClO_3$ TON ORE	MIX DRUM FEED % MOIST	MIX DRUM PRODUCT % MOIST	SOLID TAILS % MOIST	CURE TIME (HRS)	RINSE TIME ACID (HRS)	RINSE TIME WATER (HRS)	FEED $\%U_3O_8$	SOLID TAILS $\%U_3O_8$	$\%U_3O_8$ RECOVERY 100(F-T)/F	FEED $\%V_2O_5$	SOLID TAILS $\%V_2O_5$	$\%V_2O_5$ RECOVERY 100(F-T)/F	NOTES
3	19.264	16.837	50.8		12.6	19.5	19.1	44	77.5	1.5	.0465	.0193	58.49	.040	.027	32.5	Note 1
4	29.883	26.122	53.3	1.72	12.6	19.1	17.0	74	84	48	.0478	.0074	84.52	.081	.021	74.1	
5	30.539	26.688	68.2	1.98	1[illegible].6	16.9	20.3	49.5	86	24	.0461	.0074	83.95	.046	.028	39.1	
6	29.076	25.130	97.9	2.00	13.6	14.8	15.1	59.5	97	9	.0323	.00764	76.35	.037	.019	48.6	
7	29.207	25.761	83.1	3.9	11.8	14.9	17.0	46	59	10	.0340	.0041	87.94	.032	.016	50.0	
8	30.149	25.187	114.7	4.2	16.5	16.7	18.0	49	34	-0-	.0395	.0210	46.84	.042	.027	35.7	Note 2
9	30.826	27.096	94.77	3.11	12.1	16.1	15.1	71.5	6	-0-	.0428	.0117	72.66	.039	.049	-0-	Note 2
10	29.492	25.511	163.58	6.3	13.5	16.0	16.3	393	30	14	.0349	.0223	36.10	.041	.025	39.0	Note 3
11	29.294	25.511	167.77	7.72	12.9	14.44	19.8	29	28	8	.0754	.0418	44.56	.059	.044	25.4	Note 3
12	32.695	28.674	216.44	4.71	12.3	12.2	18.3	37	32	7	.0645	.0234	63.72	.059	.030	49.2	Note 3
13	29.597	25.761	207.68	2.33	12.96	13.10	16.2	51.5	73	21	.0618	.0065	89.48	.059	.018	69.5	
14	31.800	27.895	247	2.22	12.[illegible]8	17.85	17.9	31.1	29	10	.0488	.0198	59.43	.051	.025	51.0	Note 4
15	30.920	26.931	206.6	1.00	12.9	13.0	--	43.0	48	10	.0943	.045	52.28	.058	.028	51.7	Note 5
16	29.590	26.246	76.7	1.90	11.3	11.6	--	37	58	52	.0551	.005	90.93	.060	.031	48.3	
17	29.512	26.148	77	2	11.4	12.3	--	35	78	8	.0544	.009	83.46	.052	.026	50.0	
18	29.834	25.00	96	2	16.2	12.8	--	28	69	20	.0506	.006	88.14	.053	.025	52.8	
19	30.00	26.55	72.5	2.2	11.5	11.2	--	30	44	10	.0665	.006	90.98	.057	.034	40.4	

Note 1: No chlorate to cure

Note 2: Piping froze - inadequate rinse

Note 3: Insufficient rinse time

Note 4: Excessive acid to cure

Note 5: Insufficient rinse due to flooding and insufficient sodium chlorate to cure.

OPERATING PROBLEMS AND SUGGESTED SOLUTIONS

The following problems were encountered in operating the equipment for the pilot plant:

Crushing Circuit

The crushing circuit as installed at the pilot plant was a constant source of problems.

The design criteria stated that run of mine ore would be approximately minus twelve inches in size. In practice, ripping produced many slabs with twelve inches as the smallest dimension. The grizzly bars with ten inch parallel spacing admitted many particles which plugged the bottom opening in the crusher feed hopper. This problem was partially alleviated by adding grizzly bars to provide ten inch square openings. The problem was further reduced by placing the ore in a layer on the ground and running a crawler tractor (D9) over the ore to break up slabs and boulders.

The crusher feed hopper fed directly onto a fast moving inclined crusher feed conveyor. The opening at the bottom of the crusher feed hopper was too large to feed material slowly, centrally, and evenly onto the crusher feed conveyor. As a result, the material placed in the crusher feed hopper surged onto the crusher feed conveyor, and ore spilled from the edge of the conveyor. Spillage fell on the return side of the crusher feed conveyor and built up on the tail pulley causing the conveyor to track improperly. Spillage also built up on the ground around the tail pulley and underneath the return side of the crusher feed conveyor.

At the beginning of the operation while waste was being processed before Charlie Pit ore had been received, the sides of the bottom opening of the crusher feed hopper were extended downward to within one inch of the conveyor belt. This reduced spillage while Charlie Pit waste was being processed, but the bottom opening extension had to be removed when Charlie Pit ore was processed. The slabs and boulders present in Charlie Pit ore would not pass through the bottom opening of the crusher feed hopper unless a 14 inch gap between the bottom of the feed hopper and the crusher feed conveyor belt was present.

Dribble plates were placed on the frame of the crusher feed conveyor near the tail pulley to reduce the amount of spillage falling on the return side of the crusher feed conveyor. Spillage falling on the return side of the conveyor was greatly reduced. However, the dribble plates caused spillage to accumulate around the conveyor idlers.

The crusher circuit as received from the vendor had only one idler under the conveyor belt at the bottom opening of the crusher feed hopper. The amount of spillage was unacceptable with this arrangement. Ore dumped into the crusher feed hopper by the front end loader fell directly onto the fast moving crusher feed conveyor with great impact. This caused the conveyor to sag excessively directly underneath the crusher feed hopper. Two additional idlers were purchased and placed under the crusher feed belt at the point where the crusher feed hopper discharged onto the crusher feed conveyor.

A belt feeder should be placed under the crusher feed hopper for any future pilot plant. Ore would then be fed centrally onto the crusher feed conveyor with minimal impact at a rate that would not drastically overload the conveyor.

The two crusher circuit product conveyors exhibited enough carry-back to cause a cleanup problem near the tail of these two conveyors. The two conveyors were located underneath the flat bed trailer upon which the crusher and screen were mounted. They were located in such a manner that access for cleanup around the tail pulleys was difficult.

Spillage around the feed opening for the impact crusher was an additional problem with the crusher circuit. Ore dumped into the crusher feed hopper was carried to the screen in large surges and could not be accommodated by the crusher feed opening. Spillage and bridging of ore over the crusher feed opening occurred frequently due to the surges from the crusher feed hopper. At times, the crushing circuit had to be shut down after blockage at the crusher feed opening.

Mix-Drum Circuit

The feed hopper for the mix drum circuit experienced bridging of the ore and required poking with an air lance to clear it. Performance was acceptable for the pilot plant operation, however.

The weigh belt feeder operated by receiving two signals, one from a load cell and one from a belt speed sensor. The belt speed sensor input circuit did not function. The weigh belt was operated throughout the pilot plant program using an artificial belt speed signal generated by another circuit within the weigh belt circuitry. The weigh belt functioned satisfactorily in this manner.

The feed hopper for the mix drum was not satisfactory as it was received from the vendor. A feed hopper with larger feed opening and larger feed spout area was fabricated by a welding shop in Gillette. Before installation of the new feed hopper, operating the mix drum circuit was a full time job for two men. After installation of the new feed hopper, one man could comfortably operate the mix drum circuit.

The thrust rollers for the mix drum as received from the vendor did not have large enough bearings. The initial set of bearings failed. A large thrust roller assembly was obtained from the vendor which operated very well after its installation.

The mix drum product conveyor operated satisfactorily.

The flop gate at the discharge end of the mix drum product conveyor leaked slightly. This was not a serious problem.

Concrete Protection

The epoxy paint on the concrete floor of the cure pile and leach pads peeled off very quickly in local areas under the action of acid and the front end loader bucket. Epoxy paint should not be used as a protective coating for either wood or concrete surfaces in a TL leach pilot plant.

The concrete surfaces under the leach pads and cure pads did not exhibit any observable attack by acid during the nineteen pilot plant tests.

Solution Handling

The pipes which carried the leach liquors by gravity performed satisfactorily. However, these pipes should be sloped at least 1/8 inch per foot for future pilot plants. No sags should exist in the gravity flow pipes.

The plastic lined swimming pools were satisfactory for use in containing the leach liquors. Personnel from Wyoming Minerals who visited the

Cotter Pilot Plant remarked that their pilot plant tanks had been punctured by debris blown into the sides of the tanks by the wind. This was not a problem at the Cotter Pilot Plant.

Pumps for any future pilot plant should be oversized by a factor of three (an arbitrary, subjective number). This will allow flexibility in spray rates for any unforeseen operating conditions of the pilot plant and allow stirring of the liquor reservoirs. The pumps should be sized to provide three times the calculated spray to all leach pads simultaneously.

Good stirring of the reservoirs was achieved with two modifications. A portion of the pump discharge for each reservoir was recirculated tangentially. Pump suction was taken from a pipe placed six inches vertically in the center of the reservoir.

The pumps installed for leach liquor operated satisfactorily except for their size as discussed below. No damage was observed to the wetted parts of the pumps.

Spray System

When the spray nozzles used were operated continuously, flow was greater than could be accommodated by the leach beds. In order to provide an overall flow rate of proper magnitude, spraying was intermittent. The solenoid valve timers which gave intermittent flow of leach liquor solution were arranged so no more than one set of spray nozzles was operating at one time. This arrangement severely limited the flexibility required for a pilot plant operation.

The smallest wide angle spray nozzles available from Spray Systems Inc., should be tested at the Cotter Pilot Plant in subsequent operations.

High flow rates of droplets onto the surface of the pad caused localized classification. The slimes layer formed thereby reduced the percolation rate. A technique previously tested in the Holmes & Narver laboratory was used in Pilot Plant Runs 15 to 19 to reduce the momentum of the droplets of spray; a coarsely woven polyproplene cloth was laid on the bed. The percolation rate was increased markedly. The use of this technique should be explored in further tests.

Scale-up Considerations

Based on experience of operating the pilot plant, the following points should be considered in the design of a full scale plant:

An impact crusher will satisfactorily crush Charlie Pit ore if it is fed at an even rate with particles smaller than the crusher feed opening. Ordinary, accepted good practice should be used in the design of the crusher and mixing circuit. Feed hopper bottom openings should be sufficiently large to prevent bridging. Belt feeders should be used for withdrawal from hopper.

The problem of potential acid attack on concrete pads should be resolved. A coating such as paint or epoxy is not recommended for concrete. Sulfur concrete may be the answer. A square of it was set in the floor of one pad, but there was not enough exposure to effluent to affect either the Portland cement or sulfur concrete.

H & N Job No. 3052.00

SOLUBILIZATION OF COTTER ORE

SUMMARY OF TESTS CONDUCTED AT THE PILOT PLANT

Test #	H_2SO_4 #/T	$NaClO_3$ #/T	Added H_2O w%	Ore Moisture as IS-w%	Cure Time hrs.	Dry Ore Weight Gms	U_3O_8 Assay Liquid Gms	U_3O_8 Assay Tails Gms	Calc. Heads w%	%U_3O_8 Tails	%Distr. Soluble U_3O_8	H_2SO_4 Consumed #/T	COMMENTS
CT1	160	0	3.1	2.2	48	489	.425	.301	.148	.0638	56.9	---	Colorado Ore - Western Slope, < 3/4" mesh.
2	160	0	8.8	2.2	48	489	.492	.295	.161	.0616	61.7	---	
3	160	0	15.4	2.2	48	489	.542	.269	.166	.0565	65.9	---	
4	160	0	22.8	2.2	48	489	.476	.224	.143	.0476	66.8	---	
5	180	0	3.1	2.2	48	489	.476	.665	.233	.1414	39.5	---	
6	180	0	8.8	2.2	48	489	.476	.199	.138	.0415	69.9	---	
7	180	0	15.4	2.2	48	489	.520	.389	.186	.0813	56.2	---	
8	180	0	22.8	2.2	48	489	.553	.240	.162	.0504	69.0	---	
9	---												
10	100	0	3.2	12.6	48	437	.153	.0345	.0429	.00835	80.6	88.0	Charlie Ore - "Low" Grade. Ore cured in cure piles at 95 - 135°F.
11	100	1.9	3.2	12.6	48	437	.156	.0192	.0401	.00442	89.0	85.8	
12	100	3.8	3.2	12.6	48	437	.144	.0129	.0359	.00306	91.5	85.9	
13	120	0	3.2	12.6	48	437	.178	.0307	.0478	.00738	84.5	93.9	
14	120	1.9	3.2	12.6	48	437	.139	.0159	.0354	.00382	89.3	95.0	
15	120	3.8	3.2	12.6	48	437	.169	.0193	.0431	.00460	89.3	88.5	
16	140	0	3.2	12.6	48	437	.160	.0397	.0457	.00929	79.6	108.	
17	140	1.9	3.2	12.6	48	437	.166	.0147	.0413	.00352	91.6	103.	
18	140	3.8	3.2	12.6	48	437	.154	.0104	.0376	.00249	93.4	101.	
19	120	9.5	3.4	12.6	48	437	.166	.0098	.0402	.00231	94.3	109.	
10R	100	0	3.2	12.6	48	437	.108	.0572	.0378	.0134	64.6	---	
11R	100	1.9	3.2	12.6	48	437	.145	.0266	.0393	.00627	84.0	76.8	
12R	100	3.8	3.2	12.6	48	437	.166	.0193	.0424	.00451	89.4	64.5	
13R	120	0	3.2	12.6	48	437	.152	.0791	.0526	.0184	65.3	90.6	
14R	120	1.9	3.2	12.6	48	437	.169	.0346	.0466	.00815	82.5	88.4	
15R	120	3.8	3.2	12.6	48	437	.177	.0230	.0458	.00559	87.7	89.1	

H & N Job No. 3052.00

SUMMARY - SOLUBILIZATION OF COTTER ORE
Page 2

Test #	H_2SO_4 #/T	$NaClO_3$ #/T	Added H_2O w%	Ore Moisture as IS-w%	Cure Time hrs.	Dry Ore Weight Gms	U_3O_8 Assay Liquid Gms	U_3O_8 Assay Tails Gms	Calc. Heads w%	%U_3O_8 Tails	%Distr. Soluble U_3O_8	H_2SO_4 Consumed #/T	COMMENTS
16R	140	0	3.2	12.6	48	437	.113	.0548	.0384	.0131	65.9	90.2	Charlie Ore - "Low" Grade Ore cured in cure piles at 95 - 135°F.
17R	140	1.9	3.2	12.6	48	437	.165	.0315	.0450	.00747	83.3	92.3	
18R	140	3.8	3.2	12.6	48	437	.162	.0213	.0419	.00506	88.0	96.7	
19R	120	9.5	3.2	12.6	48	437	.198	.0511	.0570	.0123	78.5	91.1	
20	150	6.0	3.2	12.6	48	437	.176	.0324	.0477	.00760	84.0	102.6	
21	150	8.0	3.2	12.6	4[illegible]	437	.188	.0280	.0494	.00655	86.8	99.5	
22	150	10.0	3.2	12.6	48	437	.177	.0332	.0481	.00805	83.3	101.0	
23	180	6.0	3.2	12.6	48	437	.167	.0220	.0432	.00515	88.2	101.0	
24	180	8.0	3.2	12.6	48	437	.345	.0220	.0840	.00520	93.8	103.0	
25	180	10.0	3.2	12.6	48	437	.203	.0313	.0536	.00736	86.3	106.0	
26	210	6.0	3.2	12.6	48	437	.186	.0212	.0474	.00492	89.6	116.0	
27	210	8.0	3.2	12.6	48	437	.191	.0274	.0500	.00635	87.2	10[illegible].0	
28	210	10.0	3.2	12.6	48	437	.227	.0198	.0565	.00467	91.7	[illegible]	
29	150	8.0	3.2	12.6	24	437	---	.0186	---	.00445	---	103.0	
30	150	8.0	3.2	12.6	72	437	.185	.0251	.0481	.00601	87.4	101.0	
31	229	5.0	3.2	12.6	24	437	.200	.0434	.0557	.0101	81.9	92.8	Charlie Ore - "Low" Grade Ore cured in shop area at 35 - 50°F.
32	229	10.0	3.2	12.6	24	437	.197	.0344	.0530	.00800	84.8	81.7	
33	229	15.0	3.2	12.6	24	437	.184	.0278	.0485	.00646	86.7	100.0	
34	265	5.0	3.2	12.6	24	437	.184	.0481	.0531	.0113	78.8	90.4	
35	265	10.0	3.2	12.6	24	437	.190	.0340	.0513	.00797	84.4	88.4	
36	265	15.0	3.2	12.6	24	437	.175	.0170	.0439	.00404	90.8	82.2	
37	299	5.0	3.2	12.6	24	437	.157	.0419	.0455	.00986	78.3	80.7	
38	299	10.0	3.2	12.6	24	437	.161	.0335	.0445	.00784	82.4	120.0	
39	299	15.0	3.2	12.6	24	437	.160	.0284	.0431	.00659	84.8	106.0	

H & N Job No. 3052.00

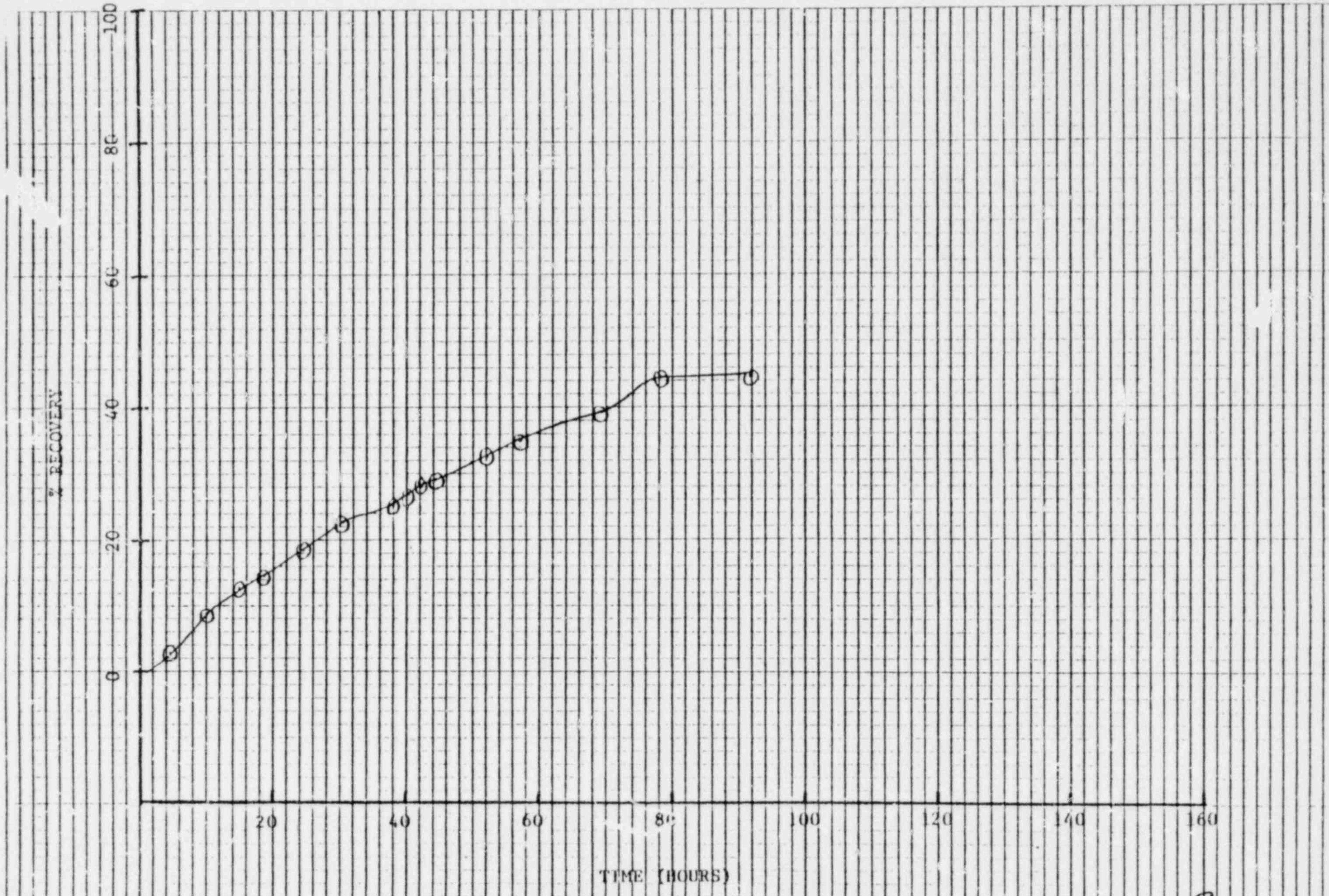
SUMMARY - SOLUBILIZATION OF COTTER ORE
Page 3

Test #	H_2SO_4 #/T	$NaClO_3$ #/T	Added H_2O w%	Ore Moisture as IS-w%	Cure Time hrs.	Dry Ore Weight Gms	U_3O_8 Assay Liquid Gms	Tails Gms	Calc. Heads w%	%U_3O_8 Tails	%Distr. Soluble U_3O_8	H_2SO_4 Consumed #/T	COMMENTS
40	230	5.0	3.2	12.6	48	437	.191	.0374	.0522	.00874	83.4	88.0	Charlie Ore - "Low" Grade Ore cured in shop area at 35 - 50°F.
41	230	10.0	3.2	12.6	48	437	.206	.0430	.0570	.00995	82.5	86.8	
42	230	15.0	3.2	12.6	48	437	.191	.0354	.0518	.00822	84.1	86.2	
43	265	5.0	3.2	12.6	48	437	.175	.0671	.0554	.0157	71.6	85.6	
44	265	10.0	3.2	12.6	48	437	.174	.0398	.0489	.00931	81.0	89.6	
45	265	15.0	3.2	12.6	48	437	.195	.0234	.0500	.0055	88.9	95.6	
46	299	5.0	3.2	12.6	48	437	.163	.0457	.0477	.0108	77.5	89.2	
47	299	10.0	3.2	12.6	48	437	.196	.0441	.0549	.0103	81.3	128.0	
48	299	15.0	3.2	12.6	48	437	.177	.0381	.0492	.00880	82.2	115.0	
49	230	5.0	3.2	12.6	72	437	.218	.0450	.0602	.0105	82.5	97.0	
50	230	10.0	3.2	12.6	72	437	.200	.0289	.0524	.00676	87.1	81.4	
51	230	15.0	3.2	12.6	72	437	.228	.0161	.0559	.00376	93.2	66.4	
52	265	5.0	3.2	12.6	72	437	.163	.0326	.0448	.00774	82.6	91.0	
53	265	10.0	3.2	12.6	72	437	.202	.0395	.0553	.00931	83.2	97.1	
54	265	15.0	3.2	12.6	72	437	.191	.0389	.0526	.00910	82.7	97.9	
55	299	5.0	3.2	12.6	72	437	No result	.0498	---	.0118	---	---	
56	299	10.0	3.2	12.6	72	437	.187	.0338	.0505	.00792	84.3	123.0	
57	299	15.0	3.2	12.6	72	437	.199	.0278	.0519	.00649	87.5	105.0	
58	200	5.0	3.3	15.1	48	424	.312	.0272	.0800	.00652	91.9	---	Charlie Ore - "Medium" Grade. Ore cured in shop area at 35 - 50°F.
59	200	10.0	3.3	15.1	48	424	.317	.0243	.0805	.00579	92.8		
60	200	15.0	3.3	15.1	48	424	.332	.0283	.0850	.00678	92.0		
61	250	5.0	3.3	15.1	48	424	.317	.0471	.0858	.0113	86.3		
62	250	10.0	3.3	15.1	48	424	.382	.0563	.1034	.0134	87.0		
63	250	15.0	3.3	15.1	48	424	.396	.0288	.1002	.00685	93.2		

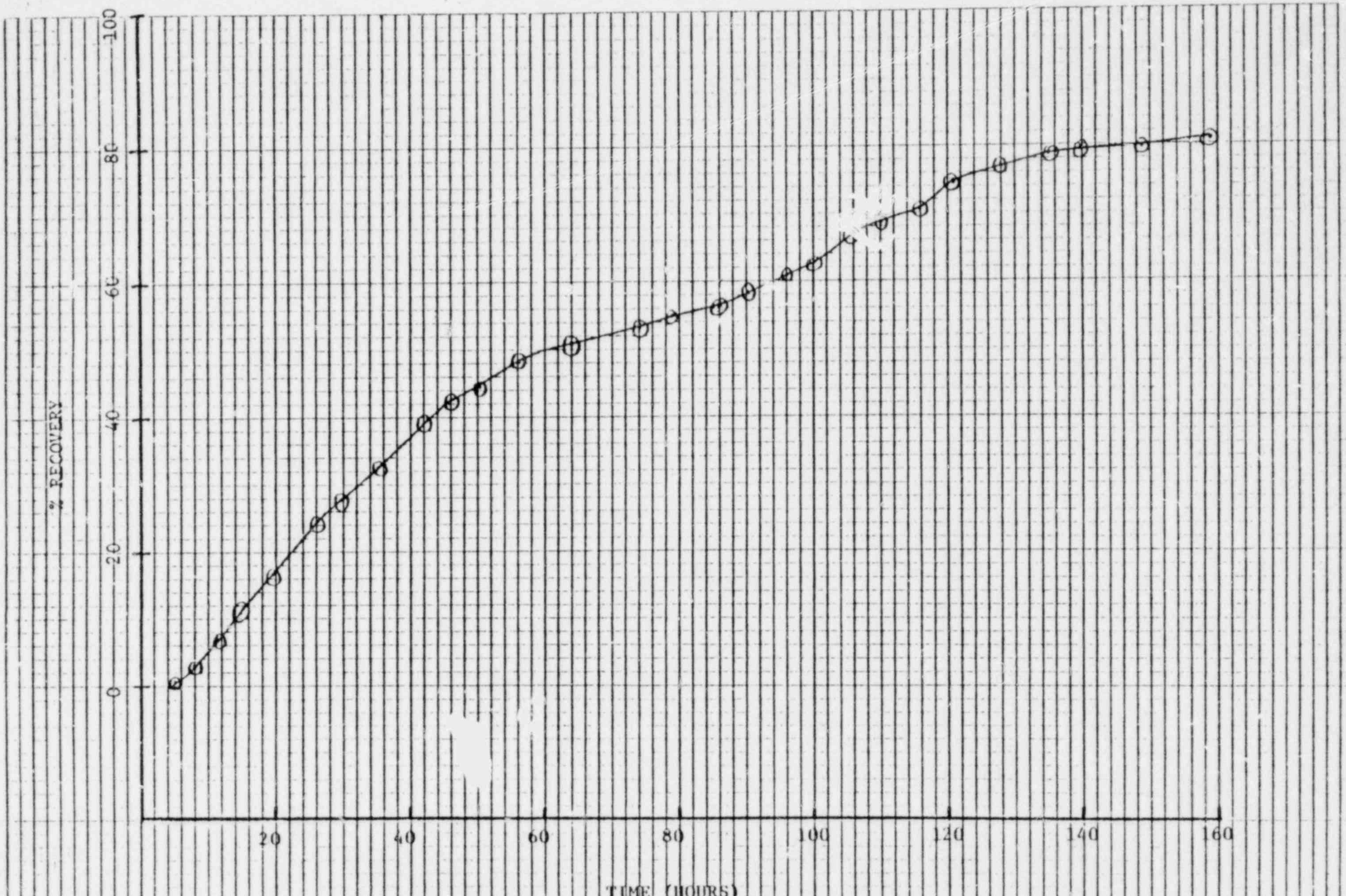
H & N Job No. 3052.00

SUMMARY - SOLUBILIZATION OF COTTER ORE
Page 4

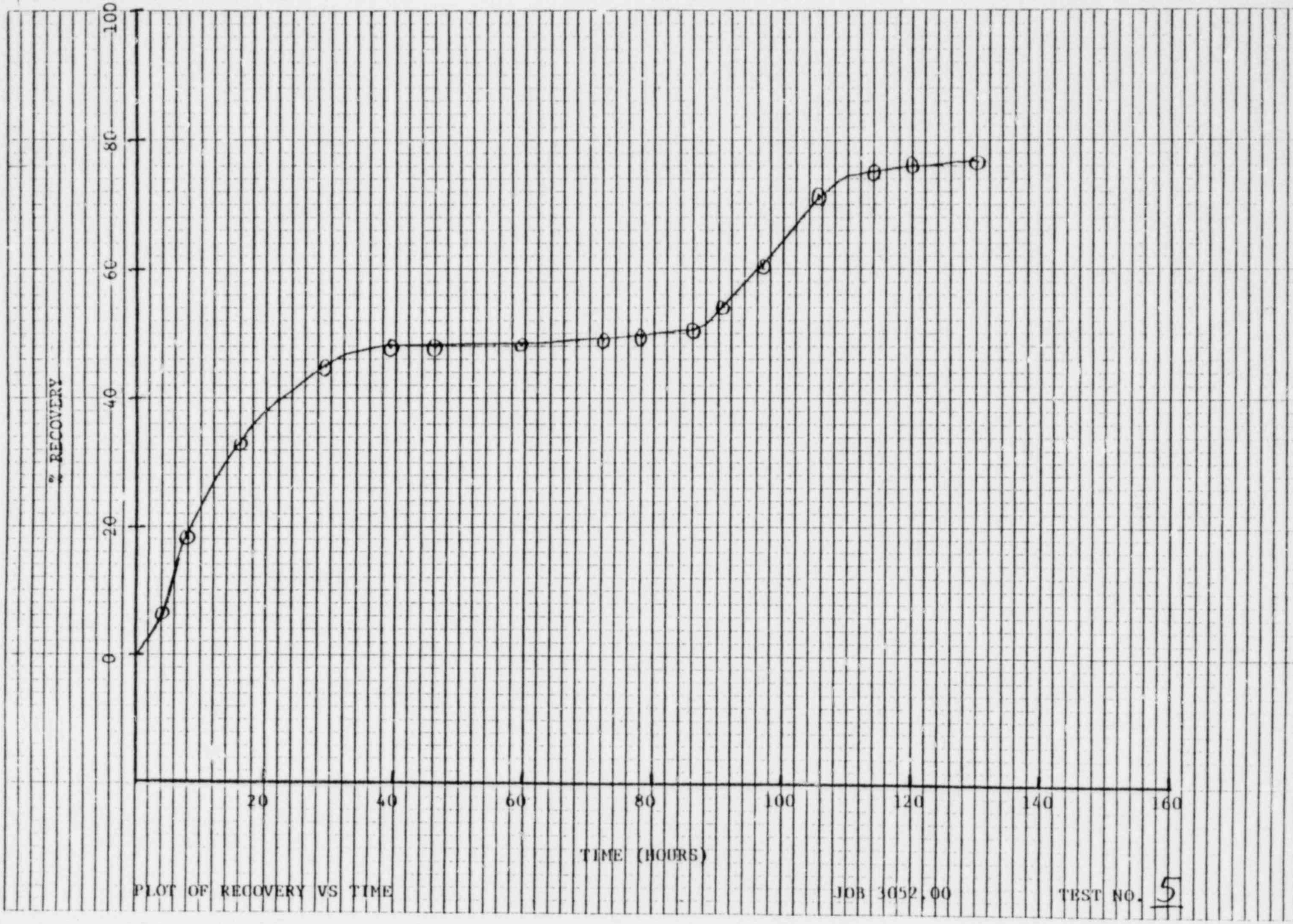
Test #	H_2SO_4 #/T	$NaClO_3$ #/T	Added H_2O w%	Ore Moisture as IS-w%	Cure Time hrs.	Dry Ore Weight Gms	U_3O_8 Liquid Gms	U_3O_8 Assay Tails Gms	Calc. Heads w%	$\%U_3O_8$ Tails	%Distr. Soluble U_3O_8	H_2SO_4 Consumed #/T	COMMENTS
64	300	5.0	3.3	15.1	48	424	.316	.0605	.0887	.0145	83.7		Charlie Ore "Medium" Grade Ore cured in shop area at 35 - 50°F.
65	300	10.0	3.3	15.1	48	424	.311	.0492	.0849	.0118	86.2		
66	300	15.0	3.3	15.1	48	424	.342	.0763	.0987	.0183	81.4		
67	189	4.7	3.1	10.4	24	448	.316	.0596	.0838	.0136	83.8		Charlie Ore - "High" Grade Ore sampled from uncrushed stockpile and hand crushed to one inch. Ore cured in shop area at 35 - 50°F.
68	189	9.4	3.1	10.4	24	448	.319	.0563	.0837	.0128	84.8		
69	189	14.1	3.1	10.4	24	448	.325	.0804	.0905	.0182	79.9		
70	236	4.7	3.1	10.4	24	448	.302	.0606	.0809	.0138	82.9		
71	236	9.4	3.1	10.4	24	448	.356	.123	.1070	.0281	73.7		
72	236	14.1	3.1	10.4	24	448	.344	.0782	.0942	.0179	81.0		
73	284	4.7	3.1	10.4	24	448	.250	.0701	.0715	.0160	77.6		
74	284	9.4	3.1	10.4	24	448	.282	.0763	.0800	.0173	78.4		
75	284	15.7	3.3	10.4	24	448	.333	.0740	.0908	.0169	81.4		

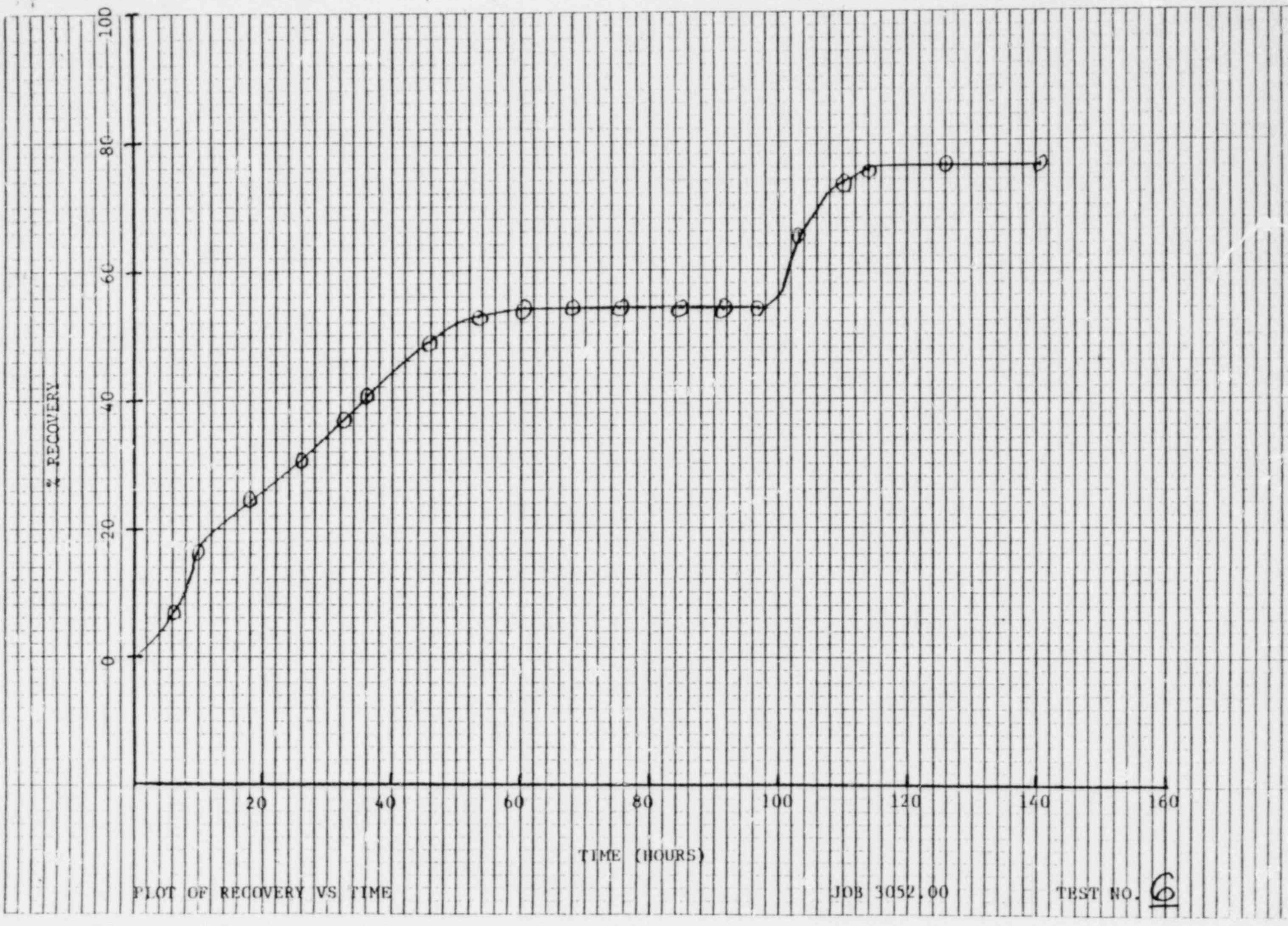


PLOT OF RECOVERY VS TIME JOB 3052.00 TEST NO. 3

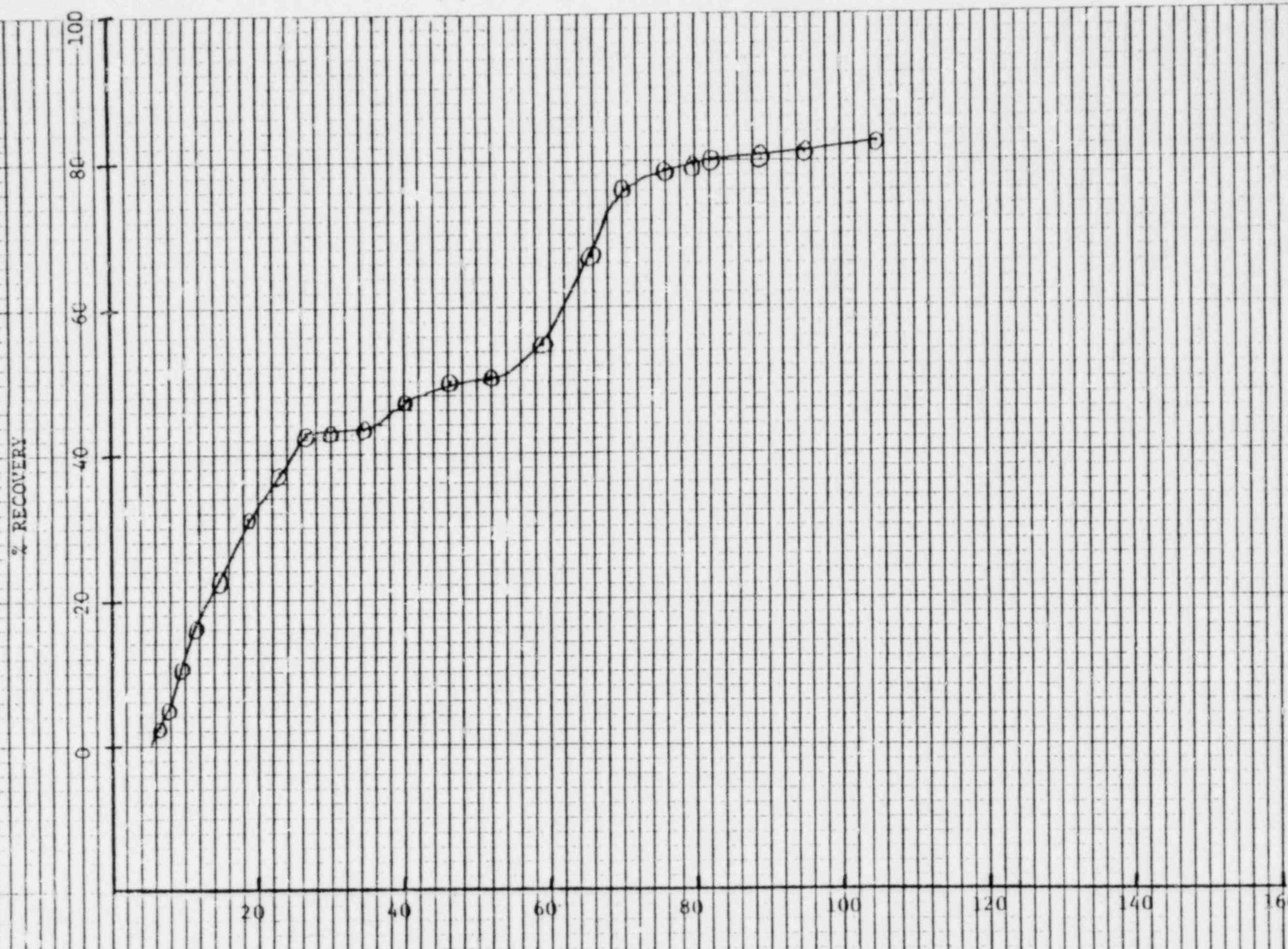


PLOT OF RECOVERY VS TIME JOB 3052.00 TEST NO. 4


% RECOVERY
0
20
40
60
80
100
20
40
60
80
100
120
140
160
TIME (HOURS)
PLOT OF RECOVERY VS TIME
JOB 3052.00
TEST NO. 5



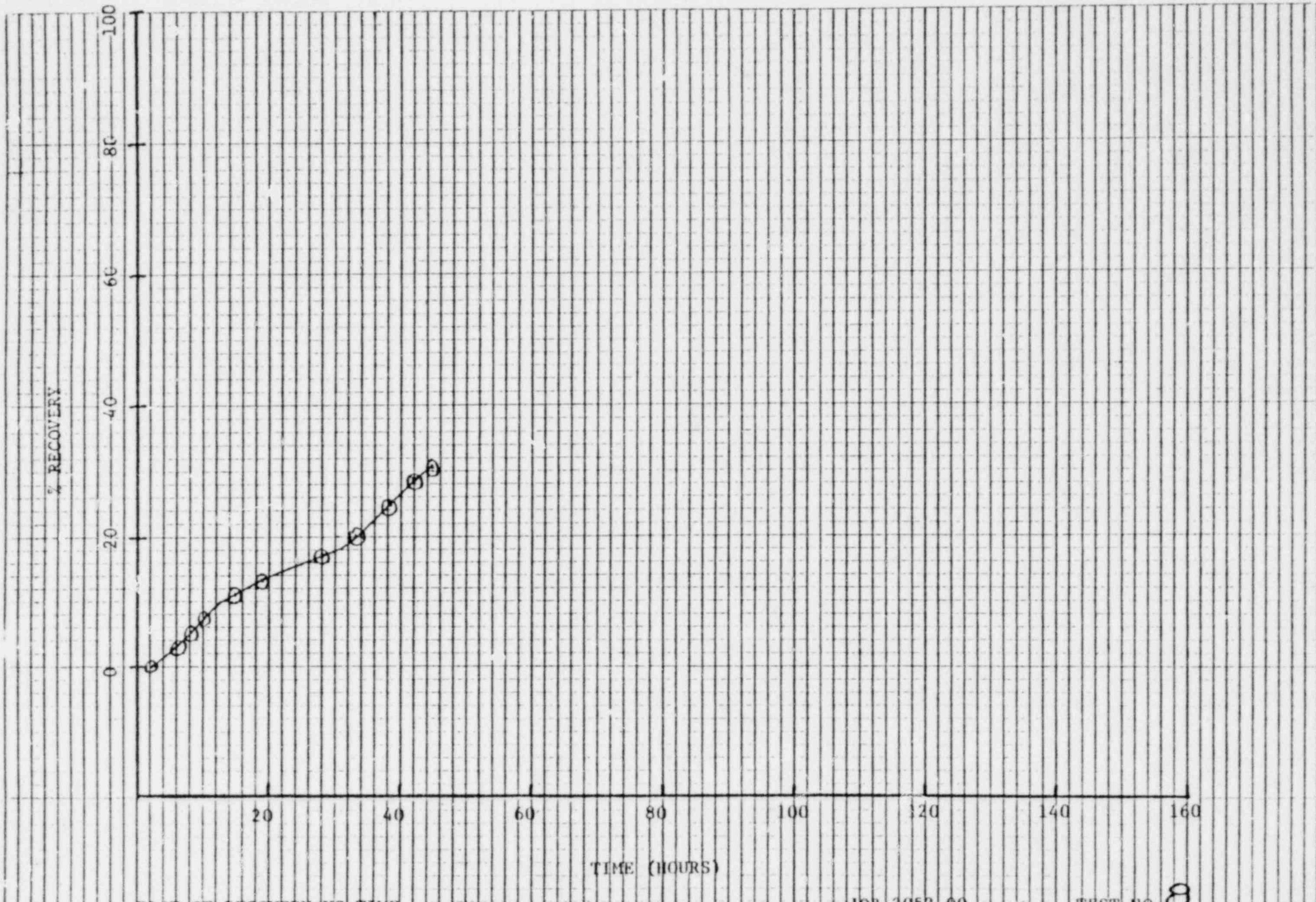
100
80
60
40
20
0
% RECOVERY
20
40
60
80
100
120
140
160
TIME (HOURS)
PLOT OF RECOVERY VS TIME
JOB 3052.00
TEST NO. 6



PLOT OF RECOVERY VS TIME

JOB 3052.00

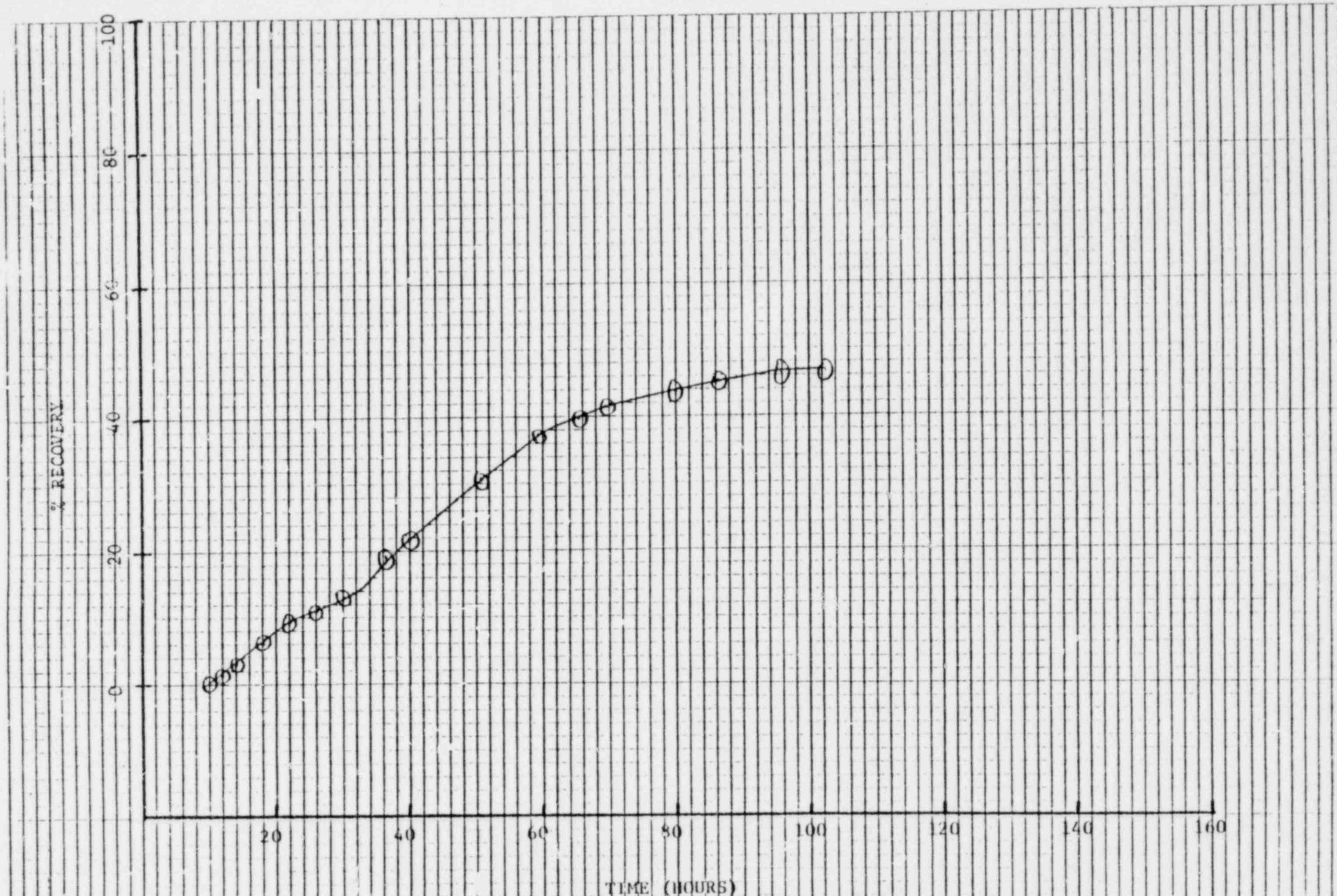
TEST NO. 7



PLOT OF RECOVERY VS TIME

JOB 3052.00

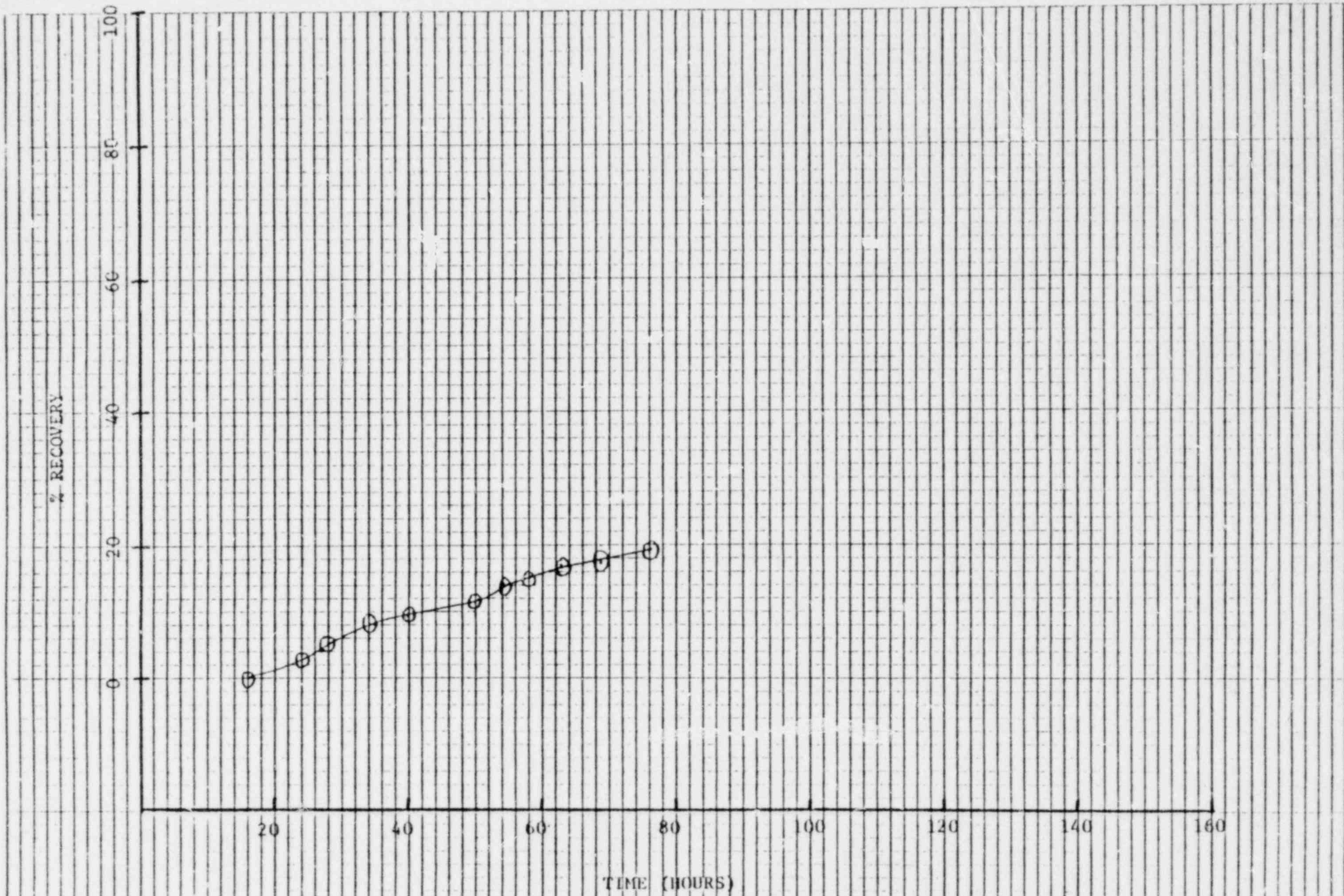
TEST NO. 8



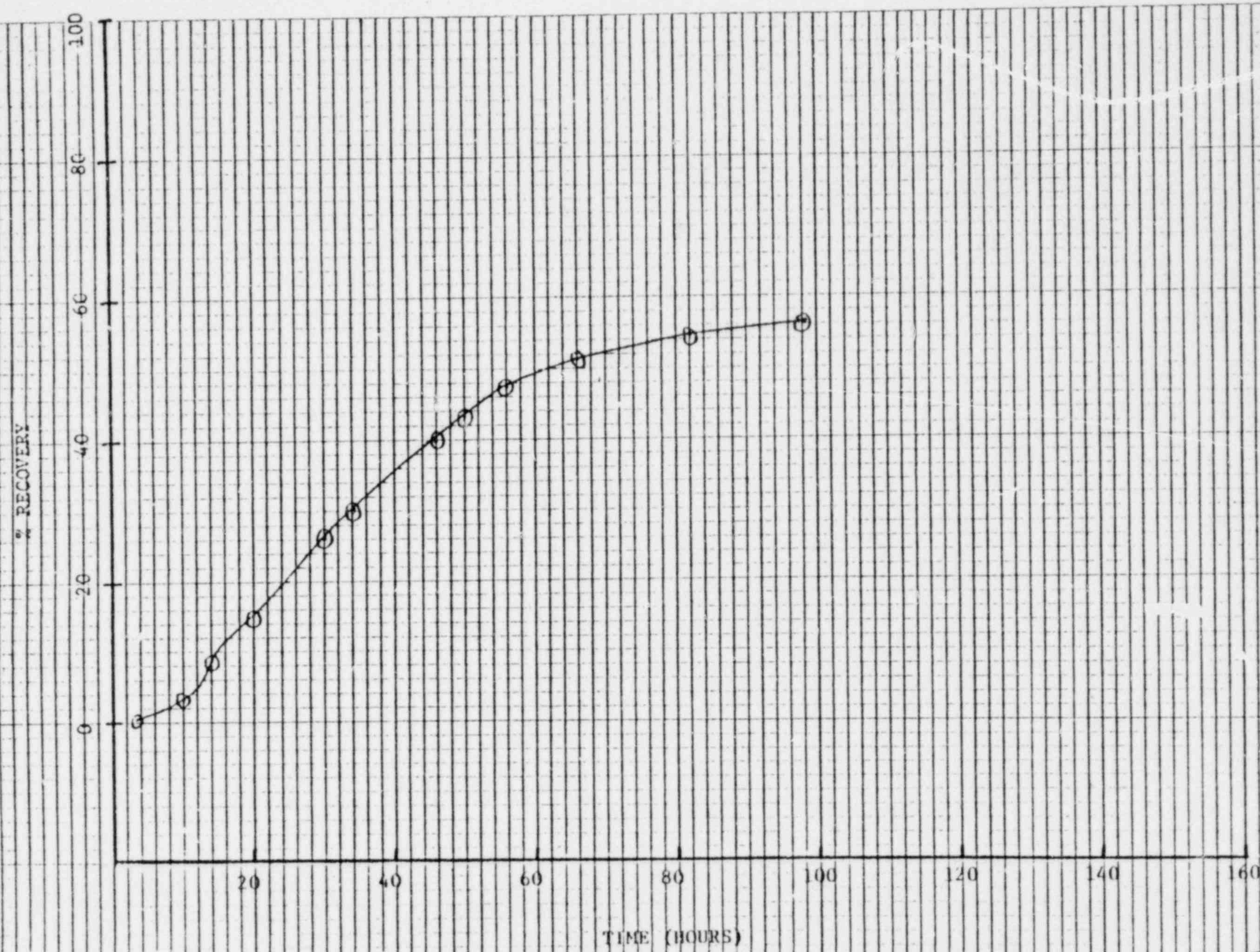
PLOT OF RECOVERY VS TIME JOB 3052.00 TEST NO. 10

46 0703

46 0703

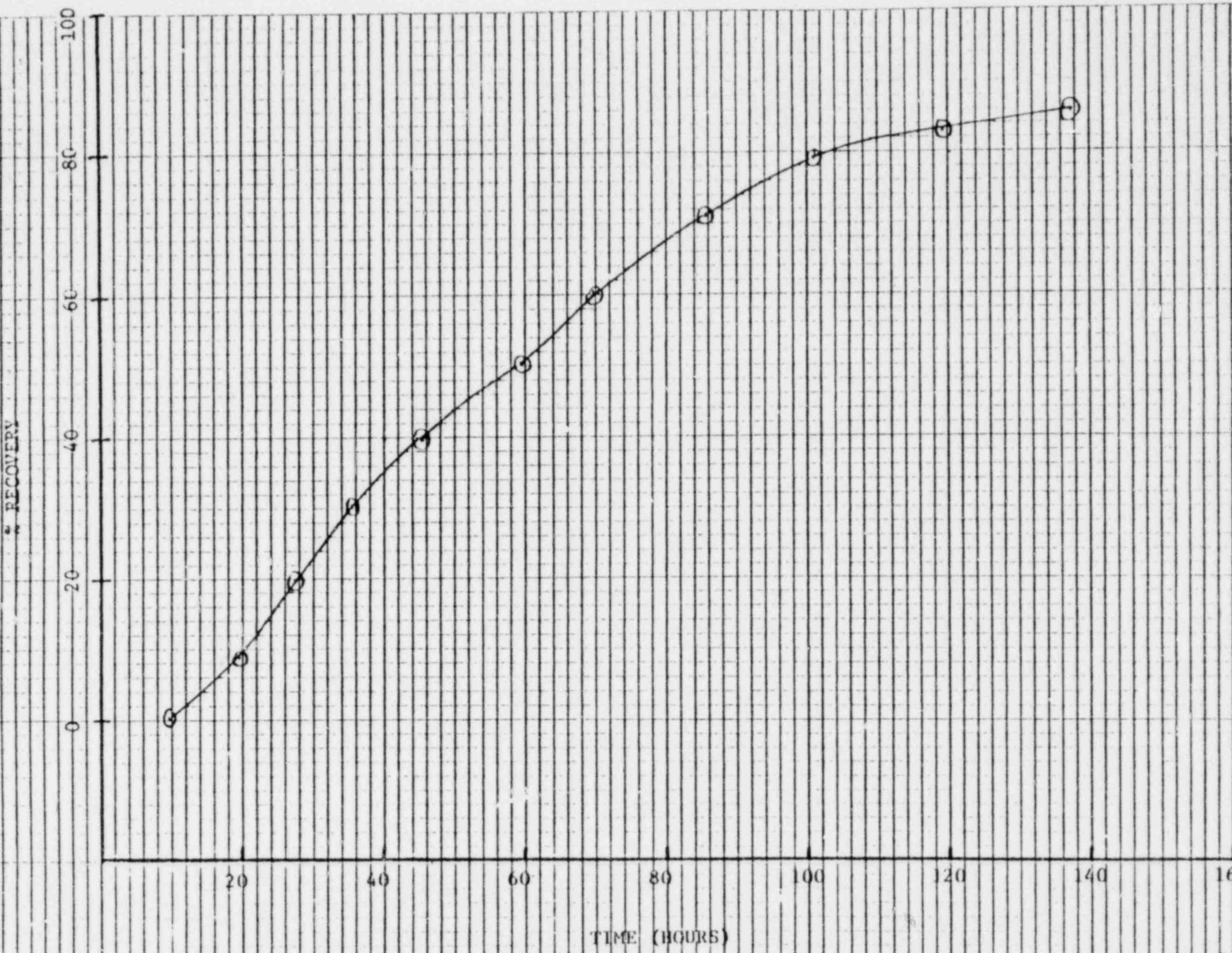


PLOT OF RECOVERY VS TIME JOB 3052.00 TEST NO. 11

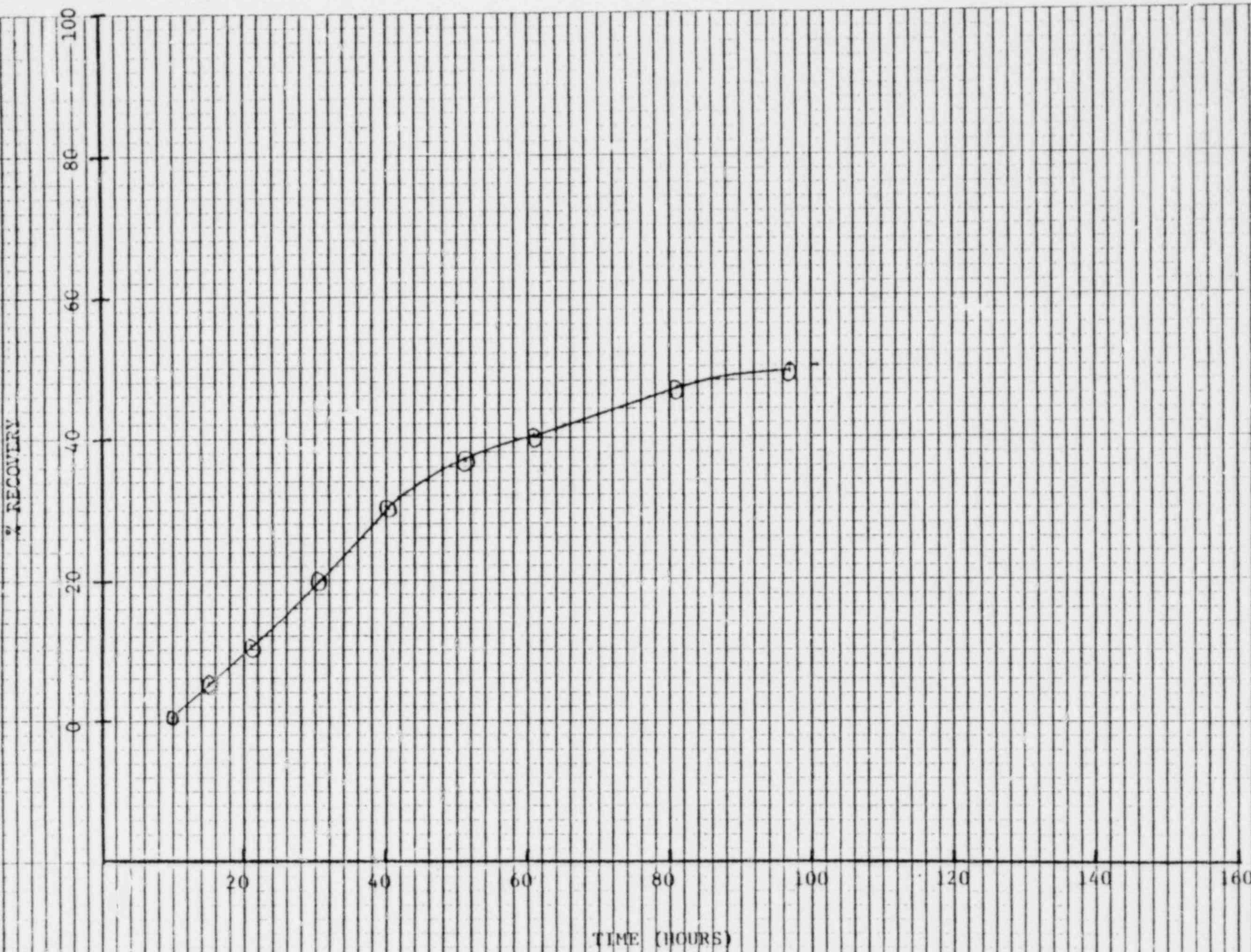


PLOT OF RECOVERY VS TIME JOB 3052.00 TEST NO. 12

46-0703



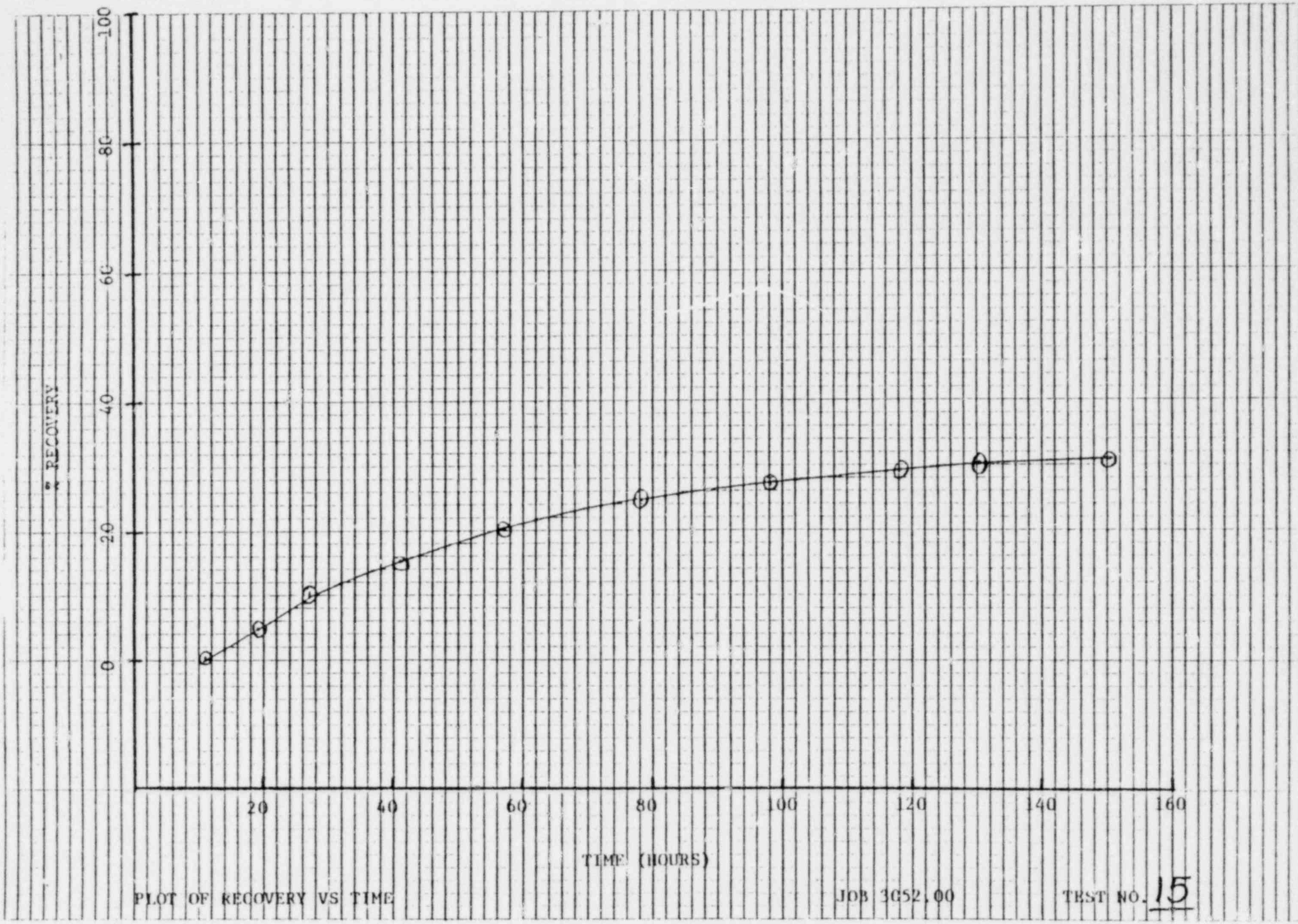
PLOT OF RECOVERY VS TIME JOB 3052.00 TEST NO. 13

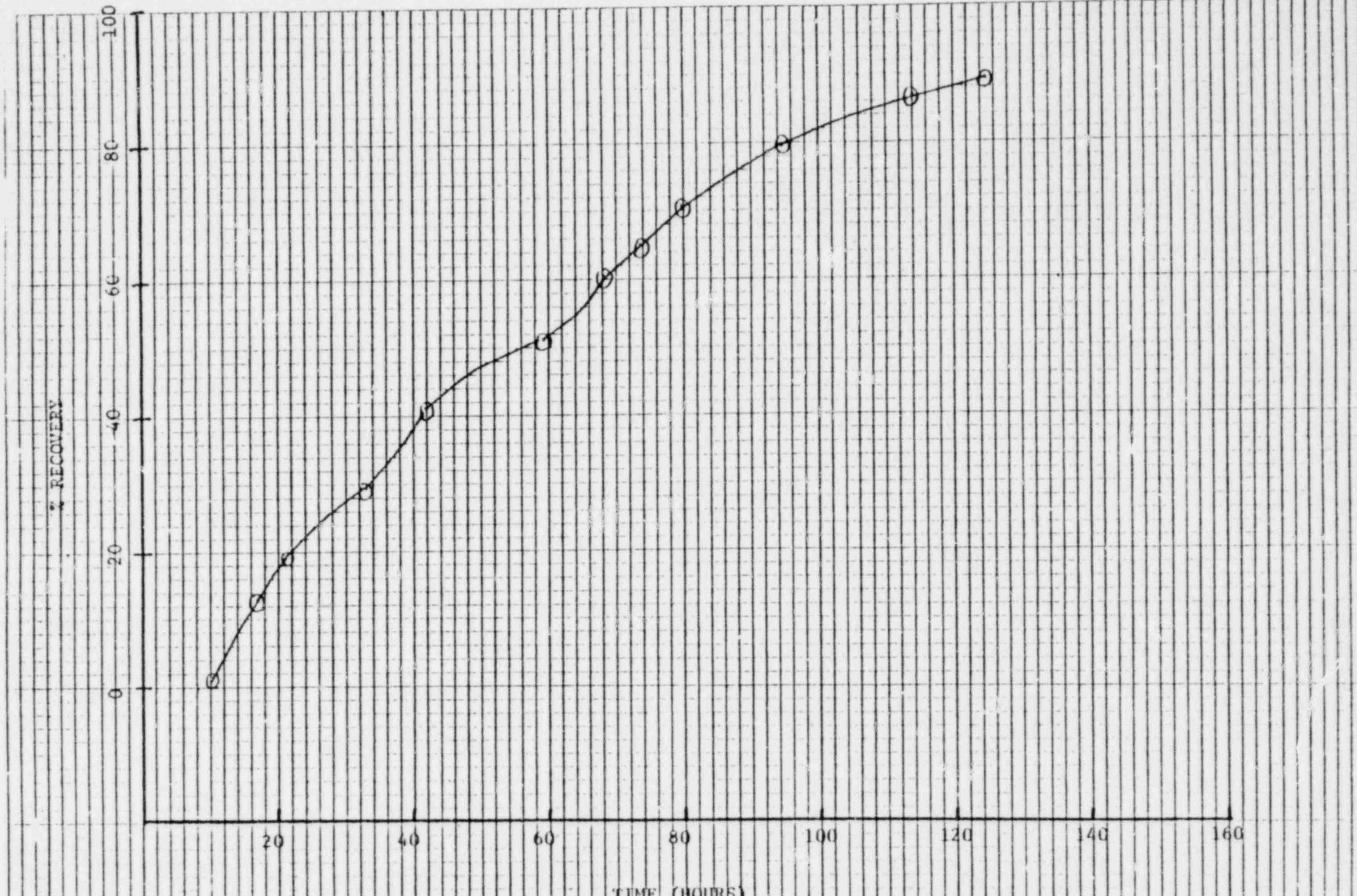


PLOT OF RECOVERY VS TIME

JOB 3052.00

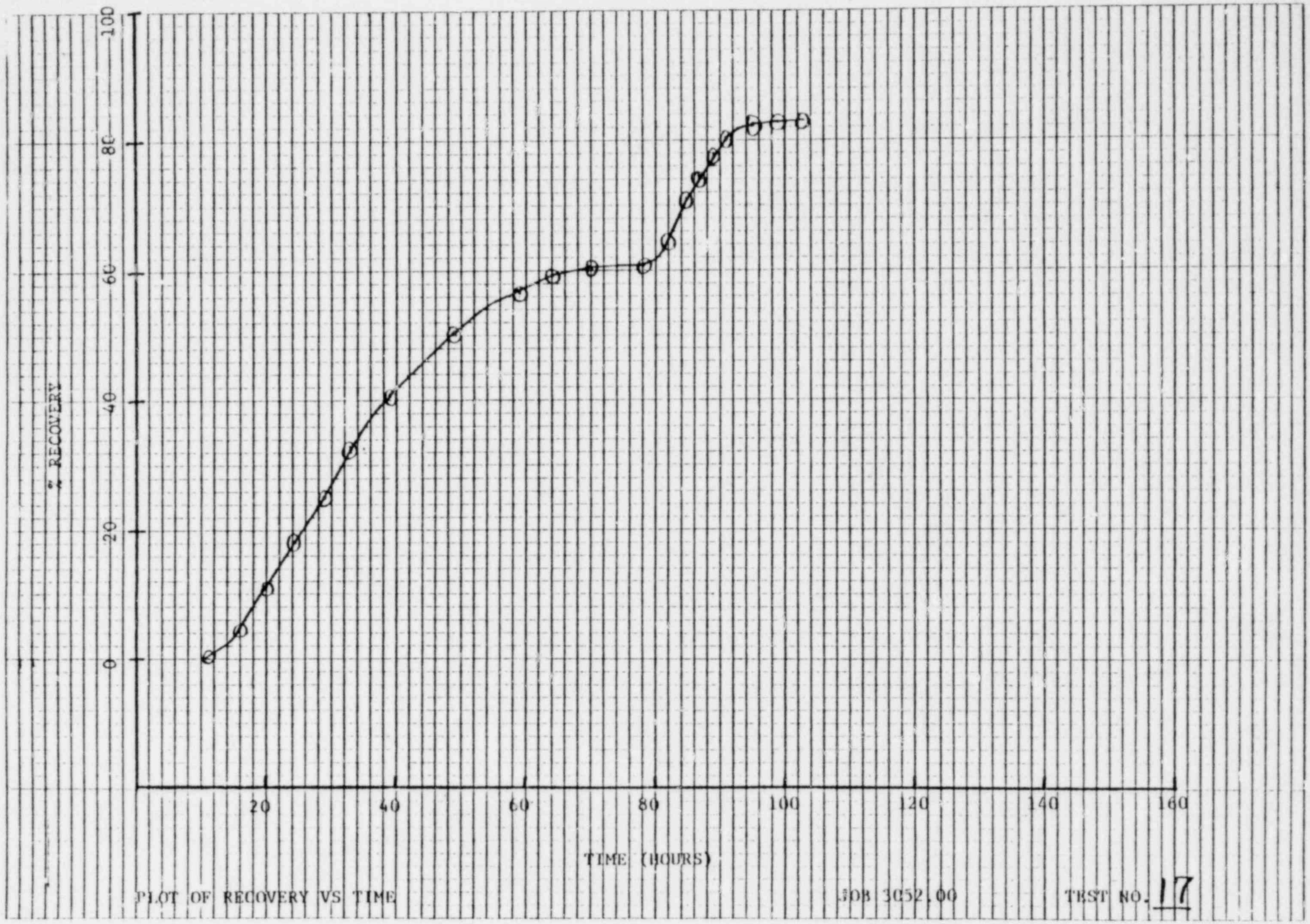
TEST NO. 14

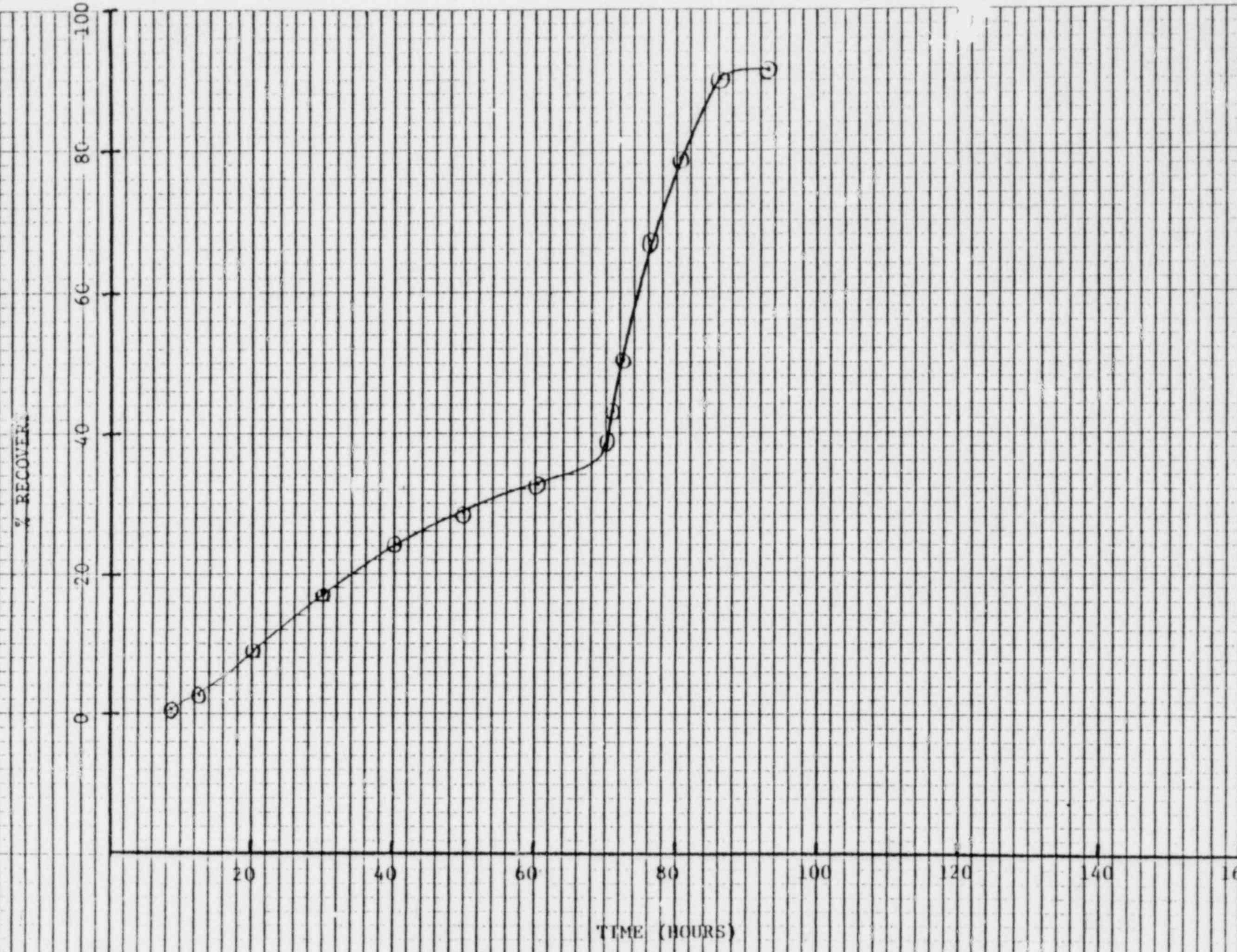

% RECOVERY
0
20
40
60
80
100
20
40
60
80
100
120
140
160
TIME (HOURS)
PLOT OF RECOVERY VS TIME
JOB 3G52.00
TEST NO. 15



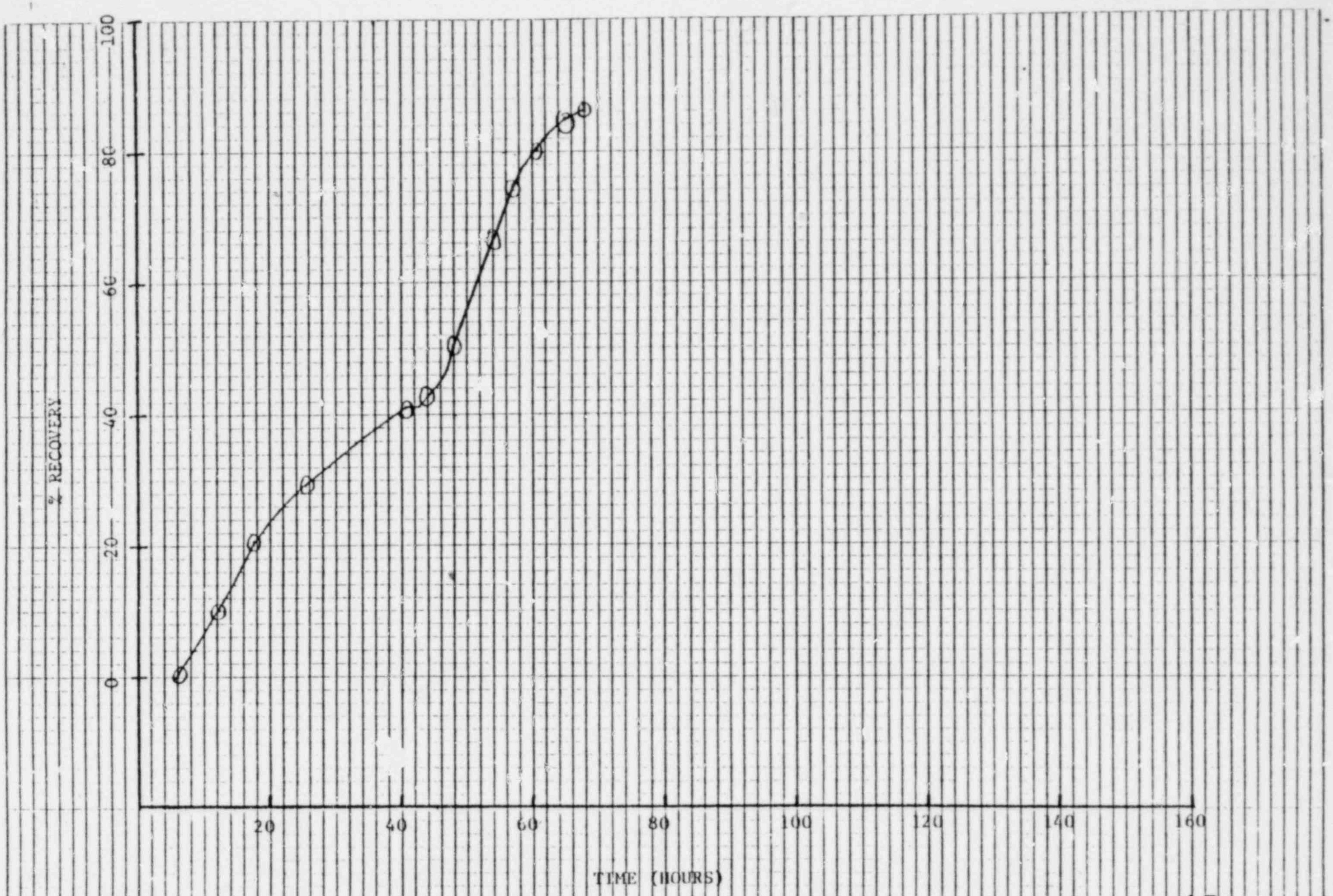
PLOT OF RECOVERY VS TIME JOB 3052.00 TEST NO. 16

46 0703


% RECOVERY
0
20
40
60
80
100
20
40
60
80
100
120
140
160
TIME (HOURS)
PLOT OF RECOVERY VS TIME
JOB 3C52.00
TEST NO. 17

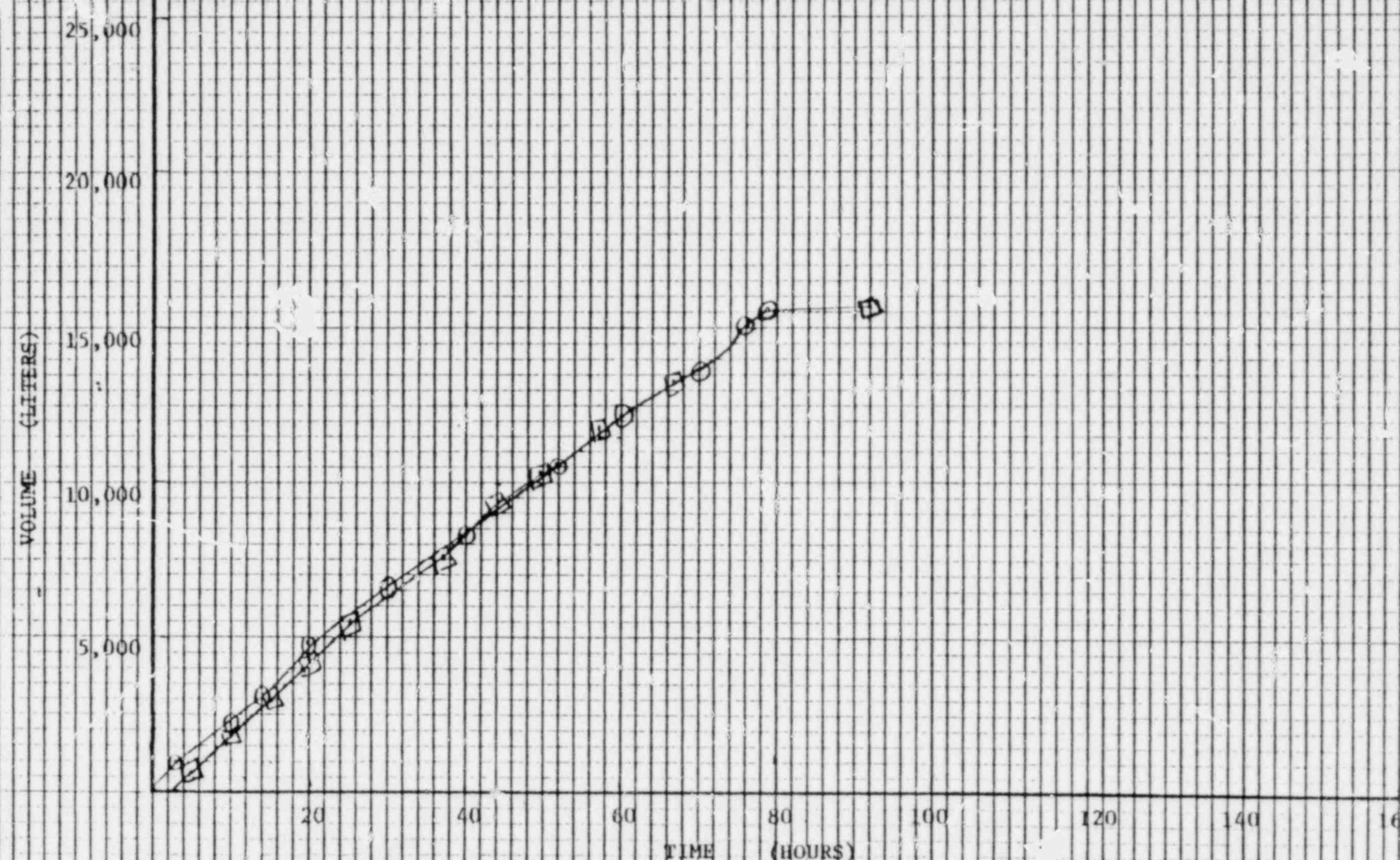


PLOT OF RECOVERY VS TIME JOB 3052.00 TEST NO. 18

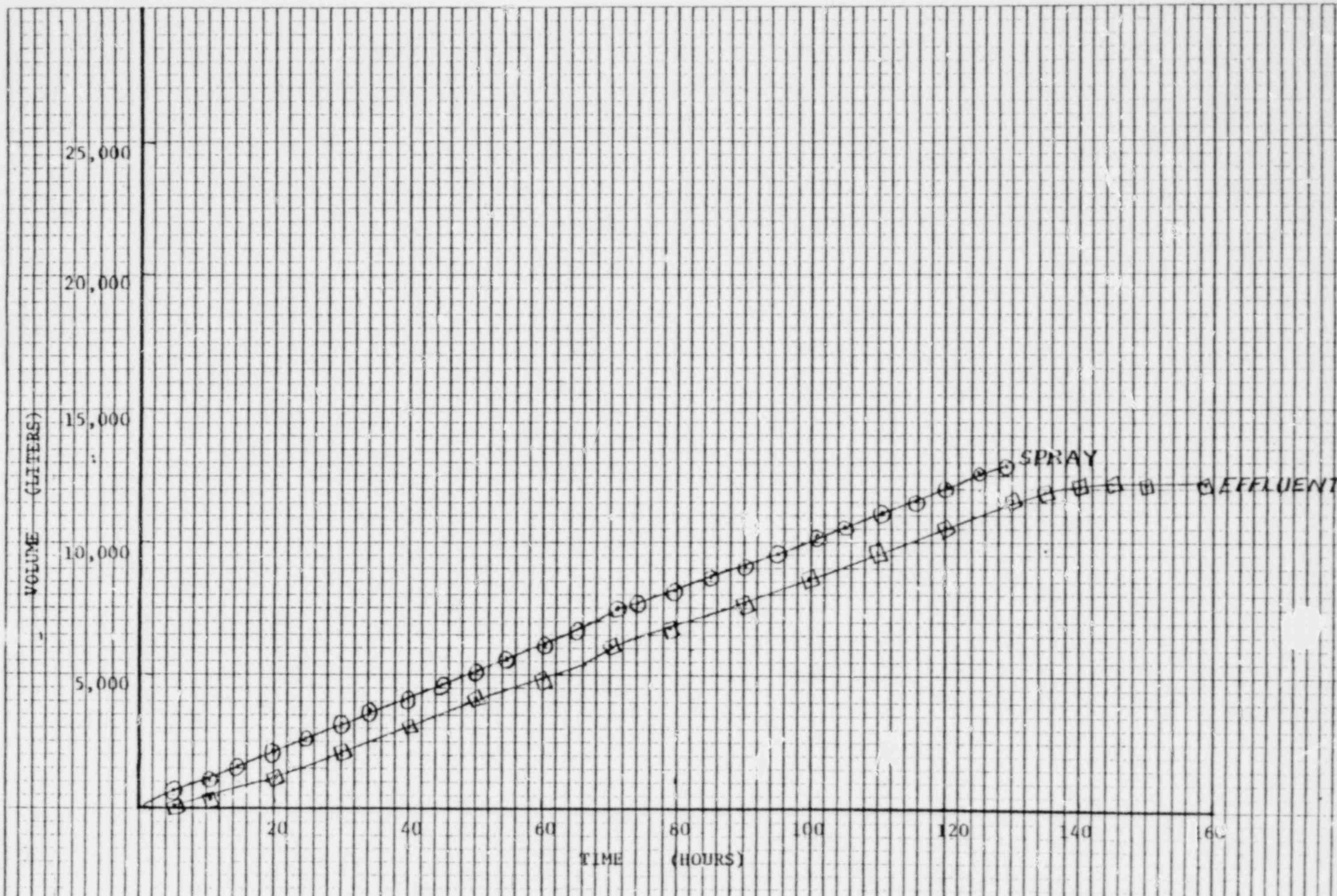


PLOT OF RECOVERY VS TIME JOB 3052.00 TEST NO. 19

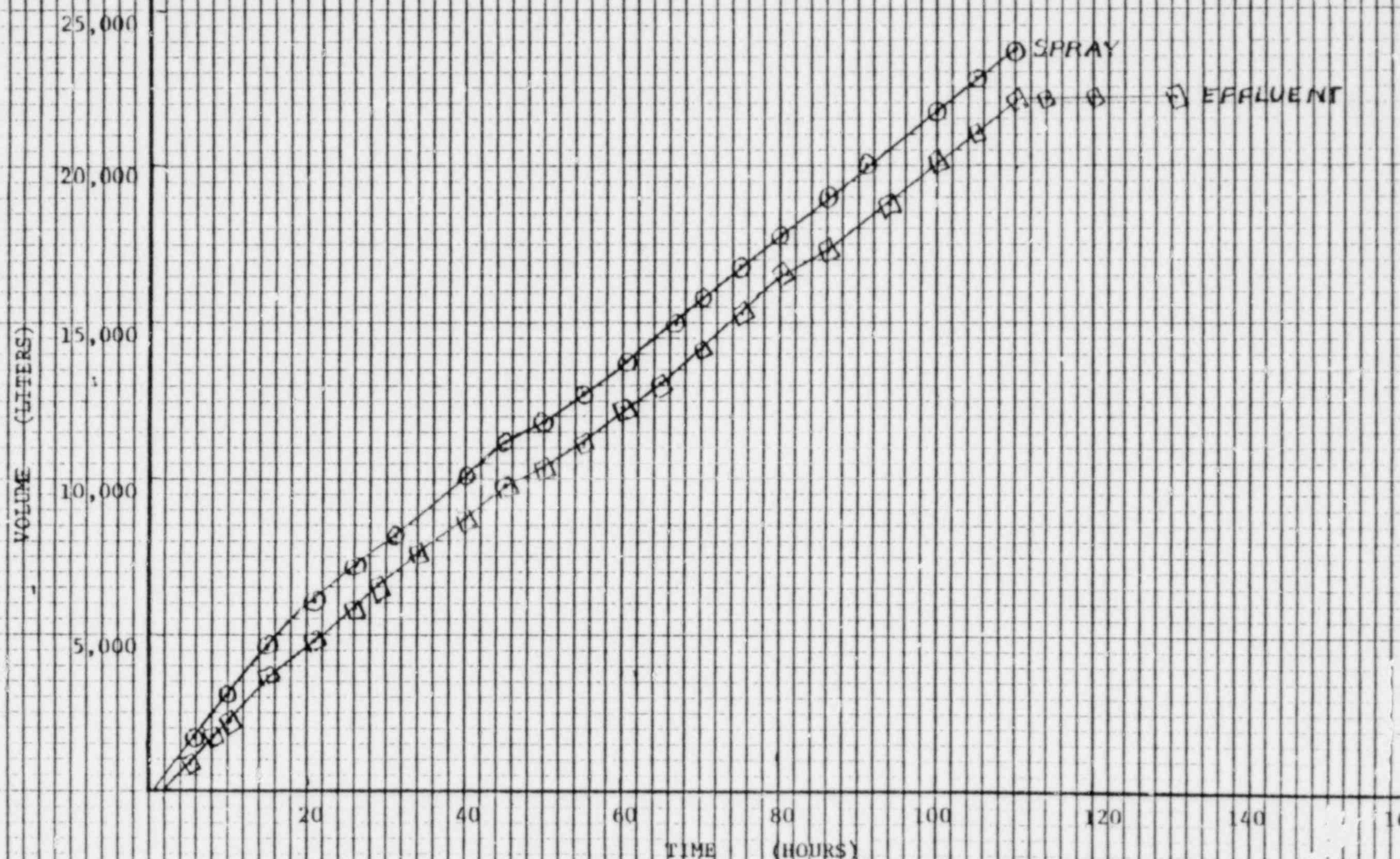
46-0703



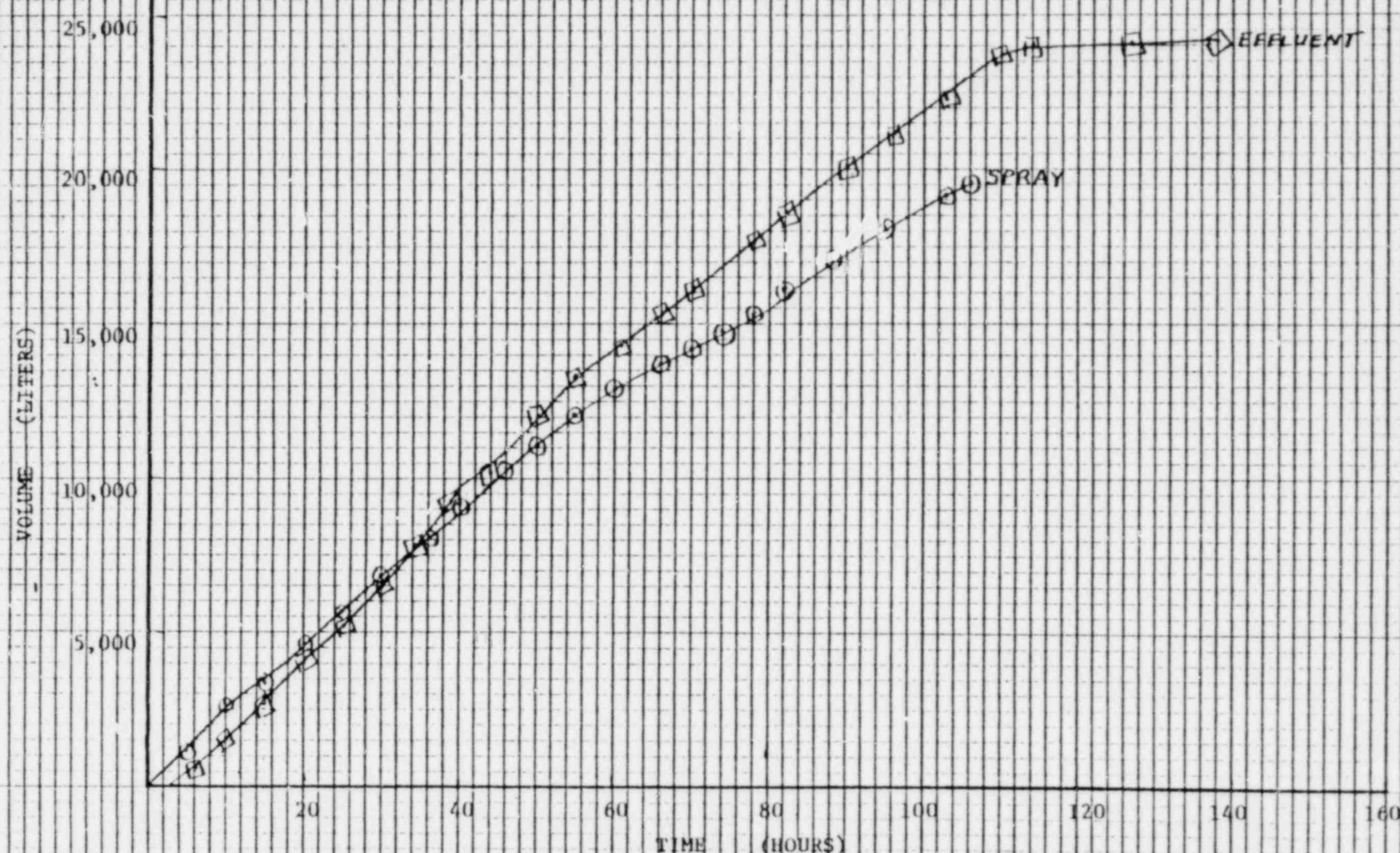
PLOT OF SPRAY AND PREGNANT SOLUTION VOLUME VS TIME JOB NO. 3052.00 TEST NO. 3



PLOT OF SPRAY AND PREGNANT SOLUTION VOLUME VS TIME JOB NO. 3052.00 TEST NO. 4



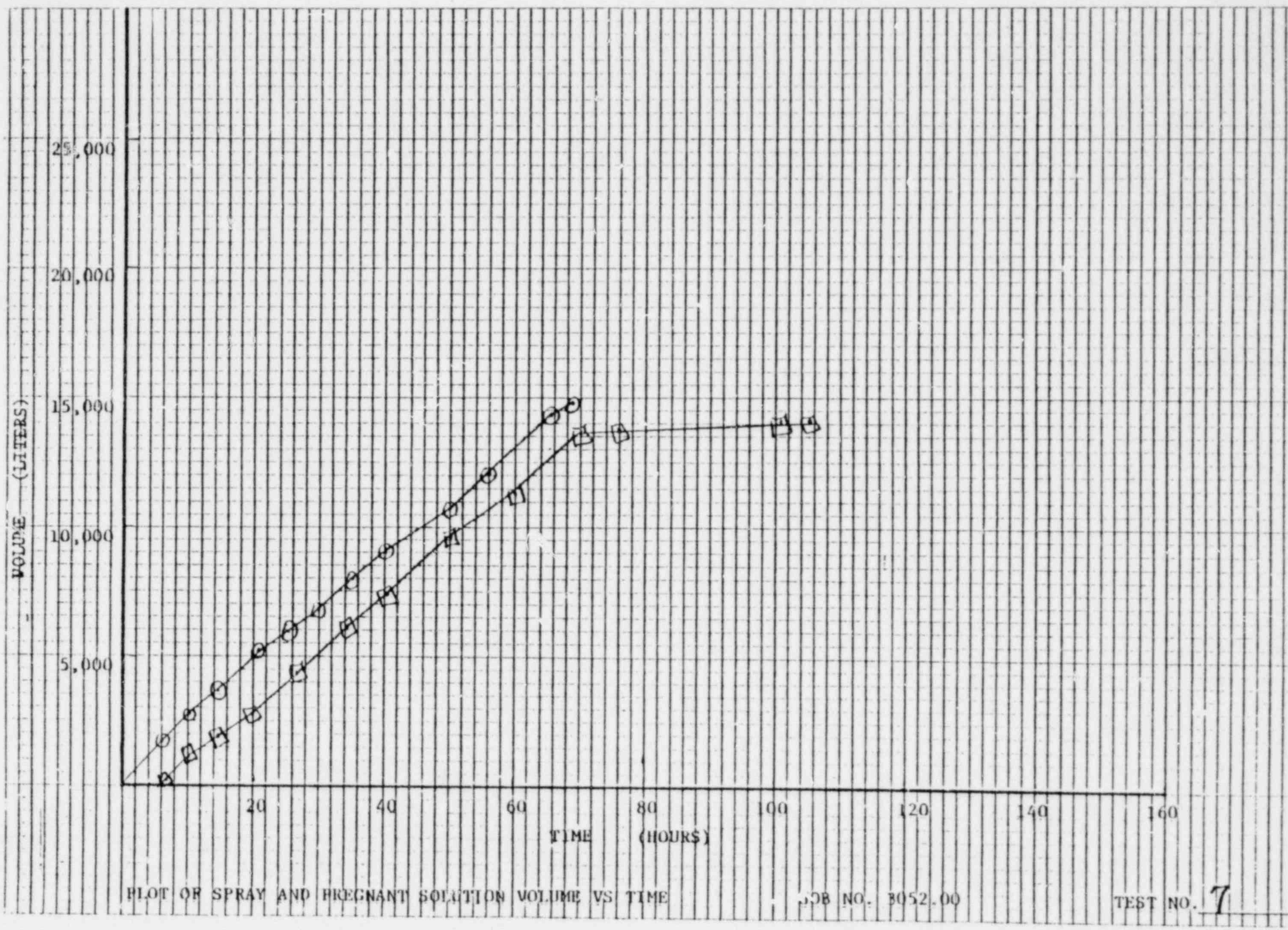
PLOT OF SPRAY AND PREGNANT SOLUTION VOLUME VS TIME JOB NO. 3052.00 TEST NO. 5

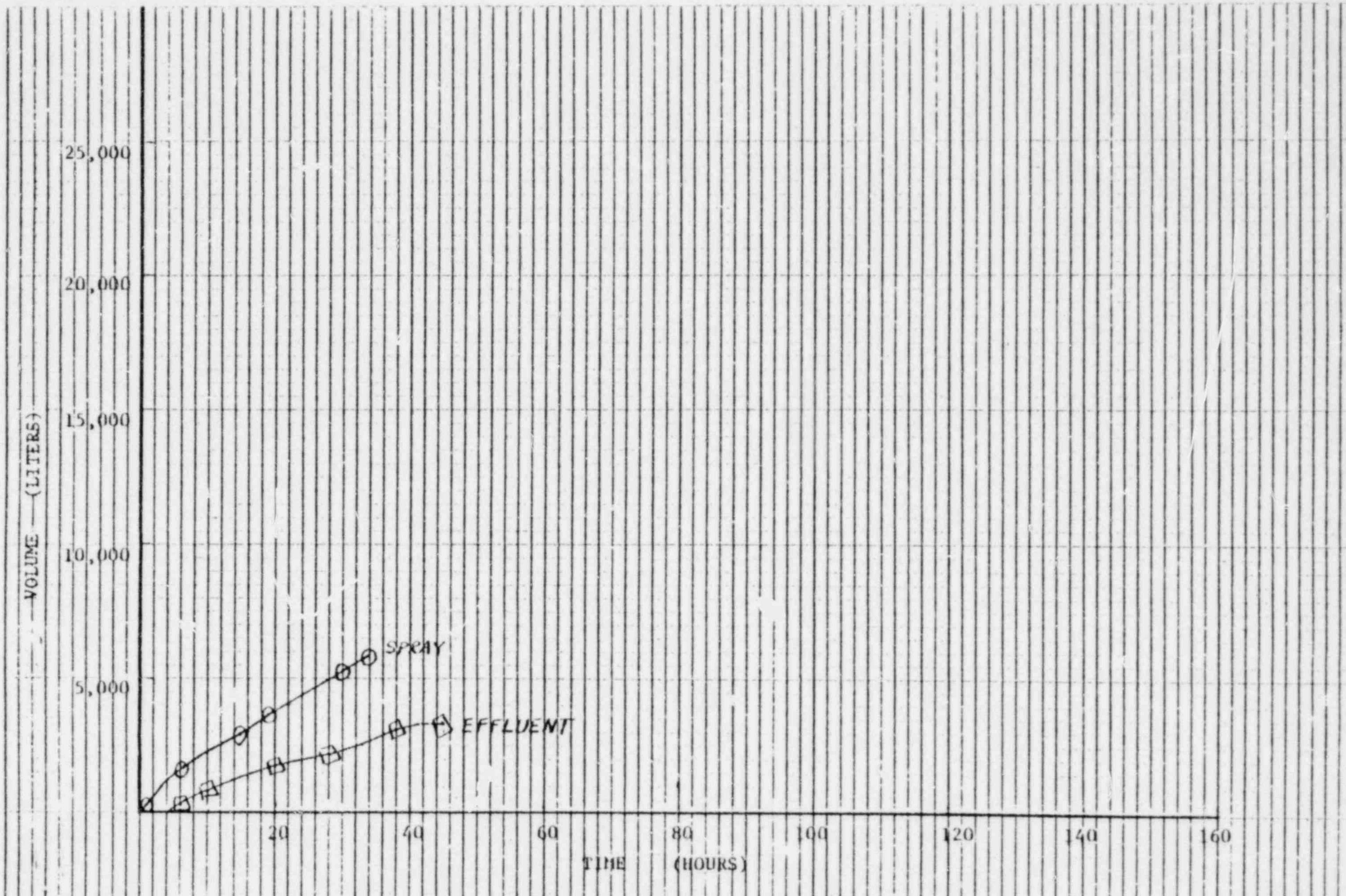


PLOT OF SPRAY AND PREGNANT SOLUTION VOLUME VS TIME

JOB NO. 3052.00

TEST NO. 6

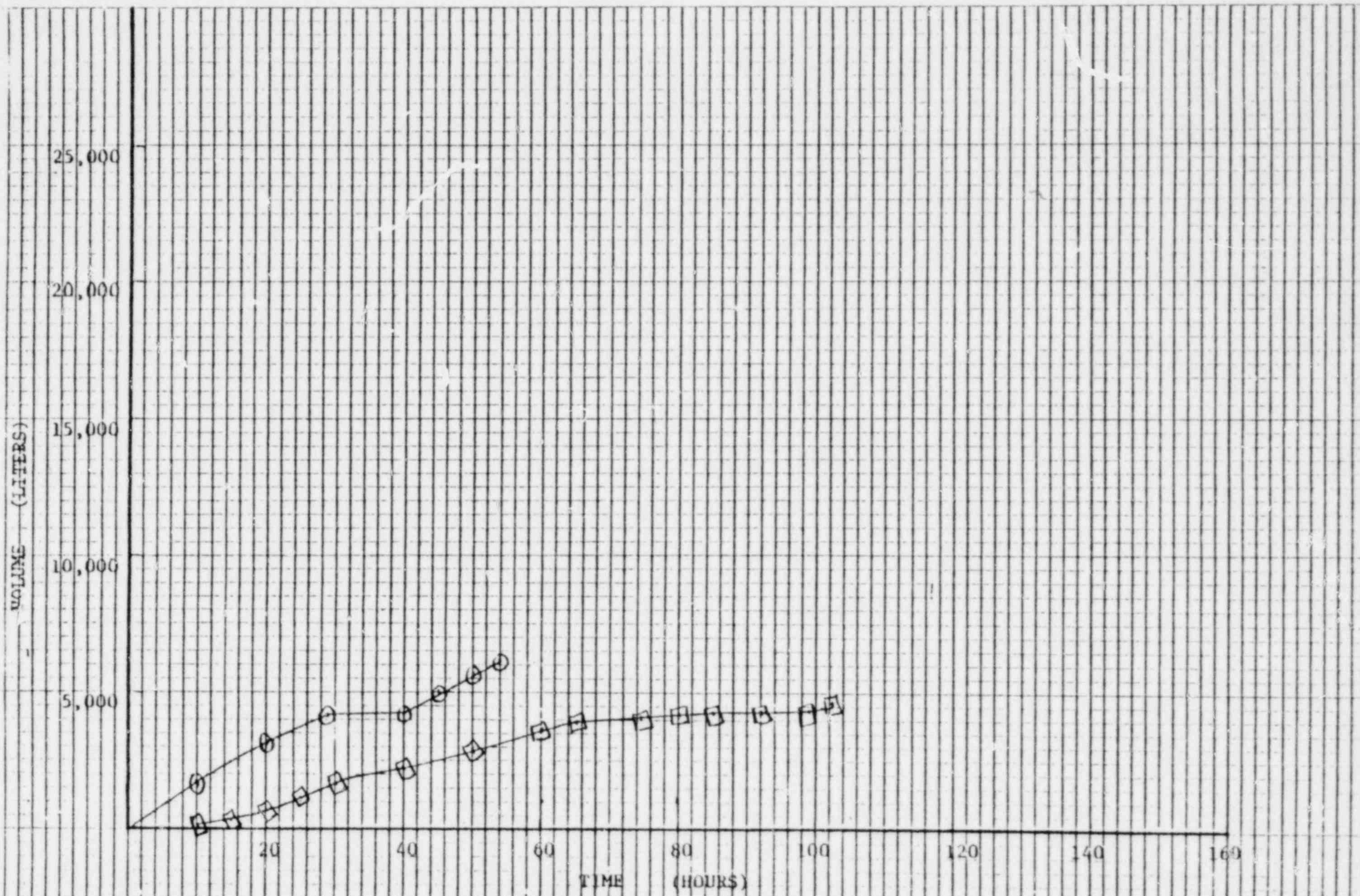

VOLUME (LITERS)
25,000
20,000
15,000
10,000
5,000
20
40
60
80
100
120
140
160
TIME (HOURS)
PLOT OF SPRAY AND PREGNANT SOLUTION VOLUME VS TIME
JOB NO. 3052.00
TEST NO. 7



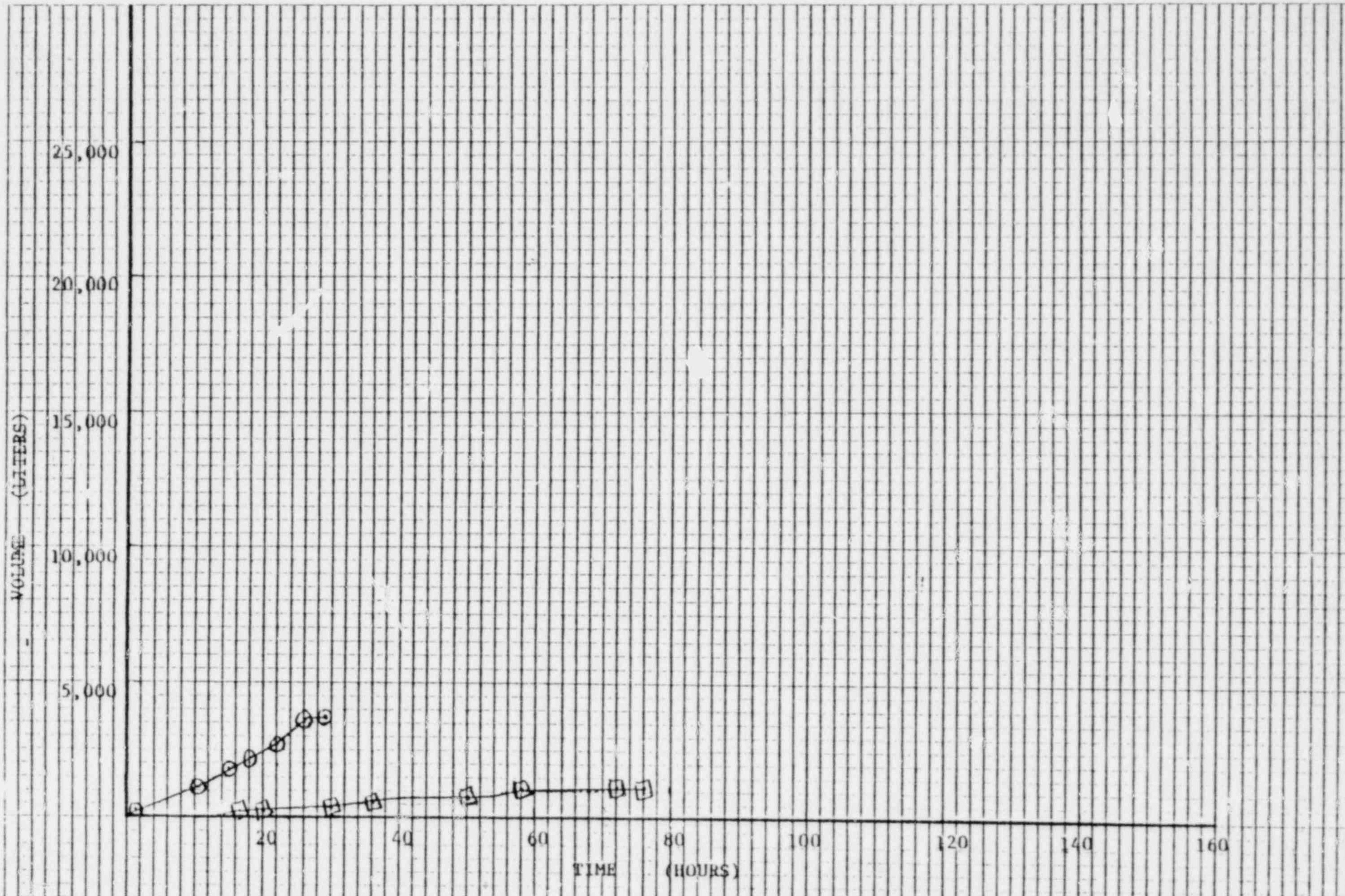
PLOT OF SPRAY AND PREGNANT SOLUTION VOLUME VS TIME

JOB NO. 3052.00

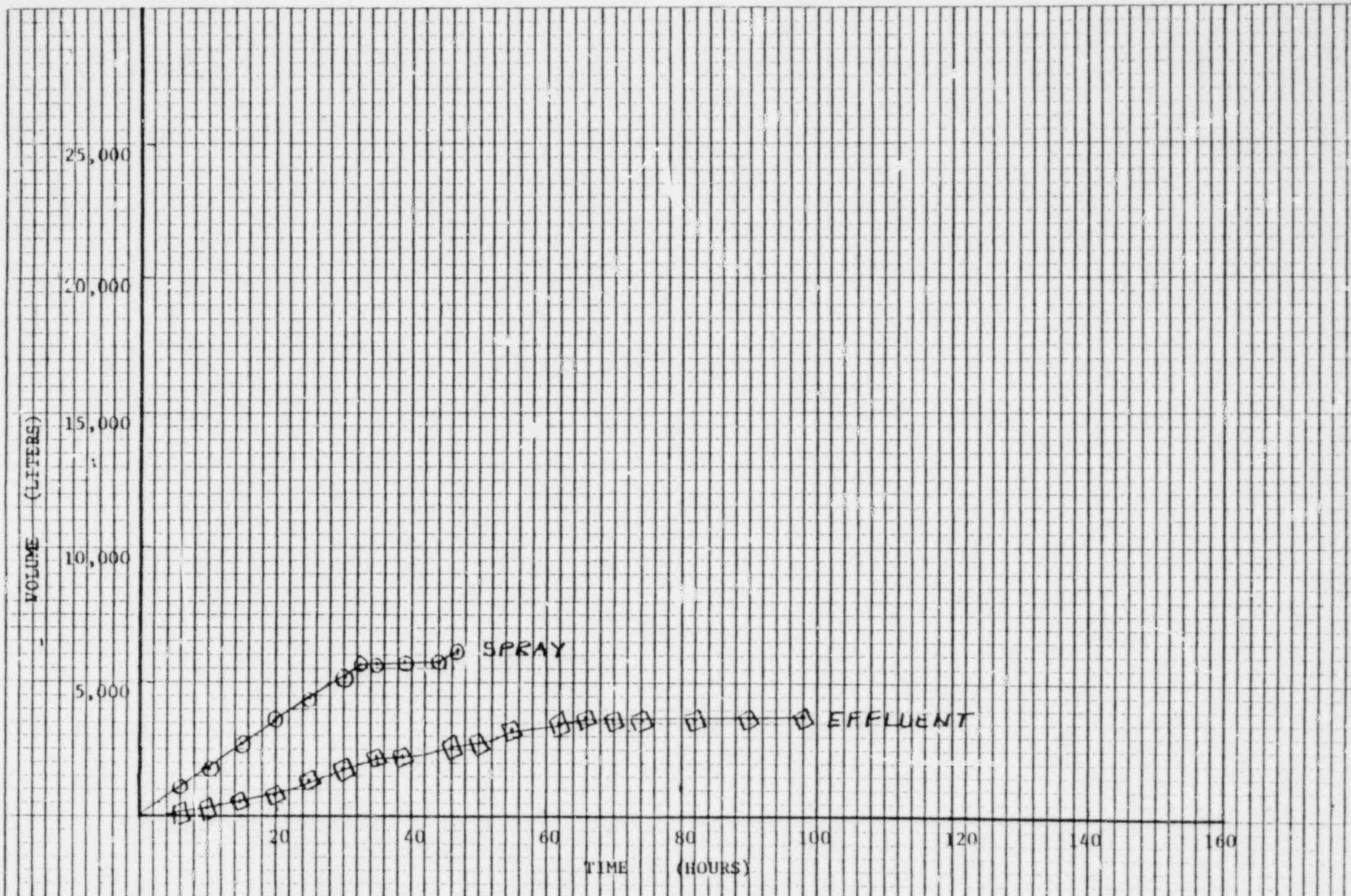
TEST NO. 8



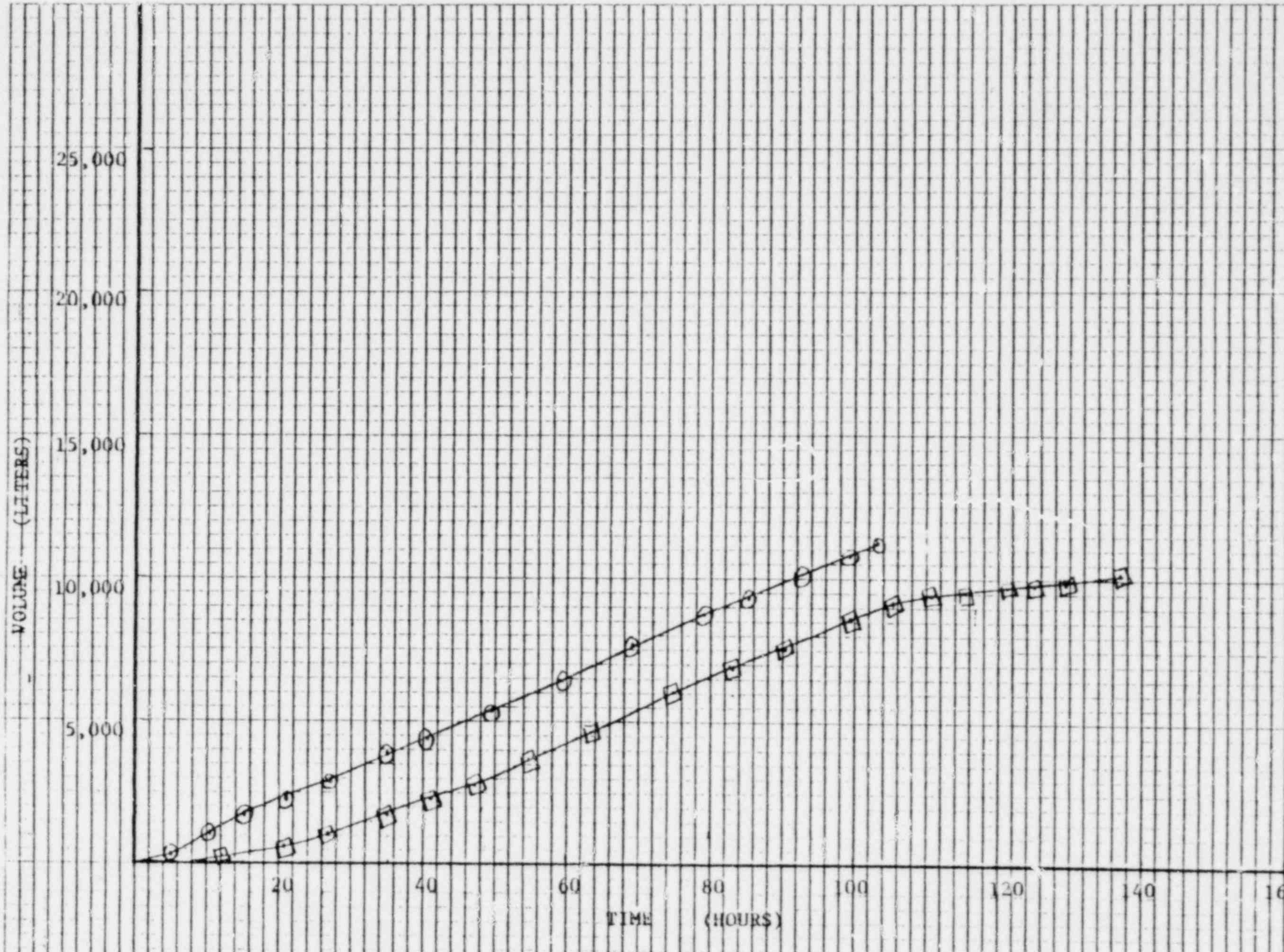
PLOT OF SPRAY AND PREGNANT SOLUTION VOLUME VS TIME JOB NO. 3052.00 TEST NO. 10



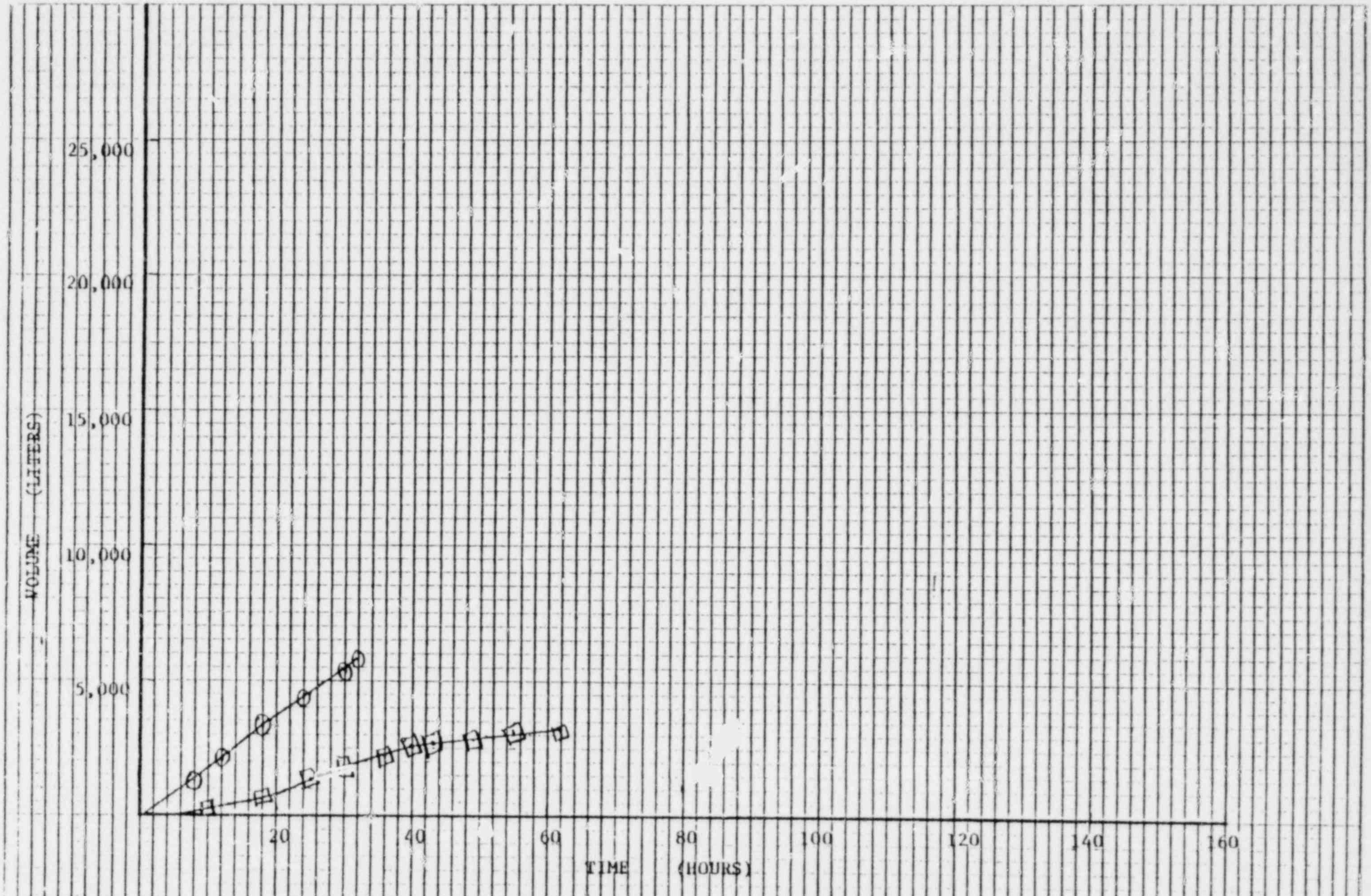
PLOT OF SPRAY AND PREGNANT SOLUTION VOLUME VS TIME JOB NO. 3052.00 TEST NO. 11



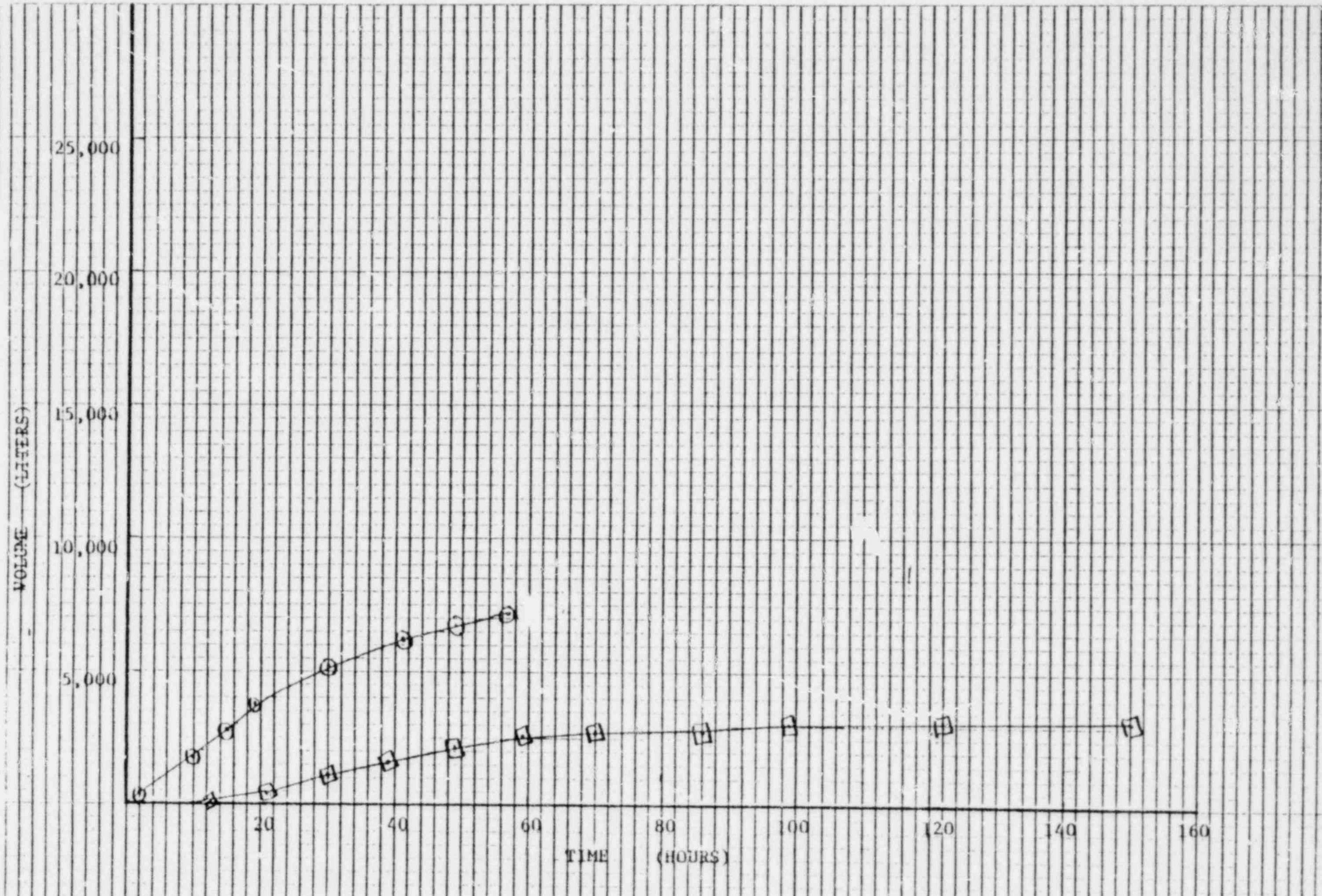
PLOT OF SPRAY AND PREGNANT SOLUTION VOLUME VS TIME JOB NO. 3052.00 TEST NO. 12



PLOT OF SPRAY AND PREGNANT SOLUTION VOLUME VS TIME JOB NO. 3052.0 TEST NO. 13



PLOT OF SPRAY AND PREGNANT SOLUTION VOLUME VS TIME JOB NO. 3052.00 TEST NO. 14

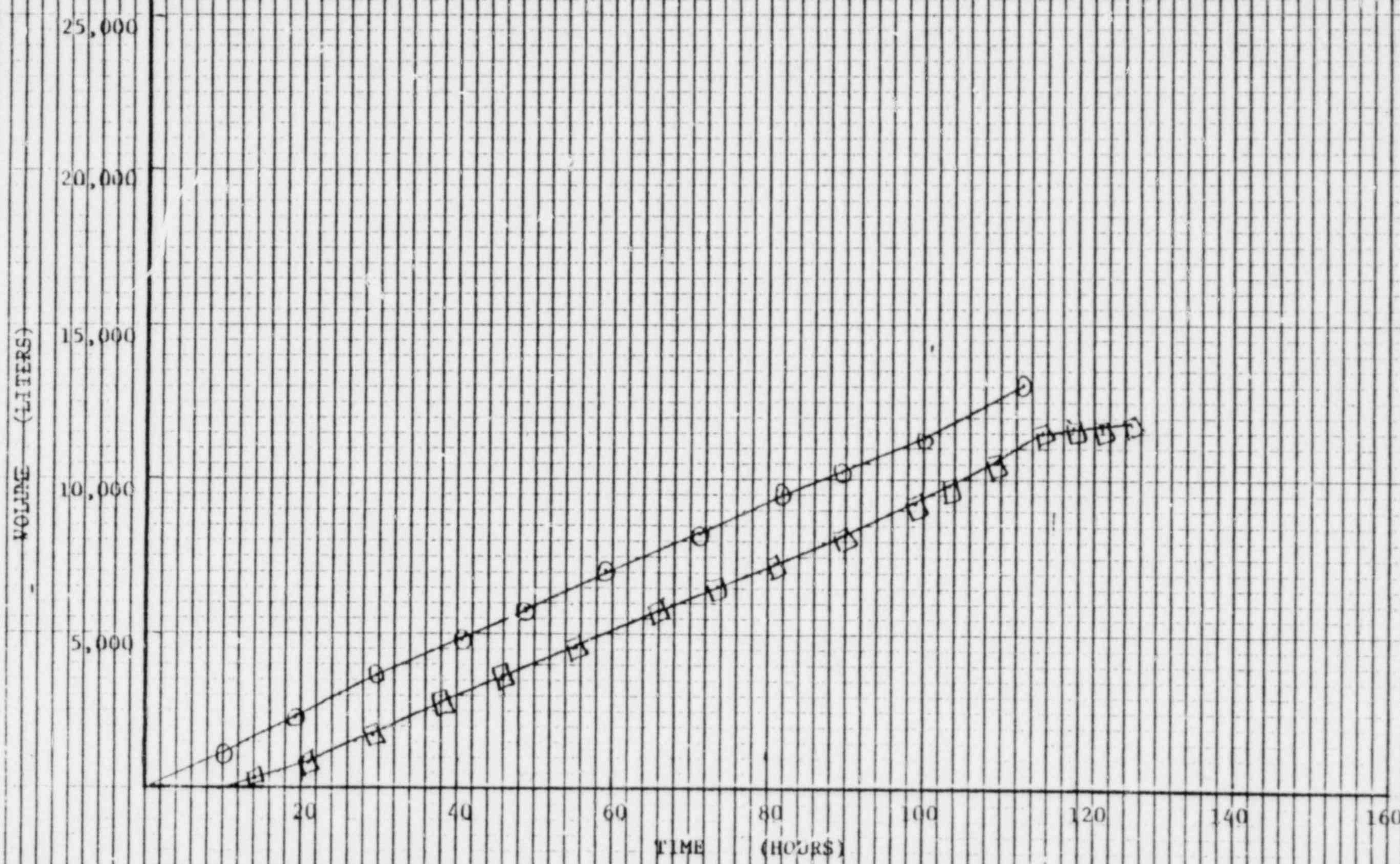


PLOT OF SPRAY AND PREGNANT SOLUTION VOLUME VS TIME

JOB NO. 3052.00

TEST NO. 15

46 0703

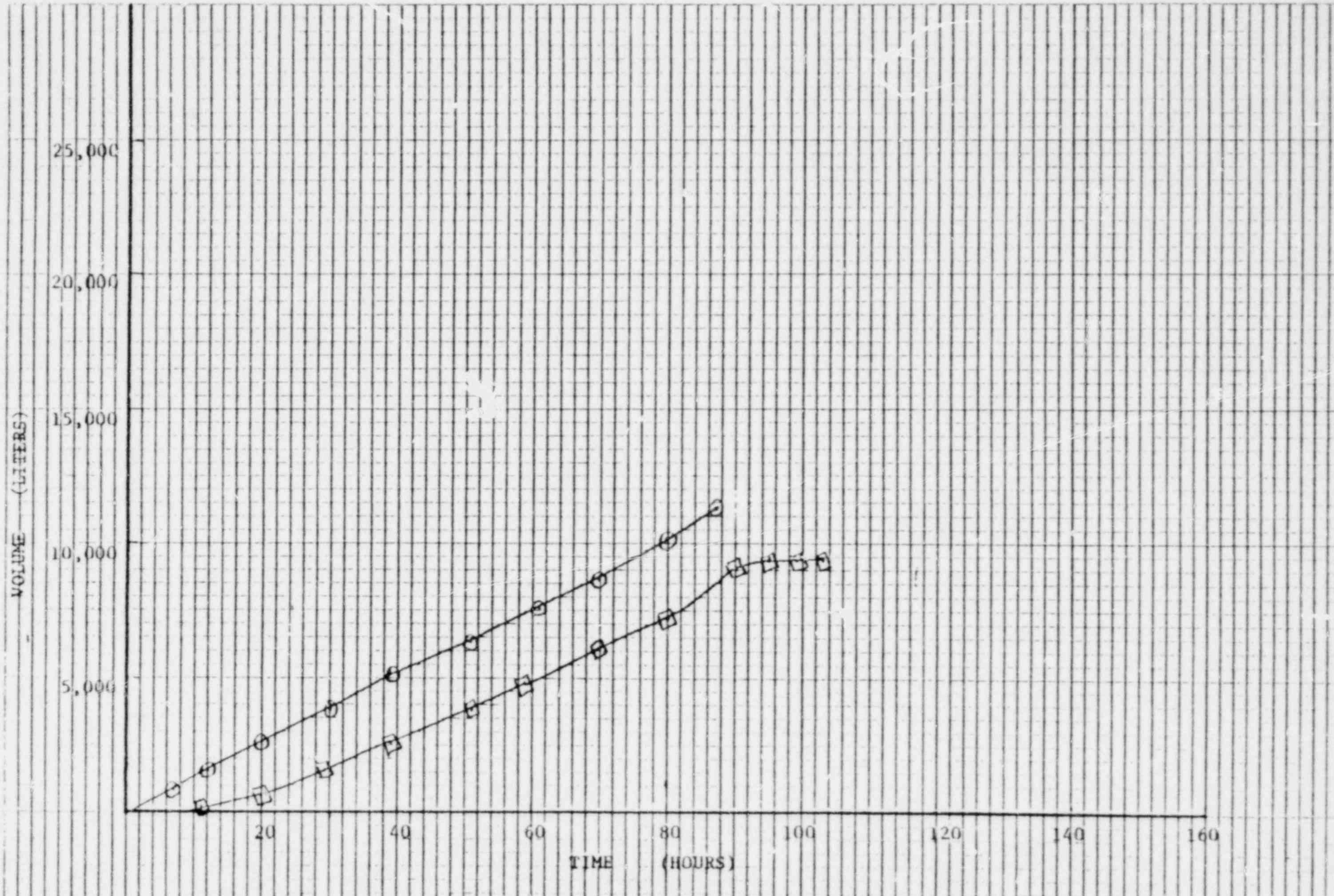


PLOT OF SPRAY AND PREGNANT SOLUTION VOLUME VS TIME

JOB NO. 3052.00

TEST NO. 16

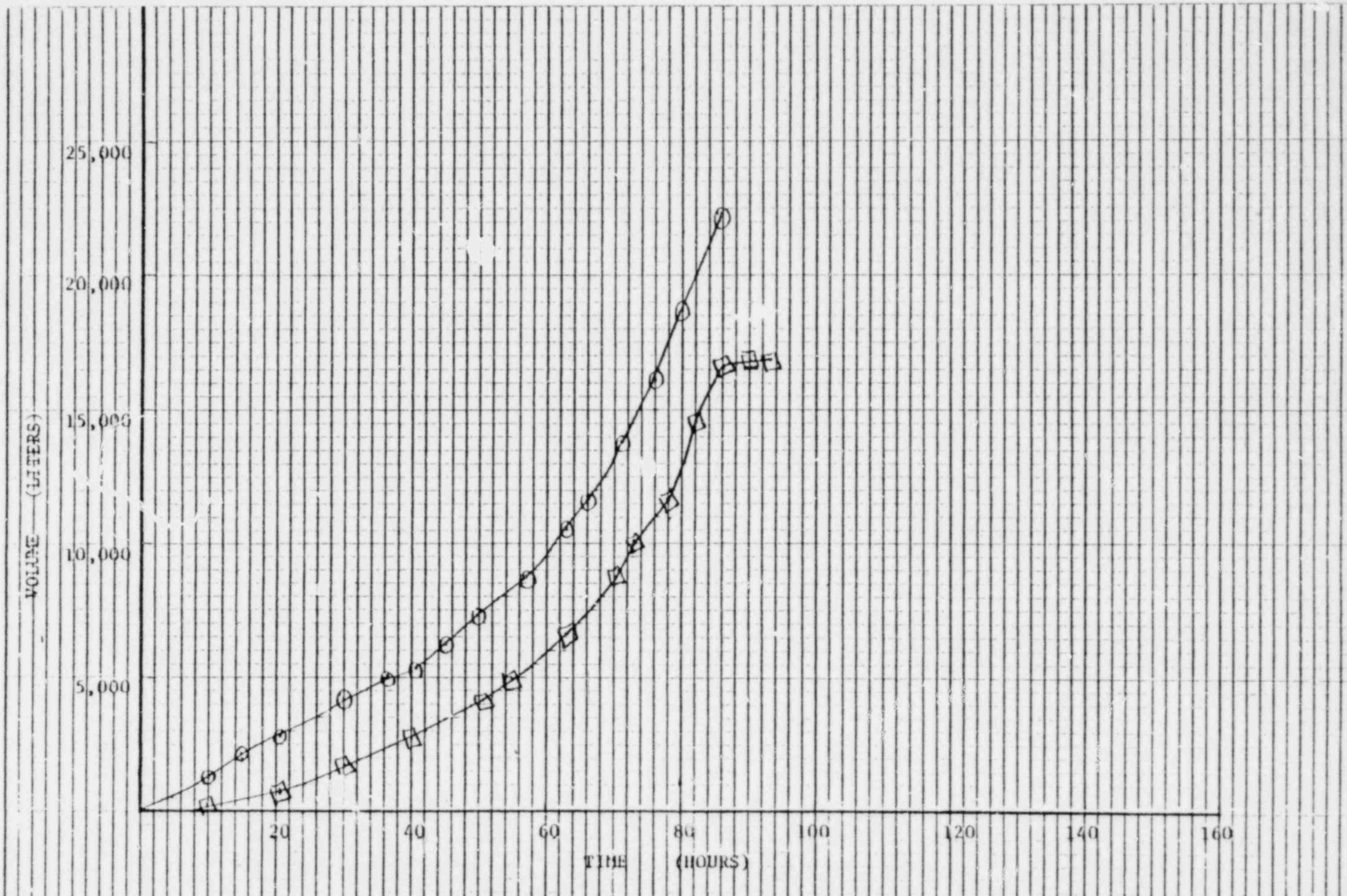
46 0703



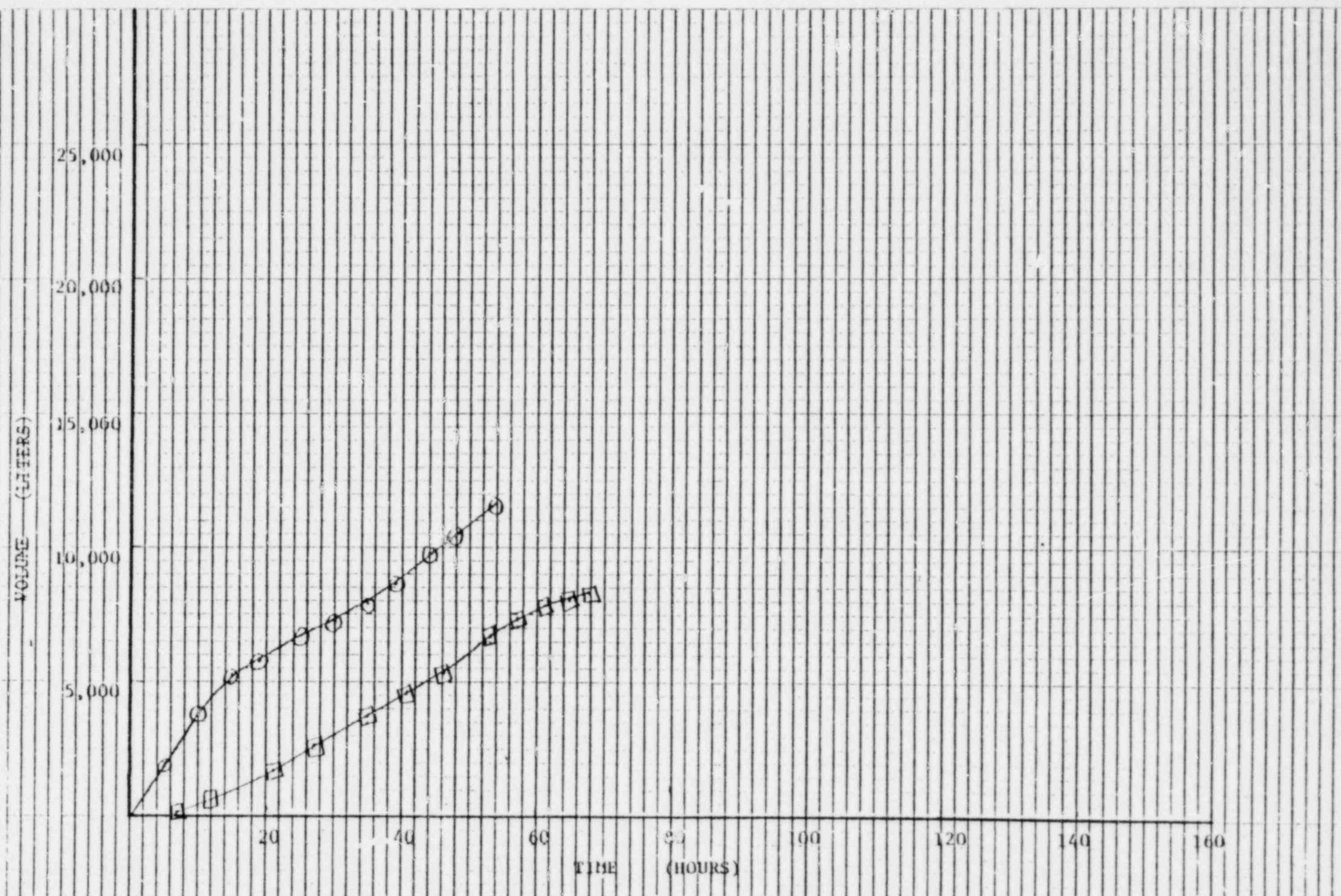
PLOT OF SPRAY AND PREGNANT SOLUTION VOLUME VS TIME

JOB NO. 3052.00

TEST NO. 17



PLOT OF SPRAY AN[D] PREGNANT SOLUTION VOLUME VS TIME   JOB NO. 3052.00   TEST NO. 18



PLOT OF SPRAY AND PREGNANT SOLUTION VOLUME VS TIME JOB NO. 3052.00 TEST NO. 19

46 0703

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
11: 15	0	0.0	6.25	0.00	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
13: 0	105	1.7	6.25	0.00	4	1.45	0.28	43	42	42	656	152	0.28	0.27	0.7
13: 30	30	2.2	6.25	0.00	5	4.15	0.28	78	34	76	843	276	0.28	0.27	1.4
14: 0	30	2.7	5.21	0.00	7	4.90	0.28	120	40	117	1000	423	0.28	0.27	2.2
15: 0	60	3.7	0.00	0.00	7	2.27	0.28	159	37	155	1000	560	0.28	0.27	2.9
15: 30	30	4.2	0.00	0.00	7	1.25	0.25	169	10	165	1000	597	0.28	0.27	3.1
16: 30	60	5.2	0.00	0.00	7	1.05	0.28	187	17	183	1000	660	0.28	0.27	3.4
16: 30	0	5.2	5.21	0.00	7	0.75	0.28	187	0	183	1000	660	0.28	0.27	3.4
17: 0	30	5.7	5.21	0.00	7	2.20	0.24	203	15	198	1156	726	0.28	0.23	3.7
17: 30	30	6.2	4.17	0.00	8	4.15	0.24	233	29	228	1281	851	0.27	0.23	4.2
18: 30	60	7.2	5.00	0.00	10	4.50	0.24	299	63	292	1581	1121	0.26	0.23	5.4
19: 0	30	7.7	0.83	0.00	10	4.40	0.24	331	31	323	1606	1253	0.26	0.23	6.0
19: 30	30	8.2	4.17	0.00	11	4.40	0.24	363	31	354	1731	1385	0.26	0.23	6.6
20: 0	30	8.7	4.17	0.00	12	4.20	0.24	394	29	384	1856	1511	0.26	0.23	7.2
20: 30	30	9.2	4.17	0.00	12	4.20	0.24	424	29	414	1981	1637	0.25	0.23	7.7
21: 0	30	9.7	4.17	0.00	13	4.20	0.24	455	29	444	2106	1763	0.25	0.23	8.3
21: 30	30	10.2	4.17	0.00	14	2.80	0.24	475	19	464	2231	1847	0.25	0.23	8.7
22: 0	30	10.7	4.17	0.00	15	3.30	0.24	500	23	487	2356	1946	0.25	0.23	9.1
22: 30	30	11.2	4.17	0.00	15	3.70	0.24	527	26	513	2482	2057	0.25	0.23	9.6
23: 0	30	11.7	4.17	0.00	16	3.90	0.24	555	27	541	2607	2174	0.25	0.23	10.1
23: 30	30	12.2	4.17	0.00	17	4.30	0.24	586	30	572	2732	2303	0.25	0.23	10.7
0: 30	60	13.2	4.17	0.00	18	4.20	0.24	643	59	632	2982	2555	0.25	0.23	11.8
1: 30	60	14.2	4.17	0.00	19	4.20	0.15	686	37	669	3232	2807	0.24	0.14	12.5
2: 30	60	15.2	4.17	0.00	20	4.20	0.15	724	37	706	3482	3059	0.23	0.14	13.2
3: 30	60	16.2	4.17	0.00	21	4.20	0.15	762	37	743	3733	3311	0.23	0.14	13.9
4: 30	60	17.2	4.17	0.00	22	4.20	0.15	801	37	781	3983	3563	0.22	0.14	14.6
5: 30	60	18.2	4.17	0.00	23	4.40	0.15	841	39	820	4233	3827	0.21	0.14	15.4
6: 30	60	19.2	4.17	0.00	24	4.30	0.15	880	38	858	4483	4085	0.21	0.14	16.1
8: 30	120	21.2	4.17	0.00	26	4.10	0.15	955	72	931	4984	4577	0.20	0.14	17.4
9: 50	80	22.5	4.17	0.01	32	4.40	0.15	1008	47	978	5317	4929	0.20	0.13	18.3
12: 0	130	24.7	3.12	0.01	38	3.20	0.15	1071	56	1034	5723	5345	0.20	0.13	19.4
12: 50	50	25.5	3.12	0.01	41	3.28	0.15	1096	22	1057	5879	5509	0.19	0.13	19.8
13: 50	60	26.5	0.00	0.00	41	1.47	0.15	1109	13	1070	5879	5597	0.19	0.15	20.0
15: 30	100	28.2	3.12	0.01	46	3.20	0.15	1157	43	1113	6191	5917	0.19	0.13	20.9
16: 30	60	29.2	3.12	0.01	49	3.40	0.15	1188	27	1141	6378	6121	0.19	0.13	21.4
18: 0	90	30.7	3.12	0.00	51	3.45	0.14	1232	40	1187	6659	6432	0.19	0.13	22.1
19: 0	60	31.7	3.12	0.00	52	3.40	0.14	1260	26	1209	6846	6636	0.18	0.13	22.7
20: 0	60	32.7	3.12	0.00	54	3.40	0.14	1289	26	1236	7033	6840	0.18	0.13	23.2
0: 30	270	37.2	3.12	0.00	61	3.40	0.14	1417	121	1357	7876	7758	0.18	0.13	25.4
1: 30	60	38.2	3.12	0.01	63	3.30	0.14	1445	25	1382	8063	7956	0.18	0.12	25.9
2: 30	60	39.2	3.12	0.01	65	4.40	0.14	1483	35	1417	8250	8220	0.18	0.13	26.6
3: 30	60	40.2	3.12	0.01	67	4.60	0.14	1524	36	1454	8437	8496	0.17	0.13	27.3
4: 30	60	41.2	3.12	0.01	70	3.15	0.14	1551	25	1480	8624	8685	0.17	0.13	27.7
5: 30	60	42.2	3.12	0.01	72	3.20	0.14	1579	25	1505	8812	8877	0.17	0.13	28.2
6: 30	60	43.2	3.12	0.01	74	3.04	0.14	1606	24	1530	8999	9059	0.17	0.13	28.7
7: 30	60	44.2	3.12	0.01	76	3.10	0.14	1633	24	1555	9186	9245	0.17	0.13	29.2
8: 30	60	45.2	3.12	0.01	79	3.04	0.14	1660	24	1579	9373	9428	0.17	0.13	29.6
10: 30	120	47.2	3.12	0.00	79	3.05	0.13	1708	48	1628	9748	9794	0.17	0.13	30.5
15: 0	270	51.7	3.12	0.00	79	3.05	0.13	1818	109	1737	10590	10617	0.17	0.13	32.6
[illegible]	30	[illegible]	3.12	0.00	79	3.00	0.13	1854	35	1772	[illegible]	[illegible]	0.17	0.13	[illegible]

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
19: 0	150	55.7	3.12	0.00	79	3.05	0.12	1910	55	1829	11309	11345	0.16	0.12	34.3
20: 0	60	56.7	3.12	0.00	79	2.90	0.12	1931	21	1850	11526	11519	0.16	0.12	34.7
21: 0	60	57.7	3.12	0.00	79	3.00	0.12	1953	21	1872	11713	11699	0.16	0.12	35.1
23: 0	120	59.7	3.12	0.00	79	2.90	0.12	1995	42	1915	12088	12047	0.16	0.12	35.9
0: 30	90	61.2	3.12	0.00	79	3.00	0.12	2028	32	1948	12368	12317	0.16	0.12	36.5
6: 30	360	67.2	3.12	0.00	80	2.90	0.11	2148	119	2067	13492	13361	0.16	0.11	38.8
8: 30	120	69.2	3.12	0.00	80	2.92	0.11	2189	40	2107	13866	13712	0.15	0.11	39.5
10: 30	120	71.2	3.12	0.01	84	3.25	0.13	2241	48	2155	14240	14102	0.15	0.12	40.4
11: 50	80	72.5	3.12	0.01	87	3.30	0.13	2277	32	2188	14490	14366	0.15	0.12	41.0
15: 40	230	76.4	3.12	0.01	95	3.20	0.13	2376	91	2279	15208	15102	0.15	0.12	42.8
16: 30	50	77.2	3.12	0.01	97	3.25	0.13	2398	20	2299	15364	15264	0.15	0.12	43.1
17: 45	75	78.5	3.12	0.01	99	3.25	0.19	2446	44	2344	15598	15508	0.15	0.18	44.0
18: 0	15	78.7	0.00	0.00	99	3.25	0.19	2455	9	2354	15598	15557	0.15	0.19	44.1
5: 0	660	89.7	0.00	0.00	99	0.15	0.19	2474	19	2373	15598	15656	0.15	0.19	44.5
7: 0	120	91.7	0.00	0.00	99	0.10	0.19	2477	2	2375	15598	15668	0.15	0.19	44.6

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
21: 0	0	0.0	4.50	0.13	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
22: 0	60	1.0	4.50	0.13	37	0.00	0.00	0	0	0	270	0	0.00	0.00	0.0
23: 30	90	2.5	1.67	0.13	58	0.00	0.00	0	0	0	420	0	0.00	0.00	0.0
2: 0	150	5.0	1.67	0.13	92	0.54	1.38	112	101	101	670	81	1.38	1.24	1.1
2: 30	30	5.5	1.67	0.13	99	0.70	1.38	141	26	127	720	102	1.38	1.24	1.4
3: 30	60	6.5	1.67	0.13	113	0.77	1.38	205	57	185	821	148	1.38	1.24	2.0
4: 0	30	7.0	1.67	0.13	120	0.85	1.38	240	31	216	871	174	1.38	1.24	2.4
4: 30	30	7.5	1.67	0.13	127	0.90	1.38	278	33	250	921	201	1.38	1.24	2.8
5: 0	30	8.0	1.67	0.13	134	0.88	1.38	314	32	283	971	227	1.38	1.24	3.2
5: 30	30	8.5	1.67	0.13	140	0.93	1.38	353	34	318	1021	255	1.38	1.24	3.5
6: 0	30	9.0	1.67	0.13	147	0.98	1.38	394	36	355	1071	284	1.38	1.24	4.0
6: 45	45	9.7	1.67	0.13	158	1.04	1.38	459	58	413	1146	331	1.38	1.24	4.6
7: 30	45	10.5	1.67	0.13	168	1.34	1.38	542	75	488	1221	391	1.38	1.24	5.5
8: 30	60	11.5	1.67	0.13	182	1.41	1.38	659	105	594	1322	476	1.38	1.24	6.7
10: 30	120	13.5	1.67	0.11	205	1.50	1.29	893	213	807	1522	656	1.36	1.18	9.1
11: 30	60	14.5	1.67	0.11	216	1.64	1.29	1021	116	924	1622	755	1.35	1.18	10.4
12: 30	60	15.5	1.67	0.11	227	1.60	1.29	1145	113	1037	1722	851	1.34	1.18	11.7
15: 10	160	18.1	1.67	0.11	257	1.62	1.29	1482	307	1345	1990	1110	1.33	1.18	15.1
16: 0	50	19.0	1.67	0.11	267	1.46	1.29	1577	86	1432	2073	1184	1.33	1.18	16.1
16: 30	30	19.5	1.67	0.11	273	1.44	1.29	1633	51	1483	2123	1227	1.33	1.18	16.7
17: 45	75	20.7	1.67	0.11	287	1.64	1.15	1777	129	1612	2248	1351	1.31	1.04	18.2
19: 0	75	22.0	1.67	0.11	301	1.53	1.15	1910	120	1732	2374	1466	1.30	1.04	19.5
20: 0	60	23.0	1.67	0.11	313	1.64	1.15	2024	102	1835	2474	1564	1.29	1.04	20.7
21: 0	60	24.0	1.67	0.11	324	1.63	1.15	2138	102	1938	2574	1663	1.28	1.04	21.8
22: 0	60	25.0	1.67	0.11	336	1.65	1.15	2253	103	2041	2674	1762	1.27	1.04	23.0
23: 0	60	26.0	1.67	0.11	347	1.56	1.15	2362	98	2139	2775	1856	1.27	1.04	24.1
0: 0	60	27.0	1.67	0.11	359	1.64	1.15	2477	103	2242	2875	1955	1.26	1.04	25.3
0: 30	30	27.5	1.67	0.11	365	1.64	1.15	2534	51	2294	2925	2004	1.26	1.04	25.9
1: 0	30	28.0	1.67	0.10	370	1.65	0.96	2582	42	2336	2975	2054	1.25	0.85	26.4
1: 30	30	28.5	1.67	0.10	376	1.47	0.96	2624	37	2374	3025	2098	1.25	0.85	26.8
2: 30	60	29.5	1.67	0.10	387	1.62	0.96	2718	83	2457	3125	2196	1.23	0.85	27.7
3: 30	60	30.5	1.67	0.10	397	1.56	0.96	2808	79	2537	3225	2289	1.22	0.85	28.6
4: 30	60	31.5	1.67	0.10	408	1.64	0.96	2903	83	2621	3326	2388	1.21	0.85	29.6
5: 30	60	32.5	1.67	0.10	419	1.65	0.96	2998	84	2705	3426	2487	1.20	0.85	30.5
6: 30	60	33.5	1.67	0.10	430	1.50	0.96	3084	76	2782	3526	2577	1.19	0.85	31.4
7: 30	60	34.5	1.67	0.10	441	1.65	0.96	3179	84	2866	3626	2676	1.18	0.85	32.3
8: 30	60	35.5	1.67	0.10	452	1.74	0.96	3280	89	2955	3726	2781	1.17	0.85	33.3
11: 0	150	38.0	1.67	0.00	454	1.49	0.91	3484	202	3157	3977	3005	1.15	0.90	35.6
13: 20	140	40.3	1.67	0.00	456	1.58	0.91	3686	199	3357	4211	3227	1.14	0.90	37.9
15: 0	100	42.0	1.67	0.00	458	1.56	0.91	3828	140	3498	4378	3383	1.13	0.90	39.5
16: 30	90	43.5	1.67	0.00	459	1.56	0.91	3956	127	3625	4528	3524	1.12	0.90	40.9
16: 30	0	43.5	1.67	0.13	459	1.56	0.72	3956	0	3625	4528	3524	1. [illegible]	0.58	40.9
18: 0	90	45.0	1.67	0.13	480	1.60	0.72	4061	84	3710	4678	3669	1.10	0.58	41.9
19: 0	60	46.0	1.67	0.13	494	1.59	0.72	4130	56	3766	4779	3765	1.09	0.58	42.5
21: 0	120	48.0	1.67	0.13	521	1.59	0.72	4268	112	3878	4979	3956	1.07	0.58	43.8
22: 0	60	49.0	1.67	0.13	535	1.63	0.72	4339	57	3935	5079	4055	1.07	0.58	44.4
22: 30	30	49.5	1.67	0.13	542	1.57	0.72	4373	27	3963	5129	4102	1.06	0.58	44.7
23: 30	60	50.5	1.67	0.13	555	1.02	0.72	4413	36	3999	5229	4164	1.06	0.58	45.1
0: 30	60	51.5	1.67	0.13	569	1.10	0.72	4444	38	4038	5330	4230	1.05	0.58	45.6
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

RUN NO: 4
DATE: 01/30/80

COTTER PILOT PLANT
H&N PROJECT NO. 3052.00

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
1: 30	30	52.5	1.67	0.11	580	1.09	0.62	4515	16	4078	5430	4310	1.04	0.50	46.0
2: 0	30	53.0	1.67	0.11	586	1.63	0.62	4546	24	4103	5480	4359	1.04	0.50	46.3
3: 0	60	54.0	1.67	0.11	597	1.31	0.62	4595	40	4143	5580	4437	1.03	0.50	46.8
4: 0	60	55.0	1.67	0.11	608	1.63	0.62	4656	49	4193	5680	4535	1.02	0.50	47.3
5: 0	60	56.0	1.67	0.11	620	1.80	0.62	4723	55	4248	5781	4644	1.01	0.50	48.0
6: 0	60	57.0	1.67	0.11	631	1.30	0.62	4790	55	4304	5881	4752	1.00	0.50	48.6
8: 30	150	59.5	1.67	0.11	659	1.62	0.62	4942	124	4428	6131	4996	0.98	0.50	50.0
8: 30	0	59.5	1.67	0.24	659	1.60	0.57	4942	0	4428	6131	4996	0.98	0.33	50.0
11: 45	195	62.7	1.67	0.24	738	1.49	0.57	5110	98	4526	6457	5288	0.96	0.33	51.1
12: 45	60	63.7	1.67	0.24	762	1.55	0.57	5164	31	4557	6557	5381	0.95	0.33	51.4
14: 15	90	65.2	1.67	0.24	798	1.57	0.57	5246	47	4605	6707	5523	0.94	0.33	52.0
15: 30	75	66.5	1.67	0.24	829	1.57	0.57	5314	39	4644	6833	5641	0.94	0.33	52.4
17: 30	120	68.5	1.67	0.33	896	1.56	0.54	5416	38	4683	7033	5809	0.92	0.20	52.9
20: 0	150	71.0	1.67	0.33	980	1.58	0.54	5545	48	4732	7284	6067	0.91	0.20	53.4
22: 25	145	73.4	1.67	0.33	1062	0.99	0.54	5623	29	4761	7526	6212	0.90	0.20	53.8
0: 30	125	75.5	1.67	0.33	1132	1.60	0.54	5732	41	4803	7734	6412	0.89	0.20	54.2
2: 30	120	77.5	1.67	0.36	1205	1.59	0.51	5831	29	4832	7935	6603	0.88	0.15	54.5
4: 0	90	79.0	1.67	0.36	1260	1.58	0.51	5905	21	4853	8085	6746	0.87	0.15	54.8
8: 30	270	83.5	1.67	0.36	1426	1.50	0.51	6115	61	4915	8536	7151	0.85	0.15	55.5
9: 30	60	84.5	1.67	0.36	1463	1.59	0.55	6168	18	4933	8636	7247	0.85	0.18	55.7
10: 30	60	85.5	1.67	0.02	1465	1.46	0.55	6217	47	4980	8736	7335	0.84	0.53	56.2
10: 30	0	85.5	0.00	0.02	1465	1.20	0.55	6217	0	4980	8736	7335	0.84	0.53	56.2
11: 0	30	86.0	0.00	0.00	1465	1.20	0.55	6237	20	5000	8736	7371	0.84	0.55	56.5
11: 30	30	86.5	1.67	0.02	1466	1.20	0.55	6257	19	5020	8787	7407	0.84	0.53	56.7
13: 0	90	88.0	1.67	0.02	1469	1.17	0.55	6316	56	5076	8937	7513	0.84	0.53	57.3
15: 30	150	90.5	1.67	0.02	1474	1.16	0.55	6413	93	5170	9187	7687	0.83	0.53	58.4
17: 30	120	92.5	1.67	0.02	1478	1.50	0.55	6513	96	5266	9388	7867	0.82	0.53	59.5
19: 0	90	94.0	1.67	0.01	1480	1.50	0.52	6585	69	5335	9538	8003	0.82	0.51	60.2
20: 0	60	95.0	1.67	0.01	1482	1.64	0.52	6637	50	5386	9638	8102	0.81	0.51	60.8
21: 0	60	96.0	1.67	0.01	1483	1.65	0.52	6689	50	5437	9738	8201	0.81	0.51	61.4
22: 0	60	97.0	1.67	0.01	1485	1.66	0.52	6742	51	5488	9839	8300	0.81	0.51	62.0
23: 30	90	98.5	1.67	0.01	1487	1.60	0.52	6813	74	5562	9989	8445	0.80	0.51	62.8
0: 30	60	99.5	1.67	0.01	1488	1.71	0.52	6872	52	5615	10089	8548	0.80	0.51	63.4
2: 30	120	101.5	1.67	0.01	1491	1.75	0.52	6983	107	5723	10290	8758	0.79	0.51	64.6
3: 30	60	102.5	1.67	0.01	1492	1.71	0.52	7037	52	5775	10390	8861	0.79	0.51	65.2
4: 30	60	103.5	1.67	0.01	1494	1.68	0.52	7090	51	5827	10490	8962	0.79	0.51	65.8
5: 30	60	104.5	1.67	0.01	1495	1.82	0.52	7148	56	5884	10590	9072	0.78	0.51	66.4
6: 30	60	105.5	1.67	0.01	1497	1.71	0.52	7202	52	5936	10690	9174	0.78	0.51	67.0
10: 30	240	109.5	1.67	0.01	1501	1.68	0.34	7340	134	6071	11091	9578	0.76	0.33	68.5
12: 30	120	111.5	1.67	0.01	1503	1.67	0.34	7409	66	6138	11292	9779	0.75	0.33	69.3
14: 30	120	113.5	1.67	0.01	1505	1.70	0.34	7480	68	6206	11492	9984	0.74	0.33	70.1
16: 30	120	115.5	1.67	0.01	1507	1.66	0.34	7548	66	6273	11692	10184	0.74	0.33	70.8
18: 0	90	117.0	0.34	0.00	1507	1.66	1.67	7799	249	6522	11723	10334	0.75	1.66	73.6
20: 0	120	119.0	1.67	0.00	1508	1.69	0.29	7859	59	6581	11924	10537	0.74	0.29	74.3
21: 30	90	120.5	1.67	0.00	1508	1.66	0.29	7903	43	6625	12074	10687	0.73	0.29	74.8
23: 30	120	122.5	1.67	0.00	1509	1.67	0.29	7962	58	6683	12274	10888	0.73	0.29	75.5
0: 30	60	123.5	1.67	0.00	1509	1.67	0.29	7991	29	6712	12374	10988	0.72	0.29	75.8
2: 0	90	125.0	1.67	0.01	1511	1.72	0.23	8027	34	6747	12525	11143	0.72	0.22	76.2
4: 0	120	127.0	1.67	0.01	1513	1.73	0.23	8076	46	6794	12725	11351	0.71	0.22	76.7

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
6: 0	60	129.0	1.67	0.01	1515	1.70	0.23	8124	22	6840	12926	11555	0.70	0.22	77.2
6: 0	0	129.0	1.67	0.01	1515	1.70	0.23	8124	0	6840	12926	11555	0.70	0.22	77.2
8: 30	150	131.5	0.00	0.01	1515	1.61	0.23	8181	54	6894	12926	11798	0.69	0.22	77.8
10: 0	90	133.0	0.00	0.00	1515	1.13	0.42	8225	43	6938	12926	11900	0.69	0.42	78.3
11: 30	90	134.5	0.00	0.00	1515	0.79	0.42	8256	30	6969	12926	11971	0.68	0.42	78.7
13: 0	90	136.0	0.00	0.00	1515	0.64	0.42	8281	24	6993	12926	12029	0.68	0.42	79.0
16: 30	210	139.5	0.00	0.00	1515	0.33	0.42	8311	30	7024	12926	12099	0.68	0.42	79.3
18: 30	120	141.5	0.00	0.00	1515	0.26	0.42	8325	13	7037	12926	12132	0.68	0.42	79.5
22: 30	240	145.5	0.00	0.00	1515	0.19	0.42	8345	20	7058	12926	12179	0.68	0.42	79.7
24: 0	90	147.0	0.00	0.00	1515	0.17	0.42	8352	6	7065	12926	12195	0.68	0.42	79.8
3: 30	210	150.5	0.00	0.00	1515	0.12	0.42	8363	11	7076	12926	12221	0.68	0.42	79.9
5: 30	120	152.5	0.00	0.00	1515	0.09	0.42	8368	4	7080	12926	12232	0.68	0.42	80.0
11: 45	375	158.7	0.00	0.00	1515	0.09	0.42	8382	14	7095	12926	12266	0.68	0.42	80.1

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
18: 0	0	0.0	5.15	0.10	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
20: 30	150	2.5	5.15	0.10	81	1.59	1.01	241	216	216	772	233	1.01	0.90	2.3
21: 30	60	3.5	5.15	0.10	113	3.02	1.01	425	164	381	1081	420	1.01	0.90	5.0
22: 0	30	4.0	5.15	0.10	129	3.51	1.01	532	95	476	1236	525	1.01	0.90	6.2
22: 30	30	4.5	5.15	0.10	146	4.25	1.01	661	115	592	1390	653	1.01	0.90	7.7
23: 30	60	5.5	5.15	0.10	178	4.74	1.01	949	258	850	1699	937	1.01	0.90	11.1
0: 30	60	6.5	5.15	0.10	210	5.05	1.01	1255	275	1125	2008	1241	1.01	0.90	14.8
1: 0	30	7.0	5.15	0.11	229	4.74	0.69	1355	82	1208	2163	1383	0.97	0.58	15.3
1: 30	30	7.5	5.15	0.11	247	4.77	0.69	1455	83	1291	2317	1526	0.95	0.58	16.9
2: 0	30	8.0	5.15	0.11	265	4.90	0.69	1558	85	1376	2472	1673	0.93	0.58	18.1
3: 0	60	9.0	5.15	0.11	302	4.64	0.69	1752	161	1538	2781	1952	0.89	0.58	20.2
4: 0	60	10.0	5.15	0.11	338	4.74	0.69	1952	165	1704	3090	2237	0.87	0.58	22.4
5: 0	60	11.0	5.15	0.11	374	4.86	0.69	2156	169	1874	3399	2529	0.85	0.58	24.6
6: 0	60	12.0	5.15	0.11	411	4.77	0.69	2356	166	2040	3708	2815	0.83	0.58	26.8
7: 0	60	13.0	5.15	0.11	447	4.77	0.69	2557	166	2207	4017	3102	0.82	0.58	29.0
7: 15	15	13.2	5.15	0.13	458	4.63	0.54	2595	28	2235	4094	3172	0.81	0.41	29.4
9: 0	105	15.0	5.15	0.13	533	4.63	0.54	2862	200	2435	4635	3658	0.78	0.41	32.0
10: 0	60	16.0	5.15	0.13	575	4.52	0.54	3011	111	2547	4944	3930	0.76	0.41	33.5
11: 45	105	17.7	3.78	0.13	630	3.38	0.54	3206	145	2693	5340	4285	0.74	0.41	35.4
12: 40	55	18.6	3.78	0.13	659	3.35	0.54	3307	75	2769	5548	4469	0.74	0.41	36.4
15: 0	140	21.0	3.78	0.13	732	3.35	0.54	3565	193	2962	6078	4939	0.72	0.41	38.9
17: 30	150	23.5	3.78	0.20	848	3.30	0.46	3795	128	3090	6645	5435	0.69	0.25	40.6
20: 0	150	26.0	3.78	0.20	964	3.23	0.46	4019	125	3215	7212	5920	0.67	0.25	42.2
22: 25	145	28.4	3.78	0.20	1077	3.32	0.46	4242	124	3339	7760	6401	0.66	0.25	43.9
23: 0	35	29.0	3.26	0.20	1100	3.32	0.46	4296	29	3369	7874	6518	0.65	0.25	44.3
1: 0	120	31.0	3.26	0.25	1198	3.33	0.43	4469	72	3442	8265	6918	0.64	0.18	45.2
2: 30	90	32.5	3.26	0.25	1271	3.26	0.43	4599	55	3497	8558	7220	0.63	0.18	46.0
4: 0	90	34.0	3.26	0.25	1345	3.29	0.43	4723	53	3551	8852	7517	0.62	0.18	46.7
7: 0	180	37.0	3.26	0.25	1491	3.04	0.43	4965	99	3651	9439	8065	0.61	0.18	48.0
9: 30	150	39.5	3.26	0.45	1714	3.00	0.45	5169	0	3651	9928	8516	0.60	0.00	48.0
10: 30	60	40.5	3.26	0.45	1803	3.02	0.45	5251	0	3651	10123	8698	0.60	0.00	48.0
11: 30	60	41.5	3.26	0.45	1893	3.00	0.45	5333	0	3651	10319	8878	0.60	0.00	48.0
13: 0	90	43.0	3.26	0.45	2026	3.03	0.45	5456	0	3651	10612	9151	0.59	0.00	48.0
15: 40	160	45.6	3.26	0.45	2264	3.10	0.45	5682	0	3651	11134	9648	0.58	0.00	48.0
16: 0	20	46.0	3.26	0.45	2294	3.00	0.45	5709	0	3651	11199	9708	0.58	0.00	48.0
17: 0	60	47.0	3.26	0.52	2397	2.90	0.55	5806	5	3656	11395	9882	0.58	0.03	48.0
20: 0	180	50.0	3.26	0.52	2707	2.93	0.55	6101	16	3672	11981	10410	0.58	0.03	48.3
21: 0	60	51.0	3.26	0.52	2810	3.06	0.55	6204	5	3678	12177	10594	0.58	0.03	48.3
22: 0	60	52.0	3.26	0.52	2914	2.95	0.55	6303	5	3684	12373	10771	0.58	0.03	48.4
23: 33	93	53.5	3.26	0.52	3074	3.00	0.55	6459	8	3692	12676	11051	0.58	0.03	48.5
24: 0	27	54.0	3.26	0.52	3120	3.00	0.55	6505	2	3695	12764	11132	0.58	0.03	48.6
0: 30	30	54.5	3.26	0.72	3191	3.00	0.67	6565	0	3695	12962	11222	0.58	0.00	48.6
2: 30	120	56.5	3.26	0.72	3474	3.11	0.67	6816	0	3695	13253	11595	0.58	0.00	48.6
3: 30	60	57.5	3.26	0.72	3616	2.99	0.67	6937	0	3695	13448	11775	0.58	0.00	48.6
4: 30	60	58.5	3.26	0.72	3757	2.96	0.67	7056	0	3695	13644	11953	0.59	0.00	48.6
5: 30	60	59.5	3.26	0.72	3899	2.99	0.67	7177	0	3695	13840	12132	0.59	0.00	48.6
7: 0	90	61.0	3.26	0.72	4111	3.60	0.[illegible]	7395	0	3695	14133	12456	0.59	0.00	48.6
8: 0	60	62.0	3.26	0.72	4253	3.87	0.67	7551	0	3695	14329	12638	0.59	0.00	48.6
10: 30	150	64.5	3.26	0.73	4613	3.27	0.67	7881	0	3695	14818	13180	0.59	0.00	48.6

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
14: 30	120	68.5	3.26	0.73	5189	3.21	0.70	8415	0	3695	15600	13955	0.60	0.00	48.6
16: 0	90	70.0	3.26	0.73	5405	3.26	0.70	8622	0	3695	15893	14250	0.60	0.00	48.6
18: 0	120	72.0	3.26	0.67	5669	3.22	0.73	8907	23	3718	16285	14637	0.60	0.06	48.9
20: 0	120	74.0	3.26	0.67	5933	3.16	0.73	9186	23	3741	16676	15016	0.61	0.06	49.2
21: 30	90	75.5	3.33	0.67	6135	3.27	0.73	9403	18	3759	16975	15311	0.61	0.06	49.4
23: 30	120	77.5	3.33	0.67	6405	3.34	0.73	9699	24	3784	17375	15713	0.61	0.06	49.7
24: 0	30	78.0	3.33	0.67	6472	3.34	0.73	9773	6	3790	17475	15813	0.61	0.06	49.8
2: 0	120	80.0	3.33	0.64	6732	3.45	0.72	10073	31	3822	17875	16227	0.62	0.07	50.2
4: 0	120	82.0	3.33	0.64	6991	3.39	0.72	10369	30	3853	18274	16635	0.62	0.07	50.6
5: 0	60	83.0	3.33	0.64	7121	3.39	0.72	10516	15	3868	18474	16838	0.62	0.07	50.8
8: 0	180	86.0	3.33	0.64	7510	3.33	0.72	10952	45	3914	19073	17439	0.62	0.07	51.4
10: 0	120	88.0	3.26	0.05	7531	3.16	0.29	11062	90	4004	19465	17819	0.62	0.23	52.6
13: 0	180	91.0	3.26	0.05	7563	3.19	0.29	11229	136	4140	20051	18393	0.61	0.23	54.4
16: 0	180	94.0	3.26	0.05	7594	3.23	0.29	11399	137	4278	20638	18975	0.60	0.23	56.2
18: 30	150	96.5	3.26	0.00	7595	3.19	0.64	11706	307	4585	21127	19455	0.60	0.64	60.3
22: 0	210	100.0	3.26	0.00	7595	3.18	0.64	12135	428	5013	21812	20124	0.60	0.64	65.9
24: 0	120	102.0	3.26	0.00	7596	3.21	0.64	12383	247	5260	22203	20510	0.60	0.64	69.1
0: 30	30	102.5	3.26	0.01	7597	3.21	0.31	12413	29	5290	22301	20607	0.60	0.30	69.5
1: 30	60	103.5	3.26	0.01	7599	3.24	0.31	12475	59	5350	22496	20801	0.59	0.30	70.3
3: 30	120	105.5	3.26	0.01	7603	3.18	0.31	12597	117	5467	22888	21183	0.59	0.30	71.9
5: 30	120	107.5	3.26	0.01	7608	3.15	0.31	12717	116	5583	23279	21562	0.58	0.30	73.4
8: 0	150	110.0	3.26	0.01	7613	3.00	0.31	12860	138	5721	23768	22012	0.58	0.30	75.2
12: 0	240	114.0	0.00	0.00	7613	0.72	0.31	12916	55	5777	23768	22186	0.58	0.31	75.9
18: 0	360	120.0	0.00	0.00	7613	0.11	0.31	12929	13	5790	23768	22229	0.58	0.31	76.1
0: 30	390	126.5	0.00	0.00	7613	0.09	0.31	12940	11	5801	23768	22264	0.58	0.31	76.3
5: 30	300	131.5	0.00	0.00	7613	0.07	0.31	12948	7	5809	23768	22287	0.58	0.31	76.4

RUN NO: 6
DATE: 01/29/80

COTTER PILOT PLANT
H&N PROJECT NO. 3052.00

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL. L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
6: 0	0	0.0	3.78	0.49	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
8: 15	135	2.2	3.78	0.49	251	0.71	1.26	121	74	74	510	96	1.26	0.76	1.0
9: 30	75	3.5	3.78	0.49	391	1.44	1.26	257	83	157	793	204	1.26	0.76	2.1
10: 30	60	4.5	3.78	0.49	503	2.96	1.26	482	136	293	1020	382	1.26	0.76	3.9
11: 30	60	5.5	3.78	0.49	614	2.72	1.26	688	125	419	1247	545	1.26	0.76	5.6
12: 0	30	6.0	3.78	0.49	670	3.00	1.26	802	69	488	1360	635	1.26	0.76	6.6
13: 0	60	7.0	3.78	0.52	788	3.88	1.24	1091	167	656	1587	868	1.25	0.72	8.8
15: 30	150	9.5	3.78	0.52	1083	4.15	1.24	1863	448	1105	2154	1491	1.24	0.72	14.9
16: 0	30	10.0	3.78	0.52	1142	4.18	1.24	2019	90	1195	2268	1617	1.24	0.72	16.1
17: 0	60	11.0	3.78	0.74	1310	4.16	0.98	2265	60	1256	2494	1867	1.21	0.24	16.9
18: 0	60	12.0	3.78	0.74	1479	4.18	0.98	2512	60	1316	2721	2118	1.18	0.24	17.8
21: 0	180	15.0	3.78	0.74	1984	4.25	0.98	3264	184	1500	3402	2883	1.13	0.24	20.3
22: 0	60	16.0	3.78	0.74	2152	4.21	0.98	3513	61	1561	3628	3137	1.11	0.24	21.1
23: 30	90	17.5	3.78	0.74	2404	4.21	0.98	3886	91	1653	3969	3516	1.10	0.24	22.3
24: 0	30	18.0	3.78	0.74	2488	4.21	0.98	4010	30	1683	4082	3642	1.10	0.24	22.7
0: 30	30	18.5	3.78	0.51	2547	4.19	0.82	4114	39	1723	4195	3768	1.09	0.31	23.3
2: 30	120	20.5	3.78	0.51	2779	4.29	0.82	4540	161	1884	4649	4284	1.05	0.31	25.4
3: 30	60	21.5	3.78	0.51	2896	4.16	0.82	4746	78	1962	4876	4533	1.04	0.31	26.5
4: 30	60	22.5	3.78	0.51	3012	4.14	0.82	4951	77	2040	5103	4782	1.03	0.31	27.6
5: 30	60	23.5	3.78	0.51	3128	4.28	0.82	5164	80	2121	5329	5039	1.02	0.31	28.6
6: 30	60	24.5	3.78	0.51	3245	4.78	0.82	5376	80	2201	5556	5296	1.01	0.31	29.7
6: 30	0	24.5	3.85	0.51	3245	4.11	0.82	5376	0	2201	5556	5296	1.01	0.31	29.7
8: 0	90	26.0	3.85	0.51	3422	4.11	0.82	5682	115	2317	5903	5667	1.00	0.31	31.3
10: 30	150	28.5	3.85	0.45	3685	4.44	0.72	6166	180	2498	6480	6333	0.97	0.27	33.7
12: 30	120	30.5	3.85	0.45	3895	4.77	0.72	6582	155	2653	6942	6906	0.95	0.27	35.8
14: 30	120	32.5	3.85	0.45	4106	4.65	0.72	6988	151	2804	7404	7465	0.93	0.27	37.9
16: 0	90	34.0	3.85	0.45	4263	4.50	0.72	7282	109	2914	7751	7870	0.92	0.27	39.4
18: 0	120	36.0	3.85	0.41	4455	4.44	0.63	7620	117	3031	8213	8403	0.90	0.22	41.0
20: 0	120	38.0	3.85	0.41	4647	4.37	0.63	7954	115	3147	8675	8928	0.89	0.22	42.5
21: 30	90	39.5	3.85	0.41	4791	4.27	0.63	8198	84	3232	9021	9313	0.88	0.22	43.7
22: 30	60	40.5	3.40	0.41	4875	4.27	0.63	8361	56	3288	9225	9569	0.87	0.22	44.4
23: 30	60	41.5	3.40	0.41	4960	4.56	0.63	8535	60	3348	9429	9843	0.86	0.22	45.2
24: 0	30	42.0	3.40	0.41	5002	4.56	0.63	8622	30	3378	9531	9980	0.86	0.22	45.7
2: 0	120	44.0	3.40	0.34	5145	4.53	0.57	8936	124	3503	9939	10524	0.84	0.22	47.3
4: 0	120	46.0	3.40	0.34	5287	4.50	0.57	9248	123	3626	10347	11064	0.83	0.22	49.0
5: 0	60	47.0	3.40	0.34	5358	4.43	0.57	9402	60	3687	10551	11330	0.82	0.22	49.8
8: 0	180	50.0	3.40	0.34	5572	4.21	0.57	9840	173	3861	11163	12088	0.81	0.22	52.2
10: 0	120	52.0	3.40	0.48	5768	4.36	0.55	10131	39	3900	11571	12611	0.80	0.07	52.7
11: 50	110	53.8	3.40	0.48	5949	4.36	0.55	10399	35	3936	11945	13091	0.79	0.07	53.2
11: 50	0	53.8	2.45	0.48	5949	4.36	0.55	10399	0	3936	11945	13091	0.79	0.07	53.2
13: 0	70	55.0	2.45	0.48	6031	3.68	0.55	10542	19	3956	12117	13349	0.78	0.07	53.5
16: 0	180	58.0	2.45	0.48	6244	3.16	0.55	10859	42	3998	12558	13913	0.78	0.07	54.0
18: 30	150	60.5	2.45	0.66	6489	3.23	0.59	11149	0	3998	12925	14402	0.77	0.00	54.0
22: 0	210	64.0	2.45	0.66	6832	3.26	0.59	11560	0	3998	13440	15087	0.76	0.00	54.0
24: 0	120	66.0	2.45	0.66	7028	3.13	0.59	11785	0	3998	13734	15463	0.76	0.00	54.0
1: 30	90	67.5	2.45	0.73	7190	3.10	0.66	11972	0	3998	13954	15743	0.76	0.00	54.0
3: 30	120	69.5	2.45	0.73	7406	3.13	0.66	12224	0	3998	14248	16119	0.75	0.00	54.0
5: 30	120	71.5	2.45	0.73	7622	3.13	0.66	12475	0	3998	14542	16495	0.75	0.00	54.0
8: 0	150	74.0	2.45	0.73	7891	3.42	0.66	12819	0	3998	14910	17009	0.75	0.00	54.0
[illegible]	240	[illegible]	2.45	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	3998	[illegible]	[illegible]	0.75	[illegible]	[illegible]

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
16: 0	240	82.0	2.45	0.72	8748	3.20	0.67	13847	0	3998	16086	18531	0.74	0.00	54.0
18: 0	120	84.0	2.45	0.73	8964	3.27	0.72	14130	0	3998	16380	18924	0.74	0.00	54.0
21: 30	210	87.5	2.45	0.73	9342	3.31	0.72	14632	0	3998	16894	19620	0.74	0.00	54.0
22: 30	60	88.5	2.45	0.73	9450	3.23	0.72	14772	0	3998	17041	19814	0.74	0.00	54.0
23: 30	60	89.5	2.45	0.73	9558	3.33	0.72	14916	0	3998	17188	20014	0.74	0.00	54.0
0: 30	60	90.5	2.45	0.73	9666	3.18	0.72	15053	0	3998	17335	20205	0.74	0.00	54.0
1: 30	60	91.5	2.45	0.77	9780	3.23	0.71	15192	0	3998	17482	20399	0.74	0.00	54.0
2: 30	60	92.5	2.45	0.77	9894	3.22	0.71	15331	0	3998	17629	20592	0.74	0.00	54.0
3: 30	60	93.5	2.45	0.77	10007	3.24	0.71	15470	0	3998	17776	20787	0.74	0.00	54.0
4: 30	60	94.5	2.45	0.77	10121	3.38	0.71	15615	0	3998	17923	20990	0.74	0.00	54.0
5: 30	60	95.5	2.45	0.77	10235	3.37	0.71	15760	0	3998	18070	21193	0.74	0.00	54.0
7: 0	90	97.0	2.45	0.77	10406	3.26	0.71	15971	0	3998	18291	21486	0.74	0.00	54.0
7: 0	0	97.0	2.45	0.01	10406	3.26	0.66	15971	0	3998	18291	21486	0.74	0.64	54.0
13: 0	360	103.0	2.45	0.01	10418	3.77	0.66	16869	879	4877	19173	22845	0.73	0.64	65.9
16: 0	180	106.0	2.45	0.01	10424	3.32	0.66	17264	386	5264	19614	23443	0.73	0.64	71.2
16: 0	0	106.0	0.00	0.00	10424	3.32	0.55	17264	0	5264	19614	23443	0.73	0.55	71.2
17: 30	90	107.5	0.00	0.00	10424	2.66	0.55	17397	133	5397	19614	23683	0.73	0.55	73.0
20: 0	150	110.0	0.00	0.00	10424	1.32	0.55	17507	109	5507	19614	23881	0.73	0.55	74.5
21: 30	90	111.5	0.00	0.00	10424	0.77	0.55	17546	38	5546	19614	23951	0.73	0.55	75.0
23: 30	120	113.5	0.00	0.00	10424	0.48	0.55	17578	32	5578	19614	24009	0.73	0.55	75.4
0: 30	60	114.5	0.00	0.00	10424	0.28	0.58	17589	10	5589	19614	24027	0.73	0.58	75.6
12: 30	720	126.5	0.00	0.00	10424	0.13	0.58	17644	55	5644	19614	24122	0.73	0.58	76.3
2: 30	840	140.5	0.00	0.00	10424	0.00	0.58	17649	4	5649	19614	24129	0.73	0.58	76.4

RUN NO: 7
DATE: 01/30/80

COTTER PILOT PLANT
H&N PROJECT NO. 3052.00

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
19: 30	0	0.0	4.50	0.58	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
2: 0	390	6.5	4.50	0.53	1026	0.40	1.36	217	124	124	1755	159	1.36	0.78	2.2
3: 0	60	7.5	4.50	0.58	1184	3.12	1.36	473	146	271	2025	346	1.36	0.78	4.8
4: 0	60	8.5	4.50	0.58	1342	3.63	1.36	772	170	441	2295	564	1.36	0.78	7.9
5: 0	60	9.5	4.50	0.58	1500	3.88	1.36	1091	182	624	2565	797	1.36	0.78	11.2
6: 0	60	10.5	4.50	0.58	1658	3.97	1.36	1417	186	811	2835	1035	1.36	0.78	14.5
6: 0	0	10.5	3.44	0.68	1658	3.97	1.21	1417	0	811	2835	1035	1.36	0.53	14.5
7: 0	60	11.5	3.44	0.68	1800	3.45	1.21	1669	109	921	3041	1242	1.34	0.53	16.5
10: 0	180	14.5	3.44	0.68	2225	3.71	1.21	2484	355	1276	3660	1912	1.29	0.53	22.9
13: 0	180	17.5	3.44	0.68	2651	3.68	1.21	3291	352	1628	4279	2574	1.27	0.53	29.2
14: 0	60	18.5	3.44	0.68	2792	3.48	1.21	3546	111	1739	4486	2784	1.27	0.53	31.2
17: 0	180	21.5	3.44	0.67	3212	3.42	1.05	4196	232	1971	5105	3401	1.23	0.37	35.4
18: 30	90	23.0	3.44	0.67	3421	3.43	1.05	4521	116	2087	5415	3710	1.21	0.37	37.4
22: 0	210	26.5	3.44	0.67	3910	3.61	1.05	5320	285	2372	6137	4469	1.19	0.37	42.6
24: 0	120	28.5	3.44	0.85	4264	3.66	0.89	5714	17	2390	6550	4908	1.16	0.03	42.9
1: 30	90	30.0	3.44	0.85	4529	3.57	0.89	6002	12	2402	6859	5230	1.14	0.03	43.1
3: 30	120	32.0	3.44	0.85	4882	3.58	0.89	6387	16	2419	7272	5660	1.12	0.03	43.4
5: 30	120	34.0	3.44	0.85	5235	3.43	0.89	6755	16	2435	7685	6072	1.11	0.03	43.7
6: 0	30	34.5	3.44	0.85	5324	3.51	0.89	6850	4	2439	7788	6178	1.10	0.03	43.8
12: 0	360	40.5	3.44	0.65	6134	3.56	0.80	7882	192	2632	9027	7462	1.05	0.15	47.2
14: 30	150	43.0	3.44	0.65	6471	3.58	0.80	8314	80	2712	9543	7999	1.03	0.15	48.7
18: 0	210	46.5	3.44	0.66	6954	3.71	0.75	8907	71	2783	10265	8780	1.01	0.09	50.0
21: 30	210	50.0	3.44	0.66	7436	3.60	0.75	9482	68	2852	10987	9537	0.99	0.09	51.2
22: 30	60	51.0	3.44	0.66	7574	3.51	0.75	9642	19	2872	11194	9748	0.98	0.09	51.5
23: 30	60	52.0	3.44	0.67	7714	3.14	0.77	9787	17	2889	11400	9937	0.98	0.09	51.9
24: 30	60	53.0	3.44	0.67	7854	3.31	0.77	9941	18	2908	11607	10136	0.98	0.09	52.2
1: 30	60	54.0	3.44	0.67	7994	3.77	0.77	10116	21	2929	11813	10362	0.97	0.09	52.6
2: 30	60	55.0	3.44	0.67	8134	3.62	0.77	10284	20	2950	12019	10580	0.97	0.09	52.9
3: 30	60	56.0	3.44	0.67	8274	3.65	0.77	10453	20	2970	12226	10799	0.96	0.09	53.3
4: 30	60	57.0	3.44	0.67	8414	3.69	0.77	10624	20	2991	12432	11021	0.96	0.09	53.7
5: 30	60	58.0	3.44	0.67	8554	3.32	0.77	10778	18	3010	12639	11220	0.96	0.09	54.0
6: 30	60	59.0	3.44	0.67	8694	3.55	0.77	10943	20	3030	12845	11434	0.95	0.09	54.4
6: 30	0	59.0	3.44	0.03	8694	3.55	0.59	10943	0	3030	12845	11434	0.95	0.56	54.4
13: 0	390	65.5	3.44	0.03	8734	3.35	0.59	11723	741	3771	14187	12743	0.91	0.56	67.7
16: 0	180	68.5	3.44	0.03	8752	3.77	0.59	12128	384	4155	14806	13422	0.90	0.56	74.6
16: 0	0	68.5	0.00	0.00	8752	3.77	0.61	12128	0	4155	14806	13422	0.90	0.61	74.6
17: 30	90	70.0	0.00	0.00	8752	2.00	0.61	12239	111	4267	14806	13602	0.89	0.61	76.6
20: 0	150	72.5	0.00	0.00	8752	0.81	0.61	12315	75	4342	14806	13724	0.89	0.61	78.0
21: 30	90	74.0	0.00	0.00	8752	0.45	0.61	12340	25	4368	14806	13765	0.89	0.61	78.4
23: 30	120	76.0	0.00	0.00	8752	0.34	0.61	12366	25	4393	14806	13807	0.89	0.61	78.9
0: 30	60	77.0	0.00	0.00	8752	0.34	0.60	12379	12	4406	14806	13828	0.89	0.60	79.1
3: 30	180	80.0	0.00	0.00	8752	0.29	0.60	12411	31	4438	14806	13880	0.89	0.60	79.7
5: 30	120	82.0	0.00	0.00	8752	0.22	0.60	12427	16	4454	14806	13907	0.89	0.60	80.0
12: 30	420	89.0	0.00	0.00	8752	0.21	0.60	12480	53	4507	14806	13996	0.89	0.60	80.9
18: 30	360	95.0	0.00	0.00	8752	0.15	0.60	12513	32	4540	14806	14050	0.89	0.60	81.5
24: 30	360	101.0	0.00	0.00	8752	0.18	0.60	12554	41	4581	14806	14113	0.88	0.60	82.2
4: 30	240	105.0	0.00	0.00	8752	0.18	0.60	12580	26	4608	14806	14162	0.88	0.60	82.7

RUN NO: 8
DATE: 01/30/80

COTTER PILOT PLANT
H&N PROJECT NO. 3052.00

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
19: 30	0	0.0	4.67	0.66	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
20: 30	60	1.0	4.53	0.66	179	0.00	0.00	0	0	0	271	0	0.00	0.00	0.0
21: 30	60	2.0	4.53	0.66	359	0.00	0.00	0	0	0	543	0	0.00	0.00	0.0
1: 30	240	6.0	4.53	0.66	1077	1.45	1.22	425	195	195	1630	348	1.22	0.56	2.8
2: 30	60	7.0	4.53	0.66	1257	1.77	1.22	555	59	254	1902	454	1.22	0.56	3.6
3: 30	60	8.0	2.27	0.66	1347	1.89	1.22	694	63	318	2038	568	1.22	0.56	4.6
4: 30	60	9.0	2.27	0.66	1437	2.11	1.22	849	71	389	2175	694	1.22	0.56	5.6
5: 30	60	10.0	2.27	0.66	1527	2.92	1.22	1056	95	485	2311	864	1.22	0.56	7.0
10: 30	300	15.0	2.27	0.67	1985	1.57	1.23	1638	264	749	2992	1337	1.22	0.56	10.8
14: 30	240	19.0	2.49	0.67	2386	1.37	1.23	2045	184	934	3589	1667	1.22	0.56	13.4
18: 30	240	23.0	2.49	0.67	2789	1.16	1.13	2361	129	1063	4187	1945	1.21	0.46	15.3
23: 30	300	28.0	2.49	0.67	3291	1.16	1.13	2757	161	1275	4934	2293	1.20	0.46	17.6
0: 30	60	29.0	2.49	0.67	3392	1.20	1.03	2832	25	1251	5083	2365	1.19	0.35	18.0
1: 0	30	29.5	2.49	0.67	3443	1.20	1.03	2869	12	1263	5158	2401	1.19	0.35	18.2
1: 30	30	30.0	2.49	0.67	3493	1.20	1.03	2906	12	1276	5233	2437	1.19	0.35	18.4
2: 30	60	31.0	2.49	0.67	3594	1.70	1.03	3012	36	1313	5382	2539	1.18	0.35	19.9
4: 30	120	33.0	2.49	0.67	3796	1.72	1.03	3226	74	1387	5681	2747	1.17	0.35	20.0
5: 30	60	34.0	2.49	0.67	3897	1.72	1.03	3333	37	1424	5830	2850	1.16	0.35	20.5
6: 30	60	35.0	0.00	0.00	3897	1.24	1.08	3414	80	1505	5830	2925	1.16	1.08	21.7
9: 30	180	38.0	0.00	0.00	3897	1.24	1.08	3655	241	1746	5830	3148	1.16	1.08	25.2
13: 30	240	42.0	0.00	0.00	3897	0.95	1.08	3902	246	1993	5830	3376	1.15	1.08	28.7
16: 0	150	44.5	0.00	0.00	3897	0.78	1.08	4030	123	2121	5830	3494	1.15	1.08	30.6

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
24: 0	0	0.0	2.68	0.74	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
3: 30	210	3.5	2.68	0.74	419	0.00	0.00	0	0	0	562	0	0.00	0.00	0.0
8: 30	300	8.5	2.79	0.74	1042	0.00	0.00	0	0	0	1399	0	0.00	0.00	0.0
10: 0	90	10.0	2.79	0.74	1229	0.33	1.75	52	30	30	1650	29	1.75	1.01	0.3
10: 20	20	10.3	2.79	0.74	1271	1.21	1.75	94	24	54	1706	53	1.75	1.01	0.5
11: 0	40	11.0	2.79	0.74	1354	1.05	1.74	163	42	96	1818	96	1.75	1.00	1.0
11: 30	30	11.5	2.79	0.74	1416	1.12	1.74	227	33	130	1902	129	1.75	1.00	1.3
12: 0	30	12.0	2.79	0.74	1479	1.14	1.74	287	34	165	1985	164	1.74	1.00	1.7
12: 30	30	12.5	2.79	0.74	1541	1.18	1.74	349	35	200	2069	199	1.74	1.00	2.0
12: 50	20	12.8	2.79	0.74	1582	1.18	1.74	390	23	224	2125	223	1.74	0.99	2.3
13: 0	10	13.0	2.22	0.74	1599	1.18	1.74	410	11	235	2147	235	1.74	0.99	2.4
13: 30	30	13.5	2.22	0.74	1648	1.19	1.73	473	35	271	2214	271	1.74	0.99	2.8
14: 0	30	14.0	2.22	0.74	1698	1.22	1.73	536	36	307	2280	307	1.74	0.98	3.1
14: 30	30	14.5	2.22	0.74	1748	1.22	1.72	600	35	343	2347	344	1.74	0.98	3.5
14: 30	0	14.5	2.22	0.74	1748	1.22	1.72	600	0	343	2347	344	1.74	0.98	3.5
15: 20	50	15.3	2.22	0.74	1830	1.25	1.68	705	58	402	2458	407	1.73	0.94	4.1
15: 35	15	15.5	2.22	0.74	1855	1.24	1.68	737	17	420	2491	425	1.73	0.94	4.3
15: 50	15	15.8	2.22	0.74	1880	1.37	1.64	770	18	438	2524	446	1.72	0.90	4.5
16: 30	40	16.5	2.22	0.74	1946	1.40	1.64	863	50	489	2613	502	1.71	0.90	5.0
17: 0	30	17.0	2.22	0.74	1995	1.39	1.62	931	36	526	2680	544	1.71	0.88	5.4
18: 0	60	18.0	2.22	0.74	2094	1.45	1.60	1071	75	601	2813	621	1.69	0.86	6.2
18: 30	30	18.5	2.22	0.74	2144	1.45	1.56	1139	35	636	2880	675	1.68	0.81	6.5
19: 30	60	19.5	2.22	0.74	2243	1.37	1.53	1265	65	701	3013	757	1.67	0.79	7.2
20: 0	30	20.0	2.22	0.74	2293	1.34	1.51	1327	31	733	3079	798	1.66	0.77	7.5
21: 0	60	21.0	2.22	0.74	2392	1.31	1.49	1444	58	792	3213	876	1.64	0.74	8.1
22: 0	60	22.0	2.22	0.74	2491	1.41	1.46	1568	60	852	3346	961	1.63	0.71	8.8
23: 0	60	23.0	2.22	0.74	2590	1.26	1.43	1677	52	905	3479	1037	1.61	0.68	9.3
24: 0	60	24.0	2.22	0.74	2689	1.50	1.40	1803	59	964	3612	1127	1.59	0.65	9.9
0: 30	30	24.5	2.22	0.74	2739	1.46	1.38	[illegible]	[illegible]	992	3679	1171	1.59	0.64	10.2
1: 30	60	25.5	2.22	0.74	2838	1.35	1.32	[illegible]	[illegible]	1040	3812	1252	1.57	0.58	10.7
2: 0	30	26.0	2.22	0.74	2887	1.38	[illegible]	[illegible]	22	1062	3879	1294	1.56	0.55	11.0
2: 30	30	26.5	2.22	0.74	2937	1.37	[illegible]	[illegible]	21	1084	3945	1335	1.55	0.52	11.2
3: 0	30	27.0	2.22	0.74	2986	1.50	[illegible]	[illegible]	22	1106	4012	1380	1.54	0.49	11.4
3: 30	30	27.5	2.22	0.74	3036	1.71	1.20	2195	23	1130	4078	1431	1.53	0.46	11.6
4: 0	30	28.0	2.22	0.74	3085	1.85	1.17	2260	24	1154	4145	1487	1.52	0.43	11.9
4: 30	30	28.5	2.22	0.72	3134	1.63	1.14	2317	20	1175	4212	1536	1.50	0.42	12.1
4: 30	0	28.5	0.00	0.00	3134	1.40	1.14	2317	0	1175	4212	1536	1.50	1.14	12.1
5: 0	30	29.0	0.00	0.00	3134	1.51	1.21	2372	55	1230	4212	1581	1.50	1.21	12.7
5: 30	30	29.5	0.00	0.00	3134	1.30	1.28	2422	50	1280	4212	1620	1.49	1.28	13.2
6: 0	30	30.0	0.00	0.00	3134	1.18	1.35	2470	48	1328	4212	1655	1.49	1.35	13.7
7: 30	90	31.5	0.00	0.00	3134	1.08	1.49	2617	146	1475	4212	1753	1.49	1.49	15.2
8: 30	60	32.5	0.00	0.00	3134	1.05	1.49	2711	94	1569	4212	1816	1.49	1.49	16.2
10: 0	90	34.0	0.00	0.00	3134	1.08	1.49	2857	146	1715	4212	1914	1.49	1.49	17.7
12: 30	150	36.5	0.00	0.00	3134	0.87	1.49	3053	195	1911	4212	2044	1.49	1.49	19.7
14: 30	120	38.5	0.00	0.00	3134	0.75	1.38	3179	125	2037	4212	2136	1.48	1.38	21.0
15: 0	30	39.0	0.00	0.00	3134	0.72	1.35	3208	29	2066	4212	2157	1.48	1.35	21.3
16: 0	60	40.0	2.01	0.00	3134	0.71	1.29	3263	55	2121	4332	2200	1.48	1.29	21.9
17: 30	90	41.5	2.01	0.00	3134	0.93	1.22	3366	102	2224	4513	2284	1.47	1.22	23.0
18: 30	60	42.5	2.01	0.00	3134	1.08	1.19	3443	77	2301	4634	2349	1.46	1.19	23.8
[illegible]	60	[illegible]	2.01	0.00	3134	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
20: 30	60	44.5	2.11	0.00	3134	1.26	1.12	3612	84	2470	4881	2497	1.44	1.12	25.5
21: 30	60	45.5	2.01	0.00	3134	1.31	1.10	3699	86	2557	5001	2576	1.43	1.10	26.4
22: 30	60	46.5	2.01	0.00	3134	1.36	1.08	3787	88	2645	5122	2657	1.42	1.08	27.3
23: 30	60	47.5	2.01	0.00	3134	1.39	1.06	3876	88	2734	5243	2741	1.41	1.06	28.2
0: 30	60	48.5	2.01	0.00	3134	1.40	1.04	3964	87	2822	5363	2825	1.40	1.04	29.2
2: 30	120	50.5	2.01	0.00	3134	1.36	0.89	4111	147	2969	5604	2963	1.37	0.89	30.7
3: 30	60	51.5	2.01	0.00	3134	1.40	0.82	4180	69	3038	5725	3074	1.35	0.82	31.4
4: 30	60	52.5	2.01	0.00	3134	0.42	0.74	4199	19	3057	5846	3099	1.35	0.74	31.6
5: 30	60	53.5	2.01	0.00	3134	1.40	0.82	4269	69	3127	5966	3183	1.34	0.82	32.3
6: 30	60	54.5	2.01	0.00	3134	1.99	0.90	4378	108	3236	6087	3303	1.32	0.90	33.4
7: 30	60	55.5	0.00	0.00	3134	1.99	0.98	4496	[illegible]	3354	6087	3423	1.31	0.98	34.7
10: 0	150	58.0	0.00	0.00	3134	1.17	1.05	4674	178	3532	6087	3592	1.30	1.05	36.5
11: 0	60	59.0	0.00	0.00	3134	0.95	1.04	4734	59	3592	6087	3650	1.29	1.04	37.1
14: 30	210	62.5	0.00	0.00	3134	0.89	1.00	4924	189	3782	6087	3838	1.28	1.00	39.1
15: 0	30	63.0	0.00	0.00	3134	0.79	1.00	4948	23	3806	6087	3862	1.28	1.00	39.3
16: 0	60	64.0	0.00	0.00	3134	0.68	0.99	4988	40	3846	6087	3903	1.27	0.99	39.8
17: 30	90	65.5	0.00	0.00	3134	0.59	0.97	5040	52	3898	6087	3957	1.27	0.97	40.3
19: 30	120	67.5	0.00	0.00	3134	0.49	0.98	5099	58	3957	6087	4016	1.26	0.98	40.9
20: 30	60	68.5	0.00	0.00	3134	0.48	0.99	5128	29	3986	6087	4046	1.26	0.99	41.2
21: 30	60	69.5	0.00	0.00	3134	0.48	1.00	5158	29	4016	6087	4075	1.26	1.00	41.5
0: 30	180	72.5	0.00	0.00	3134	0.49	1.04	5250	92	4108	6087	4164	1.26	1.04	42.5
2: 30	120	74.5	0.00	0.00	3134	0.33	1.06	5293	42	4151	6087	4204	1.25	1.06	42.9
4: 30	120	76.5	0.00	0.00	3134	0.30	1.09	5333	39	4191	6087	4241	1.25	1.09	43.3
6: 30	120	78.5	0.00	0.00	3134	0.27	1.08	5368	35	4226	6087	4274	1.25	1.08	43.7
8: 30	120	80.5	0.00	0.00	3134	0.25	1.07	5401	33	4259	6087	4304	1.25	1.07	44.0
10: 30	120	82.5	0.00	0.00	3134	0.23	1.08	5433	31	4291	6087	4333	1.25	1.08	44.4
12: 30	120	84.5	0.00	0.00	3134	0.21	1.10	5461	28	4319	6087	4359	1.25	1.10	44.7
14: 30	120	86.5	0.00	0.00	3134	0.20	1.11	5488	27	4346	6087	4383	1.25	1.11	44.9
16: 30	120	88.5	0.00	0.00	3134	0.15	1.13	5510	21	4368	6087	4402	1.25	1.13	45.2
20: 30	240	92.5	0.00	0.00	3134	0.15	1.15	5552	42	4410	6087	4439	1.25	1.15	45.6
0: 30	240	96.5	0.00	0.00	3134	0.13	1.15	5590	37	4448	6087	4471	1.25	1.15	46.0
3: 30	180	99.5	0.00	0.00	3134	0.13	1.17	5618	28	4476	6087	4496	1.24	1.17	46.3
6: 30	180	102.5	0.00	0.00	3134	0.09	1.18	5639	20	4497	6087	4513	1.24	1.18	46.5

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
24: 0	0	0.0	2.50	0.72	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
1: 30	90	1.5	2.50	0.72	163	0.00	0.00	0	0	0	225	0	0.00	0.00	0.0
3: 30	120	3.5	2.50	0.72	382	0.00	0.00	0	0	0	525	0	0.00	0.00	0.0
11: 0	450	11.0	1.66	0.72	926	0.00	0.00	0	0	0	1272	0	0.00	0.00	0.0
12: 50	110	12.8	1.66	0.72	1058	0.00	0.00	0	0	0	1454	0	0.00	0.00	0.0
13: 0	10	13.0	2.12	0.72	1074	0.00	0.00	0	0	0	1475	0	0.00	0.00	0.0
14: 0	60	14.0	2.12	0.72	1166	0.00	0.00	0	0	0	1603	0	0.00	0.00	0.0
15: 0	60	15.0	2.12	0.72	1259	0.00	0.00	0	0	0	1730	0	0.00	0.00	0.0
16: 0	60	16.0	2.12	0.72	1352	0.19	2.49	28	20	20	1857	11	2.49	1.76	0.1
16: 30	30	16.5	2.12	0.76	1400	0.30	2.50	51	15	35	1921	20	2.49	1.73	0.3
17: 0	30	17.0	2.12	0.76	1449	0.33	2.50	76	17	53	1984	30	2.50	1.74	0.4
18: 0	60	18.0	2.12	0.76	1546	0.42	2.52	140	44	97	2111	55	2.51	1.75	0.8
18: 30	30	18.5	2.12	0.76	1595	0.50	2.52	178	26	124	2175	70	2.51	1.76	1.1
19: 30	60	19.5	2.12	0.76	1692	0.40	2.54	239	42	167	2302	94	2.52	1.77	1.5
20: 0	30	20.0	2.12	0.76	1740	0.40	2.54	270	21	188	2366	107	2.52	1.78	1.7
21: 0	60	21.0	2.12	0.76	1838	0.42	2.56	335	45	234	2493	132	2.53	1.79	2.1
22: 0	60	22.0	2.12	0.76	1935	0.39	2.57	396	42	277	2620	156	2.53	1.80	2.5
23: 0	60	23.0	2.12	0.76	2032	0.60	2.58	489	65	342	2747	192	2.54	1.82	3.1
24: 0	60	24.0	2.12	0.76	2129	0.80	2.59	614	88	431	2875	240	2.55	1.83	3.9
0: 30	30	24.5	2.12	0.73	2176	0.72	2.45	667	37	463	2938	261	2.54	1.72	4.2
1: 30	60	25.5	2.12	0.73	2270	0.73	2.16	762	63	531	3065	305	2.49	1.43	4.8
2: 30	60	26.5	2.12	0.73	2363	0.82	1.38	855	56	587	3193	355	2.40	1.14	5.3
3: 0	30	27.0	2.12	0.73	2410	0.80	1.73	896	24	611	3256	379	2.36	1.00	5.5
3: 30	30	27.5	2.12	0.73	2457	0.75	1.59	932	19	630	3320	401	2.32	0.85	5.7
4: 0	30	28.0	2.12	0.73	2504	0.71	1.45	963	15	646	3383	422	2.27	0.71	5.8
4: 30	30	28.5	2.12	0.73	2550	0.73	1.53	997	17	663	3447	444	2.24	0.79	6.0
5: 0	30	29.0	0.00	0.00	2550	0.71	1.61	1031	34	697	3447	466	2.21	1.61	6.3
5: 30	30	29.5	0.00	0.00	2550	0.70	1.69	1067	35	733	3447	487	2.19	1.69	6.6
6: 0	30	30.0	0.00	0.00	2550	0.36	1.77	1086	19	752	3447	497	2.18	1.77	6.8
6: 30	30	30.5	0.00	0.00	2550	0.29	1.85	1102	16	769	3447	506	2.17	1.85	6.9
7: 0	30	31.0	0.00	0.00	2550	0.29	1.94	1119	17	786	3447	515	2.17	1.94	7.1
7: 30	30	31.5	0.00	0.00	2550	0.30	2.02	1138	18	804	3447	524	2.17	2.02	7.2
8: 0	30	32.0	0.00	0.00	2550	0.23	2.10	1153	14	819	3447	531	2.16	2.10	7.4
10: 0	120	34.0	0.00	0.00	2550	0.25	2.38	1225	72	891	3447	561	2.18	2.38	8.0
12: 0	120	36.0	0.00	0.00	2550	0.27	2.65	1311	86	978	3447	594	2.20	2.65	8.8
16: 0	240	40.0	0.00	0.00	2550	0.23	2.05	1427	115	1094	3447	650	2.19	2.05	9.9
19: 30	210	43.5	0.00	0.00	2550	0.21	1.92	1513	86	1180	3447	695	2.17	1.92	10.6
22: 0	150	46.0	0.00	0.00	2550	0.16	1.96	1561	47	1227	3447	719	2.16	1.96	11.1
24: 0	120	48.0	0.00	0.00	2550	0.16	2.02	1600	39	1266	3447	739	2.16	2.02	11.4
2: 0	120	50.0	1.91	0.00	2550	0.27	1.58	1653	52	1319	3676	772	2.14	1.58	11.9
3: 0	60	51.0	1.91	0.00	2550	0.60	1.37	1703	50	1369	3791	808	2.10	1.37	12.4
4: 0	60	52.0	1.91	0.00	2550	0.60	1.15	1745	42	1412	3905	845	2.06	1.15	12.7
6: 30	150	54.5	1.91	0.00	2550	0.71	1.26	1881	135	1547	4192	952	1.97	1.26	14.0
7: 30	60	55.5	1.91	0.00	2550	0.71	1.30	1937	56	1603	4306	995	1.94	1.30	14.5
10: 0	150	58.0	0.00	0.00	2550	0.21	1.87	1996	59	1663	4306	1027	1.94	1.87	15.0
15: 0	300	63.0	0.00	0.00	2550	0.21	2.41	2155	158	1821	4306	1093	1.97	2.41	16.5
20: 30	330	68.5	0.00	0.00	2550	0.18	2.52	2313	157	1979	4306	1155	2.00	2.52	17.9
24: 0	210	72.0	0.00	0.00	2550	0.22	2.58	2437	124	2103	4306	1203	2.02	2.58	19.0
4: 0	240	76.0	0.00	0.00	2550	0.14	2.89	2538	100	2204	4306	1238	2.04	2.89	19.9

RUN NO: 12
DATE: 01/30/80

COTTER PILOT PLANT
HAN PROJECT NO. 3052.00

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
6: 30	0	0.0	3.00	0.76	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
8: 30	120	2.0	3.00	0.76	273	0.08	1.00	10	2	2	360	10	1.00	0.24	0.0
9: 0	30	2.5	3.00	0.76	342	0.20	1.15	17	2	5	450	16	1.05	0.39	0.0
10: 0	60	3.5	3.00	0.76	478	0.25	1.75	44	15	20	630	31	1.38	0.99	0.1
12: 30	150	6.0	3.00	0.76	820	0.40	3.25	239	149	169	1080	91	2.61	2.49	1.2
14: 30	120	8.0	3.00	0.76	1094	0.58	3.19	465	171	341	1440	162	2.86	2.43	2.4
15: 0	30	8.5	3.00	0.76	1163	0.60	3.18	523	44	385	1530	180	2.89	2.42	2.7
16: 0	60	9.5	3.00	0.76	1300	0.75	3.15	665	107	493	1710	225	2.94	2.39	3.5
16: 30	30	10.0	3.00	0.76	1368	0.87	3.13	747	62	556	1800	251	2.96	2.37	3.9
17: 30	60	11.0	3.00	0.76	1505	1.01	3.15	940	146	702	1980	313	3.00	2.39	5.0
18: 30	60	12.0	3.00	0.76	1642	1.02	3.17	1136	149	851	2160	374	3.03	2.41	6.1
19: 30	60	13.0	3.00	0.76	1779	1.08	3.19	1344	158	1010	2340	439	3.05	2.43	7.2
20: 30	60	14.0	3.00	0.76	1916	1.16	3.21	1568	171	1181	2520	509	3.07	2.45	8.4
21: 30	60	15.0	3.00	0.76	2054	1.15	3.14	1785	164	1345	2700	578	3.08	2.37	9.6
22: 30	60	16.0	3.00	0.76	2192	1.20	3.06	2007	167	1512	2880	650	3.08	2.30	10.8
23: 30	60	17.0	3.00	0.76	2329	1.25	2.99	2233	168	1680	3060	726	3.07	2.22	12.0
0: 30	60	18.0	3.00	0.76	2467	1.26	2.91	2455	163	1843	3240	802	3.06	2.15	13.2
2: 30	120	20.0	3.00	0.76	2742	1.41	2.72	2918	333	2177	3600	972	3.00	1.95	15.6
3: 30	60	21.0	3.00	0.76	2880	1.42	2.62	3143	159	2336	3780	1057	2.97	1.86	16.7
4: 30	60	22.0	3.00	0.76	3018	1.42	2.53	3359	150	2487	3960	1143	2.93	1.76	17.8
5: 30	60	23.0	3.00	0.80	3163	1.42	2.53	3576	147	2634	4140	1228	2.91	1.72	18.8
6: 30	60	24.0	2.56	0.80	3286	1.26	2.53	3783	141	2776	4293	1310	2.88	1.73	19.9
7: 30	60	25.0	2.56	0.80	3410	1.59	2.53	4025	165	2941	4447	1406	2.86	1.73	21.0
8: 30	60	26.0	2.56	0.80	3534	1.59	2.54	4268	165	3107	4600	1501	2.84	1.73	22.2
10: 0	90	27.5	2.56	0.80	3719	1.40	2.55	4591	221	3328	4831	1628	2.81	1.74	23.8
11: 0	60	28.5	2.56	0.80	3843	1.37	2.56	4803	145	3473	4984	1711	2.80	1.75	24.9
12: 30	90	30.0	2.56	0.80	4028	1.37	2.56	5121	213	3691	5215	1835	2.79	1.76	26.4
14: 30	120	32.0	2.56	0.80	4275	1.21	2.50	5485	246	3938	5522	1980	2.76	1.70	28.2
15: 0	30	32.5	2.56	0.80	4337	1.14	2.49	5570	57	3996	5599	2014	2.76	1.68	28.6
15: 10	10	32.6	2.56	0.80	4358	1.14	2.48	5599	19	4015	5624	2026	2.76	1.68	28.8
16: 0	50	33.5	0.00	0.00	4358	1.11	2.46	5736	137	4153	5624	2081	2.75	2.46	29.7
16: 30	30	34.0	0.00	0.00	4358	1.11	2.44	5817	81	4234	5624	2115	2.75	2.44	30.3
17: 30	60	35.0	0.00	0.00	4358	1.04	2.41	5968	151	4385	5624	2177	2.74	2.41	31.4
19: 30	120	37.0	0.00	0.00	4358	0.82	2.36	6202	233	4619	5624	2276	2.72	2.36	33.1
20: 30	60	38.0	0.00	0.00	4358	0.79	2.33	6314	111	4731	5624	2324	2.71	2.33	33.9
22: 0	90	39.5	0.00	0.00	4358	0.79	2.29	6479	164	4896	5624	2396	2.70	2.29	35.1
24: 0	120	41.5	0.53	0.20	4371	0.92	2.25	6731	229	5125	5688	2508	2.68	2.05	36.7
2: 30	150	44.0	0.53	0.20	4387	0.94	2.21	7044	285	5410	5767	2649	2.65	2.01	38.8
4: 30	120	46.0	2.57	0.20	4448	0.94	2.21	7295	228	5639	6076	2762	2.64	2.01	40.4
5: 0	30	46.5	2.57	0.20	4464	0.98	2.12	7353	57	5696	6153	2792	2.63	1.92	40.8
6: 30	90	48.0	0.00	0.00	4464	0.83	2.04	7512	154	5850	6153	2867	2.61	2.04	41.9
7: 30	60	49.0	0.00	0.00	4464	0.93	1.99	7624	111	5962	6153	2923	2.60	1.99	42.7
8: 30	60	50.0	0.00	0.00	4464	1.01	1.96	7744	119	6081	6153	2984	2.59	1.96	43.6
10: 30	120	52.0	0.00	0.00	4464	0.88	1.93	7950	205	6287	6153	3090	2.57	1.93	45.0
11: 30	60	53.0	0.00	0.00	4464	1.08	1.92	8076	125	6413	6153	3156	2.55	1.92	46.0
12: 30	60	54.0	0.00	0.00	4464	0.81	1.91	8169	93	6507	6153	3205	2.54	1.91	46.6
13: 30	60	55.0	0.00	0.00	4464	0.76	1.87	8255	86	6593	6153	3250	2.53	1.87	47.2
14: 30	60	56.0	0.00	0.00	4464	0.70	1.84	8334	78	6671	6153	3293	2.53	1.84	47.8
15: 30	60	57.0	0.00	0.00	4464	0.67	1.81	8407	73	6745	6153	3333	2.52	1.81	48.3
16: 30	60	58.0	0.00	0.00	4464	0.61	1.79	8472	65	6810	6153	3370	2.51	1.79	[illegible]

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
17: 30	60	59.0	0.00	0.00	4464	0.61	1.79	8539	65	6876	6153	3407	2.50	1.79	49.3
20: 30	180	62.0	0.00	0.00	4464	0.51	1.30	8706	167	7044	6153	3500	2.48	1.30	50.5
0: 30	240	66.0	0.00	0.00	4464	0.34	2.03	8875	169	7213	6153	3583	2.47	2.03	51.7
4: 30	240	70.0	0.00	0.00	4464	0.35	1.88	9034	158	7372	6153	3667	2.46	1.88	52.3
8: 30	240	74.0	0.00	0.00	4464	0.21	1.84	9129	94	7467	6153	3719	2.45	1.84	53.5
12: 30	240	78.0	0.00	0.00	4464	0.21	0.94	9177	48	7515	6153	3770	2.43	0.94	53.9
16: 30	240	82.0	0.00	0.00	4464	0.18	1.90	9263	85	7601	6153	3815	2.42	1.90	54.5
20: 30	240	86.0	0.00	0.00	4464	0.15	1.91	9334	71	7672	6153	3852	2.42	1.91	55.0
0: 30	240	90.0	0.00	0.00	4464	0.14	1.92	9400	65	7738	6153	3886	2.41	1.92	55.5
4: 30	240	94.0	0.00	0.00	4464	0.09	1.88	9444	44	7782	6153	3910	2.41	1.88	55.8
8: 30	240	98.0	0.00	0.00	4464	0.13	2.09	9514	69	7852	6153	3943	2.41	2.09	56.3

DATE: 01/30/80 H&N PROJECT NO. 3052.00

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
1: 0	0	0.0	1.80	0.65	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
4: 0	180	3.0	1.80	0.65	213	0.00	0.00	0	0	0	324	0	0.00	0.00	0.0
6: 30	150	5.5	1.80	0.65	391	0.00	0.00	0	0	0	594	0	0.00	0.00	0.0
7: 30	60	6.5	1.64	0.65	456	0.01	0.65	0	0	0	692	0	0.65	0.00	0.0
8: 30	60	7.5	1.77	0.65	526	0.06	0.65	3	0	0	798	4	0.65	0.00	0.0
9: 30	60	8.5	1.77	0.65	596	0.09	1.09	9	2	2	904	10	0.90	0.44	0.0
10: 30	60	9.5	1.77	0.65	666	0.15	1.54	24	8	11	1011	20	1.20	0.88	0.1
11: 30	60	10.5	1.77	0.65	736	0.18	1.98	46	14	25	1117	31	1.47	1.32	0.2
12: 30	60	11.5	1.77	0.65	806	0.35	2.42	98	37	63	1223	52	1.85	1.76	0.5
13: 0	30	12.0	1.77	0.69	843	0.44	2.54	131	24	87	1276	65	1.99	1.84	0.8
14: 30	90	13.5	1.77	0.69	954	0.51	2.66	255	91	179	1435	112	2.27	1.96	1.6
15: 30	60	14.5	1.77	0.69	1028	0.67	2.78	369	84	264	1542	153	2.40	2.08	2.4
16: 30	60	15.5	1.77	0.69	1103	0.75	2.90	499	99	363	1648	198	2.52	2.20	3.3
17: 30	60	16.5	1.77	0.69	1177	0.95	2.80	659	120	483	1754	255	2.58	2.10	4.4
20: 30	180	19.5	1.77	0.69	1400	1.31	2.69	1295	470	953	2073	491	2.63	1.99	8.7
22: 0	90	21.0	1.90	0.72	1524	1.22	2.70	1594	218	1172	2244	602	2.64	1.98	10.7
23: 0	60	22.0	1.90	0.72	1607	1.22	2.71	1794	146	1319	2358	675	2.65	1.99	12.1
0: 30	90	23.5	1.90	0.72	1731	1.36	2.73	2131	247	1566	2529	799	2.66	2.00	14.4
2: 30	120	25.5	1.90	0.72	1897	1.40	2.64	2577	322	1889	2757	967	2.66	1.91	17.3
3: 30	60	26.5	1.90	0.72	1980	1.34	2.59	2786	150	2040	2871	1048	2.65	1.86	18.7
4: 30	60	27.5	1.90	0.72	2063	1.44	2.54	3007	157	2198	2985	1135	2.64	1.81	20.2
5: 30	60	28.5	1.90	0.72	2145	1.44	2.52	3227	156	2354	3099	1222	2.64	1.80	21.6
6: 30	60	29.5	1.90	0.72	2228	1.40	2.51	3438	150	2504	3213	1306	2.63	1.78	23.0
7: 30	60	30.5	1.90	0.72	2311	1.47	2.49	3658	155	2660	3327	1394	2.62	1.76	24.4
7: 30	0	30.5	1.90	0.34	2311	1.47	2.49	3658	0	2660	3327	1394	2.62	2.15	24.4
8: 30	60	31.5	1.85	0.34	2349	1.45	2.47	3874	186	2846	3438	1482	2.61	2.13	26.1
9: 30	60	32.5	1.85	0.34	2387	1.40	2.15	4055	152	2999	3549	1566	2.58	1.81	27.5
10: 30	60	33.5	1.85	0.34	2424	1.47	1.83	4217	131	3130	3660	1654	2.54	1.49	28.8
11: 30	60	34.5	1.85	0.34	2462	1.50	1.50	4353	105	3236	3771	1744	2.49	1.16	29.7
12: 30	60	35.5	1.85	0.34	2500	1.48	1.18	4459	75	3311	3882	1833	2.43	0.84	30.4
13: 30	60	36.5	1.85	0.62	2569	1.53	1.33	4581	65	3376	3993	1925	2.37	0.70	31.0
14: 30	60	37.5	1.85	0.62	2638	1.53	1.47	4717	78	3455	4104	2017	2.33	0.85	31.7
15: 30	60	38.5	1.85	0.62	2707	1.61	1.62	4874	96	3551	4215	2114	2.30	0.99	32.6
16: 0	30	39.0	1.85	0.62	2742	1.64	1.76	4961	56	3608	4270	2164	2.29	1.14	33.1
17: 30	90	40.5	1.85	0.62	2846	1.64	1.81	5228	175	3783	4437	2311	2.26	1.18	34.8
18: 30	60	41.5	1.85	0.62	2915	1.72	1.86	5421	128	3911	4548	2415	2.24	1.23	35.9
20: 30	120	43.5	1.85	0.62	3053	1.49	1.95	5772	238	4150	4770	2594	2.22	1.33	38.1
21: 30	60	44.5	1.85	0.76	3138	1.49	1.34	5937	96	4247	4881	2684	2.21	1.07	39.0
22: 30	60	45.5	1.85	0.76	3223	1.81	1.72	6126	104	4352	4992	2793	2.19	0.96	40.0
23: 30	60	46.5	1.85	0.76	3309	1.56	1.61	6278	79	4431	5103	2887	2.17	0.84	40.7
0: 30	60	47.5	1.85	0.76	3394	1.78	1.50	6439	78	4510	5214	2994	2.15	0.73	41.4
2: 30	120	49.5	1.85	0.76	3564	1.73	1.45	6742	143	4653	5436	3203	2.10	0.68	42.8
4: 30	120	51.5	1.85	0.76	3734	1.86	1.40	7056	142	4796	5658	3427	2.05	0.63	44.1
5: 30	60	52.5	1.85	0.86	3830	1.84	1.38	7210	57	4854	5769	3533	2.03	0.51	44.6
6: 30	60	53.5	1.85	0.86	3927	1.73	1.36	7352	51	4906	5880	3642	2.01	0.49	45.1
8: 30	120	55.5	1.85	0.86	4119	1.67	1.32	7619	92	4998	6102	3843	1.98	0.45	45.9
8: 30	0	55.5	1.96	0.00	4119	1.67	1.32	7619	0	4998	6102	3843	1.98	1.32	45.9
9: 30	60	56.5	1.96	0.00	4119	1.70	1.30	7752	133	5131	6219	3945	1.96	1.30	47.2
10: 30	60	57.5	1.96	0.00	4119	1.65	1.27	7878	126	5258	6337	4044	1.94	1.27	48.3
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

RUN NO: 13
DATE: 01/30/80

COTTER PILOT PLANT
H&N PROJECT NO. 3052.00

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
13: 0	30	60.0	1.96	0.00	4119	1.68	1.17	8174	59	5554	6631	4289	1.90	1.17	51.1
14: 30	90	61.5	1.96	0.00	4119	1.66	1.12	8344	169	5723	6807	4439	1.87	1.12	52.6
16: 30	120	63.5	1.96	0.00	4119	1.85	1.03	8574	229	5953	7042	4662	1.83	1.03	54.7
20: 30	240	67.5	1.96	0.00	4119	1.88	0.92	8994	420	6374	7513	5114	1.75	0.92	58.6
22: 30	120	69.5	1.96	0.00	4119	1.92	0.88	9199	205	6579	7748	5346	1.72	0.88	60.5
0: 30	120	71.5	1.96	0.00	4119	2.05	0.84	9407	207	6786	7983	5593	1.68	0.84	62.4
1: 30	60	72.5	1.96	0.00	4119	1.86	0.82	9499	91	6878	8101	5704	1.66	0.82	63.2
2: 30	60	73.5	1.96	0.00	4119	2.04	0.79	9596	97	6976	8218	5827	1.64	0.79	64.1
3: 30	60	74.5	1.96	0.00	4119	1.80	0.77	9680	84	7060	8336	5935	1.63	0.77	64.9
4: 30	60	75.5	1.96	0.00	4119	2.00	0.75	9770	90	7150	8454	6055	1.61	0.75	65.7
6: 30	120	77.5	1.87	0.00	4119	2.08	0.67	9939	169	7319	8678	6306	1.57	0.67	67.3
7: 30	60	78.5	1.87	0.00	4119	1.88	0.63	10011	72	7391	8790	6419	1.55	0.63	68.0
8: 30	60	79.5	1.87	0.00	4119	2.11	0.59	10087	75	7467	8902	6546	1.54	0.59	68.6
8: 30	0	79.5	0.00	0.00	4119	2.11	0.59	10087	0	7467	8902	6546	1.54	0.59	68.6
10: 30	120	81.5	0.00	0.00	4119	1.52	0.62	10201	113	7580	8902	6729	1.51	0.62	69.7
11: 30	60	82.5	1.92	0.00	4119	1.52	0.63	10259	57	7638	9018	6820	1.50	0.63	70.2
12: 30	60	83.5	1.92	0.00	4119	1.46	0.64	10316	56	7695	9133	6908	1.49	0.64	70.8
14: 30	120	85.5	1.92	0.00	4119	1.48	0.62	10428	112	7807	9363	7087	1.47	0.62	71.8
15: 30	60	86.5	1.92	0.00	4119	1.59	0.61	10487	59	7867	9478	7183	1.45	0.61	72.3
16: 30	60	87.5	1.76	0.00	4119	1.61	0.61	10546	59	7926	9594	7280	1.44	0.61	72.9
18: 30	120	89.5	1.76	0.00	4119	2.00	0.58	10686	139	8065	9795	7520	1.42	0.58	74.2
19: 0	30	90.0	1.76	0.00	4119	1.35	0.57	10717	31	8097	9848	7575	1.41	0.57	74.4
20: 30	90	91.5	1.76	0.00	4119	1.65	0.55	10800	82	8179	10006	7724	1.39	0.55	75.2
22: 30	120	93.5	1.76	0.00	4119	1.78	0.47	10902	102	8281	10218	7938	1.37	0.47	76.1
0: 30	120	95.5	1.76	0.00	4119	1.74	0.40	10986	84	8366	10429	8147	1.34	0.40	76.9
2: 30	120	97.5	1.76	0.00	4119	1.85	0.40	11077	90	8456	10640	8370	1.32	0.40	77.7
3: 0	30	98.0	1.76	0.00	4119	1.82	0.40	11099	22	8478	10693	8424	1.31	0.40	78.0
4: 30	90	99.5	1.76	0.00	4119	1.91	0.40	11169	70	8549	10851	8597	1.29	0.40	78.6
6: 30	120	101.5	1.76	0.00	4119	1.93	0.38	11259	89	8638	11062	8829	1.27	0.38	79.4
8: 30	120	103.5	1.76	0.00	4119	1.92	0.36	11343	84	8723	11274	9059	1.25	0.36	80.2
8: 30	0	103.5	0.00	0.00	4119	1.92	0.36	11343	0	8723	11274	9059	1.25	0.36	80.2
10: 30	120	105.5	0.00	0.00	4119	1.46	0.40	11414	70	8793	11274	9235	1.23	0.40	80.9
11: 30	60	106.5	0.00	0.00	4119	1.34	0.42	11448	34	8828	11274	9316	1.22	0.42	81.2
12: 30	60	107.5	0.00	0.00	4119	1.07	0.44	11476	28	8856	11274	9380	1.22	0.44	81.4
14: 30	120	109.5	0.00	0.00	4119	0.87	0.50	11529	52	8909	11274	9485	1.21	0.50	81.9
15: 30	60	110.5	0.00	0.00	4119	0.74	0.53	11553	23	8932	11274	9529	1.21	0.53	82.1
16: 30	60	111.5	0.00	0.00	4119	0.64	0.56	11575	21	8954	11274	9568	1.20	0.56	82.3
17: 30	60	112.5	0.00	0.00	4119	0.63	0.59	11598	22	8977	11274	9606	1.20	0.59	82.5
18: 30	60	113.5	0.00	0.00	4119	0.57	0.62	11619	21	8999	11274	9641	1.20	0.62	82.7
19: 30	60	114.5	0.00	0.00	4119	0.41	0.66	11636	16	9015	11274	9666	1.20	0.66	82.9
20: 30	60	115.5	0.00	0.00	4119	0.47	0.66	11655	18	9034	11274	9694	1.20	0.66	83.1
21: 30	60	116.5	0.00	0.00	4119	0.16	0.69	11661	6	9041	11274	9704	1.20	0.69	83.1
22: 30	60	117.5	0.00	0.00	4119	0.43	0.71	11680	18	9059	11274	9730	1.20	0.71	83.3
0: 30	120	119.5	0.00	0.00	4119	0.35	0.77	11713	33	9093	11274	9772	1.19	0.77	83.6
2: 30	120	121.5	0.00	0.00	4119	0.31	0.81	11744	31	9124	11274	9811	1.19	0.81	83.9
4: 30	120	123.5	0.00	0.00	4119	0.33	0.87	11779	34	9159	11274	9851	1.19	0.87	84.2
6: 30	120	125.5	0.00	0.00	4119	0.28	0.87	11809	29	9188	11274	9885	1.19	0.87	84.5
10: 30	240	129.5	0.00	0.00	4119	0.22	0.90	11858	49	9237	11274	9939	1.19	0.90	84.9
12: 30	120	131.5	0.00	0.00	4119	0.24	0.92	11885	26	9264	11274	9968	1.19	0.92	85.2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
21: 30	0	0.0	3.03	0.72	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
0: 30	180	3.0	3.03	0.72	396	0.00	0.00	0	0	0	545	0	0.00	0.00	0.0
5: 30	300	8.0	3.03	0.72	1057	0.00	0.00	0	0	0	1454	0	0.00	0.00	0.0
6: 30	60	9.0	3.03	0.72	1139	0.11	1.50	10	5	5	1636	6	1.50	0.77	0.0
7: 30	60	10.0	3.03	0.72	1321	0.21	1.80	33	14	19	1818	19	1.69	1.07	0.1
7: 30	0	10.0	3.14	0.58	1321	0.21	1.80	33	0	19	1818	19	1.69	1.21	0.1
8: 30	60	11.0	3.14	0.58	1431	0.53	2.09	101	48	68	2006	52	1.94	1.51	0.6
9: 30	60	12.0	3.14	0.58	1541	0.77	2.39	212	83	152	2194	93	2.15	1.31	1.5
10: 30	60	13.0	3.14	0.58	1651	0.85	2.69	349	107	259	2383	149	2.33	2.10	2.5
11: 30	60	14.0	3.14	0.58	1761	1.01	2.34	492	107	366	2571	210	2.34	1.75	3.6
12: 30	60	15.0	3.14	0.58	1872	1.20	1.99	637	102	469	2760	282	2.25	1.41	4.6
13: 30	60	16.0	3.14	0.58	1982	1.40	1.65	776	89	558	2948	366	2.11	1.06	5.5
14: 30	60	17.0	3.14	0.58	2092	1.65	1.30	906	71	630	3136	466	1.94	0.72	6.2
15: 30	60	18.0	3.14	0.58	2203	1.79	1.37	1054	85	715	3325	574	1.83	0.79	7.1
16: 30	60	19.0	3.14	0.58	2313	1.79	1.44	1210	92	808	3513	681	1.77	0.86	8.0
17: 30	60	20.0	3.14	0.58	2424	1.84	1.51	1378	102	911	3702	792	1.73	0.93	9.0
18: 30	60	21.0	3.14	0.58	2534	1.93	1.58	1562	115	1027	3890	908	1.71	1.00	10.2
20: 30	120	23.0	3.14	0.73	2810	2.12	1.74	2006	257	1285	4267	1162	1.72	1.01	12.8
21: 30	60	[illegible]	3.14	0.73	2949	1.89	1.82	2214	124	1409	4455	1276	1.73	1.08	14.0
22: 30	60	25.0	3.14	0.73	3087	1.59	1.90	2396	112	1521	4644	1372	1.74	1.17	15.1
23: 30	60	26.0	3.14	0.73	3225	1.74	1.88	2593	120	1641	4832	1477	1.75	1.14	16.3
0: 30	60	27.0	3.14	0.73	3364	1.71	1.85	2785	115	1757	5020	1579	1.76	1.12	17.5
2: 30	120	29.0	3.14	0.73	3640	1.49	1.80	3108	192	1949	5397	1758	1.76	1.07	19.4
3: 30	60	30.0	3.14	0.82	3795	1.49	1.79	3269	87	2036	5586	1848	1.76	0.97	20.3
4: 30	60	31.0	3.14	0.82	3949	1.42	1.78	3472	82	2119	5774	1933	1.76	0.96	21.1
5: 30	60	32.0	3.14	0.82	4104	1.54	1.70	3580	82	2201	5962	2026	1.76	0.88	21.9
6: 0	30	32.5	0.00	0.82	4104	1.54	1.76	3662	43	2245	5962	2073	1.76	0.94	22.3
6: 30	30	33.0	0.00	0.00	4104	0.99	1.76	3714	52	2298	5962	2103	1.76	1.76	22.9
8: 30	120	35.0	0.00	0.00	4104	1.19	1.71	3961	247	2545	5962	2247	1.76	1.71	25.3
9: 30	60	36.0	0.00	0.00	4104	1.05	1.69	4068	106	2651	5962	2310	1.76	1.69	26.4
10: 30	60	37.0	0.00	0.06	4104	1.06	1.67	4176	107	2759	5962	2374	1.75	1.67	27.5
12: 30	120	39.0	0.00	0.00	4104	0.94	1.61	4359	183	2942	5962	2487	1.75	1.61	29.3
13: 30	60	40.0	0.00	0.00	4104	0.85	1.58	4441	81	3024	5962	2539	1.74	1.58	30.1
14: 30	60	41.0	0.00	0.00	4104	0.88	1.56	4524	83	3107	5962	2592	1.74	1.56	30.9
15: 30	60	42.0	0.00	0.00	4104	0.78	1.55	4597	73	3181	5962	2639	1.74	1.55	31.7
16: 30	60	43.0	0.00	0.00	4104	0.72	1.54	4665	67	3248	5962	2682	1.73	1.54	32.3
20: 30	240	47.0	0.00	0.00	4104	0.64	1.52	4900	235	3483	5962	2837	1.72	1.52	34.7
22: 30	120	49.0	0.00	0.00	4104	0.55	1.50	5001	100	3584	5962	2904	1.72	1.50	35.7
0: 30	120	51.0	0.00	0.00	4104	0.45	1.53	5085	84	3668	5962	2959	1.71	1.53	36.5
1: 30	60	52.0	0.00	0.00	4104	0.51	1.55	5133	47	3716	5962	2990	1.71	1.55	37.0
2: 30	60	53.0	0.00	0.00	4104	0.42	1.56	5173	40	3756	5962	3016	1.71	1.56	37.4
3: 30	60	54.0	0.00	0.00	4104	0.43	1.51	5213	40	3796	5962	3042	1.71	1.51	37.8
4: 30	60	55.0	0.00	0.00	4104	0.43	1.46	5251	38	3834	5962	3068	1.71	1.46	38.2
6: 30	120	57.0	0.00	0.00	4104	0.34	1.37	5309	57	3892	5962	3110	1.70	1.37	38.8
6: 30	0	57.0	2.83	0.00	4104	0.38	1.37	5309	0	3892	5962	3110	1.70	1.37	38.8
7: 30	60	58.0	2.83	0.00	4104	0.41	1.39	5344	34	3927	6132	3135	1.70	1.39	39.1
8: 30	60	59.0	2.83	0.00	4104	0.33	1.42	5372	28	3955	6302	3155	1.70	1.42	39.4
8: 30	0	59.0	0.00	0.00	4104	0.33	1.42	5372	0	3955	6302	3155	1.70	1.42	39.4
10: 30	120	61.0	0.00	0.00	4104	0.48	1.48	5457	85	4041	6302	3212	1.69	1.48	40.2
11: 30	60	62.0	2.83	0.00	4104	0.48	1.44	5498	41	4082	6472	3241	1.69	1.44	40.7

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
12: 30	60	63.0	2.83	0.00	4104	0.45	1.41	5537	38	4121	6842	3268	1.69	1.41	41.0
14: 30	120	65.0	2.33	0.00	4104	0.57	1.34	5629	91	4212	6981	3337	1.68	1.34	42.0
14: 30	0	65.0	0.00	0.00	4104	0.57	1.34	5629	0	4212	6981	3337	1.68	1.34	42.0
15: 30	60	66.0	0.00	0.00	4104	0.62	0.96	5665	35	4248	6981	3374	1.67	0.96	42.3
16: 30	60	67.0	0.00	0.00	4104	0.68	0.77	5697	31	4280	6981	3415	1.66	0.77	42.6
18: 30	120	69.0	0.00	0.00	4104	0.67	0.57	5744	47	4327	6981	3496	1.64	0.57	43.1
19: 0	30	69.5	0.00	0.00	4104	0.63	0.64	5756	12	4339	6981	3515	1.63	0.64	43.2
20: 30	90	71.0	0.00	0.00	4104	0.60	0.85	5802	46	4385	6981	3569	1.62	0.85	43.7
22: 30	120	73.0	0.00	0.00	4104	0.55	1.13	5878	75	4461	6981	3636	1.61	1.13	44.4
0: 30	120	75.0	0.00	0.00	4104	0.47	1.20	5946	68	4529	6981	3692	1.61	1.20	45.1
2: 30	120	77.0	0.00	0.00	4104	0.46	1.27	6017	71	4600	6981	3748	1.60	1.27	45.8
3: 30	60	78.0	0.00	0.00	4104	0.43	1.30	6051	33	4634	6981	3774	1.60	1.30	46.2
4: 30	60	79.0	0.00	0.00	4104	0.36	1.32	6080	28	4663	6981	3796	1.60	1.32	46.5
6: 30	120	81.0	0.00	0.00	4104	0.35	1.37	6139	58	4722	6981	3829	1.59	1.37	47.0
8: 30	120	83.0	0.00	0.00	4104	0.25	1.38	6181	42	4764	6981	3869	1.59	1.38	47.5
10: 30	120	85.0	0.00	0.00	4104	0.28	1.39	6229	47	4812	6981	3903	1.59	1.39	47.9
11: 30	60	86.0	0.00	0.00	4104	0.28	1.36	6252	23	4836	6981	3921	1.59	1.36	48.2
14: 30	180	89.0	0.00	0.00	4104	0.24	1.36	6312	60	4896	6981	3965	1.59	1.36	48.8
16: 30	120	91.0	0.00	0.00	4104	0.23	1.38	6351	38	4934	6981	3992	1.59	1.38	49.2
18: 30	120	93.0	0.00	0.00	4104	0.11	1.40	6370	19	4953	6981	4006	1.58	1.40	49.4
20: 30	120	95.0	0.00	0.00	4104	0.16	1.46	6400	29	4983	6981	4027	1.58	1.46	49.6
22: 30	120	97.0	0.00	0.00	4104	0.16	1.52	6429	29	5013	6981	4046	1.58	1.52	49.9

RUN NO: 15
DATE: 01/30/80

COTTER PILOT PLANT
H&N PROJECT NO. 3052.00

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
9: 30	0	0.0	2.22	0.98	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
11: 30	120	2.0	2.77	0.98	328	0.00	0.00	0	0	0	332	0	0.00	0.00	0.0
16: 30	300	7.0	3.21	0.98	1281	0.00	0.00	0	0	0	1295	0	0.00	0.00	0.0
18: 50	140	9.3	3.21	0.98	1725	0.00	0.00	0	0	0	1744	0	0.00	0.00	0.0
19: 0	10	9.3	3.21	0.98	1757	0.14	2.14	3	1	1	1776	1	2.14	1.15	0.0
20: 30	90	11.0	3.21	0.98	2041	0.14	2.30	32	16	18	2065	14	2.29	1.32	0.1
22: 30	120	13.0	3.21	0.98	2419	0.14	2.51	75	26	44	2451	31	2.41	1.53	0.2
23: 0	30	13.5	3.21	0.98	2514	0.30	2.57	99	14	59	2547	40	2.45	1.59	0.3
0: 30	90	15.0	3.21	0.98	2798	0.98	3.09	374	188	247	2836	129	2.89	2.11	1.5
2: 30	120	17.0	3.21	1.01	3183	0.97	2.98	722	229	477	3221	246	2.93	1.96	2.9
3: 0	30	17.5	3.21	1.01	3285	1.06	2.86	813	59	536	3317	277	2.92	1.85	3.3
4: 30	90	19.0	3.21	0.91	3551	1.14	2.82	1105	196	732	3606	381	2.89	1.90	4.5
6: 30	120	21.0	3.18	0.91	3902	1.12	2.76	1479	249	982	3988	516	2.86	1.84	6.1
7: 0	30	21.5	3.18	0.91	3989	1.08	2.74	1569	59	1042	4083	549	2.85	1.82	6.4
8: 30	90	23.0	3.18	0.91	4252	1.03	2.83	1831	177	1219	4369	642	2.85	1.91	7.5
10: 30	120	25.0	3.18	0.91	4603	1.03	2.55	2149	203	1422	4751	766	2.80	1.63	8.8
11: 30	60	26.0	1.34	0.89	4675	1.13	2.51	2321	110	1533	4831	834	2.78	1.62	9.5
12: 30	60	27.0	1.34	0.89	4747	1.13	2.47	2490	107	1641	4912	903	2.75	1.58	10.1
14: 30	120	29.0	1.34	0.89	4891	0.89	2.39	2748	161	1803	5073	1010	2.71	1.50	11.2
15: 30	60	30.0	1.34	0.89	4962	0.93	2.33	2879	81	1884	5153	1066	2.69	1.44	11.7
16: 30	60	31.0	1.34	0.89	5034	0.92	2.27	3005	76	1961	5233	1122	2.67	1.38	12.1
17: 30	60	32.0	1.34	0.89	5106	0.78	2.21	3110	62	2023	5314	1169	2.65	1.32	12.5
18: 30	60	33.0	1.34	0.89	5178	0.95	2.15	3233	71	2095	5394	1226	2.63	1.26	13.0
19: 30	60	34.0	1.34	0.87	5248	0.89	2.07	3344	64	2160	5475	1279	2.61	1.20	13.4
20: 30	60	35.0	1.34	0.87	5318	1.03	2.00	3468	70	2230	5555	1341	2.58	1.13	13.8
21: 30	60	36.0	1.34	0.87	5388	0.95	1.92	3579	60	2290	5635	1399	2.55	1.05	14.2
22: 30	60	37.0	1.34	0.87	5458	0.92	1.85	3682	54	2345	5716	1455	2.53	0.98	14.5
23: 30	60	38.0	1.34	0.87	5528	0.92	1.74	3779	48	2394	5796	1510	2.50	0.87	14.8
0: 30	60	39.0	1.34	0.87	5598	0.72	1.63	3850	33	2427	5877	1554	2.47	0.76	15.0
2: 30	120	41.0	1.34	0.87	5738	1.56	1.41	4117	103	2530	6037	1742	2.36	0.54	15.7
3: 30	60	42.0	1.34	0.86	5807	0.70	1.46	4179	25	2556	6118	1784	2.34	0.60	15.8
4: 30	60	43.0	1.34	0.86	5877	0.71	1.51	4244	27	2584	6198	1827	2.32	0.65	16.0
5: 0	30	43.5	1.34	0.86	5911	0.69	1.53	4276	14	2598	6238	1848	2.31	0.67	16.1
6: 30	90	45.0	1.34	0.86	6015	0.81	1.60	4394	54	2653	6359	1922	2.28	0.74	16.4
8: 30	120	47.0	1.34	0.86	6154	1.19	1.45	4603	84	2737	6520	2065	2.22	0.58	17.0
9: 0	30	47.5	0.91	0.86	6178	1.19	1.41	4653	19	2756	6547	2101	2.21	0.54	17.1
10: 30	90	49.0	0.91	0.00	6178	0.84	1.29	4751	98	2855	6629	2177	2.18	1.29	17.7
12: 30	120	51.0	0.91	0.00	6178	0.82	1.23	4873	121	2976	6738	2276	2.14	1.23	18.4
14: 30	120	53.0	0.91	0.00	6178	0.84	1.17	4992	118	3095	6847	2377	2.10	1.17	19.2
18: 30	240	57.0	0.91	0.00	6178	0.42	1.62	5157	164	3260	7066	2478	2.08	1.62	20.2
19: 0	30	57.5	0.00	0.00	6178	0.42	1.68	5178	21	3281	7066	2491	2.07	1.68	20.3
20: 0	60	58.5	0.00	0.00	6178	0.38	1.79	5219	41	3322	7066	2513	2.07	1.79	20.6
21: 0	60	59.5	0.00	0.00	6178	0.34	1.91	5258	39	3362	7066	2534	2.07	1.91	20.8
22: 0	60	60.5	0.00	0.00	6178	0.33	2.02	5299	40	3402	7066	2554	2.07	2.02	21.1
23: 30	90	62.0	0.00	0.00	6178	0.37	2.09	5370	70	3473	7066	2588	2.07	2.09	21.5
2: 0	150	64.5	0.00	0.00	6178	0.30	2.11	5467	97	3570	7066	2634	2.07	2.11	22.1
3: 30	90	66.0	0.00	0.00	6178	0.29	2.12	5524	56	3627	7066	2661	2.07	2.12	22.5
5: 0	90	67.5	0.00	0.00	6178	0.30	2.12	5582	58	3685	7066	2688	2.07	2.12	22.8
7: 30	150	70.0	0.00	0.00	6178	0.14	2.10	5627	45	3730	7066	2709	2.07	2.10	23.1
11: 30	240	74.0	0.00	0.00	[illegible]	0.25	2.07	5754	127	3857	7066	2771	2.07	2.07	[illegible]

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
15: 30	240	78.0	0.00	0.00	6178	0.28	2.07	5897	143	4000	7066	2840	2.07	2.07	24.8
19: 30	240	82.0	0.00	0.00	6178	0.21	2.09	6006	108	4109	7066	2892	2.07	2.09	25.5
23: 30	240	86.0	0.00	0.00	6178	0.20	2.00	6102	96	4206	7066	2940	2.07	2.00	26.1
3: 30	240	90.0	0.00	0.00	6178	0.13	2.04	6195	92	4298	7066	2985	2.07	2.04	26.6
7: 30	240	94.0	0.00	0.00	6178	0.16	2.03	6274	79	4377	7066	3024	2.07	2.03	27.1
11: 30	240	98.0	0.00	0.00	6178	0.14	2.02	6346	71	4449	7066	3059	2.07	2.02	27.6
15: 30	240	102.0	0.00	0.00	6178	0.13	2.01	6412	66	4516	7066	3092	2.07	2.01	28.0
19: 30	240	106.0	0.00	0.00	6178	0.13	2.01	6478	65	4581	7066	3125	2.07	2.01	28.4
3: 30	480	114.0	0.00	0.00	6178	0.12	2.03	6603	124	4706	7066	3186	2.07	2.03	29.2
7: 30	240	[illegible].0	0.00	0.00	6178	0.10	1.98	6651	47	4754	7066	3210	2.07	1.98	29.5
11: 30	240	122.0	0.00	0.00	6178	0.10	1.94	6698	47	4801	7066	3235	2.07	1.94	29.8
15: 30	240	126.0	0.00	0.00	6178	0.09	1.96	6743	44	4846	7066	3258	2.06	1.96	30.1
19: 30	240	130.0	0.00	0.00	6178	0.14	1.97	6813	69	4916	7066	3293	2.06	1.97	30.5
1: 0	330	135.5	0.00	0.00	6178	0.08	1.99	6871	58	4974	7066	3322	2.06	1.99	30.9
5: 0	240	139.5	0.00	0.00	6178	0.05	1.99	6896	24	4999	7066	3335	2.06	1.99	31.0
9: 0	240	143.5	0.00	0.00	6178	0.07	1.99	6933	37	5036	7066	3353	2.06	1.99	31.[illegible]
13: 0	240	147.5	0.00	0.00	6178	0.07	2.00	6969	35	5072	7066	337[illegible]	2.06	2.00	31.5
16: 0	130	150.5	0.00	0.00	6178	0.07	1.57	6991	21	5094	7066	3385	2.06	1.57	31.6

RUN NO: 16
DATE: 01/30/90

COTTER PILOT PLANT
H&N PROJECT NO. 3052.00

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
9:30	0	0.0	2.04	0.41	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
14:0	270	4.5	2.05	0.41	229	0.00	0.00	0	0	0	553	0	0.00	0.00	0.0
16:30	150	7.0	2.05	0.41	356	0.00	0.00	0	0	0	861	0	0.00	0.00	0.0
17:0	30	7.5	2.05	0.41	381	0.12	2.36	8	7	7	922	3	2.36	1.94	0.0
18:30	90	9.0	2.05	0.46	467	0.37	2.51	93	69	76	1107	37	2.50	2.05	0.7
19:30	60	10.0	2.05	0.46	524	0.60	2.62	139	78	155	1230	74	2.56	2.16	1.4
21:0	90	11.5	2.05	0.46	609	0.86	2.78	405	180	335	1414	151	2.67	2.31	3.2
21:30	30	12.0	2.05	0.46	638	1.18	2.76	503	81	417	1476	187	2.69	2.29	4.0
22:30	60	13.0	2.05	0.46	695	1.29	2.71	714	175	592	1599	264	2.69	2.25	5.7
23:30	60	14.0	2.05	0.46	752	1.29	2.67	922	172	764	1722	342	2.69	2.21	7.3
0:30	60	15.0	2.05	0.46	809	1.47	2.62	1155	191	956	1845	430	2.68	2.17	9.2
2:30	120	17.0	2.05	0.45	919	1.37	2.59	1532	352	1309	2091	595	2.65	2.14	12.6
3:30	60	18.0	2.05	0.45	975	1.60	2.57	1830	204	1513	2214	692	2.64	2.12	14.5
4:30	60	19.0	2.05	0.45	1030	1.57	2.54	2071	198	1712	2337	786	2.63	2.09	16.4
5:0	30	19.5	2.05	0.45	1058	1.47	2.53	2183	92	1804	2398	830	2.62	2.08	17.3
6:30	90	21.0	2.05	0.45	1141	1.63	2.01	2480	230	2034	2583	978	2.53	1.56	19.6
8:30	120	23.0	2.05	0.45	1251	1.70	1.31	2749	177	2212	2829	1182	2.32	0.86	21.3
9:0	30	23.5	2.05	0.45	1279	1.70	1.14	2808	35	2247	2890	1234	2.27	0.69	21.6
10:30	90	25.0	2.04	0.45	1362	1.74	0.90	2950	71	2319	3074	1391	2.12	0.45	22.3
13:0	150	27.5	2.04	0.45	1499	1.73	0.51	3084	17	2336	3380	1650	1.86	0.06	22.5
15:0	120	29.5	2.04	0.44	1609	1.71	1.17	3326	149	2486	3624	1855	1.79	0.79	23.9
17:0	120	31.5	2.04	0.44	1718	1.87	1.83	3739	312	2798	3869	2080	1.79	1.38	26.9
18:30	90	33.0	2.04	0.44	1800	2.04	1.78	4067	246	3044	4053	2265	1.79	1.33	29.3
20:0	90	34.5	1.96	0.44	1879	1.97	1.73	4376	228	3273	4229	2443	1.79	1.28	31.5
21:0	60	35.5	1.96	0.44	1932	1.94	1.69	4574	145	3419	4347	2560	1.78	1.25	32.9
22:0	60	36.5	1.96	0.44	1984	1.69	1.66	4743	123	3543	4464	2661	1.78	1.22	34.1
22:30	30	37.0	1.96	0.44	2011	2.13	1.65	4849	77	3620	4523	2725	1.77	1.20	34.8
23:30	60	38.0	1.96	0.44	2063	1.72	1.62	5016	121	3741	4641	2828	1.77	1.17	36.0
1:0	90	39.5	1.96	0.44	2142	1.94	1.57	5293	198	3939	4817	3004	1.76	1.13	37.9
2:0	60	40.5	1.96	0.44	2195	1.73	1.53	5453	113	4053	4935	3108	1.75	1.09	39.0
3:30	90	42.0	1.96	0.44	2274	1.78	1.47	5690	165	4218	5111	3268	1.74	1.02	40.6
5:0	90	43.5	1.96	0.44	2353	1.79	1.41	5919	156	4375	5288	3430	1.72	0.96	42.1
6:0	60	44.5	1.96	0.46	2408	0.83	1.42	5991	47	4423	5405	3480	1.72	0.95	
7:30	90	46.0	1.88	0.46	2487	1.63	1.42	6207	145	4568	5574	3632	1.70	0.96	4[illegible]
9:0	90	47.5	1.88	0.46	2567	1.68	1.43	6424	146	4714	5744	3783	1.69	0.96	45.[illegible]
9:45	45	48.2	1.88	0.46	2606	1.68	1.40	6530	70	4785	5828	3858	1.69	0.93	46.1
10:0	15	48.5	1.94	0.46	2620	1.60	1.39	6564	72	4807	5857	3882	1.69	0.92	46.3
13:0	180	51.5	1.94	0.46	2783	1.59	1.26	6928	229	5037	6207	4170	1.66	0.79	48.5
16:0	180	54.5	1.91	0.70	3025	1.59	1.19	7269	139	5176	6550	4457	1.63	0.48	49.8
17:0	60	55.5	1.91	0.70	3105	1.63	1.16	7383	45	5221	6665	4555	1.62	0.46	50.3
18:30	90	57.0	1.91	0.70	3226	1.66	1.12	7552	63	5285	6837	4705	1.60	0.42	50.9
19:30	60	58.0	1.91	0.70	3307	1.69	1.10	7664	40	5325	6951	4807	1.59	0.39	51.3
21:0	90	59.5	1.78	0.70	3419	1.70	1.06	7826	54	5380	7112	4960	1.57	0.35	51.8
23:30	150	62.0	1.78	0.00	3419	1.72	0.95	8074	247	5628	7379	5219	1.54	0.95	54.2
1:0	90	63.5	1.78	0.00	3419	2.00	0.89	8235	161	5789	7539	5400	1.52	0.89	55.7
3:30	150	66.0	1.78	0.00	3419	2.45	0.89	8567	331	6120	7806	5768	1.48	0.89	58.9
5:30	120	68.0	1.78	0.00	3419	1.74	0.90	8757	190	6310	8019	5978	1.46	0.90	60.7
7:30	120	70.0	1.78	0.00	3419	1.74	0.91	8949	191	6502	8233	6187	1.44	0.91	62.6
9:0	90	71.5	1.83	0.00	3419	1.67	0.92	9089	140	6643	8398	6338	1.43	0.92	63.9
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
13: 0	120	75.	1.83	0.00	3419	1.68	0.88	9449	178	7003	8825	6742	1.40	0.88	67.4
17: 0	240	79.5	1.72	0.00	3419	1.68	0.79	9771	321	7324	9247	7145	1.36	0.79	70.5
19: 0	120	81.5	1.72	0.00	3419	1.76	0.75	9931	160	7485	9454	7357	1.34	0.75	72.1
19: 30	30	82.0	1.72	0.00	3419	1.84	0.74	9973	41	7526	9505	7412	1.34	0.74	72.5
21: 0	90	83.5	1.72	0.00	3419	1.93	0.71	10098	125	7652	9660	7587	1.33	0.71	73.7
21: 30	30	84.0	1.72	0.00	3419	1.83	0.70	10137	38	7691	9712	7641	1.32	0.70	74.0
23: 0	90	85.5	1.72	0.00	3419	1.76	0.67	10244	107	7798	9867	7800	1.31	0.67	75.1
0: 30	90	87.0	1.72	0.00	3419	1.76	0.64	10347	102	7900	10021	7959	1.29	0.64	76.1
1: 0	30	87.5	1.72	0.00	3419	1.72	0.63	10379	32	7933	10073	8011	1.29	0.63	76.4
2: 0	60	88.5	1.72	0.00	3419	1.65	0.60	10440	60	7993	10176	8111	1.28	0.60	77.0
3: 0	60	89.5	1.72	0.00	3419	1.91	0.57	10506	66	8059	10279	8226	1.27	0.57	77.6
3: 30	30	90.0	1.72	0.00	3419	1.86	0.56	10537	31	8091	10331	8282	1.27	0.56	77.9
5: 0	90	91.5	1.72	0.00	3419	1.95	0.52	10629	91	8182	10486	8457	1.25	0.52	78.8
7: 30	150	94.0	1.72	0.00	3419	1.68	0.46	10745	116	8299	10744	8710	1.23	0.46	79.9
8: 0	30	94.5	1.93	0.00	3419	1.68	0.44	10767	22	8321	10802	8760	1.22	0.44	80.1
9: 0	60	95.5	1.93	0.00	3419	1.75	0.42	10812	44	8366	10917	8865	1.21	0.42	80.5
11: 30	150	98.0	2.07	0.00	3419	[illegible]	0.38	10913	101	8467	11228	9129	1.19	0.38	81.5
12: 30	60	99.0	2.18	0.00	3419	1.94	0.36	10956	42	8510	11359	9245	1.18	0.36	81.9
13: 0	30	99.5	2.18	0.00	3419	1.94	0.36	10977	21	8531	11424	9304	1.17	0.36	82.1
13: 30	30	100.0	2.22	0.00	3419	1.94	0.35	10998	20	8551	11491	9362	1.17	0.35	82.3
16: 0	150	102.5	2.25	0.00	3419	2.09	0.31	11095	97	8649	11828	9676	1.14	0.31	83.3
17: 0	60	103.5	2.26	0.00	3419	2.07	0.29	11131	36	8685	11964	9800	1.13	0.29	83.6
18: 0	60	104.5	2.26	0.00	3419	2.10	0.28	11167	35	8721	12099	9926	1.12	0.28	84.0
19: 30	90	106.0	2.26	0.00	3419	1.98	0.25	11213	46	8767	12303	10105	1.10	0.25	84.4
20: 0	30	106.5	2.54	0.00	3419	2.75	0.25	11233	20	8787	12379	10187	1.10	0.25	84.6
21: 0	60	107.5	2.54	0.00	3419	2.77	0.23	11273	39	8827	12531	10354	1.08	0.23	85.0
23: 0	120	109.5	2.54	0.00	3419	2.93	0.22	11351	77	8904	12836	10706	1.06	0.22	85.7
1: 0	120	111.5	2.54	0.00	3419	2.93	0.20	11423	72	8977	13141	11059	1.03	0.20	86.4
2: 0	60	112.5	0.00	0.00	3419	2.40	0.21	11455	31	9009	13141	11203	1.02	0.21	86.7
3: 30	90	114.0	0.00	0.00	3419	2.17	0.24	11502	47	9056	13141	11399	1.00	0.24	87.2
5: 0	90	115.5	0.00	0.00	3419	1.96	0.25	11548	45	9101	13141	11576	0.99	0.25	87.6
9: 0	240	119.5	0.00	0.00	3419	0.47	0.40	11593	45	9147	13141	11690	0.99	0.40	88.1
13: 0	240	123.5	0.00	0.00	3419	0.23	0.45	11619	25	9173	13141	11747	0.98	0.45	88.3
16: 0	180	126.5	0.00	0.00	3419	0.17	0.46	11634	15	9188	13141	11779	0.98	0.46	88.5

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
10: 0	0	0.0	2.39	0.61	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
12: 30	150	2.5	2.24	0.61	207	0.00	0.00	0	0	0	336	0	0.00	0.00	0.0
14: 30	120	4.5	2.26	0.61	374	0.01	2.07	4	3	3	607	2	2.06	1.45	0.0
16: 0	90	6.0	2.26	0.68	514	0.00	0.00	4	0	3	810	2	2.06	0.00	0.0
17: 0	60	7.0	2.26	0.68	607	0.00	0.00	4	0	3	946	2	2.06	0.00	0.0
18: 30	90	8.5	2.17	0.68	741	0.00	0.00	4	0	3	1141	2	2.06	0.00	0.0
20: 0	90	10.0	2.17	0.68	875	0.03	2.06	11	4	7	1336	5	2.06	1.38	0.0
21: 0	60	11.0	2.17	0.68	965	0.71	[illegible]	100	59	66	1467	48	2.06	1.38	0.5
22: 0	60	12.0	[illegible]17	0.68	1054	1.52	2.06	288	126	193	1597	139	2.06	1.38	1.4
22: 30	30	12.5	[illegible]	0.68	1099	0.50	2.06	320	21	214	1662	155	2.06	1.37	1.6
23: 30	60	13.5	2.17	0.70	1191	0.61	2.40	409	62	277	1792	192	2.13	1.69	2.1
1: 0	90	15.0	2.17	0.70	1328	0.87	2.90	637	172	449	1987	270	2.35	2.20	3.4
2: 0	60	16.0	2.17	0.70	1420	1.16	3.24	864	177	627	2118	340	2.53	2.53	4.7
2: 30	30	16.5	2.17	0.70	1466	1.18	3.40	985	96	723	2183	376	2.62	2.70	5.4
3: 30	60	17.5	2.17	0.70	1557	1.30	3.40	1251	210	934	2313	454	2.75	2.69	7.0
5: 0	90	19.0	2.17	0.70	1695	1.51	3.29	1699	351	1286	2508	590	2.87	2.58	9.7
6: 0	60	20.0	2.17	0.70	1786	1.05	3.38	1913	169	1456	2638	653	2.92	2.68	11.0
6: 30	30	20.5	2.17	0.70	1832	0.97	3.38	2012	78	1534	2703	682	2.94	2.67	11.6
7: 30	60	21.5	1.96	0.70	1915	1.65	3.37	2346	264	1799	2821	781	3.00	2.67	13.6
10: 0	150	24.0	1.96	0.70	2122	1.61	3.16	3113	595	2394	3115	1024	3.03	2.45	18.1
11: 30	90	25.5	2.22	0.70	2263	1.67	3.03	3570	351	2745	3315	1174	3.03	2.33	20.8
13: 30	120	27.5	2.22	0.74	2461	1.73	2.90	4175	449	3195	3581	1383	3.01	2.15	24.2
15: 30	120	29.5	2.22	0.74	2660	1.77	2.76	4763	429	3625	3848	1596	2.98	2.02	27.4
17: 30	120	31.5	2.22	0.74	2858	1.74	2.63	5314	395	4020	4114	1805	2.94	1.89	30.4
18: 30	60	32.5	2.02	0.74	2948	1.50	2.57	5546	164	4185	4235	1895	2.92	1.82	31.7
19: 30	60	33.5	2.02	0.74	3039	1.73	2.50	5808	183	4369	4356	1999	2.90	1.76	33.1
20: 30	60	34.5	2.02	0.76	3131	1.69	2.44	6056	171	4540	4478	2101	2.88	1.68	34.4
22: 30	120	36.5	2.02	0.76	3316	1.86	2.33	6577	350	4891	4720	2324	2.82	1.57	37.0
23: 30	60	37.5	2.02	0.76	3409	1.86	2.27	6831	168	5060	4841	2436	2.80	1.51	38.3
1: 0	90	39.0	2.02	0.76	3547	1.78	2.27	7198	243	5303	5023	2597	2.77	1.51	40.2
3: 30	150	41.5	2.07	0.76	3779	2.01	2.13	7844	414	5718	5326	2900	2.70	1.36	43.3
5: 0	90	43.0	2.02	0.78	3922	1.70	2.13	8171	206	5924	5508	3053	2.67	1.34	44.9
7: 30	150	45.5	2.02	0.78	4161	1.75	2.04	8710	330	6255	5811	3317	2.62	1.25	47.4
11: 30	240	49.5	2.00	0.78	4539	1.86	1.77	9505	441	6697	6291	3766	2.52	0.98	50.7
13: 0	90	51.0	2.00	0.85	4692	1.86	1.77	9803	154	6851	6471	3934	2.49	0.91	51.9
15: 30	150	53.5	2.00	0.85	4949	1.77	1.68	10252	221	7072	6771	4201	2.44	0.82	53.6
19: 0	210	57.0	2.00	0.85	5307	1.90	1.57	10883	289	7361	7191	4601	2.36	0.72	55.8
19: 30	30	57.5	2.00	0.85	5359	1.82	1.56	10968	38	7400	7251	4655	2.35	0.70	56.1
21: 30	120	59.5	2.00	0.85	5564	1.93	1.52	11323	155	7556	7491	4888	2.31	0.67	57.2
23: 0	90	61.0	2.00	0.85	5717	1.79	1.49	11565	103	7660	7671	5050	2.29	0.64	58.0
0: 30	90	62.5	2.00	0.85	5871	1.79	1.47	11803	100	7760	7851	5211	2.26	0.62	58.8
2: 0	90	64.0	2.00	0.85	6025	1.70	1.44	12025	91	7851	8031	5364	2.24	0.59	59.5
3: 0	60	65.0	2.00	1.21	6171	1.78	1.43	12178	23	7874	8151	5471	2.22	0.21	59.7
3: 30	30	65.5	2.00	1.21	6243	1.94	1.41	12260	11	7886	8211	5530	2.21	0.19	59.7
5: 30	120	67.5	2.00	1.19	6529	1.72	1.37	12543	37	7923	8451	5736	2.18	0.18	60.0
7: 30	120	69.5	2.00	1.19	6815	1.79	1.33	12829	30	7953	8691	5951	2.15	0.14	60.3
8: 0	30	70.0	2.25	1.19	6895	1.79	1.32	12900	7	7960	8758	6005	2.14	0.13	60.3
11: 30	210	73.5	2.44	1.19	7505	1.92	1.26	13409	28	7989	9271	6409	2.09	0.07	60.5
12: 30	60	74.5	2.58	1.32	7710	1.98	1.25	13559	0	7989	9426	6528	2.07	0.00	60.5
13: 0	30	75.0	2.58	1.32	[illegible]	[illegible]	1.25	[illegible]	0	7989	[illegible]	[illegible]	2.06	0.00	60.5

TIME		DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
13:	30	30	75.5	2.66	1.32	7918	1.98	1.24	13708	0	7989	9583	6647	2.06	0.00	60.5
16:	0	150	78.0	2.71	1.32	8457	2.29	1.22	14131	0	7989	9989	6992	2.02	0.00	60.5
17:	0	60	79.0	2.70	1.32	8671	2.20	1.21	14292	0	7989	10151	7124	2.00	0.00	60.5
18:	0	60	80.0	2.70	0.00	8671	2.29	1.22	14461	169	8158	10313	7262	1.99	1.22	61.8
19:	30	90	81.5	2.70	0.00	8671	2.75	1.24	14769	308	8466	10556	7509	1.96	1.24	64.1
20:	0	30	82.0	3.01	0.00	8671	3.93	1.24	14916	147	8613	10647	7627	1.95	1.24	65.3
23:	0	180	85.0	3.01	0.00	8671	3.34	1.27	15802	885	9499	11198	8319	1.89	1.27	72.0
23:	30	30	85.5	3.01	0.00	8671	3.84	1.28	15950	148	9647	11279	8435	1.89	1.28	73.1
1:	0	90	87.0	3.01	0.00	8671	2.28	1.26	16210	260	9907	11550	8641	1.87	1.26	75.1
2:	0	60	88.0	0.00	0.00	8671	2.17	1.25	16374	163	10071	11550	8771	1.86	1.25	76.3
3:	30	90	89.5	0.00	0.00	8671	2.74	1.23	16678	304	10375	11550	9018	1.84	1.23	78.6
5:	0	90	91.0	0.00	0.00	8671	2.77	1.21	16981	303	10678	11550	9268	1.83	1.21	80.9
9:	0	240	95.0	0.00	0.00	8671	0.62	1.24	17168	186	10865	11550	9419	1.82	1.24	82.3
13:	0	240	99.0	0.00	0.00	8671	0.31	1.32	17267	99	10964	11550	949[illegible]	1.81	1.32	83.1
16:	0	180	102.0	0.00	0.00	8671	0.23	1.59	17333	66	11030	11550	9535	1.81	1.59	83.6
17:	0	60	103.0	0.00	0.00	8671	0.23	1.59	17355	22	11052	11550	9549	1.81	1.59	83.7

RUN NO: 18
DATE: 1/29/80

COTTER PILOT PLANT
H&N PROJECT NO. 3052.00

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
19: 0	0	0.0	2.96	1.10	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
20: 0	60	1.0	2.53	1.10	167	0.00	0.00	0	0	0	151	0	0.00	0.00	0.0
21: 0	60	2.0	2.32	1.10	321	0.00	0.00	0	0	0	291	0	0.00	0.00	0.0
1: 0	240	6.0	2.32	1.10	936	0.00	0.00	0	0	0	847	0	0.00	0.00	0.0
2: 0	60	7.0	2.32	1.10	1090	0.17	2.20	22	11	11	987	10	2.20	1.09	0.0
3: 30	90	8.5	2.32	1.12	1325	0.39	2.39	106	44	55	1195	45	2.34	1.26	0.4
5: 0	90	10.0	2.32	1.12	1560	0.58	2.57	242	76	132	1404	98	2.47	1.45	0.9
6: 0	60	11.0	2.32	1.12	1717	0.67	2.70	352	64	196	1543	138	2.54	1.57	1.4
6: 30	30	11.5	2.32	1.12	1795	0.64	2.76	405	31	228	1613	158	2.56	1.64	1.6
7: 30	60	12.5	2.16	1.12	1941	0.75	2.89	536	79	307	1743	203	2.64	1.76	2.2
8: 0	30	13.0	2.88	1.12	2039	0.75	2.86	600	39	346	1829	225	2.66	1.74	2.4
9: 0	60	14.0	2.16	1.12	2185	1.14	2.81	792	115	462	1959	293	2.69	1.68	3.3
10: 0	60	15.0	2.16	1.12	2331	1.12	2.75	978	109	571	2088	361	2.70	1.62	4.1
11: 0	60	16.0	2.16	1.12	2476	1.18	2.69	1171	112	684	2218	432	2.70	1.57	4.9
11: 30	30	16.5	2.23	1.12	2552	1.38	2.67	1281	64	748	2295	474	2.70	1.54	5.3
12: 30	60	17.5	2.23	1.11	2702	1.18	2.65	1470	109	857	2418	545	2.69	1.53	6.1
13: 30	60	18.5	2.23	1.11	2851	1.25	2.63	1669	114	971	2552	620	2.68	1.52	6.9
15: 30	120	20.5	2.16	1.11	3141	1.42	2.60	2113	253	1225	2811	791	2.67	1.49	8.3
17: 30	120	22.5	2.14	1.11	3429	1.46	2.58	2566	256	1481	3068	966	2.65	1.46	10.6
18: 30	60	23.5	2.34	1.11	3586	1.53	2.55	2801	132	1613	3209	1058	2.64	1.43	11.6
19: 30	60	24.5	2.34	1.11	3743	1.55	2.49	3034	128	1742	3349	1151	2.63	1.37	12.5
21: 30	120	26.5	2.34	1.14	4063	1.65	2.43	3516	255	1998	3630	1350	2.60	1.29	14.3
23: 30	120	28.5	2.34	1.14	4384	1.76	2.36	4018	260	2258	3911	1562	2.57	1.22	16.2
1: 0	90	30.0	2.34	1.14	4624	1.82	2.34	4403	197	2455	4121	1726	2.55	1.20	17.6
3: 30	150	32.5	2.34	1.14	5024	1.72	2.29	4996	298	2753	4472	1984	2.51	1.15	19.8
5: 0	90	34.0	2.34	1.14	5265	1.95	2.21	5385	189	2943	4683	2160	2.49	1.07	21.1
7: 30	150	36.5	2.34	1.14	5665	1.92	2.14	6004	288	3232	5034	2449	2.45	1.00	23.2
11: 30	240	40.5	2.31	1.67	6591	1.96	2.06	6980	187	3419	5598	2921	2.38	0.39	24.5
13: 0	90	42.0	3.12	1.67	7060	1.96	2.01	7337	61	3480	5869	3098	2.36	0.34	25.0
15: 30	150	44.5	3.12	1.67	7842	2.24	1.97	8001	101	3581	6337	3435	2.32	0.30	25.7
19: 0	210	48.0	3.12	1.41	8766	1.94	1.93	8793	215	3797	6992	3844	2.28	0.52	27.3
19: 30	30	48.5	3.12	1.41	8898	2.19	1.90	8919	32	3829	7086	3910	2.28	0.49	27.5
21: 30	120	50.5	3.12	1.41	9426	2.68	1.86	9521	147	3977	7460	4232	2.24	0.45	28.5
23: 0	90	52.0	3.90	1.41	9922	2.69	1.84	9968	104	4081	7811	4475	2.22	0.42	29.3
0: 30	90	53.5	3.90	1.41	10417	2.76	1.81	10419	99	4181	8162	4724	2.20	0.40	30.0
1: 0	30	54.0	3.90	1.41	10582	2.98	1.78	10579	33	4214	8279	4814	2.19	0.37	30.3
2: 0	60	55.0	3.90	1.41	10912	3.11	1.76	10908	65	4280	8513	5000	2.18	0.35	30.7
3: 0	60	56.0	3.90	1.41	11242	3.30	1.76	11257	69	4350	8747	5198	2.16	0.35	31.2
3: 30	30	56.5	3.90	1.41	11407	3.21	1.76	11427	33	4384	8864	5295	2.15	0.35	31.5
5: 30	120	58.5	3.90	1.41	12068	3.05	1.75	12069	125	4509	9332	5661	2.13	0.34	32.4
7: 30	120	60.5	3.90	1.41	12728	3.22	1.74	12745	130	4639	9800	6048	2.10	0.33	33.3
8: 0	30	61.0	5.40	1.35	12947	3.22	1.73	12913	37	4676	9962	6145	2.10	0.33	33.6
10: 0	120	63.0	5.40	1.35	13824	4.30	1.69	13787	174	4851	10610	6661	2.06	0.33	34.8
11: 30	90	64.5	5.78	1.35	14528	4.33	1.65	14434	118	4970	11130	7052	2.04	0.30	35.7
12: 30	60	65.5	7.13	1.35	15107	4.33	1.64	14862	76	5046	11558	7312	2.03	0.29	36.2
13: 0	30	66.0	7.15	1.35	15397	4.66	1.64	15092	40	5086	11773	7452	2.02	0.28	36.5
13: 30	30	66.5	7.15	1.35	15687	4.66	1.63	15320	39	5126	11987	7591	2.01	0.28	36.8
16: 0	150	69.0	7.13	1.35	17134	5.94	1.60	16753	225	5351	13057	8483	1.97	0.25	38.4
17: 0	60	70.0	7.13	1.35	17713	5.69	1.59	17298	82	5434	13485	8805	1.96	0.24	39.0
19: 0	60	71.0	7.13	0.00	17713	7.20	1.55	17971	673	6108	13913	9257	1.94	1.55	42.9

RUN NO: 18 | COTTER PILOT PLANT | PAGE 2
DATE: 1/29/80 | H&N PROJECT NO. 3052.00

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
19: 30	90	72.5	7.13	0.00	17713	7.32	1.50	18962	990	7098	14554	9916	1.91	1.50	51.0
20: 0	30	73.0	7.98	0.00	17713	8.13	1.43	19313	350	7449	14793	10160	1.90	1.43	53.5
23: 0	180	76.0	7.98	0.00	17713	8.35	1.30	21278	1965	9414	16230	11664	1.82	1.30	67.6
23: 30	30	76.5	7.98	0.00	17713	8.35	0.93	21523	245	9660	16469	11915	1.80	0.98	69.4
1: 0	90	78.0	7.98	0.00	17713	7.43	0.84	22087	563	10223	17187	12584	1.75	0.84	73.5
3: 30	150	80.5	10.73	0.00	17713	9.42	0.61	22952	864	11088	18797	13997	1.63	0.61	79.7
5: 0	90	82.0	10.73	0.00	17713	8.86	0.47	23331	378	11467	19763	14795	1.57	0.47	82.4
6: 30	90	83.5	10.73	0.00	17713	8.26	0.52	23722	390	11858	20728	15532	1.52	0.52	85.2
9: 0	150	86.0	10.73	0.00	17713	8.26	0.57	24435	713	12571	22338	16779	1.45	0.57	90.3
9: 0	0	86.0	0.00	0.00	17713	1.70	0.57	24435	0	12571	22338	16779	1.45	0.57	90.3
13: 0	240	90.0	0.00	0.00	17713	0.50	0.72	24522	87	12658	22338	16900	1.45	0.72	91.0
16: 0	180	93.0	0.00	0.00	17713	0.46	1.35	24636	113	12772	22338	16983	1.45	1.35	91.8

RUN NO: 19
DATE: 01/29/80

COTTER PILOT PLANT
H&N PROJECT NO. 3052.00

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
20: 0	0	0.0	6.36	1.13	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
23: 0	180	3.0	6.36	1.13	1302	0.00	0.00	0	0	0	1144	0	0.00	0.00	0.0
1: 0	120	5.0	6.36	1.13	2171	0.00	0.00	0	0	0	1908	0	0.00	0.00	0.0
2: 0	60	6.0	6.36	1.13	2605	0.15	2.83	26	15	15	2289	9	2.83	1.69	0.1
3: 0	60	7.0	6.36	1.13	3039	0.50	2.83	111	50	66	2671	39	2.83	1.69	0.6
4: 0	60	8.0	6.36	1.13	3474	1.13	2.87	307	118	185	3052	107	2.85	1.73	1.7
5: 0	60	9.0	6.36	1.13	3908	1.66	2.91	598	177	362	3434	207	2.88	1.77	3.3
6: 0	60	10.0	6.36	1.13	4342	1.98	2.95	950	216	578	3816	326	2.90	1.81	5.3
7: 0	60	11.0	6.36	1.13	4776	2.21	2.99	1347	245	824	4197	459	2.93	1.85	7.6
8: 0	60	12.0	4.07	1.13	5054	2.36	2.89	1757	248	1073	4441	601	2.92	1.75	9.9
10: 0	120	14.0	4.07	1.13	5610	2.25	2.69	2487	422	1495	4930	872	2.85	1.56	13.8
11: 0	60	15.0	2.38	1.14	5773	2.95	2.60	2949	258	1753	5073	1049	2.80	1.45	16.2
13: 0	120	17.0	2.42	1.29	6148	2.48	2.48	3691	356	2110	5363	1348	2.73	1.19	19.5
13: 30	30	17.5	2.42	1.29	6242	2.48	2.45	3874	86	2197	5436	1422	2.72	1.16	20.3
15: 0	90	19.0	2.42	1.29	6523	2.26	2.36	4357	220	2417	5653	1627	2.67	1.07	22.3
19: 0	240	23.0	2.42	1.29	7272	2.31	2.26	5617	542	2959	6234	2183	2.57	0.97	27.3
19: 30	30	23.5	2.42	1.29	7365	2.32	2.23	5773	65	3025	6307	2252	2.56	0.94	27.9
21: 30	120	25.5	2.42	1.29	7740	2.14	2.12	6318	213	3239	6597	2510	2.51	0.83	29.9
23: 0	90	27.0	2.42	1.29	8021	2.28	2.01	6732	148	3387	6815	2716	2.47	0.72	31.2
0: 30	90	28.5	2.42	1.29	8302	2.22	1.99	7131	140	3527	7033	2916	2.44	0.70	32.5
2: 0	90	30.0	2.42	1.29	8583	2.13	1.96	7508	130	3657	7251	3108	2.41	0.67	33.7
3: 0	60	31.0	2.42	1.29	8770	2.32	1.95	7781	92	3750	7396	3247	2.39	0.66	34.6
3: 30	30	31.5	2.42	1.29	8864	2.20	1.94	7910	43	3794	7468	3313	2.38	0.65	35.0
5: 30	120	33.5	2.42	1.29	9233	2.16	1.92	8410	164	3959	7759	3573	2.35	0.63	36.5
7: 0	90	35.0	2.42	1.29	9519	2.18	1.90	8785	120	4079	7977	3770	2.32	0.61	37.6
8: 0	60	36.0	2.72	1.32	9735	2.18	1.87	9031	72	4152	8140	3901	2.31	0.55	38.3
11: 0	180	39.0	2.72	1.32	10383	2.28	1.79	9771	195	4347	8629	4313	2.26	0.47	40.1
11: 0	0	39.0	2.91	1.32	10383	2.28	1.79	9771	0	4347	8629	4313	2.26	0.47	40.1
12: 30	90	40.5	3.07	1.32	10749	2.28	1.76	10135	91	4439	8906	4519	2.24	0.44	41.0
13: 0	30	41.0	3.07	1.32	10870	2.47	1.75	10266	32	4471	8998	4593	2.23	0.43	41.3
13: 30	30	41.5	3.06	1.32	10992	2.47	1.74	10396	31	4503	9090	4668	2.22	0.42	41.6
16: 0	150	44.0	3.29	1.32	11645	2.49	1.70	11032	141	4644	9583	5042	2.18	0.37	42.9
17: 0	60	45.0	3.10	1.32	11891	2.54	1.68	11289	54	4698	9769	5195	2.17	0.35	43.4
18: 0	60	46.0	3.10	0.00	11891	2.74	1.62	11555	266	4965	9955	5359	2.15	1.62	45.8
19: 0	60	47.0	3.10	0.00	11891	2.84	1.56	11821	266	5231	10141	5530	2.13	1.56	48.3
19: 30	30	47.5	3.10	0.00	11891	2.90	1.53	11955	133	5365	10234	5617	2.12	1.53	49.5
20: 0	30	48.0	3.45	0.00	11891	2.72	1.51	12079	123	5489	10338	5699	2.11	1.51	50.7
23: 0	180	51.0	3.45	0.00	11891	3.43	1.37	12927	848	6337	10959	6318	2.04	1.37	58.5
1: 0	120	53.0	3.45	0.00	11891	3.62	1.45	13561	633	6971	11373	6753	2.00	1.45	64.4
2: 0	60	54.0	3.45	0.00	11891	3.61	1.50	13886	325	7296	11580	6970	1.99	1.50	67.4
2: 0	0	54.0	0.00	0.00	11891	3.61	1.50	13886	0	7296	11580	6970	1.99	1.50	67.4
3: 0	60	55.0	0.00	0.00	11891	3.47	1.54	14208	321	7617	11580	7178	1.97	1.54	70.3
3: 30	30	55.5	0.00	0.00	11891	2.32	1.56	14317	109	7727	11580	7248	1.97	1.56	71.3
5: 0	90	57.0	0.00	0.00	11891	2.38	1.58	14658	341	8068	11580	7463	1.96	1.58	74.5
9: 0	240	61.0	0.00	0.00	11891	1.63	1.59	15282	623	8692	11580	7855	1.94	1.59	80.3
13: 0	240	65.0	0.00	0.00	11891	1.30	1.57	15774	492	9184	11580	8163	1.93	1.57	84.3
16: 0	180	68.0	0.00	0.00	11891	1.30	0.81	15966	191	9376	11580	8402	1.90	0.81	86.6

PRECIPITATION OF URANIUM FROM PILOT PLANT LIQUORS

Introduction

TL leach tests were made on 25-ton batches of ore from the Charlie Mine. Ore was crushed, treated with sulfuric acid and sodium chlorate, cured and rinsed. The rinsing of solubilized uranium was done by spraying an intermediate liquor on a bed of cured ore to yield pregnant solution, followed by spraying intermediate liquor and water onto the bed to give more intermediate liquor.

Pregnant solution was accumulated over the 17 runs with Charlie ore before precipitation of a crude yellow cake was started. In the first, and only, batch run before shutdown, the solution set to a gel when magnesia was added. When centrifugation was tried, there was almost no dewatering of the gelatinous solid. As a result, the treatment of pregnant solution was stopped until a procedure could be found to get a precipitate that is not gelatinous. This report describes a procedure that has since been found to produce a flocculated, filterable precipitate.

Conclusion

Leach liquor, as a composite of existing inventory, can be precipitated and readily vaccum filtered by slowly adding the liquor to an aqueous slurry of MgO at a pH above 5-5.5. Approximately, 0.4 lbs. MgO per gallon of liquor is required. Additional water for processing is not required as filtrate can be recycled to prepare the MgO slurry. A filter cake with about 30% solids and density of about 10 pounds per gallon can be produced by filtration at 26 inches Hg vacuum. The precipitate is uniform, containing no large particles which would cause plugging.

The gel-like material currently at the plant can be mixed with 20 v% pregnant liquor to give a thin slurry. This can be pumped to other liquor tanks where it will completely dissolve. The dissolved gel can then be reprecipitated as part of the leach liquor composite.

Proposed Process

Current Inventory	Contents	Capacity
Precipitation Tank	Ø gal.	2000 gal
Pregnant Liquor P-1	Ø *	4500
Pregnant Liquor P-2	4360	4500
Interliquor 1-1	2820	3000
Interliquor 1-2	2780	3000
Interliquor 1-3	2570	3000
Interliquor 1-4	2750	3000
Rinse Solution 1-5	Ø *	3000
Filtrate 1-6	2000 **	3000

* Tank lining torn but repairable

** Currently contains gel from precipitation tank

The precipitation tank is seven feet in diameter by seven feet high, dish-bottom, supported on legs about two feet above ground. A 1-1/2 inch nozzle protrudes from the side of the tank four feet from the top. Lines from each of the tanks can each be changed in about an hour as needed to pump liquor from one location to another.

Step 1. Add 1000 gal. from P-2 to 1-6 which contains the gel-precipitate on hand. Recirculate this mixture until the thin suspension is uniform. Use compressed air to speed the mixing process (3-6 hours). Caution: Hazard exists of puncturing the plastic liner if an air lance is used.

Step 2. If any solids remain in the precipitation tank, transfer 500 gal. from P-2 to the tank and mix until solids dissolve. Rinse down walls of the tank with liquor. The tank must not have any solid particles in it. Transfer liquid back to P-2. (2-4 hours)

Step 3. Transfer 500 gal. from 1-1 to the precipitation tank. (1 hour)

Step 4. Set up pumps and transfer lines to circulate and mix liquor from tank to tank to form a composite. The transfer sequence should be P-2, 1-6, 1-3, 1-2, 1-1, and back to P-2. Locate inlet and outlet at opposite ends of the tank to facilitate mixing. (10 hours at 20/gal./min.)

Step 5. Attach a high-speed mixer and a pump to a 55 gal. drum. Fill the drum about 1/2 full with solution from the precipitation tank. Add 1 bag MgO slowly with stirring and pump the uniform slurry back to the precipitation tank. Repeat this process until 7-1/2 bags have been added. (1/2 to 1 hour)

Step 6. Add composite liquor prepared in Step 4 to the precipitation tank at 20 gal./min. with mixing. Check the pH when 500 gal. and 1000 gal. have been added. At this point, reduce the flow rate to 10 gal./min. and monitor pH continuously. If pH drops to 5.5, stop the pump and continue mixing until the pH rises to 6. At no time should the pH drop below 5. After 1500 gal. of liquor have been added, continue mixing until the pH rises to 7.5. Allow the solids to settle for one hour. (4-5 hours)

Step 7. Pump the solids to the centrifuge. Transfer solids to 55 gal. drums. Pump or drain filtrate to tank 1-5. Leave 500 gal. of supernatant in the precipitation tank to prepare the MgO slurry for the next batch. (3 hours assuming a rate of 10 gal./min.) If the centrifuge does not function suitably, the filter press could be used with great sacrifice in efficiency.

Step 8. Repeat Steps 5-7. To insure a uniform composite, continue circulating liquor from tank to tank during precipitation and filtration steps.

Step 9. When about 2000 gal. of filtrate has accumulated in 1-5, dispose of it in the manner specified by Cotter. Keep 1000 gal. in the tank as reserve for washing down other tanks or preparing MgO slurry as required.

Step 10. When all of the liquor has been processed, rinse down each tank with filtrate. Pump filtrate, followed by water through the centrifuge. Dispose of the remaining filtrate and wash water. Secure all equipment.

Notes:

Number precipitation batches (25% R/C) = 12
Min. MgO required - 6900 lbs. (86 bags)
Number 55 gal. drums required for solids disposal = 80-100
Weight of drum of solids = 560 lb./drum
Volume of filtrate to dispose = 12,800 gal.
Estimated time for batch precipitation of liquor, allowing 24 hours for each start-up and shutdown, assuming satisfactory operation of the centrifuge = 180 hours.

Background

The Cotter Pilot Plant was shut down for the winter on December 20, 1979. Five leach liquor tanks and a tank of gel-like precipitate were left.

The precipitate was prepared by adding an aqueous MgO slurry to pregnant liquor. Attempts were made, without success, to filter or centrifuge the precipitate. Before the plant could be dismantled, these materials would have to be removed. Alternatives were precipitation, filtration, and shipping drummed solids to Cotter, or transporting liquid in trucks to Cotter. A satisfactory precipitation scheme was preferred.

Materials

All tests were performed on samples from the liquor tanks brought from the pilot plant by Bryan Hamel. The material in the precipitation tank was simulated by adding an aqueous slurry of MgO to pregnant liquor from P-2. A composite of all the liquor tanks was prepared in proportion by volume and used for most of the tests.

Samples of each tank were titrated with NaOH to pH 7 and pH 8. Results were converted to gm. MgO/100 ml. solution to reach these pH levels.

TABLE I

GRAMS OF MgO REQUIRED TO PRECIPITATE LEACH LIQUOR

TANK	GRAMS MgO/100 ml	
	pH 7	pH 8
1-1	0.55	0.56
1-2	2.22	2.30
1-3	2.85	2.96
1-4	3.47	3.61
P-2	7.78	8.06
Composite	-	3.88

Experimentally, more MgO, 4.6 - 5.4 gm/100 ml., was required for precipitation of composite leach liquor than was calculated.

Procedures

A slurry of MgO was prepared in a beaker, using interliquor from 1-1 or filtrate from previous tests. The mixture was stirred with a magnetic spin-bar. Electrodes were immersed in the mixture to measure the pH. Liquor solution usually 150 ml., was added at a controlled rate using a Masterflex pump. The rate was adjusted to maintain a pH above 5.0 (5.5 desired).

To simulate the attempted pilot plant precipitation, solid MgO or a slurry of MgO in 10 ml. water was added slowly to 100 ml. of pregnant liquor from P-2.

After a period of equilibration, during which the pH rose to the desired range 7.5 - 8.0, the mixtures were filtered through #41 Whatman filter paper on a 7 cm. Buchner funnel under 26" Hg vacuum. The volume of filtrate, thickness of filter cake, and weight of a wet filter cake were recorded. The filter cake was dried overnight at 110° C and weighed. The % solids, volume, and density of wet filter cake were calculated.

Results

The following tests were conducted for batch precipitation of liquor from the pilot plant:

(1) A slurry was prepared containing 8.1g MgO and 50 ml. interliquor from tank 1-1, the most dilute source in the plant. One hundred fifty ml. of composite from tanks P-2, 1-2, 1-3, and 1-4 were added in proportion to their volume. The pH was held above 5.5. After addition of liquor, the pH rose to 8.0 during an equilibration period. The mixture filtered rapidly in 1 min. to give a grey-green solid and a clear filtrate.

(2) A slurry of 8.1g MgO with 50 ml. filtrate from the first run was prepared and 150 ml. composite by volume of all five liquor tanks was added over a 2 hour period. Final pH was 7.90.

Filtration was complete within 1.5 min. Filtrate was combined with the filtrate from test (1).

A total of five runs were conducted using recycled filtrate. The following variables were investigated. In all tests, filtration was rapid giving a wet filter cake with approximately 30% solids.

(3) Twenty ml. of gel representing the material currently in the precipitation tank and 130 ml. of composite liquor were added to a slurry containing 7g MgO and 50 ml. filtrate. Initially, the gel dissolved to give a deep brown solution which turned light green with time. Solid particles in the gel, about 1/16th to 1/8th inch in diameter, dissolved more slowly over a 15 minute period. The solution was added to an MgO/filtrate slurry over a 1.5 hour period. Final pH was 7.74.

(4) A 50 ml. portion of suspended solids from a prior test was used as a slurry to form the MgO suspension instead of filtrate. A satisfactory precipitate was produced. The initial mixture was hard to stir, however, because of the high solids content.

(5) A slurry was prepared with 16.7 gm. MgO used at the Pilot Plant and 50 ml. of filtrate. A solution consisting of 40 ml. of gel dissolved in 310 ml. composite liquor was added in two hours. The percent recycled filtrate was over 12-1/2% versus 25% in all other tests. Unreacted MgO formed a cake on the bottom of the beaker. Either the ratio of liquid to MgO in the slurry was too low or stirring was not efficient in this run. The properties of the filter cake were typical of a satisfactory test.

To obtain a solid that could be readily filtered, the pH had to be maintained at as high a value as possible during the addition of acid liquor. In one run, liquor was added rapidly and the pH dropped to 2.8. The pH rose slowly to 7.5 overnight. This mixture was filtered in 20 minutes. When the pH was held above 5, filtration was complete in 1-2 minutes. Time required to add liquor to MgO was not critical. In one test, liquor was added in one hour. However, when most of the liquor was added, the rate had to be reduced or momentarily stopped as the pH approached 5. When all the liquor had been added, an equilibration period of 15-120 minutes was required to complete the neutralization and increase the pH to the desired 7 - 8 range.

Solids, obtained by adding liquor to an MgO slurry, were allowed to settle by gravity. Solids settled from 33% to 46% of their original volume in one hour. However, this was two to three times the volume of the solids obtained by vacuum filtration. Cationic flocculating agents did not produce a more compact solid. Anionic agents were not available for evaluation.

The following average results were obtained from six tests in which liquor was added to a slurry of MgO.

v % Filtrate/Initial Liquid = 74%
w % Solids in filter cake = 31.9%
Rate of filtration * (lb. wet solid/ft^2 min) = 1.5
Thickness of wet filter cake (in.) * = 0.5
Density of wet filter cake (1 lb/ft^3) = 69
* 7 cm. Buchner funnel, 26" Hg vacuum, #43 filter paper

By comparison, the gel-like precipitate prepared by adding MgO to pregnant liquor had a filtration rate of 0.094 lb/ft^2/min., 6% of the rate by the preferred method.

Filtrates were initially clear. After several minutes, a pale yellow suspension would form and settle out as a trace of precipitate. The substance does not contain ferric iron.

INTRODUCTION

In 1979, Holmes & Narver designed and built a 25 ton per day TL leach pilot plant to demonstrate the amenability of Charlie ore to large-scale TL leaching. Seventeen runs were conducted at this facility during November and December, 1979. Results were discussed in a report dated February 1, 1980. Results showed that TL leaching could give the uranium extraction (90%) on 25-ton batches of ore that had been demonstrated on bench-scale testing of core samples from the Charlie ore deposit.

During the current, second phase of the pilot plant program, detailed design data were obtained for the construction of a commercial plant. Ten of the 25 tests were conducted with ore remaining from 1979 operations. The balance of the tests used freshly mined ore. This report describes the objectives of the program, discussion of the results, and conclusions leading to the recommendation that the program continue with the conduct of a feasibility study for the construction of a full-scale TL leach facility.

PROJECT OBJECTIVES

GENERAL OBJECTIVES

1. Determine uranium recovery from freshly mined ore representing the main portion of a subsidiary ore body at Charlie mine.

2. Obtain operating data for design of a commercial plant.

3. Test operating methods and procedures.

SPECIFIC OBJECTIVES

1. Establish an adequate system of rinsing the bed and draining effluent from the bed.

2. Demonstrate the process of curing ore with less than the amount of acid consumed and rinsing with the balance. This would give a less acidic pregnant solution without affecting overall recovery and would reduce the cost of downstream recovery of uranium.

3. Determine optimum productivity of rinsing uranium from beds of ore as a function of rinse rate and bed height. Productivity, grams of uranium recovered per square foot of bed surface per hour to achieve the desired uranium recovery, is the critical variable for determining the rinse pad area.

4. Demonstrate the process by which the concentration of uranium in pregnant solution can be increased relative to a one-stage rinse system by countercurrent leaching. A consequence of countercurrent leaching is a decrease in the volume of filtrate or raffinate which must be sent to an evaporation pond.

5. Obtain tailings as moist solids which can be removed from the rinse pad with conventional loading equipment to a tailings pile. This would eliminate the need for a costly tailings pond.

6. Obtain samples of liquors and tailings for use by Cotter in preparing environmental impact statements.

7. Determine reproducibility in performance that can be expected from operating a TL leach pad.

SUMMARY

1. Twenty-five TL leach tests were conducted on Charlie ore in a total of 37 actual test days (Figure 1). Ten runs used ore remaining from 1979 operations. The balance used ore mined in 1980 which more closely represented the expected composition of the main ore body.

2. Residual U_3O_8 concentrations in the tailings of less than 0.005% were obtained when optimum leaching conditions were used (Table I).

3. Uranium in lower grade ore mined in 1979 could be readily solubilized in the cure with 100 pounds per ton sulfuric acid. Ore mined in 1980 was more refractory, requiring both exposure to 100-125 pounds per ton sulfuric acid in the cure and a minimum of 25 hours rinsing with dilute acid solution to achieve less than 0.010% U_3O_8 in the tailings.

4. Typical cure conditions required for optimum extraction of uranium were 125 pounds per ton sulfuric acid, 2 pounds per ton sodium chlorate, 14% total moisture, and 24 hour cure time. Rinse solutions contained 5-10 grams per liter sulfuric acid and 1-2 grams per liter sodium chlorate.

5. Vanadium concentrations in the ores processed were of the same order as those for uranium. Vanadium recoveries generally paralleled uranium recoveries, increasing as the time of exposure to acid rinse solution increased. Residual vanadium concentrations were 0.01-0.02% V_2O_5 under optimum conditions for extraction of uranium.

6. When four-stage countercurrent rinsing was used, concentrations of uranium in pregnant liquors increased four-fold over those from single-stage operation.

7. Solubilization of uranium in the cure and recovery in the rinse step were better when ore was crushed to pass a 1/2 inch screen rather than a 1 inch screen.

8. Tests were conducted at 1 foot, 3 foot, and 6 foot bed heights and at different rinse rates to determine productivity of the beds. At the same flowrate, efficiency of rinsing 3 foot and 6 foot beds was the same.

9. In the 1980 tests, rinsing was more uniform and at three-times higher average rate than in 1979. A cover screen to protect the bed surface from particle classification and blinding was tested and found to be unnecessary.

10. Effective drainage from a bed of ore was possible with drainage troughs spaced 30 inches apart filled with acid-resistant gravel.

11. Six to eight hours drain time on the TL leach pad was sufficient for rinsed ore to be removed from 3 foot and 6 foot beds of ore to a tailings pile with a front-end loader. Tailings were removed as moist, firm solids.

12. Samples of tailings were sent to Cotter for analysis for use in preparing environmental impact statements.

13. Uranium was recovered from pregnant leach solution as a thick slurry by precipitation with magnesia. The precipitate settled rapidly and completely leaving a clear supernatant.

TABLE 1. SUMMARY OF TEST CONDITIONS AND RESULTS. COTTER PILOT PLANT   H&N: 3055.00

Test	Objective	Ore Grade	Weight Dry Ore T	% H_2O Crushed Ore	Cure Conditions H_2SO_4 #/T	$NaClO_3$ #/T	H_2O %	Time hrs.	Average Temp °C	Rinse Conditions a) Flowrate l/min	H_2SO_4 g/l	$NaClO_3$ g/l	Time hrs.	Concentration Preg. Liq. g/l U_3O_8	Drainage Hours	% H_2O Tailings	Heads % U_3O_8	Tails % U_3O_8	Recovery U_3O_8
1	Drainage	Low	25.3	9.8	110	2.2	11.7	46	44	7.6 - 38	1	1	34.5	0.49	14.0	17.7	.044	.005	90.5
2	Drainage	Low	25.2	10.0	104	2.2	11.0	41	43	7.0 - 12	5	1	66.0	0.45	8.3	18.4	.065	.003	94.3
3	Cure Conditions	Low	25.4	9.4	74.0	2.0	12.7	40	44	7.0	10	1	69.7	0.42	9.7	20.2	.045	.003	93.9
4	Countercurrent	Low	25.1	10.[illegible]	75.0	2.0	13.8	25	47	6.0	(b)	(b)	54.0	2.14	11.7	14.8	.048	.010	85.4
5	"	Low	25.6	8.0	72.9	1.9	12.5	48	38	5.5 - 7.0	(c)	(c)	55.0	2.35	11.2	15.3	.063	.008	88.8
6	"	Low	25.2	10.0	75.7	2.0	11.5	26	43	6.0	"	"	58.0	2.81	9.5	15.3	.071	.005	93.3
7	"	Low	25.5	9.0	73.7	1.9	10.4	46	44	6.0 - 7.0	"	"	55.0	2.59	10.0	16.3	.060	.007	90.3
8	"	Low	25.6	8.7	74.5	1.9	11.3	32	40	5.5 - 9.5	"	"	47.7	2.33	8.8	16.1	.055	.003	95.1
9	"	Low	25.3	9.5	74.3	2.0	13.3	38	37	6.0 - 7.0	"	"	54.0	2.24	(d)	14.0	.053	.004	92.8
10	Productivity	Comp.(e)	25.1	10.5	153	2.0	12.2	24	66	6.0 - 7.0	5.4	1.0	70.7	.63	19.7	17.4	.085	.005	93.5
11	"	"	25.3	9.7	114	2.0	12.4	28	57	11.5	6.6	1.0	44.0	.60	7.5	18.1	.094	.012	85.8
12	Cure Conditions	"	25.1	10.5	72.6	2.0	12.2	31	52	5.0	10.4	1.0	73.2	.90	11.5	17.8	.089	.027	75.1
13	Productivity	"	24.8	10.7	121	2.0	10.6	48	54	16.5	4.9	1.0	31.0	.61	8.0	17.6	.100	.018	79.2
14	" (6' bed)	"	18.1	8.5	147	2.0	9.9	24	63	1.2 - 1.4	6.0	1.0	209	.80	49.5	---	.099	.002	97.4
15	" (6' bed)	"	16.6	7.9	122	2.7	11.9	28	63	4.0	10.0	2.0	94.5	.58	8.0	19.5	.100	.003	96.4
16	"	"	25.2	10.1	115	2.0	10.2	28	68	26.0	5.8	1.0	19.5	.55	6.5	17.7	.094	.019	78.2
17	Cure Conditions	"	25.2	9.3	110	2.0	10.2	42	59	11.6	6.8	[illegible].0	28.5	.85	8.0	16.5	.05[illegible]	.007	90.5
18	Productivity (1' bed)"		8.6	9.3	112	2.0	10.8	26	63	12.0	6.1	1.0	11.5	.56	6.0	17.7	.159	.018	75.6
19	Particle Size	Comp.(f)	25.0	8.2	133	3.0	13.5	24	49	6.2	5.0	1.5	63.5	.85	8.0	17.0	.102	.006	93.1
20	High Grade Ore	High	25.6	7.8	129	1.9	11.5	24	60	5.6	10.7	2.0	92.5	.66	6.5	16.4	.103	.003	96.5
21	Productivity(6'bed)	Med.	18.4	7.8	122	2.0	12.9	29	61	2.4 - 3.5	11.0	2.0	101	.56	7.0	19.5	.075	.003	94.2
22	Reproducibility	Med.	16.6	7.9	128	2.0	13.5	32	62	4.1	11.6	2.0	83.3	.45	8.0	19.3	.072	.002	94.8
23	"	Med.	16.7	8.0	111	2.0	13.5	29	56	3.0	11.6	2.0	75.8	.56	15.2	17.7	.088	.[illegible]02	96.4
24	"	Med.	16.6	7.0	124	2.0	10.6	40	54	3.6 - 5.7	10.0	2.0	67.5	.64	6.0	19.3	.064	.003	95.3
25	Permeability	Low	25.9	8.4	70.2	0	13.8	23	49	8.0 - 20.	10.0	2.0	32.2	.55	8.2	18.1	.056	.003	93.5

a) Final rinse in all tests was with water. Three foot deep beds unless otherwise indicated.

b) Interliquor from run 3. Acid concentration <1 g/l H_2SO_4.

c) Interliquor from previous run. H_2SO_4 and $NaClO_3$ added to third interliquor rinse solution to give about 30 g/l H_2SO_4 and 1 g/l $NaClO_3$.

d) Pad unloaded the week following conclusion of the run.

e) Composite ore of 40% "High" grade (>0.1% U_3O_8) and 60% "Medium" grade (.05 - .10% U_3O_8)

f) Runs 1-18 used -1" ore. Runs 19-25 used -½" ore.

HOLMES & NARVER INC.

CLIENT: COTTER CORP.
LOCATION: WYOMING
PROJECT: TL LEACH PILOT PLANT

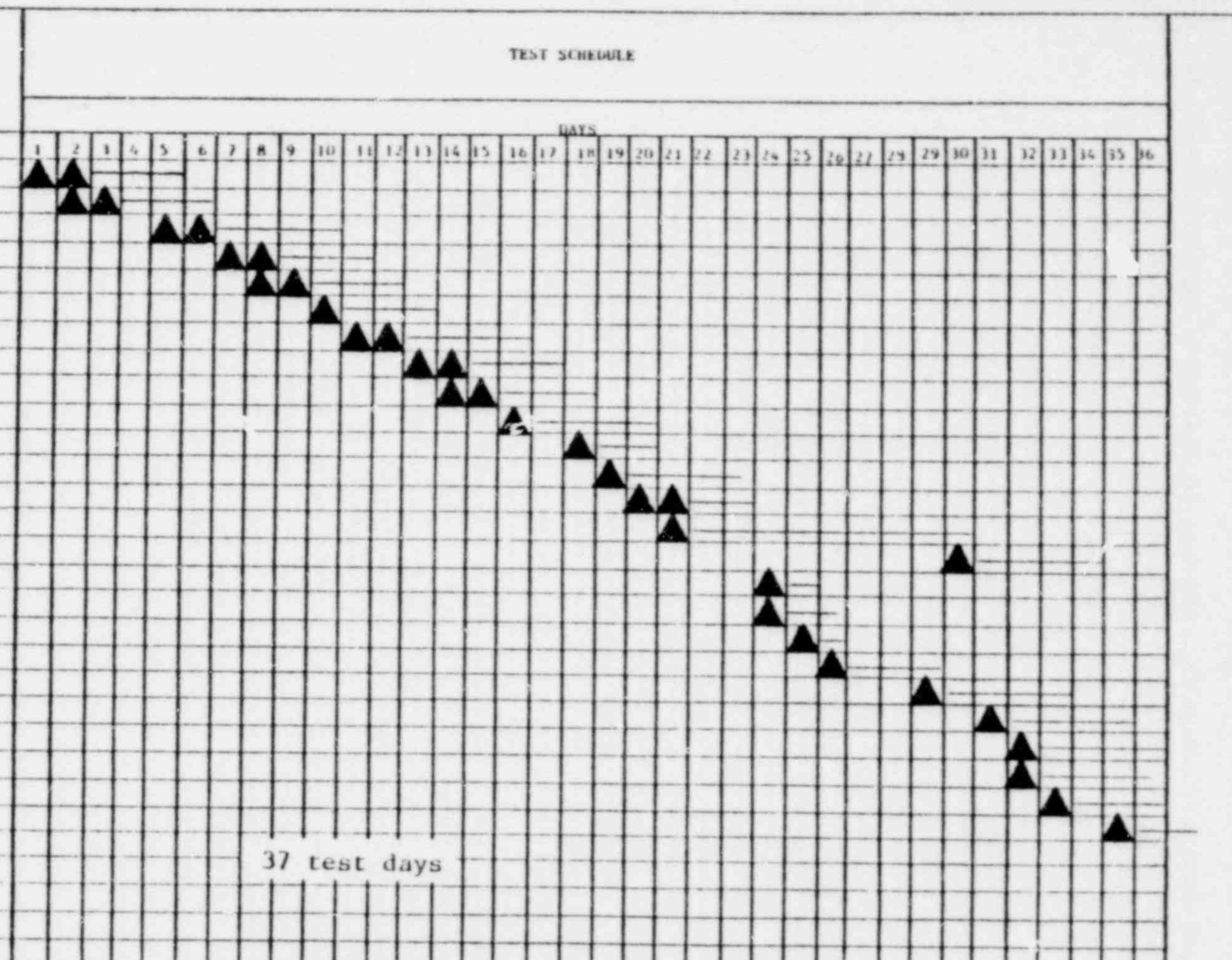
ENGINEERING PROGRESS SUMMARY

CONTRACT: 3055.00
DATE:
REVISION:

▲ CURE TIME
—— RINSE TIME

TEST	OBJECTIVE	PAD
1	Drainage	4
2	Drainage	3
3	Cure Conditions	2
4	Countercurrent	1
5	"	5
6	"	2
7	"	3
8	"	1
9	"	2
10	Productivity	5
11	"	1
12	Cure Conditions	4
13	Productivity	3
14	" (6' bed)	2
15	" "	5
16	"	4
17	Cure Conditions	1
18	Productivity (1' bed)	3
19	Particle Size	4
20	High Grade Ore	1
21	Productivity (6' bed)	2
22	Reproducibility	4
23	"	3
24	"	1
25	Permeability	5

TEST SCHEDULE



CONCLUSIONS AND RECOMMENDATIONS

The results of the 1980 test program demonstrate the ability of TL leaching to extract uranium and vanadium from Charlie Mine ore on a semi-commercial scale. Results of the current tests have corroborated and augmented the findings of earlier pilot plant and bench-scale studies. Realistic operating and design data have been accumulated during the pilot plant program for the design and construction of a full-scale TL leach plant.

With TL leaching, uranium extraction from Charlie ore exceeded 90% and residual uranium in the tailings was less than 0.010% U_3O_8. A total of three days rinsing in three foot deep beds with dilute acid and water, and draining were adequate.

Therefore, we conclude TL leaching should be considered for the commercial exploitation of Charlie Mine ore. A feasibility study should be conducted as the next step to establish the design and to estimate the cost of a commercial TL leach plant.

RESULTS

Ore. TL leach pilot plant tests were conducted on "Low" grade ore mined for the 1979 test program and higher grade ore brought up from the pit in 1980. The lower grade ore required less acid in the cure and less stringent rinsing conditions to extract uranium than the higher grade ore, which was more refractory.

Ore mined in 1980 was located in two areas of the pit in the same horizon. One area comprised the sump which was blasted in the pit to promote drainage. The other area was about 50 yards from the sump. Ore from the second location was graded with a gamma ray probe in the pit into two fractions, 0.05-0.1% U_3O_8 and > 0.1% U_3O_8. These were stored in separate piles at the pilot plant. To conserve the limited amount of the richest ore, a composite ore mixture was prepared containing ore from both locations in the pit.

For purposes of this report, each type of ore or blend of ore used has been given an arbitrary label. Identification of each ore is given below.

"Low" Grade Ore - 0.056 $\pm$ 0.009% U_3O_8
Mined in 1979. Used for runs 1-9 and 25.

"Composite" Grade Ore - 0.095 $\pm$ 0.006% U_3O_8
This was a blend of ore mined in 1980 consisting of 40% ore containing > 0.1% U_3O_8, 40% ore containing 0.05-0.1% U_3O_8, and 20% ore from the sump. Used for runs 10-19.

"High" Grade Ore - 0.105 $\pm$ 0.002% U_3O_8
This was graded in the pit at > 0.1% U_3O_8. Used for run 20.

"Medium" Grade Ore - 0.080 $\pm$ 0.008% U_3O_8
Ore from the sump. Used for runs 21-24.

The ore mined in 1980 contained more carbonaceous material than the "Low" grade ore used in 1979. One piece of carbon from the "High" grade ore pile, 5 inches x 5 inches x 1-1/2 inches, contained 1.95% U_3O_8, about twenty times greater than the average uranium content of the ore. Small amounts of iron pyrites were also associated with the ore mined in 1980. One sample of pyrites contained 0.009% U_3O_8.

Uranium was not distributed uniformly throughout the ore. Table II lists the uranium content as a function of particle size for a sample of -1/2 inch "Composite" grade ore. Uranium concentrations were higher in the larger mesh fractions.

TABLE II

SCREEN ANALYSIS OF -1/2 INCH COMPOSITE GRADE ORE. a)

Mesh (Tyler)	Wt %	Cum. Wt %	$\%U_3O_8$	% Distribution U_3O_8
-.750 + .525	0.2	0.2	.112	0.2
-.525 + 3	6.8	7.0	.113	8.2
- 3 + 4	3.6	10.6	.129	4.8
- 4 + 8	6.0	16.6	.124	8.0
- 8 + 12	7.1	23.7	.125	9.5
-12 + 28	18.4	42.2	.078	15.3
-28	57.8	100.0	.088	54.0

a) Ore used for run 19.
Ore was dry screened.

H&N: 3055.00

Acid. The amount of acid to which the ore was exposed was the most important single variable in the extraction of uranium from "Low" grade Charlie ore. About 90-100 pounds per ton sulfuric acid in the cure and rinse solubilized 90-94% of the uranium. In runs 1 and 2, this amount of acid was added to the cure. In run 3, 75 pounds per ton sulfuric acid was added to the cure and 15 pounds per ton were added to the rinse. Residual uranium in the tailings for these three runs was 0.005% U_3O_8 or less. In run 4, also cured with 75 pounds per ton sulfuric acid, insufficient acid was added to the rinse. Residual uranium in the tailings increased to 0.010% U_3O_8.

When 16-20 pounds per ton sulfuric acid was added to the rinse in runs 5-9, otherwise cured and rinsed identically to test 4, uranium in the tailings fell below 0.010%.

Run	H_2SO_4 #/T Cure	H_2SO_4 #/T Rinse	H_2SO_4 #/T Total	Tails %U_3O_8
1	110	0.8	111	.005
2	104	5.1	109	.003
3	74	13	87	.003
4	75	0	75	.010
5	73	19	92	.008
9	74	16	90	.004

The relationship between the amount of acid to which the ore was exposed and uranium recovery was more complicated for runs 10-24 than it was for the first nine tests. Relative to the "Low" grade ore, uranium was not solubilized as readily in the ore mined in 1980; that is, this ore was more refractory. In runs 10-24, both the amount of acid exposed to the ore and the time of exposure to acid in the rinse were critical factors.

Run	H_2SO_4 #/T Cure	H_2SO_4 #/T Rinse	H_2SO_4 #/T Total	Exposure to Acid Rinse Hrs.	Tails %U_3O_8
18	112	8.4	120	7.5	.018
16	115	8.7	124	11.0	.019
17	110	9.4	119	22.5	.007
23	111	16.5	127	61.3	.002

The total amounts of acid in both cure and rinse for the four tests shown above were comparable. Residual uranium in the tailings decreased as the time of exposure to dilute acid rinse increased.

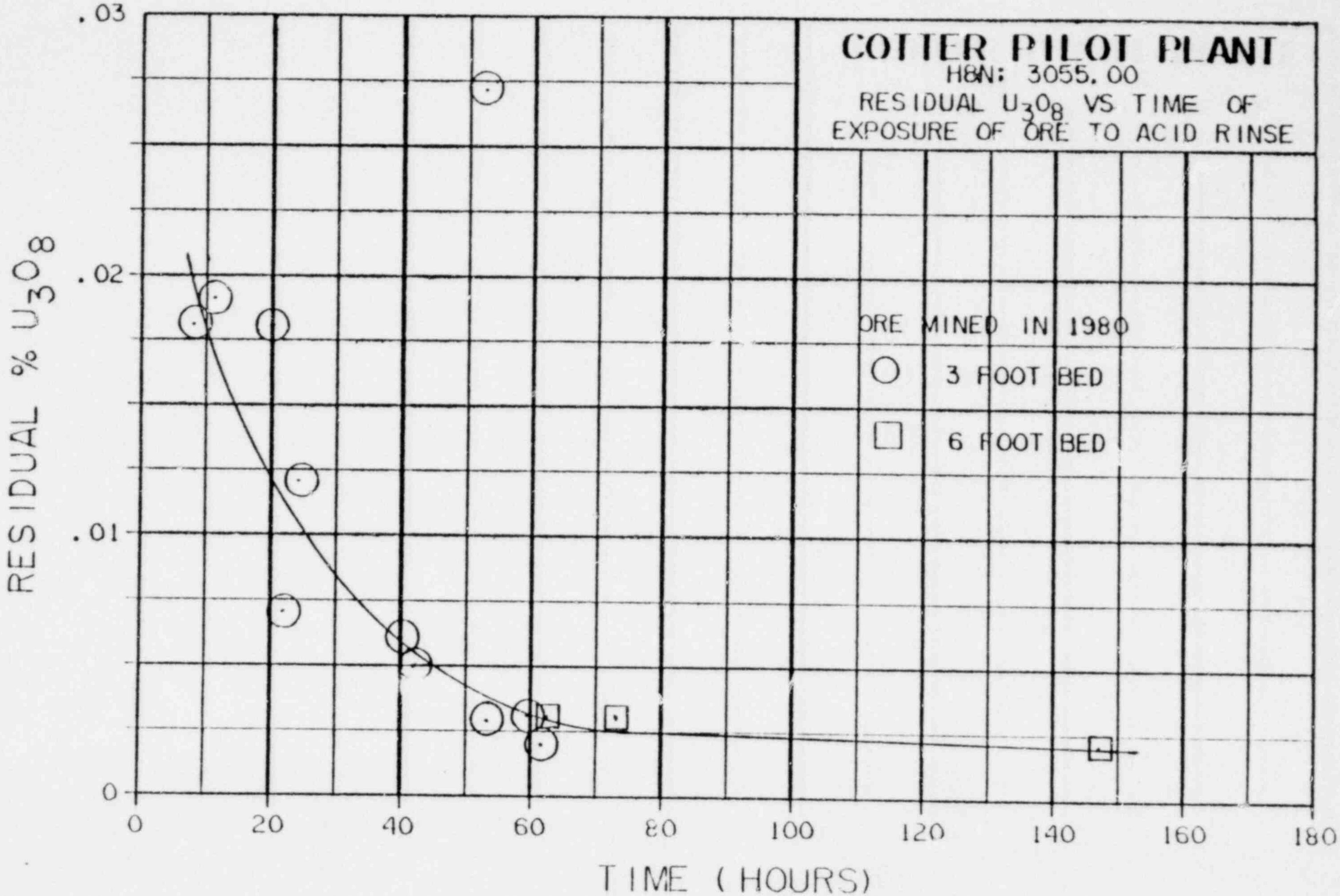
Figure 2 and Table III illustrate the dependence of acid content and time on the extraction of uranium from 1980 ore.

Residual uranium was below 0.010% U_3O_8 when the ore was cured with a minimum of 1[illegible]0 pounds per ton sulfuric acid and rinsed with dilute acid for more than 25 hours. Laboratory solubilization tests indicated that acid consumption exceeded 100 pounds per ton sulfuric acid.

Reagent Dosage H_2SO_4 #/T	Reagent Dosage $NaClO_3$ #/T	Reagent Dosage H_2O %	H_2SO_4 Consumed #/T	Calc. Heads $\%U_3O_8$	Tails $\%U_3O_8$	$\%U_3O_8$ Solubilized
100	4	12.7	102	.084	.018	78.5
150	4	12.7	132	.074	.009	87.8
200	6	16.7	154	.086	.015	82.5

"High" Grade Ore
24 hr. cure time.

In run 12, residual uranium was high, 0.027% U_3O_8, because the ore was exposed to an insufficient amount of acid, 84 pounds per ton. In tests 13, 16, and 18, the ore was cured and rinsed with adequate amounts of acid, but the rinse time was not long enough to solubilize the uranium in those portions of the ore that were resistant to attack.



COTTER PILOT PLANT
HBN: 3055.00
RESIDUAL U_3O_8 VS TIME OF
EXPOSURE OF ORE TO ACID RINSE
ORE MINED IN 1980
3 FOOT BED
6 FOOT BED
RESIDUAL % U_3O_8
.03
.02
.01
0
0
20
40
60
80
100
120
140
160
180
TIME (HOURS)

Figure 2

TABLE III

EFFECT OF ACID ON THE SOLUBILIZATION OF CHARLIE ORE [a)]

Run	Cure H_2SO_4 #/T	Rinse H_2SO_4 g/l	Conditions Rinse Rate l/min	Acid Rinse Time Hours	H_2SO_4 In Rinse #/T	Total H_2SO_4 #/T	Tails % U_3O_8
10	153	5.4	6.5	40.7	7.5	160	.005
11	114	6.6	11.6	24.6	9.8	124	.012
12	72.6	8.8[b)]	4.9	52.2	11.8	84	.027
13	121	4.9	16.6	19.7	3.5	122	.018
14	147	6.0	1.3	147.0	8.3	155	.002
15	122	10.0	4.0	61.5	19.3	141	.003
16	115	5.8	26.0	11.0	8.7	124	.019
17	110	6.8	11.7	22.5	9.4	119	.007
18	112	6.1	12.0	7.5	8.4	120	.018
19	133	5.0	6.2	40.5	6.6	140	.006
20	129	10.7	5.6	60.6	18.6	148	.003
21	122	11.0	2.4	73.0	14.1	136	.003
22	128	11.6	3.9	60.8	22.0	150	.003
23	111	11.6	2.9	61.3	16.5	127	.002
24	124	10.0	3.7	52.8	15.2	139	.003

a) Ore mined in 1980. -1 inch ore (exceptions, runs 15, 19-24, which were -1/2 inch ore)

b) Average value

Run	H_2SO_4 #/T Cure	Rinse	Total	Exposure to Acid Rinse Hrs.	Tails $\%U_3O_8$
12	72.6	11.8	84	52.2	.027
13	121	1.0	122	19.7	.018
16	115	8.7	124	11.0	.019
18	112	8.4	120	7.5	.018
23	111	16.5	127	61.3	.002

Sodium Chlorate. An oxidizing agent is requir ith some ores to effect the oxidation of uranium and its subsequent solubilization. With one exception, sodium chlorate was added to both the cure and rinse steps of the TL leach process. In test 25, using "Low" grade ore, sodium chlorate was present in the rinse only at 2.0 grams per liter concentration. This was sufficient to give a residual uranium content of 0.003% U_3O_8. The practical upper limit of sodium chlorate content in the cure was 2 pounds per ton. At higher levels, the fumes from gaseous reduction products of sodium chlorate emanating from the mix drum were oppressive. Furthermore, in test 19 extraction of uranium was not improved by an increase of sodium chlorate concentration in the cure from 2.0 to 3.0 pounds per ton.

Run	Ore Grade	$NaClO_3$ in Cure, #/T	$\%U_3O_8$ Not Solubilized in Cure
3	Low	2.0	.002
25	Low	0	.004
18	Composite	2.0	.010
19	Composite	3.0	.010

Sodium chlorate was added to the rinse solution in the concentration range of 1.0 - 2.0 grams per liter. Based on periodic measurements of the oxidation potentials of the effluent samples, one gram per liter sodium chlorate in the rinse was sufficient.

Cure Time. The effect of cure time on solubilization of uranium was studied extensively during the 1979 test program. A 24 hour cure time was found to be adequate. During the current test series, cure times varied from 24-48 hours with no apparent effect on uranium recovery.

Particle Size. Reduction of the particle size of an ore should enhance uranium extraction by increasing the surface area exposed to attack of leach reagents. A limit on the reduction of mesh size, however, would be the increased costs of crushing and/or grinding the ore as particle size decreases.

Ore for tests 1-14 and 16-18 was crushed to pass a 1 inch screen. Runs 15 and 19-25 were conducted with ore crushed to pass a 1/2 inch screen.

For the extraction of uranium from "Low" grade ore, it was not necessary to crush the ore below 1 inch mesh.

Run	H_2SO_4 in Cure, #/T	%U_3O_8 Not Solubilized in Cure	%U_3O_8 Tails
3	74	.002	.003
25	70	.004	.003

Uranium extraction from the higher grade ore mined in 1980 was more likely to be improved by a reduction in particle size since this ore was more refractory than the "Low" grade ore.

In Tables II and IV, the uranium distribution in heads and tails as a function of particle size for run 19 is presented. Ore for run 19 was crushed to -1/2 inch mesh, cured with 133 pounds per ton sulfuric acid, and rinsed with 5.0 g/l sulfuric acid. During the TL leach process, some of the larger particles in the feed broke up. For example, 23.7% of the feed but only 2.8% of the tailings was larger than 12 mesh. Of the uranium that remained after leaching, almost 45% was concentrated in the

TABLE II

SCREEN ANALYSIS OF -1/2 INCH COMPOSITE GRADE ORE. a)

Mesh (Tyler)	Wt %	Cum. Wt %	% U_3O_8	% Distribution U_3O_8
-.750 + .525	0.2	0.2	.112	0.2
-.525 + 3	6.8	7.0	.113	8.2
- 3 + 4	3.6	10.6	.129	4.8
- 4 + 8	6.0	16.6	.124	8.0
- 8 + 12	7.1	23.7	.125	9.5
-12 + 28	18.4	42.2	.078	15.3
-28	57.8	100.0	.088	54.0

a) Ore used for run 19.
Ore was dry screened.

TABLE IV

SCREEN ANALYSIS OF -1/2 INCH COMPOSITE GRADE ORE TAILINGS. a)

Mesh (Tyler)	Wt %	Cum. Wt %	% U_3O_8	% Distribution U_3O_8
+.371	0.3	0.3	.055	2.2
-.371 + 3	0.7	1.0	.242	19.6
- 3 + 8	0.6	1.6	.248	16.4
- 8 + 12	1.2	2.8	.047	6.4
-12 + 28	21.4	24.2	.008	20.0
-28	75.8	100.0	.004	35.4

a) Tailings sample was residue from run 19.
Material was wet screened.

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H&N: 3055.00

2.8% of the tailings that was larger than 12 mesh. The larger particles in the feed not only contained a disproportionate amount of uranium but also were less susceptible to attack during the leach process than the bulk of the ore. Reducing the mesh size of the higher grade Charlie Ore from -1 inch to -1/2 inch was advantageous.

Countercurrent Rinsing. "Low" grade ore was rinsed in a four-stage countercurrent rinse cycle in tests 4-9 to increase the concentration of uranium in pregnant solutions while reducing water requirements relative to a single-stage rinse process. Ore was cured with 75 pounds per ton sulfuric acid, rinsed with three stages of progressively weaker interliquor, and, finally, rinsed with water to reduce solubles in the tailings.

Figure 3 and Table V show the change in concentration of the pregnant liquor and interliquor fractions as the number of countercurrent rinse cycles increased. After six cycles, the pregnant liquor contained 2.2 grams per liter U_3O_8. The uranium concentration in the pregnant liquor from a one-stage rinse of the same ore was about 0.5 grams per liter. The number of countercurrent rinse cycles required to reach steady state conditions was determined by extrapolating data from the six runs. In Figure 4, the volume of effluent containing the total net weight of U_3O_8 extracted from the ore was plotted against run number. By extrapolation, the 4500 liters of pregnant liquor collected in each run would have contained all the uranium extracted from the ore during the eighth countercurrent rinse cycle.

By rinsing ore countercurrently, the volume of fresh rinse water required to rinse "Low" grade ore was a fraction of the total required in a one-stage rinse, 6000 liters versus 27,000 liters. The choice of four countercurrent rinse stages was arbitrary. The concentration of pregnant liquor could have been increased and the volume of fresh water required for rinsing decreased had a larger number of rinse stages been used.

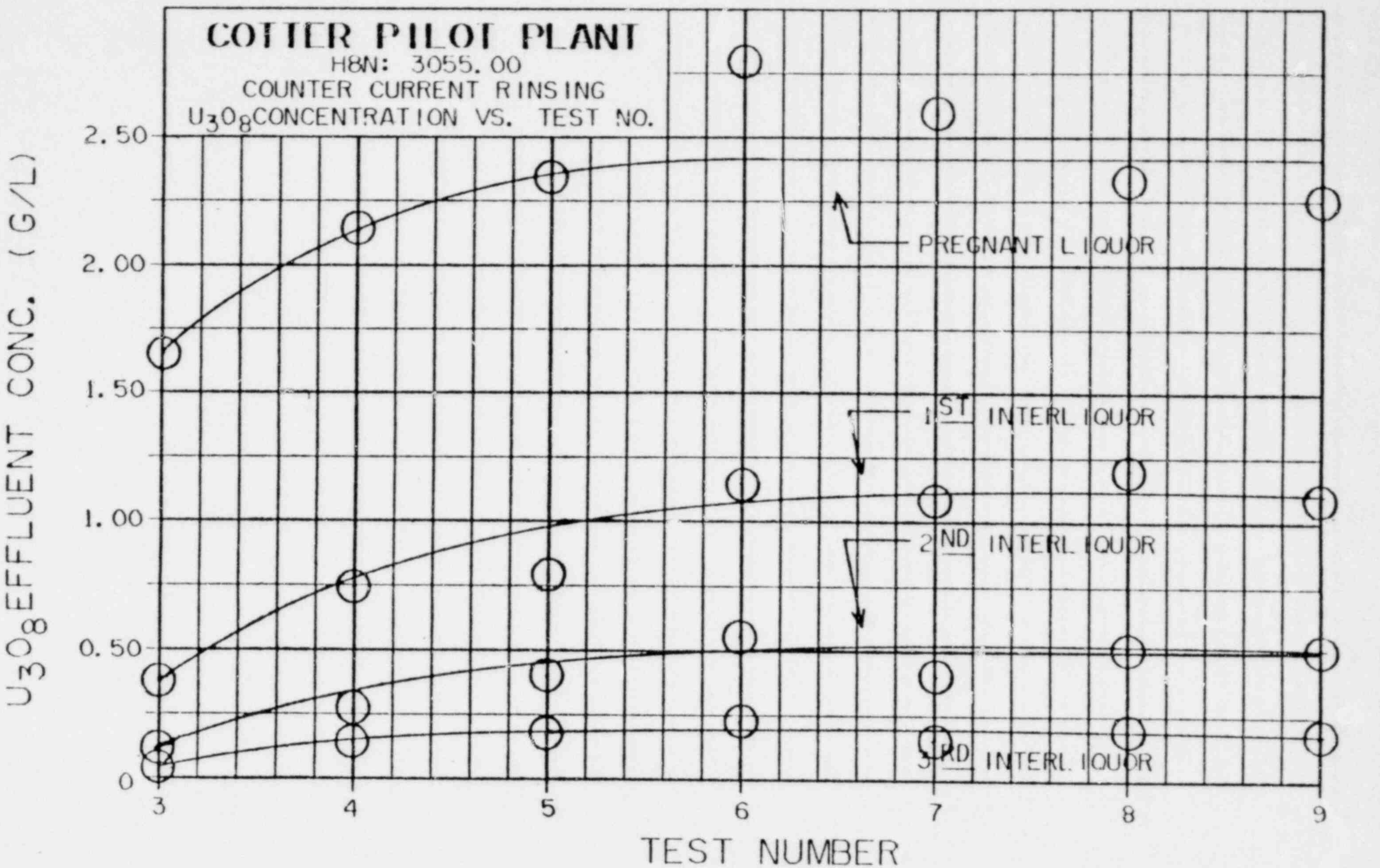
COTTER PILOT PLANT
H8N: 3055.00
COUNTER CURRENT RINSING
U_3O_8 CONCENTRATION VS. TEST NO.
U_3O_8 EFFLUENT CONC. (G/L)
TEST NUMBER
PREGNANT LIQUOR
1ST INTERL IQUOR
2ND INTERL IQUOR
3RD INTERL IQUOR
2.50
2.00
1.50
1.00
0.50
0
3
4
5
6
7
8
9

Figure 3

TABLE V

COUNTERCURRENT RINSING "MEDIUM" GRADE ORE

RUN		3	4	5	6	7	8	9
RINSE								
1st	U_3O_8, g/1		0.344	.697	.879	1.105	1.092	1.231
Interliquor	Volume, 1		4050	2459	4923	3600	3630	4410
2nd	U_3O_8, g/1	0	0.125	.300	.426	.583	.480	.509
Interliquor	Volume, 1	15,345	3598	5665	4410	3792	3817	5460
3rd	U_3O_8, g/1		0.040	.067	.133	.205	.155	.175
Interliquor	Volume, 1		5280	4995	4757	6153	5316	4557
Water	Volume, 1	11,653	3900	6115	5760	7900	6303	6303
EFFLUENT								
Pregnant	U_3O_8, g/1	1.65	2.14	2.35	2.81	2.59	2.33	2.24
Liquor	Volume, 1	4337	4651	4760	4205	4513	4539	4441
1st	U_3O_8, g/1	0.388	0.728	.804	1.15	1.09	1.20	1.10
Interliquor	Volume, 1	3373	3072	4430	4125	5736	3838	4525
2nd	U_3O_8, g/1	0.113	0.269	.399	.569	.398	.509	.505
Interliquor	Volume, 1	3504	4896	4577	4722	4505	5273	4546
3rd	U_3O_8, g/1	0.046	0.154	.181	.239	.138	.159	.160
Interliquor	Volume, 1	11,995	1709	4794	4839	4897	4991	5469

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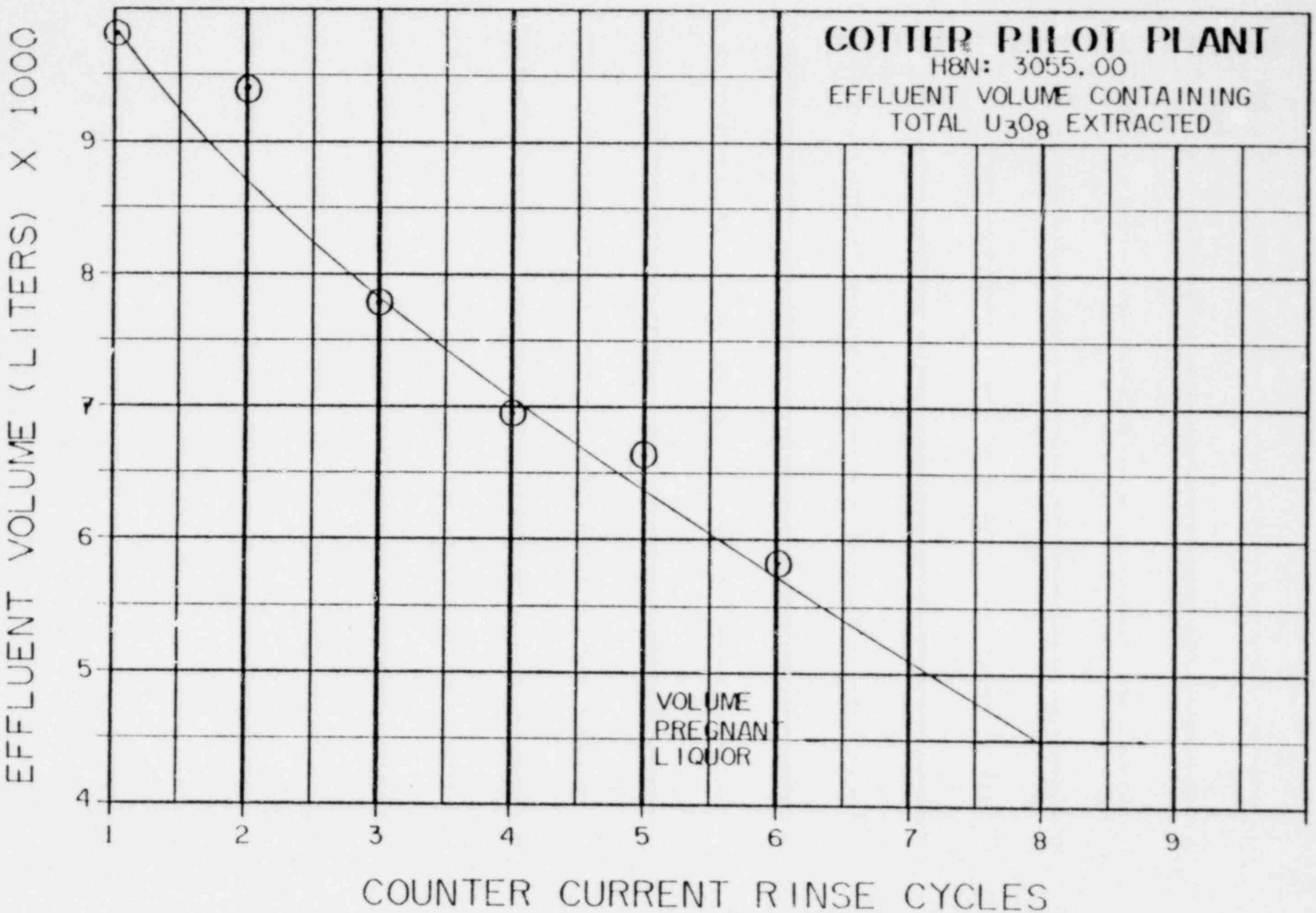


COTTER PILOT PLANT
HBN: 3055.00
EFFLUENT VOLUME CONTAINING
TOTAL U_3O_8 EXTRACTED
EFFLUENT VOLUME (LITERS) X 1000
4
5
6
7
8
9
1
2
3
4
5
6
7
8
9
VOLUME
PREGNANT
LIQUOR
COUNTER CURRENT RINSE CYCLES

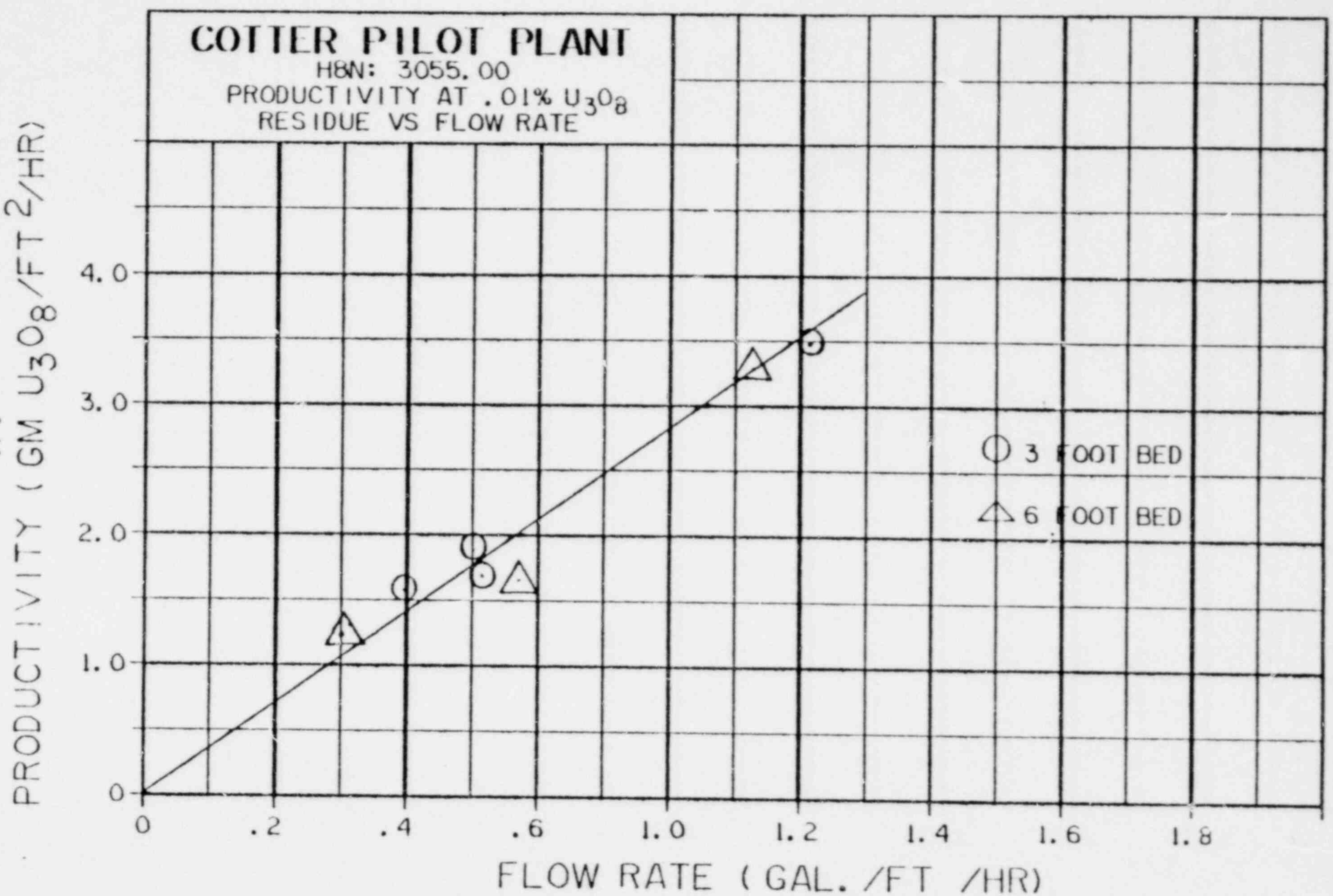
Figure 4

With the exception of run 4, in which no acid or sodium chlorate was added to the rinse, 16-20 pounds per ton sulfuric acid and 0.5 pounds per ton sodium chlorate was added to the third interliquor rinse. Most of this acid was consumed as the solution passed through successive pads of ore until it emerged as pregnant liquor. In run 9, the last countercurrent rinse test, the sulfuric acid content of the pregnant liquor was 2.4 grams per liter.

Productivity. Tests were conducted to determine the most efficient conditions for rinsing uranium from 3 foot and 6 foot beds of ore. Productivity measures rinse efficiency and is defined as the weight of uranium extracted per unit area per unit time. Calculations of this parameter were based on the time required to rinse a bed of ore sufficiently to achieve 0.01% U_3O_8 in the tailings. A plot of productivity versus rinse rate is shown in Figure 5.

Productivity increased directly with flowrate to 1.0 gallons per square foot per hour. Rinse rates could be increased to this value with no loss of rinse efficiency. Productivity calculations at higher flowrates were not possible since residual uranium in the tailings for those tests (Runs 13 and 16) were greater than 0.01% U_3O_8. Ore in run 18 was not rinsed for a sufficiently long time to reduce the tailings to 0.01% U_3O_8. Hence, it was not possible to compare the productivity of rinsing a one foot bed with those for greater bed heights.

Productivity at a given flowrate was the same for a 3 foot bed and a 6 foot bed of ore. While the total weight of uranium that could be recovered from a 6 foot bed of ore would be twice that from a 3 foot bed of the same area, the rinse time of a 6 foot bed would be twice as long as for a 3 foot bed. Rinsing a bed of ore higher than 3 feet would be advantageous only if the ore was highly refractory. The rinse time could be lengthened to allow more extensive attack of the ore and increase solubilization of uranium without affecting productivity.



COTTER PILOT PLANT
H&N: 3055.00
PRODUCTIVITY AT .01% U_3O_8
RESIDUE VS FLOW RATE
PRODUCTIVITY (GM U_3O_8/FT ^{2}/HR)
4.0
3.0
2.0
1.0
0
0
.2
.4
.6
1.0
1.2
1.4
1.6
1.8
FLOW RATE (GAL. /FT /HR)
3 FOOT BED
6 FOOT BED

Figure 5

Run	Bed Height Ft	Rinse Rate Gal/Ft^2/Hr.	Productivity Gm. $U_3O_8/Ft^2/Hr$ @ .01% U_3O_8 Tails
17	3	1.01	3.48
15	6	.92	3.27
10	3	.51	1.72
21	6	.57	1.66

High Grade Ore. One test was conducted with "High" grade ore mined in 1980. Ore was cured with 129 pounds per ton sulfuric acid, 1.9 pounds per ton sodium chlorate, and 11.5% water. It was rinsed without a protective screen on the surface in a 3 foot bed. The rinse solution contained 10.7 grams per liter sulfuric acid and 9 grams per liter sodium chlorate. Recovery of uranium was excellent, 96.5% with 0.003% U_3O_8 in the tailings.

A sample of "High" grade ore was cured in the laboratory and rinsed in a 3.5 inch column at 5.4 milliliters per minute (1.28 gallons per square foot per hour). Residual uranium content of 0.005% U_3O_8 was comparable to the 0.003% U_3O_8 obtained in the 25-ton test (Table VI).

Permeability of the Ore and Drainage from the Pad. During the last five runs of the 1979 test program, ore was rinsed without flooding when the surface was covered with a coarsely woven polypropylene screen from Menardi-Southern Corporation. The screen reduced the high momentum of the spray droplets which had previously caused classification of particles at the surface, blinding, and flooding. Wide angle cone spray nozzles were used in the current tests. Spraying was gentle and continuous. Flowrates of 38 liters per minute with a screen on the surface and 20 liters per minute with the surface exposed were achieved without flooding.

Efficient drainage was obtained at all flowrates through drainage troughs spaced 30 inches apart. Liquor drained from the pad through drain pipes placed in the troughs. The pipes were covered with +1/2 inch mesh quartz gravel to reduce the buildup of fine particles in the troughs. After each

TABLE VI

Job No: 3055.00

Ore: "High" Grade Charlie Ore

Weight Ore: 4907 g.

Cure Conditions: 125 #/T H_2SO_4, 2 #/T $NaClO_3$, 15.6% H_2O

Bed Area: .067 ft^2

Bed Height: 34"

Rinse Solution: 5 g/1 H_2SO_4, 1 g/1 $NaClO_3$

EXTRACTION SUMMARY

	Wt. Ore	% U_3O_8	g U_3O_8	% Distribution
Effluent			3.564	93.6
Residue	4844 g.	.005	.242	6.4
Calculated Heads	4907 g.	.078	3.806	100.0

DATA

Cumulative Hours	Volume (1)	Cumulative Volume (1)	g/1 U_3O_8	Cumulative g U_3O_8	% Extraction
15.5	5.025	5.025	.681	3.422	89.9
22.6	2.310	7.335	.036	3.505	92.1
28.2	1.800	9.135	.033	3.564	93.6

run it was necessary to sluice out the sand from the pipes and troughs with a high velocity stream of water. A backflush system would be highly desirable in a commercial plant.

In the first 24 runs, ore was loaded into the rinse bay with the front end loader and raked level by hand. In test 25, the ore was loaded with the front end loader and leveled to a depth of 3 feet by drawing the bottom blade of the front end loader bucket across the surface of the ore as the loader backed from the bay. This ore was rinsed without a cover screen at flow rates up to 20 liters per minute with no flooding. The labor intensive leveling of the rinse bed by hand appears to be unnecessary.

<u>Drainage</u>. One objective of the test program was to determine the minimum drainage time required which would leave the tailings in a condition to be removed by front end loader from the rinse pad as a moist solid. In all of the tests, the drained ore was moist, but firm, except for small regions at the base of the walls where drainage was presumably slowest. A 3 foot bed of ore from run 19 was unloaded after 6 hours drainage. A 6 foot bed of ore from test 21 was unloaded after 8 hours. The 6 foot bed of ore was sufficiently rigid after 8 hours drainage that it retained its form even when two operators walked on the surface.

<u>Tailings</u>. Samples were removed from several locations in the tailings pile to determine moisture content and evaporation rate as a function of time and location within the pile. Results are listed in Table VII. The surface of the pile dried rapidly in the dry, 80-90°F air.

Within 1/2-1 inch below the surface, however, the tailings were still moist after 18 days exposure. Little or no evaporation occurred from the tailings pile of run 19 after 3 days exposure. After 18 days, tailings from run 10 had lost 3.6% water from the top of the bed and 1.9% water from the base of the bed.

TABLE VII

Run	Sample Location in Tailings Pile	Time in Tailings Pile Days	% H_2O
10	Leach Pad Residue	0	17.4
10	Surface	18	3.6
10	Top of Pile [a)]	18	13.8
10	Bottom of Pile [a)]	18	15.5
19	Leach Pad Residue	0	17.0
19	Surface	3	6.7
19	Top of Pile [a)]	3	17.4
19	Bottom of Pile [a)]	3	18.4

a) Sampled 8-12 inches deep into the pile.

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Precipitation. Uranium was recovered from pregnant liquor at the pilot plant by precipitation with magnesia. Concentrated solutions were precipitated by adding liquor to a magnesia slurry to pH 6.5-7. Dilute liquors were best precipitated by adding magnesia to the liquor. With both techniques the solids settled rapidly leaving a clear supernatant. Solids were trucked to the Canon City mill after the supernatant was drawn off to other tanks to partially evaporate prior to disposal.

A sample of the thick slurry was analyzed.

% U_3O_8 (dried at 100°C)	= 1.55%
% Solids	= 27.7%

Samples of the supernatant were analyzed and were found to contain from 0.0001-0.007 grams per liter U_3O_8 which indicated effective precipitation of uranium.

Although precipitation was an adequate method of uranium concentration for the pilot plant, solvent extraction or ion exchange might be preferred in a commercial installation. Large quantities of iron and elements other than uranium were precipitated, producing a crude yellow cake that would have to be reprocessed to become commercially acceptable.

Vanadium Extraction. Vanadium contents of the heads were comparable to those for uranium for all the ores studied.

"Low" Grade Ore	$0.060 \pm 0.009\%$ V_2O_5
"Composite" Grade Ore	$0.081 \pm 0.007\%$ V_2O_5
"High" Grade Ore	0.083% V_2O_5
"Medium" Grade Ore	$0.081 \pm 0.002\%$ V_2O_5

Vanadium recoveries were lower from the "Low" grade ore than from the ore mined in 1980 (Table VIII). By contrast, uranium was more readily extracted from the "Low" grade ore than from the higher grades.

TABLE VIII

RECOVERY OF VANADIUM FROM TL LEACHING CHARLIE ORE

RUN	ORE GRADE	MESH INCHES	% V_2O_5 HEADS	% V_2O_5 TAILS	% RECOVERY (100) (H-T)/H
1	Low	1	(.062)*	.025	(59.7)
2	"	1	(.062)*	.022	(64.5)
3	"	1	.056	.030	46.4
4	"	1	.068	.041	39.7
5	"	1	.070	.040	42.9
6	"	1	.071	.034	52.1
7	"	1	.059	.021	64.4
8	"	1	.058	.020	65.5
9	"	1	.049	.0199	59.4
10	Composite	1	.072	.0166	76.9
11	"	1	.074	.0386	47.8
12	"	1	.091	.0284	68.8
13	"	1	.089	.0311	65.1
14	"	1	.072	.0115	84.0
15	"	1/2	.088	.0116	86.8
16	"	1	.081	.0320	60.5
17	"	1	.078	.0259	66.8
18	"	1	.089	.0349	60.8
19	"	1/2	.078	.0150	80.8
20	High	1/2	.083	.017	79.5
21	Medium	1/2	.080	.0191	76.1
22	"	1/2	.082	.0236	71.2
23	"	1/2	.079	.0221	72.0
24	"	1/2	.082	.0188	77.1
25	Low	1/2	.049	.0238	51.4

* Average value of heads from runs 3-9; % V_2O_5 = .062 $\pm$ .008

Residual V_2O_5 was plotted as a function of the time of exposure of the ore to acid rinse solution, Figure 6.

Run	Ore Grade	Residual in the Tailings %U_3O_8	%V_2O_5
1	Low	.005	.025
3	Low	.003	.030
10	Composite	.005	.017
12	Composite	.027	.028
16	Composite	.019	.032
20	High	.003	.017

As a general trend, vanadium content in the tailings decreased as the exposure to acid rinse solution increased. A similar relationship was noted for extraction of uranium, Figure 2. Notable exceptions to the trend are runs 3-6 and 12, all of which were cured with 75 pounds per ton sulfuric acid and rinsed with an insufficient amount of acid. To optimize vanadium recovery in the "Low" grade ore, more acid was required than was needed to extract uranium.

Using the best conditions for extraction of uranium from ore mined in 1980, vanadium recoveries were 70-75%.

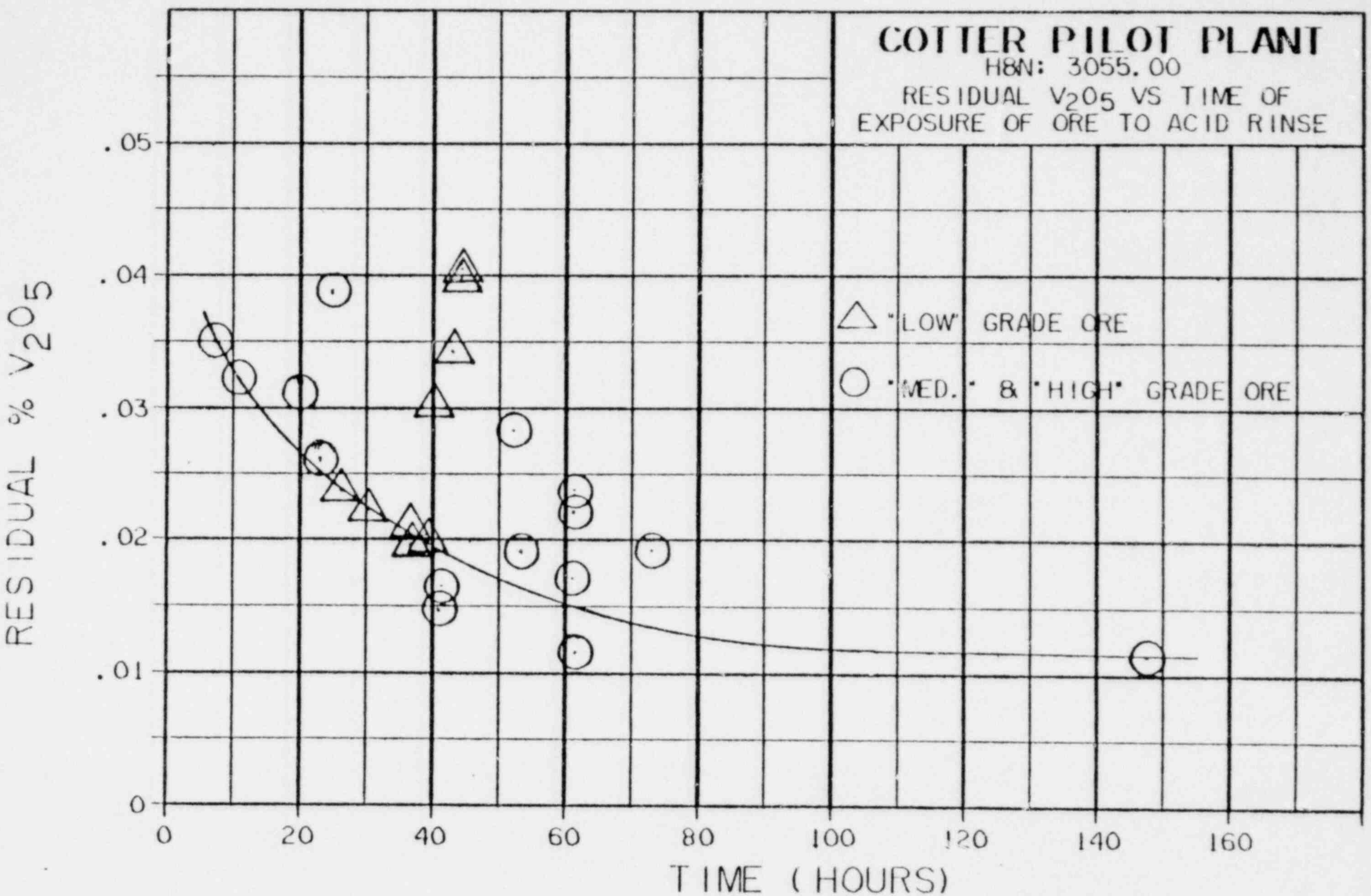

COTTER PILOT PLANT
H&N: 3055.00
RESIDUAL V2O5 VS TIME OF
EXPOSURE OF ORE TO ACID RINSE
"LOW" GRADE ORE
"MED." & "HIGH" GRADE ORE
RESIDUAL % V2O5
.05
.04
.03
.02
.01
0
0
20
40
60
80
100
120
140
160
TIME (HOURS)

Figure 6

TEST PROCEDURE

CRUSHING AND MIXING. Ore was crushed to pass a one inch screen for runs 1 - 14 and 16 - 18. Ore from a fine ore storage pile was sprayed continuously with sodium chlorate solution on the conveyor belt leading to the mix drum. Within the mix drum, ore was sprayed with 96% sulfuric acid and water. After a three minute retention time in the mix drum, the ore was conveyed to a concrete pad where it lay for 24 - 48 hours to solubilize the uranium.

Modifications to this procedure were made for runs 15 and 19 - 25. Ore was crushed to pass a 1/2 inch screen. Sodium chlorate was sprayed onto the ore after the ore had been mixed with acid and water. Sodium chlorate solution was added about three feet from the discharge end of the mix drum as a fine spray.

LOADING ORE ONTO RINSE PAD. Ore was removed from the cure pile by front-end loader to a rinse bay and leveled by hand. In run 25, the ore was leveled by drawing the blade of the front-end loader across the surface as the loader exited the bay.

Average size of three foot beds was 25 feet x 8.5 feet. Smaller beds were used in runs 22 - 24 to conserve the supply of available ore. TL leach tests at six foot bed height were conducted on a pad 8 feet x 8.5 feet. A reinforced wood barrier was placed across the width of the bay to contain the ore. Ore was dumped onto the pad with the loader and leveled by hand.

RINSING. During some of the tests, ore was covered with strips of polypropylene soil stabilizer cloth to protect the bed surface. In the other tests, the bed was uncovered.

Ore was rinsed continuously and uniformly with wide-angle cone spray nozzles from Spraying Systems, Inc. For a standard 25 foot long bed, three nozzles, spaced 9 feet apart, were used on a single spray bar. The number of nozzles used in other tests and their configuration were selected to provide uniform coverage.

DRAINAGE. Effluent from the bed drained through three troughs, 4 inches x 4 inches, running the length of the bed. Troughs were spaced 30 inches apart. They contained lengths of 2 inch PVC pipe drilled with drainage holes. The pipes were covered with 3/4" acid-resistant, quartz gravel. At the conclusion of each run, the pipes and gravel were sluiced out with a stream of water to remove fine particles which had built up in the drainage troughs.

SAMPLING PROCEDURES. Ore was sampled from each run to determine the uranium content of the heads. Samples of about 200 grams each were taken from the feed to the mix drum 6 - 8 times per hour, composited, and analyzed.

As the cured ore was removed to the rinse pad, 3 - 5 samples from each bucket load were removed, composited, and analyzed to check the uranium analysis of the heads composite. A sample of the cure pile composite was slurried in dilute acid and filtered. The % U_3O_8 solubilized in the cure was calculated from analyses of the filtrate and residue.

From runs 22 - 25, the ore, mixed with acid, water, and sodium chlorate, was sampled at the outlet of the mix drum about 6 - 8 times per hour. The composite was cured within the cure pile. At the end of the cure period, the % U_3O_8 solubilized in the cure was determined as described above for the cure pile composite.

Effluent flow rates were determined by measuring volumes of effluent collected for a known time. Rinse rates were determined from flowmeter readings. Samples of rinse solution and effluent were collected for analysis of uranium and acid concentrations. Tailings were sampled equally from the top, middle, and bottom of the bed as each load was removed to the tailings pile. About 200 samples were composited for analysis of % H_2O and residual % U_3O_8 for each run.

ANALYTICAL METHODS. Liquids were analyzed by spectrophotometry, fluorometry, or neutron activation - delayed neutron counting. Solids were dried and split. The split portions were ground, digested with acid, and analyzed spectrophotometrically. Additionally, many of the heads samples and all of the tailings samples were analyzed by neutron activation to confirm the results of classical analysis. Heads and tails were analyzed for vanadium by neutron activation.

COTTER PILOT PLANT TEST SUMMARY

TEST NO. 1

H&N: 3055,00

R.O.M. ORE

Dry Ore (T) - 25.3

Wet Ore (t) - 28.0

% Moisture - 9.8

% U_3O_8 Heads - 0.044

CRUSHER

Screen Size (in) - 1

% Fine Ore - 85

% Crushed Ore - 15

Crushed Ore Size - < 3/4"

Crusher Time (hr) - 1.8

Rate (T/hr) - 15

MIX DRUM

Mix Drum Time (hr) - 7

Rate (T/hr) - 4.0

CURE CONDITIONS

H_2SO_4 (#/T) - 110

$NaClO_3$ (#/T) - 2.2

% H_2O - 11.7

CURE PILE

Loading Time (hr) 1.4

RINSE PAD

Bed Height (ft) - 2.73

Bed Area (ft^2) - 220

Unloading Time (hr) 7

% H_2O Tails 17.7

TAILINGS PILE

Cure Time (hr) - 46

Ave. Temp (^oC) - 44

H_2SO_4 Consumed (#/T) -

% U_3O_8 Solubilized - 95.0

% U_3O_8 Calc. Heads - .061

% U_3O_8 Tails - .003

U_3O_8 RECOVERY

PRODUCT	WT./VOL.	% U_3O_8	gU_3O_8	% DIST
EFFLUENT	5925gal		11010	90.5
RESIDUE	25.2T	.005	1144	9.5
CALC. H.	25.2T	.053	12154	100.0

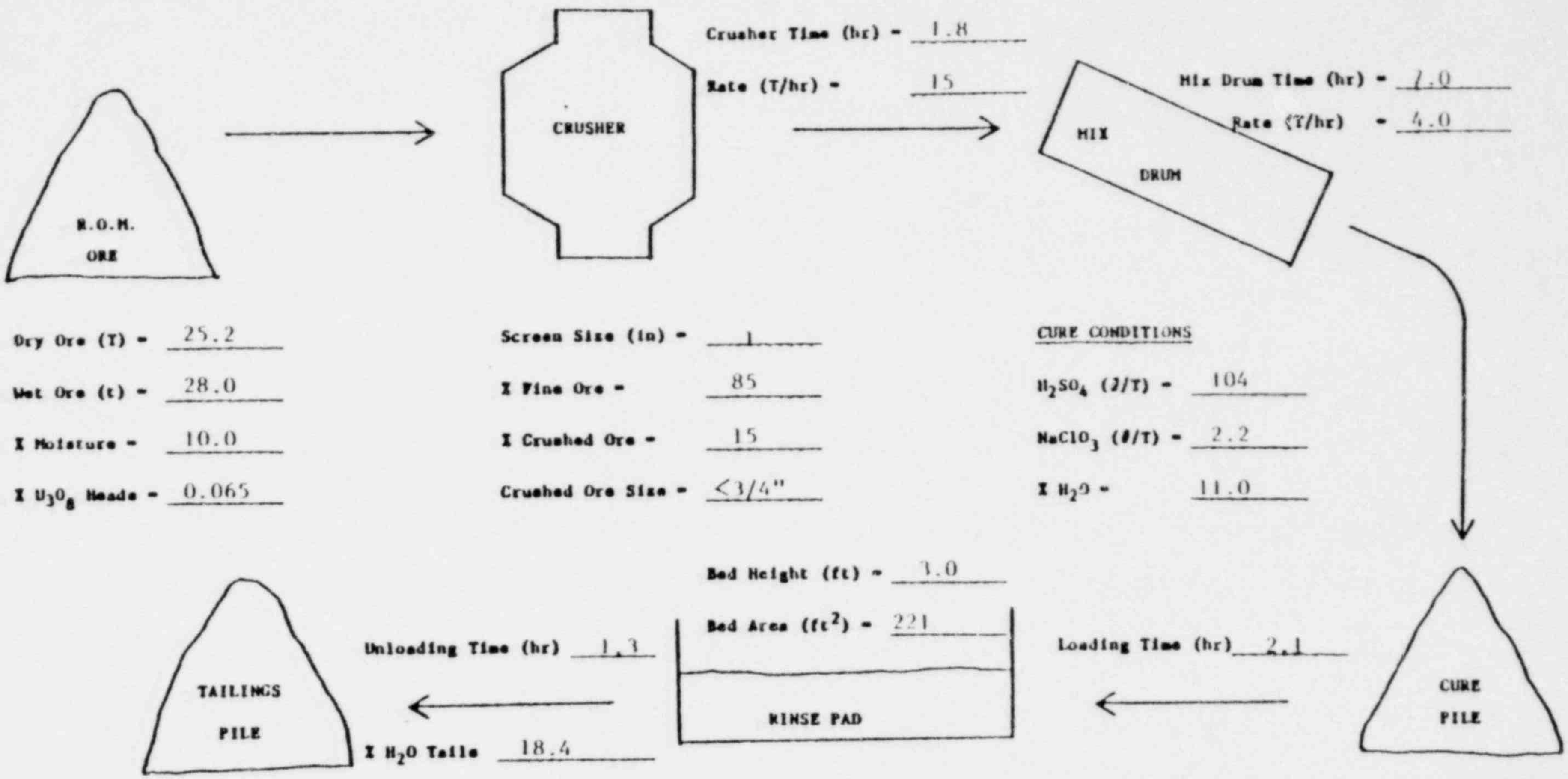
	RINSE SOLUTIONS	H_2O	DRAINAGE
	H_2SO_4 (g/l) - 1.0 $NaClO_3$ (g/l) - 1.0		
Time (hr)	21.0	15.2	14.0
Volume Spray (gal)	2410	4740	—
Rate (gal/ft^2 hr.)	0.55	.58-2.7	—
Volume Effluent	7439	3530	375
% Solids Effluent	—	—	

COMMENTS: > 40 l/min (≥ 2.9 gal/ft^2/hr) was drained from bed with no flooding. Gravel in troughs.

COTTER PILOT PLANT TEST SUMMARY

TEST NO. 2

H&N: 3055,00



Crusher Time (hr) - 1.8

Rate (T/hr) - 15

Mix Drum Time (hr) - 7.0

Rate (T/hr) - 4.0

Dry Ore (T) - 25.2

Wet Ore (t) - 28.0

% Moisture - 10.0

% U_3O_8 Heads - 0.065

Screen Size (in) - 1

% Fine Ore - 85

% Crushed Ore - 15

Crushed Ore Size - <3/4"

CURE CONDITIONS

H_2SO_4 (#/T) - 104

$NaClO_3$ (#/T) - 2.2

% H_2O - 11.0

Bed Height (ft) - 3.0

Bed Area (ft^2) - 221

Loading Time (hr) 2.1

Unloading Time (hr) 1.3

% H_2O Tails 18.4

Cure Time (hr) - 41

Ave. Temp (°C) - 43

H_2SO_4 Consumed (#/T) -

% U_3O_8 Solubilized - 81.4

% U_3O_8 Calc. Heads - .086

% U_3O_8 Tails - .016

U_3O_8 RECOVERY

PRODUCT	Wt./VOL.	% U_3O_8	gU_3O_8	% DIST
EFFLUENT	6758gal		11536	94.3
RESIDUE	25.2T	.003	686	5.7
CALC. H.	25.2T	.053	12222	100.0

COMMENTS: Rinse pad covered with 1-2" layer of gravel for drainage.

	RINSE SOLUTIONS	H_2O	DRAINAGE
	H_2SO_4 (g/l) - 6.7 $NaClO_3$ (g/l) - 0.8		
Time (hr)	30.0	12.0	8.3
Volume Spray (gal)	3100	4170	—
Rate (gal/ft^2 hr.)	.50	.50-.86	—
Volume Effluent	2610	3980	172
% Solids Effluent	—	—	

COTTER PILOT PLANT TEST SUMMARY

H&N: 3055,00

TEST NO. 3

R.O.M. ORE

CRUSHER

Crusher Time (hr) - 1.8

Rate (T/hr) - 15

MIX DRUM

Mix Drum Time (hr) - 4.7

Rate (T/hr) - 5.9

Dry Ore (T) - 25.4

Wet Ore (t) - 28.0

% Moisture - 9.4

% U_3O_8 Heads - 0.045

Screen Size (in) - 1

% Fine Ore - 85

% Crushed Ore - 15

Crushed Ore Size - < 3/4"

CURE CONDITIONS

H_2SO_4 (#/T) - 74.0

$NaClO_3$ (#/T) - 2.0

% H_2O - 12.7

TAILINGS PILE

Unloading Time (hr) 0.7

% H_2O Tails 20.2

Bed Height (ft) - 2.7

Bed Area (ft^2) - 210

RINSE PAD

Loading Time (hr) ----

CURE PILE

Cure Time (hr) - 40

Ave. Temp (°C) - 44

H_2SO_4 Consumed (#/T) -

% U_3O_8 Solubilized - 96.9

% U_3O_8 Calc. Heads - .062

% U_3O_8 Tails - .002

U_3O_8 RECOVERY

ODUCT	WT./VOL.	% U_3O_8	gU_3O_8	% DIST
FLUENT	6612 gal		10667	93.9
SIDUE	25.4 T	.003	692	6.1
LC. H.	25.4 T	.049	11359	100.0

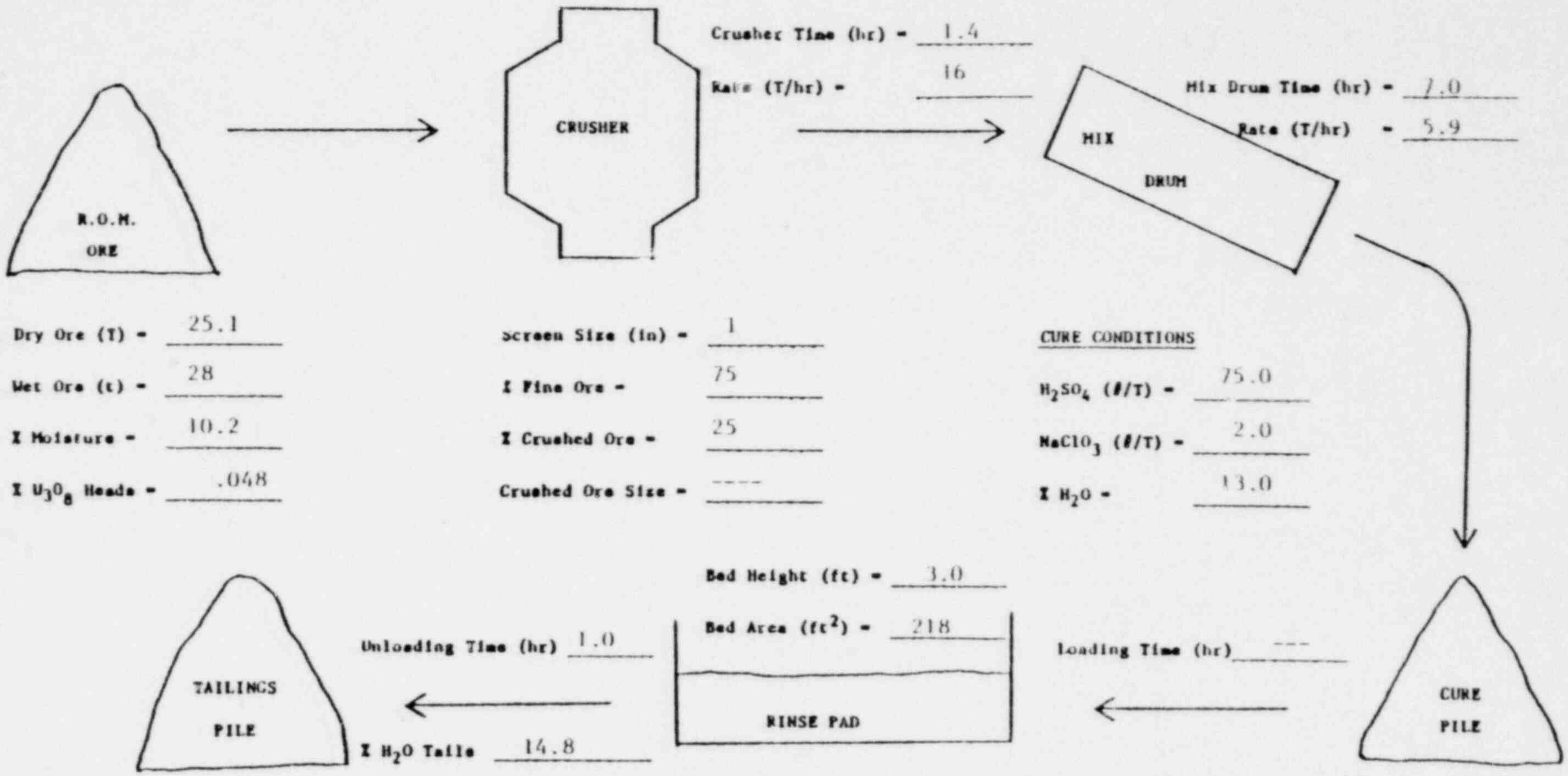
ENTS: Effluent collected in pregnant & three interliquor fractions. Interliquor rinsed ore in run 4.

	RINSE SOLUTIONS	H_2O	DRAINAGE
	H_2SO_4 (g/l) - 10.0 $NaClO_3$ (g/l) - 1.0		
Time (hr)	39.8	30.0	9.7
Volume Spray (gal)	4060	3080	—
Rate (gal/ft^2 hr.)	.45 - .53	.45-.53	—
Volume Effluent	3440	2950	221
% Solids Effluent	—	—	

COTTER PILOT PLANT TEST SUMMARY

H&N: 3055,00

TEST NO. 4



Crusher Time (hr) = 1.4

Rate (T/hr) = 16

Mix Drum Time (hr) = 7.0

Rate (T/hr) = 5.9

Dry Ore (T) = 25.1

Wet Ore (t) = 28

% Moisture = 10.2

% U_3O_8 Heads = .048

Screen Size (in) = 1

% Fine Ore = 75

% Crushed Ore = 25

Crushed Ore Size = ----

CURE CONDITIONS

H_2SO_4 (#/T) = 75.0

$NaClO_3$ (#/T) = 2.0

% H_2O = 13.0

Bed Height (ft) = 3.0

Bed Area (ft^2) = 218

Unloading Time (hr) 1.0

Loading Time (hr) ---

% H_2O Tails 14.8

Cure Time (hr) = 25

Ave. Temp (°C) = 47

H_2SO_4 Consumed (#/T) =

% U_3O_8 Solubilized = 90.7

% U_3O_8 Calc. Heads = .065

% U_3O_8 Tails = .006

U_3O_8 RECOVERY

PRODUCT	WT./VOL.	% U_3O_8	gU_3O_8	% DIST
EFFLUENT	6064 gal		13325	85.4
RESIDUE	25.1 T	.010	2279	14.6
CALC. H.	25.1 T	.068	15604	100.0

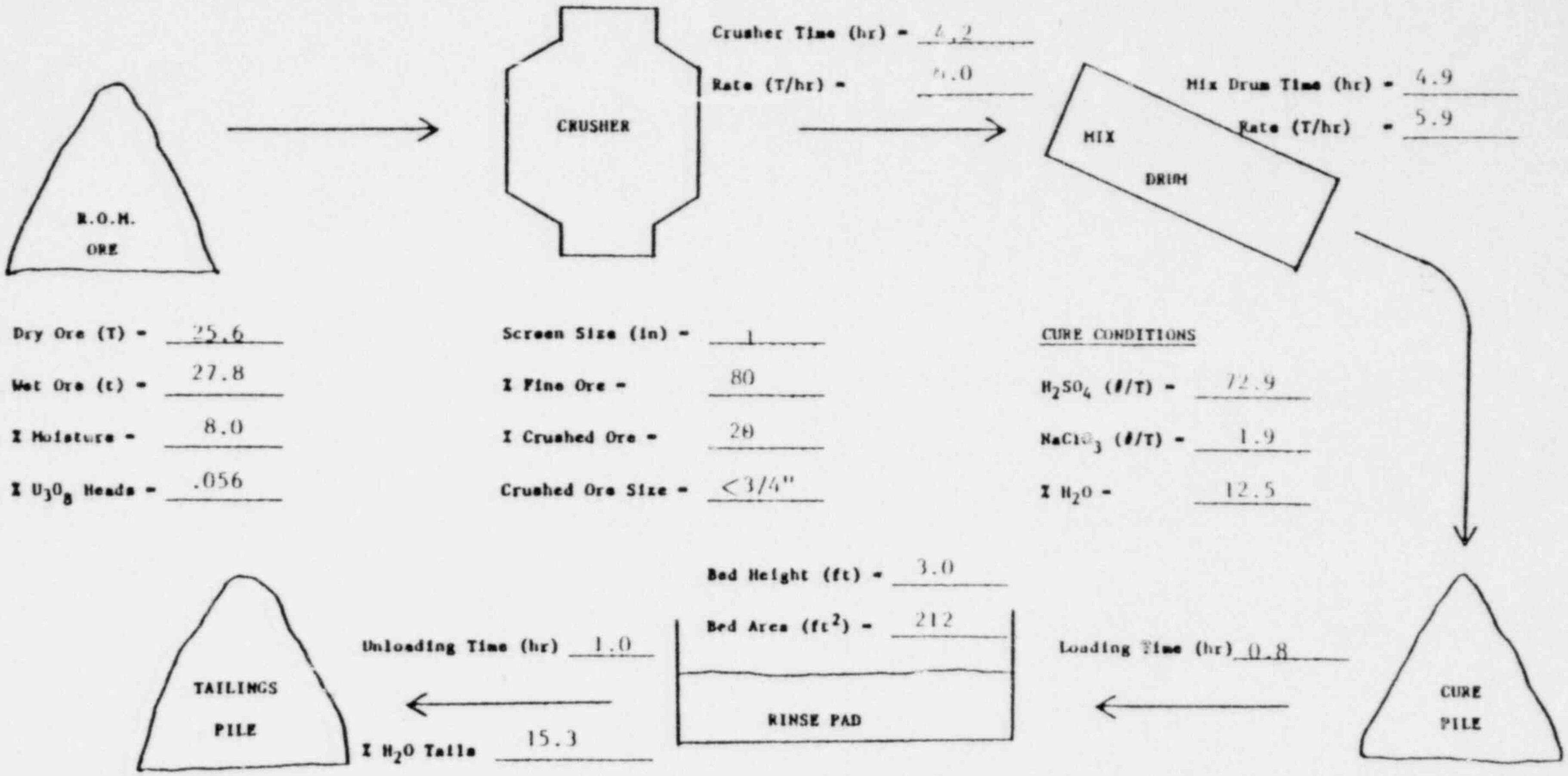
COMMENTS: Insufficient acid in rinse solution.

	RINSE SOLUTIONS	H_2O	DRAINAGE
Interliq. Run 3	H_2SO_4 (g/l) = — $NaClO_3$ (g/l) = —		
Time (hr)	43.5	10.2	11.7
Volume Spray (gal)	3490	872	—
Rate (gal/ft^2 hr.)	0.44	0.44	—
Volume Effluent	2860	840	220
% Solids Effluent	—	—	

COTTER PILOT PLANT TEST SUMMARY

TEST NO. 5

H&N: 3055.00



Crusher Time (hr) = 4.2

Rate (T/hr) = 6.0

Mix Drum Time (hr) = 4.9

Rate (T/hr) = 5.9

Dry Ore (T) = 25.6

Wet Ore (t) = 27.8

% Moisture = 8.0

% U_3O_8 Heads = .056

Screen Size (in) = 1

% Fine Ore = 80

% Crushed Ore = 20

Crushed Ore Size = <3/4"

CURE CONDITIONS

H_2SO_4 (#/T) = 72.9

$NaClO_3$ (#/T) = 1.9

% H_2O = 12.5

Bed Height (ft) = 3.0

Bed Area (ft^2) = 212

Unloading Time (hr) 1.0

Loading Time (hr) 0.8

% H_2O Tails 15.3

Cure Time (hr) = 48

Ave. Temp (°C) = 38

H_2SO_4 Consumed (#/T) =

% U_3O_8 Solubilized = 89.4

% U_3O_8 Calc. Heads = .066

% U_3O_8 Tails = .007

U_3O_8 RECOVERY

PRODUCT	WT./VOL.	% U_3O_8	gU_3O_8	% DIST
EFFLUENT	4906 gal		14850	88.8
RESIDUE	25.6 T	.008	1860	11.2
CALC. H.	25.6 T	.072	16710	100.0

COMMENTS: 30 g/ℓ H_2SO_4 & 1 g/ℓ $NaClO_3$
Added to 3rd I.L. Rinse.
4-stage countercurrent rinse.

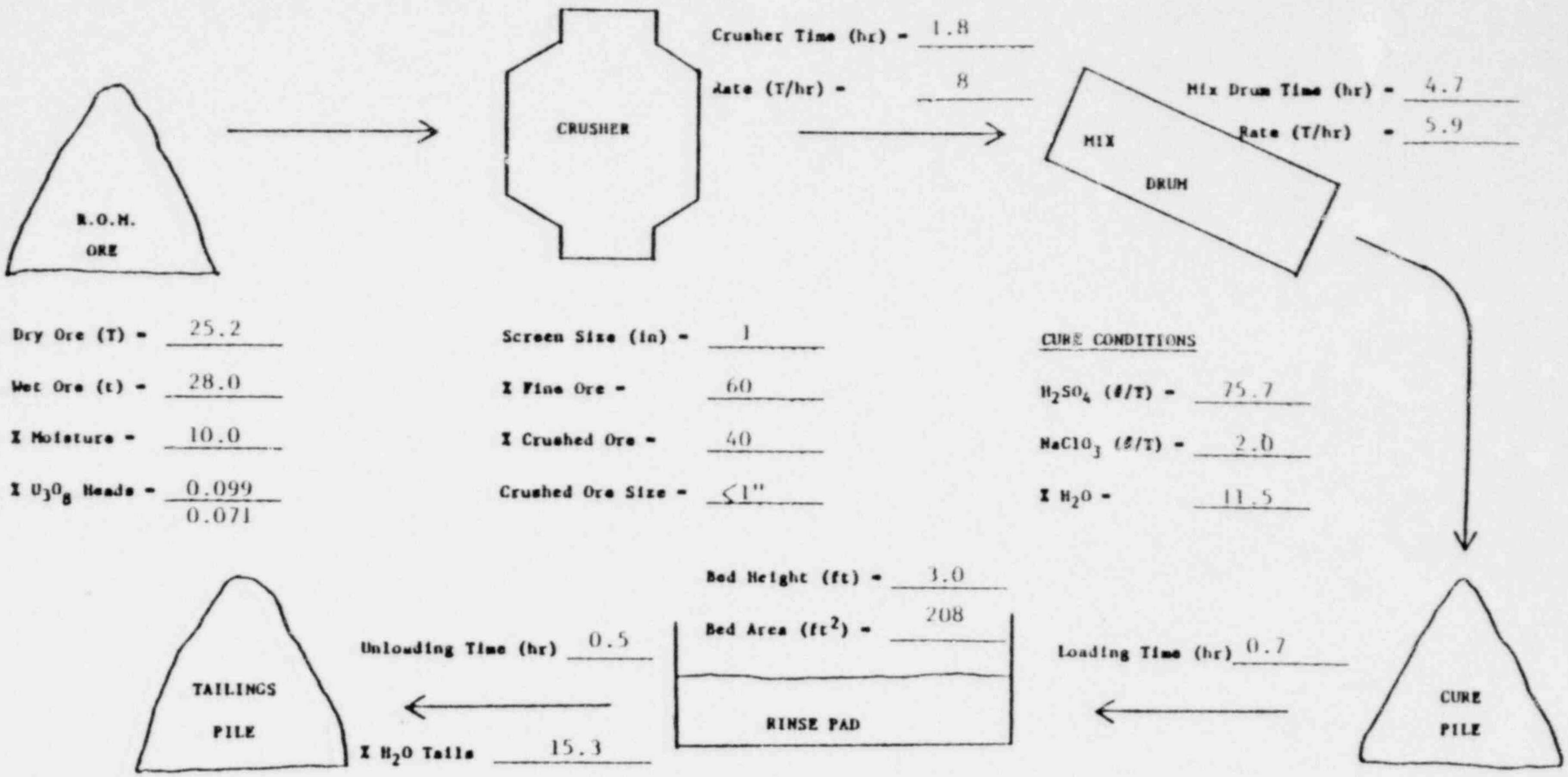
	RINSE SOLUTIONS	H_2O	DRAINAGE
Interliq. Run 4	H_2SO_4 (g/l) = 30* $NaClO_3$ (g/l) = 0.9		
Time (hr)	41.2	15.8	11.2
Volume Spray (gal)	3470	1620	—
Rate (gal/ft^2 hr.)	.45	.50	—
Volume Effluent	3080	1550	270
% Solids Effluent	—	—	

* Added to 3rd interliquor rinse.

COTTER PILOT PLANT TEST SUMMARY

H&N: 3055,00

TEST NO. 6



Crusher Time (hr) - 1.8

Rate (T/hr) - 8

Mix Drum Time (hr) - 4.7

Rate (T/hr) - 5.9

Dry Ore (T) - 25.2

Wet Ore (t) - 28.0

% Moisture - 10.0

% U_3O_8 Heads - 0.099
0.071

Screen Size (in) - 1

% Fine Ore - 60

% Crushed Ore - 40

Crushed Ore Size - <1"

CURE CONDITIONS

H_2SO_4 (#/T) - 75.7

$NaClO_3$ (#/T) - 2.0

% H_2O - 11.5

Bed Height (ft) - 3.0

Bed Area (ft^2) - 208

Unloading Time (hr) 0.5

Loading Time (hr) 0.7

% H_2O Tails 15.3

9-7

Cure Time (hr) - 26

Ave. Temp (°C) - 43

H_2SO_4 Consumed (#/T) -

% U_3O_8 Solubilized -

% U_3O_8 Calc. Heads -

% U_3O_8 Tails -

U_3O_8 RECOVERY

PRODUCT	WT./VOL.	% U_3O_8	gU_3O_8	% DIST
EFFLUENT	[illegible]728 gal		15973	93.3
RESIDUE	25.2 T	.005	1144	6.7
CALC. H.	25.2 T	.075	17117	100.0

COMMENTS: 20#/T H_2SO_4 & 2#/T $NaClO_3$

Added to 3rd interliquor rinse.

4-stage countercurrent rinse.

	RINSE SOLUTIONS	H_2O	DRAINAGE
Interliq. Run 5	H_2SO_4 (g/l) - 50* $NaClO_3$ (g/l) - 1.1		
Time (hr)	42.6 hr	16.3	9.5
Volume Spray (gal)	3720	1520	—
Rate (gal/ft^2 hr.)	.46	.46	—
Volume Effluent	3800	1480	245
% Solids Effluent	—	—	

* Added to 3rd interliquor rinse.

COTTER PILOT PLANT TEST SUMMARY

H&N: 3055.00

TEST NO. 7

R.O.M. ORE

Dry Ore (T) - 25.5

Wet Ore (t) - 28.0

% Moisture - 9.0

% U_3O_8 Heads - .058

CRUSHER

Crusher Time (hr) - 1.0

Rate (T/hr) - 10

Screen Size (in) - 1"

% Fine Ore - 70%

% Crushed Ore - 30%

Crushed Ore Size - <1"

MIX DRUM

Mix Drum Time (hr) - 4.6

Rate (T/hr) - 5.9

CURE CONDITIONS

H_2SO_4 (#/T) - 73.7

$NaClO_3$ (#/T) - 1.9

% H_2O - 10.4

CURE PILE

Loading Time (hr) 1.2

RINSE PAD

Bed Height (ft) - 3.0

Bed Area (ft^2) - 217

Unloading Time (hr) 1.8

% H_2O Tails 16.3

TAILINGS PILE

U_3O_8 RECOVERY

ODUCT	WT./VOL.	% U_3O_8	gU_3O_8	% DIST
LUENT	5193 gal		15103	90.3
IDUE	25.5 T	.007	1621	9.7
C. H.	25.5 T	.072	16724	100.0

NTS: 4-stage countercurrent rinse.

	RINSE SOLUTIONS	H_2O	DRAINAGE
Interliq. ex Run 6	H_2SO_4 (g/l) - 25.2* $NaClO_3$ (g/l) - 0.7		
Time (hr)	36.5	19.5	10.0
Volume Spray (gal)	3580	2090	—
Rate (gal/ft^2 hr.)	.44 - .51	.51	—
Volume Effluent	2920	1990	280
% Solids Effluent	—	—	

Cure Time (hr) - 46

Ave. Temp (°C) - 44

H_2SO_4 Consumed (#/T) -

% U_3O_8 Solubilized -

% U_3O_8 Calc. Heads -

% U_3O_8 Tails - .006

* Added to 3[rd] interliquor rinse.

COTTER PILOT PLANT TEST SUMMARY

TEST NO. 8

H&N: 3055.00

R.O.M. ORE → CRUSHER → MIX DRUM → CURE PILE → RINSE PAD → TAILINGS PILE

Crusher Time (hr) = 1.0

Rate (T/hr) = 10

Mix Drum Time (hr) = 5.0

Rate (T/hr) = 5.9

Dry Ore (T) = 25.6

Wet Ore (t) = 28.0

% Moisture = 8.7

% U_3O_8 Heads = .055

Screen Size (in) = 1

% Fine Ore = 70

% Crushed Ore = 30

Crushed Ore Size = ≤ 1"

CURE CONDITIONS

H_2SO_4 (#/T) = 74.5

$NaClO_3$ (#/T) = 1.9

% H_2O = 11.3

Bed Height (ft) = 3.0

Bed Area (ft^2) = 206

Unloading Time (hr) ---

Loading Time (hr) 1.0

% H_2O Tails 16.1

Cure Time (hr) = 32

Ave. Temp (°C) = 40

H_2SO_4 Consumed (#/T) =

% U_3O_8 Solubilized =

% U_3O_8 Calc. Heads =

% U_3O_8 Tails =

U_3O_8 RECOVERY

ODUCT	WT./VOL.	% U_3O_8	gU_3O_8	% DIST
FLUENT	4926 gal		13541	95.1
SIDUE	25.6 T	.003	697	4.9
LC. H.	25.6 T	.061	14238	100.0

ENTS: 4-stage countercurrent rinse

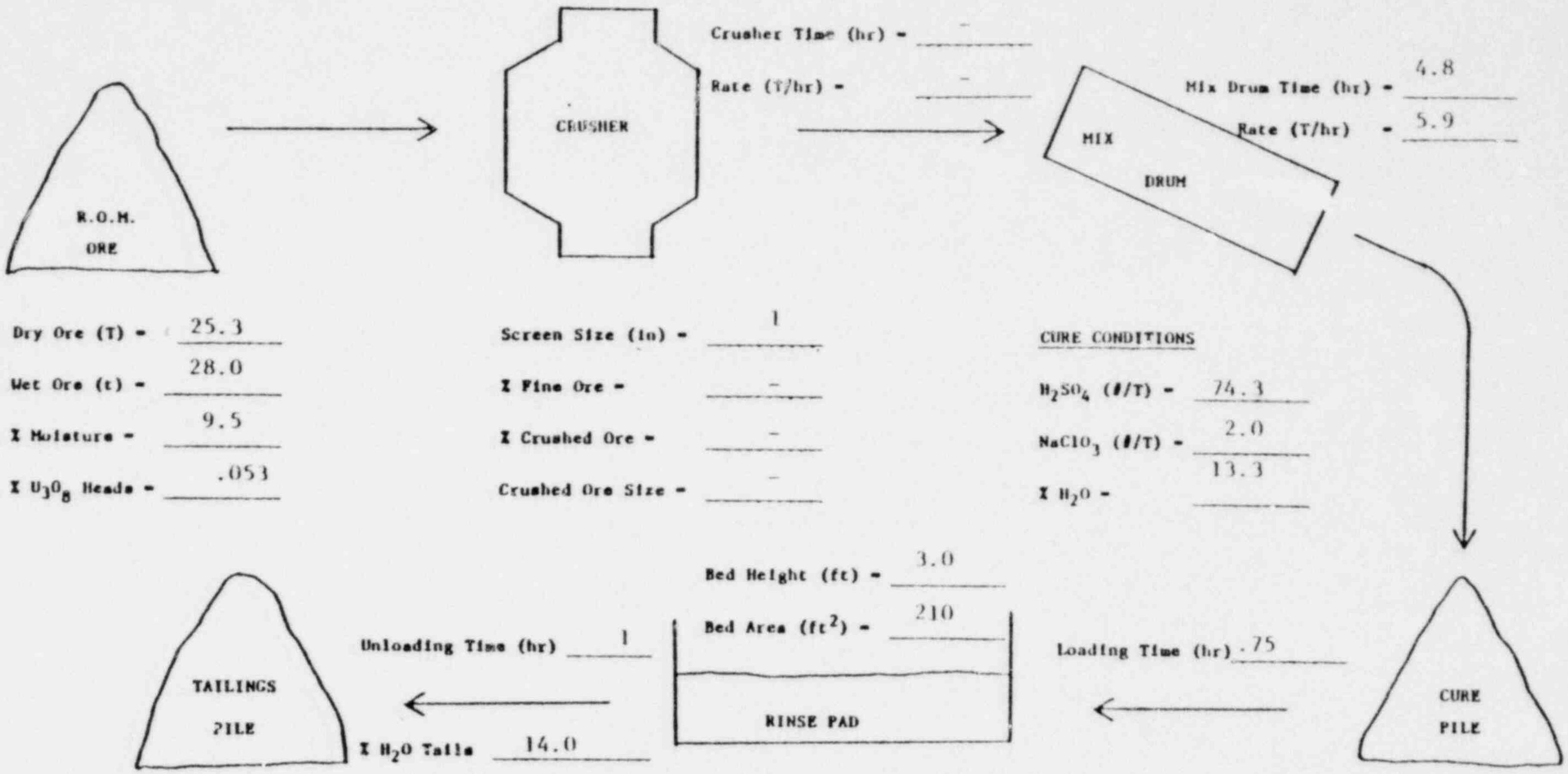
	RINSE SOLUTIONS	H_2O	DRAINAGE
Interliq. ex Run 7	H_2SO_4 (g/l) = 42* $NaClO_3$ (g/l) = 1.2		
Time (hr)	35.8	12.2	8.8
Volume Spray (gal)	3370	1670	—
Rate (gal/ft^2 hr.)	.42 - .54	.62-.73	—
Volume Effluent	3010	1440	230
% Solids Effluent	—	—	

* Added to 3rd interliquor rinse.

COTTER PILOT PLANT TEST SUMMARY

H&N: 3055,00

TEST NO. 9



Crusher Time (hr) - –

Rate (T/hr) - –

Mix Drum Time (hr) - 4.8

Rate (T/hr) - 5.9

Dry Ore (T) - 25.3

Wet Ore (t) - 28.0

% Moisture - 9.5

% U_3O_8 Heads - .053

Screen Size (in) - 1

% Fine Ore - –

% Crushed Ore - –

Crushed Ore Size - –

CURE CONDITIONS

H_2SO_4 (#/T) - 74.3

$NaClO_3$ (#/T) - 2.0

% H_2O - 13.3

Bed Height (ft) - 3.0

Bed Area (ft^2) - 210

Unloading Time (hr) 1

Loading Time (hr) .75

% H_2O Tails 14.0

Cure Time (hr) - 38

Ave. Temp (^oC) - 37

H_2SO_4 Consumed (#/T) -

% U_3O_8 Solubilized - 93.6

% U_3O_8 Calc. Heads - .047

% U_3O_8 Tails - .003

U_3O_8 RECOVERY

RODUCT	WT./VOL.	% U_3O_8	gU_3O_8	% DIST
FFLUENT	18981		11863	92.8
ESIDUE	25.3T	.004	919	7.2
ALC. H.	25.3T	.056	12782	100.0

MENTS: 4-stage countercurrent rinse

	RINSE SOLUTIONS	H_2O	DRAINAGE
Interliq. Ex Run 8	H_2SO_4 (g/l) - 22.7* $NaClO_3$ (g/l) - .62		
Time (hr)	38.5	16.0	>1 week
Volume Spray (gal)	3810	1670	—
Rate (gal/ft^2 hr.)	.47	.50	—
Volume Effluent	3200	1700	
% Solids Effluent	—	—	

* Added to 3rd interliquor rinse.

COTTER PILOT PLANT TEST SUMMARY

H&N: 3055,00

TEST NO. 10

R.O.M. ORE

CRUSHER

Crusher Time (hr) = 2.2

Rate (T/hr) = 16

MIX DRUM

Mix Drum Time (hr) = 5.3

Rate (T/hr) = 5.4

Dry Ore (T) = 25.1

Wet Ore (t) = 28.1

% Moisture = 10.5

% U_3O_8 Heads = .085

Screen Size (in) = 1

% Fine Ore = 75

% Crushed Ore = 25

Crushed Ore Size = < 1"

CURE CONDITIONS

H_2SO_4 (#/T) = 153

$NaClO_3$ (#/T) = 2.0

% H_2O = 12.2

Bed Height (ft) = 3.2

Bed Area (ft^2) = 202

TAILINGS PILE

Unloading Time (hr) .50

RINSE PAD

Loading Time (hr) 1.25

CURE PILE

% H_2O Tails 17.4

Cure Time (hr) = 24

Ave. Temp (^oC) = 66

H_2SO_4 Consumed (#/T) =

% U_3O_8 Solubilized = 69.2

% U_3O_8 Calc. Heads = .107

% U_3O_8 Tails = .033

U_3O_8 RECOVERY

RODUCT	WT./VOL.	% U_3O_8	gU_3O_8	% DIST
FFLUENT	260601.		16343	93.5
ESIDUE	25.1T	.005	1139	6.5
ALC. H.	25.1T	.077	17482	100.0

ENTS: First test using ore mined in 1980.

	RINSE SOLUTIONS	H_2O	DRAINAGE
	H_2SO_4 (g/l) = 5.4 $NaClO_3$ (g/l) = 1.0		
Time (hr)	40.7	30.0	19.7
Volume Spray (gal)	4210	2710	—
Rate (gal/ft^2 hr.)	.51	.45	—
Volume Effluent	3390	3040	463
% Solids Effluent	—	—	

COTTER PILOT PLANT TEST SUMMARY

H&N: 3055,00

TEST NO. ______________

R.O.M. ORE

Dry Ore (T) - 25.3

Wet Ore (t) - 28.0

% Moisture - 9.7

% U_3O_8 Heads - .094

CRUSHER

Crusher Time (hr) - –

Rate (T/hr) - –

Screen Size (in) - 1

% Fine Ore - –

% Crushed Ore - –

Crushed Ore Size - –

MIX DRUM

Mix Drum Time (hr) - 3.7

Rate (T/hr) - 7.5

CURE CONDITIONS

H_2SO_4 (#/T) - 114

$NaClO_3$ (#/T) - 2.0

% H_2O - 12.4

CURE PILE

Loading Time (hr) 1.2

Cure Time (hr) - 28

Ave. Temp (°C) - 57

H_2SO_4 Consumed (#/T) -

% U_3O_8 Solubilized - 81.7

% U_3O_8 Calc. Heads - .099

% U_3O_8 Tails - .018

RINSE PAD

Bed Height (ft) - 3.0

Bed Area (ft^2) - 196

TAILINGS PILE

Unloading Time (hr) ______

% H_2O Tails 18.1

U_3O_8 RECOVERY

ODUCT	WT.	% U_3O_8	gU_3O_8	% DIST
FLUENT	2760		16602	85.8
SIDUE	25.3T	.012	2757	14.2
C. H.	25.3T	.084	19359	100.0

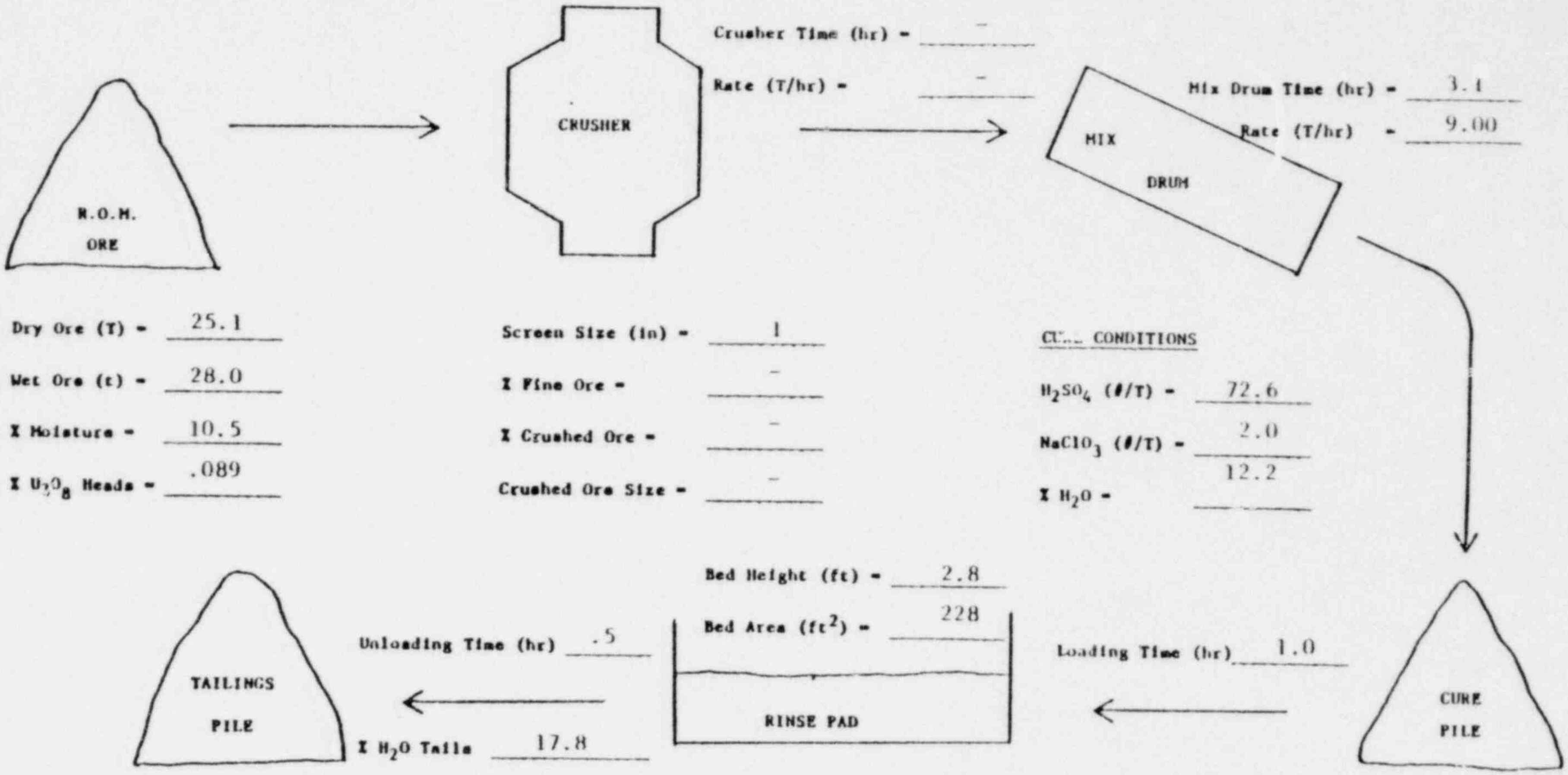
ENTS: ______________________

	RINSE SOLUTIONS	H_2O	DRAINAGE
	H_2SO_4 (g/l) - 6.6 $NaClO_3$ (g/l) - 1.0		
Time (hr)	24.6	19.4	7.5
Volume Spray (gal)	4520	3460	—
Rate (gal/ft^2 hr.)	.94	.94	—
Volume Effluent	3720	3460	116
% Solids Effluent	—	—	

COTTER PILOT PLANT TEST SUMMARY

H&N: 3055,00

TEST NO. 12



Crusher Time (hr) - –

Rate (T/hr) - –

Mix Drum Time (hr) = 3.1

Rate (T/hr) = 9.00

Dry Ore (T) = 25.1

Wet Ore (t) = 28.0

% Moisture = 10.5

% U_3O_8 Heads = .089

Screen Size (in) = 1

% Fine Ore = –

% Crushed Ore = –

Crushed Ore Size = –

CU... CONDITIONS

H_2SO_4 (#/T) = 72.6

$NaClO_3$ (#/T) = 2.0

% H_2O = 12.2

Bed Height (ft) = 2.8

Bed Area (ft^2) = 228

Unloading Time (hr) .5

Loading Time (hr) 1.0

% H_2O Tails 17.8

Cure Time (hr) = 31

Ave. Temp (°C) = 52

H_2SO_4 Consumed (#/T) =

% U_3O_8 Solubilized = 73.5

% U_3O_8 Calc. Heads = .106

% U_3O_8 Tails = .028

U_3O_8 RECOVERY

ODUCT	WT./VOL.	% U_3O_8	gU_3O_8	% DIST
FLUENT	20490		18587	75.1
SIDUE	25.1T	.027	6154	24.9
LC. H.	25.1T	.109	24741	100.0

ENTS: Insufficient acid in rinse

	RINSE SOLUTIONS H_2SO_4 (g/l) = 10.4* $NaClO_3$ (g/l) = 1.0	H_2O	DRAINAGE
Time (hr)	52.2	21.0	11.5
Volume Spray (gal)	4100	1510	—
Rate (gal/ft^2 hr.)	.34	.35	—
Volume Effluent	3630	1587	200
% Solids Effluent	—	—	

COTTER PILOT PLANT TEST SUMMARY

H&H: 3055.00

TEST NO. 13

R.O.M. ORE

Dry Ore (T) = 24.8

Wet Ore (t) = 27.8

% Moisture = 10.7

% U_3O_8 Heads = .100

CRUSHER

Crusher Time (hr) = –

Rate (T/hr) = –

Screen Size (in) = 1

% Fine Ore = –

% Crushed Ore = –

Crushed Ore Size = –

MIX DRUM

Mix Drum Time (hr) = 3.9

Rate (T/hr) = 7.46

CURE CONDITIONS

H_2SO_4 (#/T) = 121

$NaClO_3$ (#/T) = 2.0

% H_2O = 10.6

CURE PILE

Loading Time (hr) .5

RINSE PAD

Bed Height (ft) = 3.0

Bed Area (ft^2) = 217

TAILINGS PILE

Unloading Time (hr) 0.4

% H_2O Tails 17.6

Cure Time (hr) = 48.0

Ave. Temp (°C) = 54*

H_2SO_4 Consumed (#/T) =

% U_3O_8 Solubilized = 58.1

% U_3O_8 Calc. Heads = .141

% U_3O_8 Tails = .059

*62°C center of cure pile.

U_3O_8 RECOVERY

ODUCT	WT./VOL.	% U_3O_8	gU_3O_8	% DIST
FLUENT	25620		15738	79.5
SIDUE	24.8T	.018	4053	20.5
LC. H.	24.8T	.088	19791	100.0

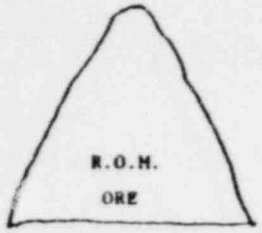
ENTS:

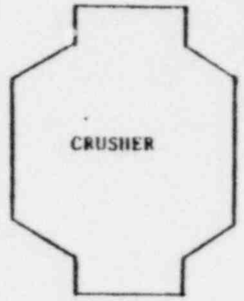
	RINSE SOLUTIONS	H_2O	DRAINAGE
	H_2SO_4 (g/l) = 4.9 $NaClO_3$ (g/l) = 1.0		
Time (hr)	19.7	11.3	8
Volume Spray (gal)	5170	2620	—
Rate (gal/ft^2 hr.)	1.21	1.07	—
Volume Effluent	4080	2390	290
% Solids Effluent	—	—	

COTTER PILOT PLANT TEST SUMMARY

TEST NO. 14

H&N: 3055.00





Crusher Time (hr) = –

Rate (T/hr) = –

Mix Drum Time (hr) = 2.70

Rate (T/hr) = 7.50

Dry Ore (T) = 18.1

Wet Ore (t) = 20.0

% Moisture = 8.5

% U_3O_8 Heads = .099

Screen Size (in) = 1

% Fine Ore = –

% Crushed Ore = –

Crushed Ore Size = –

CURE CONDITIONS

H_2SO_4 (#/T) = 147

$NaClO_3$ (#/T) = 2.0

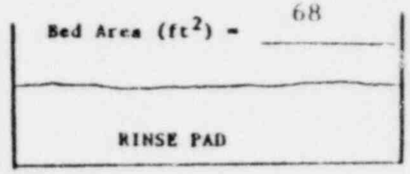
% H_2O = 9.9

Unloading Time (hr) 1.0

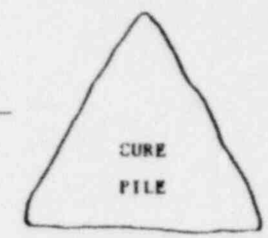
% H_2O Tails –

Bed Height (ft) = 6.0

Bed Area (ft^2) = 68



Loading Time (hr) 0.6



Cure Time (hr) = 24

Ave. Temp (°C) = 63

H_2SO_4 Consumed (#/T) =

% U_3O_8 Solubilized = 81.4

% U_3O_8 Calc. Heads = .096

% U_3O_8 Tails = .018

U_3O_8 RECOVERY

PRODUCT	WT./VOL.	% U_3O_8	gU_3O_8	% DIST
EFFLUENT	15447		12455	97.4
RESIDUE	18.1T	.002	329	2.6
CALC. H.	18.1T	.078	12784	100.0

COMMENTS: 8' x 8.5' x 6' high bed.
Ore cured on rinse pad.

	RINSE SOLUTIONS	H_2O	DRAINAGE
	H_2SO_4 (g/l) = 6.0 $NaClO_3$ (g/l) = 1.0		
Time (hr)	147	62	49.5
Volume Spray (gal)	3000	1160	—
Rate (gal/ft^2 hr.)	.30	.28	—
Volume Effluent	2760	1215	102
% Solids Effluent	—	—	

COTTER PILOT PLANT TEST SUMMARY

H&N: 3055,00

TEST NO. 15

R.O.M. ORE → CRUSHER → MIX DRUM → CURE PILE → RINSE PAD → TAILINGS PILE

Crusher Time (hr) - –

Rate (T/hr) - –

Mix Drum Time (hr) - 2.7

Rate (T/hr) - 7.50

Dry Ore (T) - 16.6

Wet Ore (t) - 18

% Moisture - 7.9

% U_3O_8 Heads - .100

Screen Size (in) - 1/2

% Fine Ore - –

% Crushed Ore - –

Crushed Ore Size - –

CURE CONDITIONS

H_2SO_4 (#/T) - 122

$NaClO_3$ (#/T) - 2.7

% H_2O - 11.9

Bed Height (ft) - 5.8

Bed Area (ft^2) - 68

Unloading Time (hr) 1.0

Loading Time (hr) .7

% H_2O Tails 19.5

Cure Time (hr) - 28

Ave. Temp (°C) - 63

H_2SO_4 Consumed (#/T) -

% U_3O_8 Solubilized - 87.0

% U_3O_8 Calc. Heads - .107

% U_3O_8 Tails - .014

U_3O_8 RECOVERY

PRODUCT	WT./VOL.	% U_3O_8	gU_3O_8	% DIST
EFFLUENT	20612		12048	96.4
RESIDUE	16.6T	.003	452	3.6
CALC. H.	16.6T	.083	12500	100.0

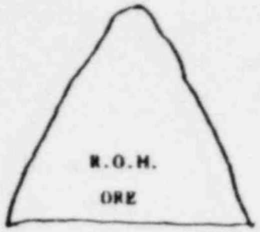
COMMENTS:

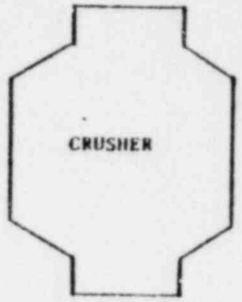
	RINSE SOLUTIONS	H_2O	DRAINAGE
	H_2SO_4 (g/l) - 10 $NaClO_3$ (g/l) - 2.0		
Time (hr)	61.5	33.0	8.0
Volume Spray (gal)	3840	2160	—
Rate (gal/ft^2 hr.)	.92	.96	—
Volume Effluent	3203	2011	232
% Solids Effluent	—	—	

COTTER PILOT PLANT TEST SUMMARY

H&N: 3055,00

TEST NO. 17





Crusher Time (hr) - –

Rate (T/hr) - –

Mix Drum Time (hr) - 3.5

Rate (T/hr) - 8.00

Dry Ore (T) - 25.2

Wet Ore (t) - 27.8

% Moisture - 9.3

% U_3O_8 Heads - .088

Screen Size (in) - 1

% Fine Ore - –

% Crushed Ore - –

Crushed Ore Size - –

CURE CONDITIONS

H_2SO_4 (#/T) - 110

$NaClO_3$ (#/T) - 2.0

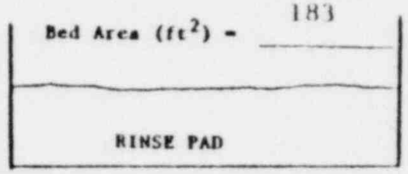
% H_2O - 10.2

Unloading Time (hr) 0.8

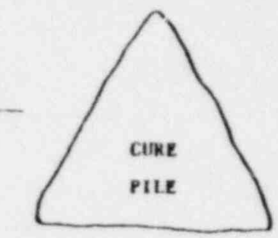
% H_2O Tails 16.5

Bed Height (ft) - 3.0

Bed Area (ft^2) - 183



Loading Time (hr) 0.6



Cure Time (hr) - 42

Ave. Temp (°C) - 59

H_2SO_4 Consumed (#/T) -

% U_3O_8 Solubilized - 80.0

% U_3O_8 Calc. Heads - .095

% U3O8 Tails - .019

U_3O_8 RECOVERY

RODUCT	WT./VOL.	% U_3O_8	gU_3O_8	% DIST
FFLUENT	17847		15252	90.5
ESIDUE	25.2T	.007	1602	9.5
ALC. H.	25.2T	.074	16854	100.0

MENTS:

	RINSE SOLUTIONS	H_2O	DRAINAGE
	H_2SO_4 (g/l) - 6.8 $NaClO_3$ (g/l) - 1.0		
Time (hr)	22.5	6.0	8.0
Volume Spray (gal)	4140	1141	—
Rate (gal/ft^2 hr.)	1.01	1.04	—
Volume Effluent	3360	1190	170
% Solids Effluent	—	—	

COTTER PILOT PLANT TEST SUMMARY

H&N: 3055,00

TEST NO. 18

R.O.M. ORE → CRUSHER → MIX DRUM → CURE PILE → RINSE PAD → TAILINGS PILE

Crusher Time (hr) - 4

Rate (T/hr) - 11

Mix Drum Time (hr) - 1.5

Rate (T/hr) - 6.40

Dry Ore (T) - 8.6

Wet Ore (t) - 9.4

% Moisture - 9.3

% U_3O_8 Heads - .159

Screen Size (in) - 1

% Fine Ore - 74

% Crushed Ore - 26

Crushed Ore Size - <2"

CURE CONDITIONS

H_2SO_4 (#/T) - 112

$NaClO_3$ (#/T) - 2.0

% H_2O - 10.8

Bed Height (ft) - 1.0

Bed Area (ft^2) - 174

Unloading Time (hr) -

Loading Time (hr) 0.5

% H_2O Tails 17.7

U_3O_8 RECOVERY

RODUCT	WT./VOL.	% U_3O_8	gU_3O_8	% DIST
FFLUENT	7765		4363	75.6
ESIDUE	8.6T	.018	1406	24.4
ALC. H.	8.6T	.074	5769	100.0

MENTS:

	RINSE SOLUTIONS	H_2O	DRAINAGE
	H_2SO_4 (g/l) - 6.1 $NaClO_3$ (g/l) - 1.0		
Time (hr)	7.5	4.0	6.0
Volume Spray (gal)	1430	760	—
Rate (gal/ft^2 hr.)	1.09	1.09	—
Volume Effluent	1190	800	60
% Solids Effluent	—	—	

Cure Time (hr) - 26

Ave. Temp (°C) - 63

H_2SO_4 Consumed (#/T) -

% U_3O_8 Solubilized - 89.2

% U_3O_8 Calc. Heads - .092

% U_3O_8 Tails - .010

COTTER PILOT PLANT TEST SUMMARY

TEST NO. 19

H&N: 3055,00

R.O.M. ORE

Dry Ore (.) - 25.0

Wet Ore (t) - 27.2

% Moisture - 8.2

% U_3O_8 Heads - 0.102

CRUSHER

Screen Size (in) - 1/2

% Fine Ore - 86

% Crushed Ore - 14

Crushed Ore Size - 1"

Crusher Time (hr) - 1.1

Rate (T/hr) - 32*

*Recrushed <1" Mesh Ore to <1/2 mesh

MIX DRUM

Mix Drum Time (hr) - 4.2

Rate (T/hr) - 6.4

CURE CONDITIONS

H_2SO_4 (#/T) - 133

$NaClO_3$ (#/T) - 3.0

% H_2O - 13.5

CURE PILE

Loading Time (hr) 1.0

Cure Time (hr) - 24

Ave. Temp (^oC) - 49

H_2SO_4 Consumed (#/T) -

% U_3O_8 Solubilized - 88.9

% U_3O_8 Calc. Heads - 0.091

% U_3O_8 Tails - 0.010

RINSE PAD

Bed Height (ft) - 3.0

Bed Area (ft^2) - 198

Unloading Time (hr) -

TAILINGS PILE

% H_2O Tails 17.0

	RINSE SOLUTIONS	H_2O	DRAINAGE
	H_2SO_4 (g/l) - 5.0 $NaClO_3$ (g/l) - 1.5		
Time (hr)	40.5	23.0	6.0
Volume Spray (gal)	3980	2210	—
Rate (gal/ft^2 hr.)	0.50	0.49	—
Volume Effluent	3330	2200	140
% Solids Effluent	—	—	

U_3O_8 RECOVERY

PRODUCT	WT./VOL.	% U_3O_8	gU_3O_8	% DIST
EFFLUENT	21436		18433	93.1
RESIDUE	25.0T	.006	1362	6.9
CALC. H.	25.0T	.087	19795	100.0

COMMENTS: Particle size of ore reduced from -1" to -1/2"

COTTER PILOT PLANT TEST SUMMARY

TEST NO. 20

H&N: 3055.00

R.O.M. ORE

CRUSHER

Crusher Time (hr) - –

Rate (T/hr) - –

MIX DRUM

Mix Drum Time (hr) - 3.76

Rate (T/hr) - 7.20

Dry Ore (T) - 25.6

Wet Ore (t) - 27.8

% Moisture - 7.8

% U_3O_8 Heads - 0.103

Screen Size (in) - 1/2

% Fine Ore - –

% Crushed Ore - –

Crushed Ore Size - –

CURE CONDITIONS

H_2SO_4 (#/T) - 129

$NaClO_3$ (#/T) - 1.9

% H_2O - 11.[illegible]

CURE PILE

Bed Height (ft) - 3.0

Bed Area (ft^2) - 226

RINSE PAD

Loading Time (hr) 0.9

Unloading Time (hr) 0.8

TAILINGS PILE

% H_2O Tails 16.4

Cure Time (hr) - 24

Ave. Temp (°C) - 60

H_2SO_4 Consumed (#/T) -

% U_3O_8 Solubilized - 93.8

% U_3O_8 Calc. Heads - 0.098

% U_3O_8 Tails - 0.006

U_3O_8 RECOVERY

RODUCT	WT./VOL.	% U_3O_8	gU_3O_8	% DIST
FFLUENT	28910		19128	96.5
ESIDUE	25.6T	.003	697	3.5
ALC. H.	25.6T	.085	19825	100.0

	RINSE SOLUTIONS	H_2O	DRAINAGE
	H_2SO_4 (g/l) - 10.7 $NaClO_3$ (g/l) - 2.0		
Time (hr)	60.6	31.9	6.5
Volume Spray (gal)	5360	2870	—
Rate (gal/ft^2 hr.)	0.39	0.40	—
Volume Effluent	4550	2860	230
% Solids Effluent	—	—	

MENTS: High Grade Ore (>0.1% U_3O_8)

Mined in 1980.

COTTER PILOT PLANT TEST SUMMARY

H&N: 3055.00

TEST NO. 21

R.O.M. ORE → CRUSHER → MIX DRUM → CURE PILE → RINSE PAD → TAILINGS PILE

Crusher Time (hr) = –

Rate (T/hr) = –

Mix Drum Time (hr) = 2.7

Rate (T/hr) = 7.50

Dry Ore (T) = 18.4

Wet Ore (t) = 20.0

% Moisture = 7.8

% U_3O_8 Heads = 0.075

Screen Size (in) = 1/2

% Fine Ore = –

% Crushed Ore = –

Crushed Ore Size = –

CURE CONDITIONS

H_2SO_4 (#/T) = 122

$NaClO_3$ (#/T) = 2.0

% H_2O = 12.9

Bed Height (ft) = 5.4

Bed Area (ft^2) = 68.0

Unloading Time (hr) 0.8

Loading Time (hr) .8

% H_2O Tails 19.5

Cure Time (hr) = 29

Ave. Temp (°C) = 61

H_2SO_4 Consumed (#/T) =

% U_3O_8 Solubilized = 93.8

% U_3O_8 Calc. Heads = 0.079

% U_3O_8 Tails = 0.005

U_3O_8 RECOVERY

PRODUCT	WT./VOL.	% U_3O_8	gU_3O_8	% DIST
EFFLUENT	14417		8117	94.2
RESIDUE	18.4T	.003	501	5.8
CALC. H.	18.4T	.052	8618	100.0

COMMENTS:

	RINSE SOLUTIONS H_2SO_4 (g/l) = 11.0 $NaClO_3$ (g/l) = 2.0	H_2O	DRAINAGE
Time (hr)	73	28	7.0
Volume Spray (gal)	2840	1370	—
Rate (gal/ft^2 hr.)	0.57	0.72	—
Volume Effluent	2280	1420	120
% Solids Effluent	—	—	

COTTER PILOT PLANT TEST SUMMARY

H&N: 3055.00

TEST NO. 22

R.O.M. ORE

CRUSHER

Crusher Time (hr) = –

Rate (T/hr) = –

MIX DRUM

Mix Drum Time (hr) = 2.2

Rate (T/hr) = 7.5

Dry Ore (T) = 16.6

Wet Ore (t) = 18.1

% Moisture = 7.9

% U_3O_8 Heads = .072

Screen Size (in) = 1/2

% Fine Ore = –

% Crushed Ore = –

Crushed Ore Size = –

CURE CONDITIONS

H_2SO_4 (#/T) = 128

$NaClO_3$ (#/T) = 2.0

% H_2O = 13.5

Bed Height (ft) = 2.8

Bed Area (ft^2) = 155

Unloading Time (hr) .3

Loading Time (hr) .7

TAILINGS PILE

RINSE PAD

CURE PILE

% H_2O Tails 19.3

Cure Time (hr) = 32.2

Ave. Temp (°C) = 62

H_2SO_4 Consumed (#/T) =

% U_3O_8 Solubilized = 91.2

% U_3O_8 Calc. Heads = .079

% U_3O_8 Tails = .007

U_3O_8 RECOVERY

RODUCT	WT./VOL.	% U_3O_8	gU_3O_8	% DIST
FFLUENT	18277		8267	94.8
ESIDUE	16.6T	.003	452	5.2
ALC. H.	16.6T	.058	8719	100.0

MENTS:

	RINSE SOLUTIONS	H_2O	DRAINAGE
	H_2SO_4 (g/l) = 11.6 $NaClO_3$ (g/l) = 2.0		
Time (hr)	60.8	22.5	8.0
Volume Spray (gal)	3760	1480	—
Rate (gal/ft^2 hr.)	0.40	0.42	—
Volume Effluent	3220	1500	>110
% Solids Effluent	—	—	

COTTER PILOT PLANT TEST SUMMARY

TEST NO. 23

H48: 3055.00

R.O.M. ORE

CRUSHER

Crusher Time (hr) - –

Rate (T/hr) - –

MIX DRUM

Mix Drum Time (hr) - 1.9

Rate (T/hr) - 7.1

Dry Ore (T) - 16.7

Wet Ore (t) - 18.1

% Moisture - 8.0

% U_3O_8 Heads - .088

Screen Size (in) - 1/2

% Fine Ore - –

% Crushed Ore - –

Crushed Ore Size - –

CURE CONDITIONS

H_2SO_4 (#/T) - 111

$NaClO_3$ (#/T) - 2.0

% H_2O - 13.5

CURE PILE

Loading Time (hr) 0.6

RINSE PAD

Bed Height (ft) = 2.8

Bed Area (ft^2) - 145

Unloading Time (hr) 0.7

% H_2O Tails 17.7

TAILINGS PILE

Cure Time (hr) - 28.7

Ave. Temp (°C) - 56

H_2SO_4 Consumed (#/T) -

% U_3O_8 Solubilized - 91.5

% U_3O_8 Calc. Heads - .071

% U_3O_8 Tails - .006

U_3O_8 RECOVERY

PRODUCT	WT./VOL.	% U_3O_8	gU_3O_8	% DIST
EFFLUENT	14320		8077	96.4
RESIDUE	16.7T	.002	303	3.6
CALC. H.	16.7T	.055	8380	100.0

	RINSE SOLUTIONS	H_2O	DRAINAGE
	H_2SO_4 (g/l) - 11.6 $NaClO_3$ (g/l) - 2		
Time (hr)	61.3	14.4	15.2
Volume Spray (gal)	2890	1220	—
Rate (gal/ft^2 hr.)	0.32	.59	—
Volume Effluent	2510	1210	70
% Solids Effluent	—	—	

COMMENTS:

COTTER PILOT PLANT TEST SUMMARY

H&N: 3055.00

TEST NO. 24

R.O.M. ORE → CRUSHER → MIX DRUM → CURE PILE → RINSE PAD → TAILINGS PILE

Crusher Time (hr) - –

Rate (T/hr) - –

Mix Drum Time (hr) - 2.50

Rate (T/hr) - 7.50

Dry Ore (T) - 16.8

Wet Ore (t) - 18.1

% Moisture - 7.0

% U_3O_8 Heads - .084

Screen Size (in) - 1/2

% Fine Ore - –

% Crushed Ore - –

Crushed Ore Size - –

CURE CONDITIONS

H_2SO_4 (#/T) - 124

$NaClO_3$ (#/T) - 2.0

% H_2O - 10.6

Bed Height (ft) - 2.8

Bed Area (ft^2) - 149

Unloading Time (hr) 0.5

Loading Time (hr) 0.5

% H_2O Tails 19.3

Cure Time (hr) - 39.8

Ave. Temp (°C) - 54

H_2SO_4 Consumed (#/T) -

% U_3O_8 Solubilized - 94.4

% U_3O_8 Calc. Heads - .088

% U_3O_8 Tails - .005

U_3O_8 RECOVERY

PRODUCT	WT./VOL.	% U_3O_8	gU_3O_8	% DIST
EFFLUENT	14463		9300	95.3
RESIDUE	16.8T	.003	458	4.7
CALC. H.		.064	9758	100.0

COMMENTS:

	RINSE SOLUTIONS	H_2O	DRAINAGE
	H_2SO_4 (g/l) - 10 $NaClO_3$ (g/l) - 2.0		
Time (hr)	52.8	14.7	6.0
Volume Spray (gal)	3090	1250	—
Rate (gal/ft^2 hr.)	0.39	0.57	—
Volume Effluent	2527	1180	110
% Solids Effluent	—	—	

COTTER PILOT PLANT TEST SUMMARY

H&N: 3055.00

TEST NO. 25

R.O.M. ORE

CRUSHER

Crusher Time (hr) = –

Rate (T/hr) = –

MIX DRUM

Mix Drum Time (hr) = 2.9

Rate (T/hr) = 9.5

Dry Ore (T) = 25.9

Wet Ore (t) = 28.2

% Moisture = 8.4

% U_3O_8 Heads = .056

Screen Size (in) = 1/2

% Fine Ore = –

% Crushed Ore = –

Crushed Ore Size = –

CURE CONDITIONS

H_2SO_4 (#/T) = 70.2

$NaClO_3$ (#/T) = 0

% H_2O = 13.8

Bed Height (ft) = 2.75

Bed Area (ft^2) = 213

Unloading Time (hr) .50

Loading Time (hr) .75

TAILINGS PILE

RINSE PAD

CURE PILE

% H_2O Tails 18.1

Cure Time (hr) = 22.8

Ave. Temp (°C) = 49

H_2SO_4 Consumed (#/T) = 92.3

% U_3O_8 Solubilized = .051

% U_3O_8 Calc. Heads = .004

% U_3O_8 Tails =

U_3O_8 RECOVERY

ODUCT	WT./VOL.	% U_3O_8	gU_3O_8	% DIST
FLUENT	18467		10235	93.5
SIDUE	25.9T	.003	706	6.5
LC. H.	25.9T	.047	10941	100.0

ENTS: Rinsed from 6-20 l/min without a cover screen and with no flooding

	RINSE SOLUTIONS	H_2O	DRAINAGE
	H_2SO_4 (g/l) = 10 $NaClO_3$ (g/l) = 2.0		
Time (hr)	25.7	6.5	8.2
Volume Spray (gal)	3670	1650	—
Rate (gal/ft^2 hr.)	.60 - 1.19	.89 - 1.49	—
Volume Effluent	3080	1430	380
% Solids Effluent	—	—	

COTTER PILOT PLANT - TL LEACH DATA ANALYSIS

EXPLANATION OF TERMS

H&N: 3055.00

"TIME"* - Time entered in hours and minutes based on a 24 hour clock.

"DT MIN" - Time interval between measurements in minutes.

"CUM TIME HRS" - Total run time in hours.

"SPRAY L/MIN"* - Spray rate of rinse solution in liters/min.

"U308 SPRAY G/L"* - Concentration of uranium as U_3O_8 in the rinse solution. Unit is grams/liter.

"SU308 SPRAY G" - Total weight of U_3O_8 in grams added in the rinse solution from the beginning of the run.

"EFFL L/MIN"* - Flow rate of effluent from the ore in liters/min.

"U308 EFFL G/L"* - Concentration of uranium as U_3O_8 in the effluent. Unit is grams/liter.

"SU308 EFFL G" - Total weight of U_3O_8 in grams rinsed from the bed from the beginning of the run.

"NET U308 EFFL G" - Weight of U_3O_8 in the effluent minus the weight of U_3O_8 in the rinse solution during the stated time interval. Unit of mass is the gram.

"NET SU308 EFFL G" - Cumulative net weight of U_3O_8 in the effluent. This represents net recovery of U_3O_8 in grams from the beginning of the run.

"CUM VOL SPRAY L" - Total volume of rinse solution in liters applied from the beginning of the run.

"CUM VOL EFFL L" - Total volume of effluent in liters collected from the beginning of the run.

CUM U308 EFFL G/L" - Concentration of the effluent collected from the beginning of the run. Calculated by dividing the total weight of uranium recovered by the total volume of effluent. Unit of concentration is grams/liter.

"NET U308 EFFL G/L" - Difference in U_3O_8 concentration of the effluent and rinse solution at a given time. Unit of concentration is grams/liter.

"PCNT REC" - Per-cent recovery of uranium as U_3O_8 at a given time during the run. Calculated by dividing the cumulative net weight of U_3O_8 recovered up to a given time by the calculated heads which is the sum of the total net weight of U_3O_8 recovered during the run and the weight of residual U_3O_8 in the tailings.

* - Experimental data.

COTTER PILOT PLANT
H&N PROJECT NO. 3055.00

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
10: 0	0	0.0	7.60	0.00	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
12: 45	165	2.7	7.60	0.00	0	0.36	0.76	45	45	45	1254	59	0.76	0.76	0.3
13: 20	35	3.3	7.60	0.00	0	0.86	1.24	82	37	82	1520	89	0.92	1.24	0.6
14: 5	45	4.0	7.60	0.00	0	1.86	1.86	239	156	239	1862	173	1.37	1.86	1.9
14: 50	45	4.8	7.60	0.00	0	3.85	2.47	667	428	667	2204	347	1.92	2.47	5.4
15: 30	40	5.5	7.60	0.00	0	5.33	2.36	1171	503	1171	2508	560	2.08	2.36	9.6
16: 5	35	6.0	7.60	0.00	0	6.13	2.27	1658	487	1658	2774	775	2.13	2.27	13.6
16: 45	40	6.7	7.60	0.00	0	6.62	2.16	2231	572	2231	3078	1040	2.14	2.16	18.3
17: 40	55	7.6	7.60	0.00	0	7.23	2.02	3035	804	3035	3496	1438	2.11	2.02	24.9
18: 40	60	8.6	7.60	0.00	0	9.60	1.82	4083	1048	4083	3952	2014	2.02	1.82	33.5
20: 50	130	10.8	7.60	0.00	0	7.70	1.39	5476	1393	5476	4940	3016	1.81	1.39	45.0
22: 50	120	12.8	7.60	0.00	0	7.46	0.99	6365	889	6365	5852	3912	1.62	0.99	52.3
0: 5	75	14.0	7.60	0.00	0	7.35	0.83	6826	460	6826	6422	4463	1.52	0.83	56.1
1: 45	100	15.7	7.60	0.00	0	7.32	0.62	7284	457	7284	7182	5196	1.40	0.62	59.9
3: 0	75	17.0	7.60	0.00	0	7.47	0.58	7612	327	7612	7752	5757	1.32	0.58	62.6
4: 40	100	18.6	7.60	0.00	0	7.14	0.52	7989	377	7989	8512	6471	1.23	0.52	65.7
5: 50	70	19.8	7.60	0	0	7.04	0.49	8231	241	8231	9044	6965	1.18	0.49	67.7
6: 0	10	20.0	0.00	0.00	0	7.04	0.48	8265	34	8265	9044	7035	1.17	0.48	68.0
6: 49	49	20.8	0.00	0.00	0	5.65	0.45	8391	126	8391	9044	7312	1.14	0.45	69.0
7: 0	11	21.0	8.00	0.00	0	5.65	0.45	8419	28	8419	9132	7374	1.14	0.45	69.2
7: 20	20	21.3	8.00	0.00	0	3.22	0.43	8447	28	8447	9292	7439	1.13	0.43	69.5
9: 15	115	23.2	8.00	0.00	0	7.01	0.37	8749	301	8749	10212	8246	1.06	0.37	71.9
10: 0	45	24.0	8.00	0.00	0	7.22	0.34	8862	113	8862	10572	8571	1.03	0.34	72.9
10: 30	30	24.5	12.50	0.00	0	7.22	0.33	8934	72	8934	10947	8787	1.01	0.33	73.5
11: 0	30	25.0	12.50	0.00	0	6.62	0.31	8998	63	8998	11322	8986	1.00	0.31	74.0
12: 0	60	26.0	12.60	0.00	0	12.18	0.28	9208	209	9208	12078	9717	0.94	0.28	75.7
13: 30	90	27.5	12.60	0.00	0	12.31	0.24	9475	267	9475	13212	10825	0.87	0.24	77.9
14: 40	70	28.6	15.00	0.00	0	12.28	0.20	9652	177	9652	14262	11686	0.82	0.20	79.4
15: 7	27	29.1	15.00	0.00	0	11.16	0.19	9710	57	9710	14667	11987	0.81	0.19	79.8
16: 0	53	30.0	15.00	0.00	0	12.56	0.16	9820	109	9820	15462	126[illegible]	0.77	0.16	80.7
17: 0	60	31.0	15.00	0.00	0	15.46	0.15	9959	139	9959	[illegible]	13581	0.73	0.15	81.9
17: 5	5	31.0	20.00	0.00	0	15.45	0.14	9970	11	9970	16462	13659	0.72	0.14	82.0
18: 15	70	32.2	20.00	0.00	0	19.23	0.13	10147	176	10147	17862	15005	0.67	0.13	83.4
18: 30	15	32.5	26.50	0.00	0	19.23	0.12	10184	36	10184	18259	15294	0.66	0.12	83.7
19: 0	30	33.0	26.50	0.00	0	24.98	0.12	10274	89	10274	19054	16043	0.64	0.12	84.5
19: 30	30	33.5	26.50	0.00	0	8.26	0.10	10300	26	10300	19849	16291	0.63	0.10	84.7
20: 0	30	34.0	26.50	0.00	0	24.77	0.09	10366	66	10366	20644	17035	0.60	0.09	85.2
20: 30	30	34.5	26.50	0.00	0	24.70	0.07	10422	55	10422	21439	17776	0.58	0.07	85.7
20: 30	0	34.5	0.00	0.00	0	24.70	0.07	10422	0	10422	21439	17776	0.58	0.07	85.7
21: 0	30	35.0	0.00	0.00	0	8.15	0.05	10436	14	10436	21439	18020	0.57	0.05	85.8
21: 30	30	35.5	0.00	0.00	0	3.68	0.05	10443	6	10443	21439	18131	0.57	0.05	85.9
22: 0	30	36.0	0.00	0.00	0	2.49	0.05	10447	4	10447	21439	18206	0.57	0.05	85.9
22: 30	30	36.5	0.00	0.00	0	1.94	0.05	10451	3	10451	21439	18264	0.57	0.05	85.9
23: 0	30	37.0	0.00	0.00	0	1.41	0.05	10453	2	10453	21439	18306	0.57	0.05	86.0
23: 30	30	37.5	0.00	0.00	0	1.92	0.05	10457	3	10457	21439	18364	0.56	0.05	86.0
0: 0	30	38.0	0.00	0.00	0	0.96	0.05	10458	1	10458	21439	18393	0.56	0.05	86.0
0: 30	30	38.5	0.00	0.00	0	0.82	0.05	10460	1	10460	21439	18418	0.56	0.05	86.0
1: 0	30	39.0	0.00	0.00	0	0.67	0.05	10461	1	10461	21439	18438	0.56	0.05	86.0
2: 0	60	40.0	0.00	0.00	0	0.52	0.05	10463	1	10463	21439	18470	0.56	0.05	86.0
3: 0	60	41.0	0.00	0.00	0	0.47	0.05	10464	1	10464	21439	18499	0.56	0.05	86.0

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
4: 0	60	42.0	0.00	0.00	0	0.42	0.06	10466	1	10466	21439	18523	0.56	0.06	86.1
5: 15	75	43.2	0.00	0.00	0	0.31	0.08	10468	1	10468	21439	18547	0.56	0.08	86.1
6: 5	50	44.0	0.00	0.00	0	0.28	0.09	10470	1	10470	21439	18561	0.56	0.09	86.1
10: 35	270	48.5	0.00	0.00	0	0.19	0.14	10477	7	10477	21439	18614	0.56	0.14	86.2
11: 25	50	49.4	37.80	0.00	0	0.19	0.14	10478	1	10478	23329	18623	0.56	0.14	86.2
12: 0	35	50.0	37.00	0.00	0	16.88	0.14	10561	82	10561	24624	19214	0.54	0.14	86.8
12: 35	35	50.5	37.00	0.00	0	32.50	0.14	10720	159	10720	25919	20352	0.52	0.14	88.2
13: 5	30	51.0	38.00	0.00	0	42.67	0.14	10899	179	10899	27059	21632	0.50	0.14	89.6
13: 10	5	51.1	0.00	0.00	0	42.67	0.14	10929	29	10929	27059	21845	0.50	0.14	89.9
20: 50	460	58.8	0.00	0.00	0	1.25	0.14	11010	80	11010	27059	22422	0.49	0.14	90.5

COTTER PILOT PLANT
H&N PROJECT NO. 3055.00

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
7: 0	0	0.0	7.00	0.00	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
11: 25	265	4.4	7.00	0.00	0	1.59	1.51	637	637	637	1855	422	1.50	1.51	5.2
12: 0	35	5.0	7.00	0.00	0	2.26	1.68	770	133	770	2100	501	1.53	1.68	6.3
12: 30	30	5.5	7.00	0.00	0	2.96	1.72	923	152	923	2310	590	1.56	1.72	7.5
13: 0	30	6.0	7.00	0.00	0	3.40	1.75	1102	178	1102	2520	692	1.59	1.75	9.0
13: 30	30	6.5	7.00	0.00	0	4.48	1.78	1341	239	1341	2730	827	1.62	1.78	10.9
14: 0	30	7.0	7.00	0.00	0	5.26	1.81	1627	295	1627	2940	984	1.65	1.81	13.3
15: 0	60	8.0	7.00	0.00	0	6.28	1.87	2333	705	2333	3360	1362	1.71	1.87	19.0
16: 0	60	9.0	7.00	0.00	0	6.76	1.74	3043	709	3043	3780	1768	1.72	1.74	24.8
17: 0	60	10.0	7.00	0.00	0	6.88	1.62	3715	672	3715	4200	2181	1.70	1.62	30.3
18: 10	70	11.1	7.00	0.00	0	6.83	1.48	4426	710	4426	4690	2659	1.66	1.48	36.2
19: 0	50	12.0	7.00	0.00	0	6.20	1.38	4856	429	4856	5040	2970	1.63	1.38	39.7
19: 30	30	12.5	7.00	0.00	0	6.16	1.34	5104	248	5104	5250	3154	1.61	1.34	41.7
20: 0	30	13.0	7.00	0.00	0	6.15	1.30	5345	240	5345	5460	3339	1.60	1.30	43.7
20: 30	30	13.5	7.00	0.00	0	2.71	1.26	5447	102	5447	5670	3420	1.59	1.26	44.5
20: 45	15	13.7	0.00	0.00	0	2.71	1.24	5498	50	5498	5670	3461	1.58	1.24	44.9
21: 0	15	14.0	7.00	0.00	0	4.93	1.22	5588	90	5588	5775	3535	1.58	1.22	45.7
22: 8	68	15.1	7.00	0.00	0	5.81	1.12	6034	446	6034	6251	3931	1.53	1.12	49.3
23: 0	52	16.0	6.90	0.00	0	6.43	1.05	6388	353	6388	6609	4265	1.49	1.05	52.2
1: 0	120	18.0	7.00	0.00	0	6.66	0.89	7101	713	7101	7449	5065	1.40	0.89	58.1
3: 0	120	20.0	7.00	0.00	0	6.54	0.72	7673	571	7673	8289	5850	1.31	0.72	62.7
5: 0	120	22.0	7.00	0.00	0	6.67	0.67	8210	536	8210	9129	6652	1.23	0.67	67.1
8: 45	225	25.7	7.00	0.00	0	6.68	0.56	9053	842	9053	10704	8156	1.10	0.56	74.0
13: 0	255	30.0	4.00	0.00	0	6.68	0.39	9733	680	9733	11724	9861	0.98	0.39	79.6
13: 0	0	30.0	7.00	0.00	0	6.33	0.39	9733	0	9733	11724	9861	0.98	0.39	79.6
13: 20	20	30.3	7.00	0.00	0	6.33	0.38	9782	48	9782	11864	9988	0.97	0.38	80.0
15: 20	120	32.3	7.00	0.00	0	6.98	0.31	10042	259	10042	12704	10826	0.92	0.31	82.1
18: 0	160	35.0	7.00	0.00	0	6.89	0.20	10272	230	10272	13824	11929	0.86	0.20	84.0
21: 50	230	38.8	6.50	0.00	0	6.81	0.16	10526	254	10526	15319	13497	0.77	0.16	86.1
22: 5	15	39.0	7.00	0.00	0	6.81	0.15	10542	16	10542	15424	13599	0.77	0.15	86.2
0: 5	120	41.0	7.00	0.00	0	6.61	0.13	10649	107	10649	16264	14392	0.73	0.13	87.1
2: 0	115	43.0	7.00	0.00	0	6.78	0.11	10737	87	10737	17069	15173	0.70	0.11	87.8
4: 0	120	45.0	7.00	0.00	0	6.79	0.10	10821	83	10821	17909	15988	0.67	0.10	88.5
7: 0	180	48.0	7.00	0.00	0	7.35	0.09	10940	119	10940	19169	17312	0.63	0.09	89.5
11: 40	280	52.6	7.00	0.00	0	7.35	0.07	11087	146	11087	21129	19371	0.57	0.07	90.7
15: 0	200	56.0	6.00	0.00	0	7.35	0.05	11171	84	11171	22329	20841	0.53	0.05	91.3
15: 30	30	56.5	7.00	0.00	0	7.35	0.06	11185	13	11185	22539	21062	0.53	0.06	91.5
17: 0	90	58.0	7.00	0.00	0	7.35	0.06	11229	44	11229	23169	21724	0.51	0.06	91.8
18: 0	60	59.0	7.00	0.00	0	7.35	0.07	11260	30	11260	23589	22165	0.50	0.07	92.1
20: 30	150	61.5	7.00	0.00	0	6.37	0.07	11329	68	11329	24639	23122	0.48	0.07	92.6
21: 0	30	62.0	0.00	0.00	0	0.05	0.07	11329	0	11329	24639	23123	0.48	0.07	92.6
22: 0	60	63.0	12.00	0.00	0	2.51	0.07	11341	11	11341	25359	23274	0.48	0.07	92.7
23: 0	60	64.0	12.00	0.00	0	4.87	0.08	11365	24	11365	26079	23567	0.48	0.08	92.9
24: 0	60	65.0	12.00	0.00	0	11.49	0.10	11434	68	11434	26799	24257	0.47	0.10	93.5
1: 0	60	66.0	12.00	0.00	0	11.06	0.08	11491	57	11491	27519	24920	0.46	0.08	94.0
1: 30	30	66.5	0.00	0.00	0	7.36	0.07	11508	17	11508	27519	25141	0.45	0.07	94.1
2: 0	30	67.0	0.00	0.00	0	4.04	0.07	11517	8	11517	27519	25263	0.45	0.07	94.2
2: 30	30	67.5	0.00	0.00	0	2.64	0.06	11522	5	11522	27519	25342	0.45	0.06	94.2
3: 15	45	68.2	0.00	0.00	0	1.49	0.05	11526	3	11526	27519	25410	0.45	0.05	94.2
3: 30	15	68.5	0.00	0.00	0	1.33	0.05	11527	1	11527	27519	25430	0.45	0.05	94.3

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
4: 10	40	69.1	0.00	0.00	0	0.98	0.06	11530	2	11530	27519	25469	0.45	0.06	94.3
4: 30	20	69.5	0.00	0.00	0	0.88	0.06	11531	1	11531	27519	25487	0.45	0.06	94.3
5: 0	30	70.0	0.00	0.00	0	0.73	0.06	11532	1	11532	27519	25509	0.45	0.06	94.3
6: 0	60	71.0	0.00	0.00	0	0.57	0.07	11534	2	11534	27519	25543	0.45	0.07	94.3
9: 20	200	74.3	0.00	0.00	0	0.14	0.06	11536	1	11536	27519	25572	0.45	0.06	94.3

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	?U308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
8: 15	0	0.0	7.00	0.00	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
12: 0	225	3.7	7.00	0.00	0	0.00	0.00	0	0	0	1575	0	0.00	0.00	0.0
13: 0	60	4.7	7.00	0.00	0	3.18	2.45	468	468	468	1995	190	2.45	2.45	4.1
13: 40	40	5.4	7.00	0.00	0	4.11	2.46	874	406	874	2275	355	2.46	2.46	7.7
14: 34	54	6.3	7.00	0.00	0	4.79	2.48	1517	642	1517	2653	614	2.47	2.48	13.3
15: 0	26	6.7	7.00	0.00	0	5.67	2.49	1885	367	1885	2835	761	2.47	2.49	16.5
15: 30	30	7.2	7.00	0.00	0	5.83	2.50	2323	438	2323	3045	936	2.48	2.50	20.4
16: 0	30	7.7	7.00	0.00	0	6.11	2.53	2788	464	2788	3255	1120	2.48	2.53	24.5
17: 0	60	8.7	7.00	0.00	0	6.30	2.24	3636	847	3636	3675	1499	2.42	2.24	32.0
18: 0	60	9.7	7.00	0.00	0	6.41	1.94	4386	749	4386	4095	1883	2.32	1.94	38.6
19: 0	60	10.7	7.00	0.00	0	7.00	1.76	5128	742	5128	4515	2303	2.22	1.76	45.1
20: 15	75	12.0	7.00	0.00	0	6.51	1.54	5881	753	5881	5040	2792	2.10	1.54	51.7
21: 0	45	12.7	7.00	0.00	0	6.84	1.40	6314	432	6314	5355	3100	2.03	1.40	55.5
22: 0	60	13.7	7.00	0.00	0	6.83	1.22	6816	501	6816	5775	3510	1.94	1.22	60.0
23: 0	60	14.7	7.00	0.00	0	6.73	1.04	7237	421	7237	6195	3915	1.84	1.04	63.7
24: 0	60	15.7	7.00	0.00	0	7.04	0.86	7601	363	7601	6615	4337	1.75	0.36	66.9
1: 15	75	17.0	6.50	0.00	0	6.59	0.75	7974	373	7974	7102	4832	1.65	0.75	70.1
2: 0	45	17.7	6.50	0.00	0	6.37	0.69	8172	198	8172	7395	5119	1.59	0.69	71.9
3: 0	60	18.7	6.50	0.00	0	6.33	0.60	8402	230	8402	7785	5499	1.52	0.60	73.9
4: 0	60	19.7	6.00	0.00	0	6.28	0.52	8599	196	8599	8145	5876	1.46	0.52	75.7
5: 15	75	21.0	6.00	0.00	0	6.26	0.48	8825	225	8825	8595	6346	1.39	0.48	77.6
7: 45	150	23.5	6.00	0.00	0	6.31	0.39	9198	373	9198	9495	7294	1.26	0.39	80.9
10: 10	145	25.9	6.00	0.00	0	6.28	0.31	9482	284	9482	10365	8205	1.15	0.31	83.4
14: 0	230	29.7	6.00	0.00	0	5.73	0.18	9721	238	9721	11745	9523	1.02	0.18	85.5
20: 30	390	36.2	6.00	0.00	0	5.86	0.11	9993	272	9993	14085	11809	0.84	0.11	87.9
21: 0	30	36.7	6.00	0.00	0	5.81	0.11	10013	19	10013	14265	11983	0.83	0.11	88.1
22: 0	60	37.7	6.00	0.00	0	5.77	0.10	10049	36	10049	14625	12330	0.81	0.10	88.4
22: 30	30	38.2	6.00	0.00	0	5.82	0.10	10066	17	10066	14805	12505	0.80	0.10	88.6
23: 0	30	38.7	6.00	0.00	0	5.81	0.09	10084	17	10084	14985	12679	0.79	0.09	88.7
23: 30	30	39.2	6.00	0.00	0	5.78	0.09	10100	16	10100	15165	12853	0.78	0.09	88.9
24: 0	30	39.7	6.00	0.00	0	5.80	0.09	10116	16	10116	15345	13027	0.77	0.09	89.0
24: 0	0	39.7	4.50	0.00	0	6.02	0.09	10116	0	10116	15345	13027	0.77	0.09	89.0
2: 0	120	41.7	4.90	0.00	0	6.22	0.08	10177	60	10177	15933	13773	0.73	0.08	89.5
4: 0	120	43.7	6.00	0.00	0	6.13	0.07	10229	51	10229	16653	14510	0.70	0.07	90.0
6: 0	120	45.7	6.00	0.00	0	6.01	0.06	10276	47	10276	17373	15232	0.67	0.06	90.4
9: 50	230	49.5	6.00	0.00	0	5.85	0.05	10352	76	10352	18753	16578	0.62	0.05	91.1
12: 5	135	51.8	6.00	0.00	0	5.78	0.05	10392	40	10392	19563	17359	0.59	0.05	91.4
14: 0	115	53.7	6.00	0.00	0	5.96	0.04	10425	32	10425	20253	18045	0.57	0.04	91.7
16: 0	120	55.7	6.60	0.00	0	5.58	0.04	10455	29	10455	21045	18715	0.55	0.04	92.0
19: 45	225	59.5	7.00	0.00	0	6.26	0.03	10506	51	10506	22620	20125	0.52	0.03	92.4
20: 0	15	59.7	7.00	0.00	0	6.45	0.03	10509	3	10509	22725	20222	0.51	0.03	92.5
23: 20	200	63.0	7.00	0.00	0	6.95	0.03	10556	47	10556	24125	21613	0.48	0.03	92.9
0: 0	40	63.7	7.00	0,00	0	6.92	0.03	10566	9	10566	24405	21890	0.48	0.03	93.0
2: 0	120	65.7	7.30	0.00	0	5.48	0.03	10587	21	10587	25281	22548	0.46	0.03	93.2
4: 10	130	67.9	7.20	0.00	0	7.30	0.03	10618	30	10618	26217	23498	0.45	0.03	93.4
6: 0	110	69.7	7.10	0.00	0	6.26	0.03	10640	22	10640	26998	24187	0.43	0.03	93.6
7: 0	60	70.7	0.00	0.00	0	6.26	0.03	10652	11	10652	26998	24564	0.43	0.03	93.7
7: 55	55	71.6	0.00	0.00	0	3.80	0.03	10659	6	10659	26998	24773	0.43	0.03	93.3
10: 30	155	74.2	0.00	0.00	0	0.86	0.03	10663	4	10663	[illegible]	24906	0.42	0.03	93.8
14: 0	210	77.7	0.00	0.00	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL [illegible] L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
15: 40	100	79.4	0.00	0.00	0	0.32	0.04	10667	1	10667	26998	25022	0.42	0.04	93.9

RUN NO: 4

COTTER PILOT PLANT
H&N PROJECT NO. 2055.00

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
18: 45	0	0.0	6.00	0.34	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
23: 0	255	4.2	6.00	0.34	526	0.47	2.50	303	261	261	1530	121	2.50	2.16	1.6
23: 30	30	4.7	6.00	0.34	588	0.77	2.65	364	53	315	1710	144	2.52	2.31	2.0
24: 0	30	5.2	6.00	0.34	650	1.21	2.80	467	89	405	1890	180	2.58	2.46	2.5
24: 30	30	5.7	6.00	0.34	712	1.58	2.96	607	124	529	2070	228	2.66	2.61	3.3
1: 0	30	6.2	6.00	0.34	774	1.98	3.11	793	164	694	2250	287	2.75	2.76	4.4
1: 30	30	6.7	6.00	0.34	835	2.72	3.10	1047	225	920	2430	369	2.83	2.76	5.8
2: 0	30	7.2	6.00	0.34	897	3.34	3.09	1357	276	1196	2610	469	2.88	2.75	7.6
2: 30	30	7.7	6.00	0.34	959	4.11	3.08	1738	338	1534	2790	593	2.92	2.74	9.8
3: 0	30	8.2	6.00	0.34	1021	4.57	3.08	2161	375	1909	2970	730	2.95	2.73	12.2
3: 30	30	8.7	6.00	0.34	1083	4.70	3.07	2594	385	2295	3150	871	2.97	2.72	14.7
4: 0	30	9.2	6.00	0.34	1145	5.15	3.06	3069	421	2716	3330	1026	2.99	2.72	17.4
4: 30	30	9.7	6.00	0.34	1207	5.37	2.97	3548	423	3139	3510	1187	2.98	2.62	20.1
5: 30	60	10.7	6.00	0.34	1331	5.55	2.78	4477	814	3954	3870	1521	2.94	2.44	25.3
6: 0	30	11.2	6.00	0.34	1393	5.59	2.69	4929	393	4348	4050	1689	2.91	2.34	27.8
6: 30	30	11.7	0.00	0.00	1393	5.45	2.59	5354	425	4773	4050	1852	2.88	2.59	30.5
7: 15	45	12.5	6.00	0.12	1426	5.45	2.45	5958	572	5346	4320	2098	2.83	2.33	34.2
9: 50	155	15.0	6.00	0.12	1543	4.45	1.97	7321	1276	6623	5250	2788	2.62	1.85	42.4
10: 0	10	15.2	0.00	0.00	1543	4.45	1.94	7408	86	6710	5250	2833	2.61	1.94	42.9
10: 5	5	15.3	6.00	0.12	1546	4.45	1.93	7451	40	6750	5280	2855	2.60	1.81	43.2
10: 45	40	16.0	5.00	0.12	1571	4.28	1.83	7764	292	7042	5480	3026	2.56	1.70	45.1
11: 0	15	16.2	0.00	0.00	1571	4.12	1.79	7875	110	7153	5480	3088	2.54	1.79	45.8
11: 30	30	16.7	6.00	0.12	1594	4.12	1.71	8087	196	7349	5660	3212	2.51	1.58	47.0
12: 5	35	17.3	6.00	0.12	1620	4.12	1.61	8320	215	7565	5870	3356	2.47	1.49	48.4
14: 0	115	19.2	5.60	0.12	1701	5.52	1.31	9157	757	8322	6514	3992	2.29	1.19	53.3
15: 45	105	21.0	0.00	0.00	1701	5.52	1.23	9874	716	9039	6514	4573	2.15	1.23	57.9
16: 0	15	21.2	5.60	0.12	1711	5.22	1.22	9970	86	9125	6598	4651	2.14	1.09	58.4
17: 15	75	22.5	3.00	0.12	1739	4.89	1.16	10398	381	9507	6823	5018	2.07	1.04	60.9
19: 45	150	25.0	3.00	0.12	1796	3.10	1.05	10886	430	9937	7273	5483	1.98	0.92	63.6
20: 0	15	25.2	3.00	0.12	1801	3.01	1.04	10933	41	9979	7318	5529	1.97	0.91	63.9
20: 40	40	25.9	6.00	0.12	1831	2.36	1.00	11043	100	10079	7558	5643	1.95	0.88	64.5
21: 0	20	26.2	3.00	0.12	1839	2.30	0.98	11094	39	10119	7618	5689	1.94	0.86	64.8
22: 0	60	27.2	5.00	0.12	1876	2.14	0.93	11215	104	10224	7918	5818	1.92	0.81	65.5
23: 20	90	29.5	0.00	0.04	1876	2.42	0.86	11382	159	10383	7918	6012	1.89	0.82	66.5
24: 0	40	29.2	6.00	0.04	1886	1.93	0.82	11446	60	10444	8158	6089	1.87	0.78	66.9
2: 0	120	31.2	6.00	0.04	1915	4.82	0.71	11859	390	10834	8878	6669	1.77	0.67	69.4
4: 10	130	33.4	6.00	0.04	1946	5.92	0.59	12315	425	11260	9658	7440	1.65	0.55	72.1
6: 0	110	35.2	6.00	0.04	1972	5.91	0.49	12634	292	11552	10318	8090	1.56	0.45	74.0
7: 55	115	37.1	6.00	0.04	2000	5.92	0.44	12937	275	11829	11008	8772	1.47	0.40	75.7
10: 30	155	39.7	6.00	0.04	2037	5.90	0.38	13286	313	12141	11938	9687	1.37	0.34	77.3
11: 0	30	40.2	6.00	0.04	2044	5.90	0.37	13352	58	12199	12118	9865	1.35	0.33	77.1
14: 0	180	43.2	6.00	0.04	2087	5.34	0.29	13639	248	12447	13198	10827	1.25	0.25	79.7
15: 40	100	44.9	6.00	0.00	2087	5.29	0.26	13776	137	12585	13798	11356	1.21	0.26	80.6
17: 15	95	46.5	6.00	0.00	2087	5.90	0.24	13912	135	12720	14368	11917	1.15	0.24	81.5
19: 55	160	49.1	6.00	0.00	2087	5.96	0.20	14111	199	12920	15328	12872	1.09	0.20	82.7
22: 30	155	51.7	6.00	0.00	2087	5.14	0.17	14253	141	13062	16258	13663	1.04	0.17	83.7
24: 50	140	54.0	6.00	0.00	2087	6.20	0.15	14383	130	13192	17098	14537	0.98	0.15	84.5
1: 30	40	54.7	0.00	0.00	2087	5.54	0.15	14416	33	13225	17098	14759	0.97	0.15	84.7
2: 0	30	55.2	0.00	0.00	2087	4.19	0.15	14435	18	13244	17098	14885	0.96	0.15	84.8
2: 30	30	55.7	0.00	0.00	2087	2.72	0.14	14447	12	13256	17098	14966	0.96	0.14	84.9

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
3: 0	30	56.2	0.00	0.00	2087	2.00	0.14	14456	8	13265	17098	15026	0.96	0.14	95.0
3: 35	35	56.8	0.00	0.00	2087	1.52	0.14	14464	7	13273	17098	15080	0.95	0.14	95.0
4: 10	35	57.4	0.00	0.00	2087	1.26	0.14	14471	6	13280	17098	15124	0.95	0.14	95.1
4: 35	25	57.8	0.00	0.00	2087	1.07	0.15	14475	4	13284	17098	15151	0.95	0.15	95.1
5: 0	25	58.2	0.00	0.00	2087	0.91	0.15	14479	3	13287	17098	15174	0.95	0.15	95.1
6: 0	60	59.2	0.00	0.00	2087	0.73	0.17	14486	7	13295	17098	15218	0.95	0.17	95.1
6: 50	50	60.0	0.00	0.00	2087	0.61	0.18	14492	5	13300	17098	15248	0.95	0.18	95.2
8: 30	100	61.7	0.00	0.00	2087	0.46	0.18	14500	8	13309	17098	15295	0.94	0.18	95.2
11: 0	150	64.2	0.00	0.00	2087	0.32	0.19	14509	9	13318	17098	15343	0.94	0.19	95.2
13: 10	130	66.4	0.00	0.00	2087	0.26	0.21	14517	7	13325	17098	15377	0.94	0.21	95.3

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
14: 0	0	0.0	6.00	0.69	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
17: 15	195	3.2	6.00	0.69	815	0.41	2.44	195	139	139	1170	79	2.44	1.74	0.8
18: 0	45	4.0	6.00	0.69	1003	0.79	2.44	281	62	201	1440	115	2.44	1.74	1.2
19: 55	115	5.9	5.70	0.69	1460	3.64	3.50	1749	1175	1376	2095	534	3.27	2.80	8.2
21: 0	65	7.0	5.60	0.69	1714	4.82	3.33	2794	827	2204	2459	647	3.29	2.64	13.1
22: 30	90	8.5	6.00	0.30	1876	5.94	3.10	4457	1501	3705	2999	1382	3.22	2.80	22.1
23: 40	70	9.6	5.90	0.30	2000	6.24	2.84	5700	1112	4818	3412	1819	3.13	2.54	28.8
0: 50	70	10.8	6.00	0.30	2126	6.09	2.58	6805	976	5795	3832	2246	3.02	2.28	34.6
2: 0	70	12.0	6.20	0.30	2256	6.06	2.32	7794	861	6656	4266	2671	2.91	2.02	39.8
4: 10	130	14.1	6.00	0.30	2490	5.59	1.84	9138	1125	7782	5046	3398	2.68	1.54	46.5
6: 0	110	16.0	5.70	0.30	2678	5.71	1.65	10177	850	8632	5673	4027	2.52	1.35	51.6
8: 30	150	18.5	5.70	0.30	2934	4.88	1.38	11191	794	9427	6528	4760	2.35	1.08	56.4
11: 0	150	21.0	5.70	0.30	3191	6.11	1.11	12214	747	10175	7383	5676	2.15	0.81	60.8
13: 10	130	23.1	5.70	0 0	3413	5.81	0.88	12883	441	10616	8124	6433	2.00	0.58	63.5
15: 25	135	25.4	2.70	0.06	3438	5.81	0.79	13503	567	11184	8489	7218	1.87	0.72	66.9
15: 50	25	25.8	6.00	0.06	3448	5.05	0.77	13601	89	11273	8639	7344	1.85	0.70	67.4
16: 40	50	26.6	5.50	0.06	3466	5.05	0.73	13787	169	11443	8914	7597	1.81	0.67	68.4
17: 20	40	27.3	0.00	0.06	3466	5.05	0.70	13930	129	11572	8914	7799	1.78	0.64	69.2
17: 40	20	27.6	4.00	0.06	3472	3.70	0.69	13982	46	11619	8994	7873	1.77	0.62	69.5
18: 10	30	28.1	6.00	0.06	3484	3.70	0.67	14057	67	11686	9174	7985	1.76	0.60	69.9
19: 15	65	29.2	5.70	0.06	3508	4.11	0.63	14227	152	11838	9544	8252	1.72	0.56	70.8
20: 5	50	30.0	5.50	0.06	3527	5.30	0.60	14387	142	11981	9819	8517	1.68	0.53	71.7
21: 0	55	31.0	5.50	0.06	3547	5.29	0.55	14549	142	12123	10122	8808	1.65	0.48	72.5
21: 50	50	31.8	6.10	0.06	3568	4.26	0.54	14664	101	12224	10427	9021	1.62	0.47	73.1
22: 0	10	32.0	0.00	0.00	3568	4.26	0.53	14687	22	12247	10427	9064	1.62	0.53	73.2
22: 30	30	32.5	0.00	0.00	3568	4.26	0.52	14755	67	12315	10427	9192	1.60	0.52	73.6
22: 45	15	32.7	6.00	0.00	3568	3.51	0.52	14782	27	12342	10517	9245	1.59	0.52	73.8
22: 50	5	32.8	5.90	0.06	3570	3.51	0.52	14792	8	12351	10546	9262	1.59	0.45	73.9
0: 5	75	34.0	5.90	0.06	3599	4.21	0.50	14951	137	12489	10989	9579	1.56	0.43	74.7
1: 0	55	35.0	6.00	0.06	3621	5.77	0.48	15105	133	12622	11319	9896	1.52	0.42	75.5
2: 55	115	36.9	6.00	0.06	3668	5.84	0.45	15410	260	12882	12009	10568	1.45	0.38	77.0
4: 0	65	38.0	6.00	0.06	3694	5.90	0.43	15577	141	13023	12399	10952	1.42	0.36	77.9
6: 0	120	40.0	6.00	0.06	3742	5.98	0.40	15866	239	13263	13119	11670	1.35	0.33	79.3
8: 14	134	42.2	7.00	0.00	3742	6.62	0.36	16188	322	13585	14057	12558	1.28	0.36	81.3
9: 50	96	43.8	7.00	0.00	3742	6.90	0.33	16410	222	13808	14729	13220	1.24	0.33	82.6
11: 10	80	45.1	7.00	0.00	3742	6.86	0.31	16583	172	13980	15289	13769	1.20	0.31	83.6
13: 0	110	47.0	7.50	0.00	3742	6.52	0.27	16779	196	14177	16114	14487	1.15	0.27	84.8
15: 0	120	49.0	6.50	0.00	3742	6.56	0.23	16961	181	14358	16894	15275	1.11	0.22	85.9
17: 0	120	51.0	6.50	0.00	3742	6.15	0.18	17098	137	14496	17674	16014	1.06	0.18	86.7
19: 0	120	53.0	6.50	0.00	3742	6.37	0.14	17207	108	14604	18454	16779	1.02	0.14	87.3
21: 0	120	55.0	6.50	0.00	3742	6.35	0.13	17313	105	14710	19234	17541	0.98	0.13	88.0
22: 0	60	56.0	0.00	0.00	3742	6.35	0.13	17365	52	14763	19234	17922	0.96	0.13	88.3
22: 15	15	56.2	0.00	0.00	3742	5.95	0.13	17378	12	14775	19234	18012	0.96	0.13	88.4
22: 25	10	56.4	0.00	0.00	3742	5.95	0.13	17386	8	14783	19234	18071	0.96	0.13	88.4
23: 15	50	57.2	0.00	0.00	3742	3.43	0.13	17409	23	14807	19234	18243	0.95	0.13	88.6
1: 0	105	59.0	0.00	0.00	3742	1.35	0.13	17429	19	14826	19234	18385	0.94	0.13	88.7
3: 10	130	61.1	0.00	0.00	3742	0.65	0.13	17440	11	14837	19234	18470	0.94	0.13	88.7
4: 55	105	62.9	0.00	0.00	3742	0.36	0.13	17445	5	14842	19234	18507	0.94	0.13	88.8
7: 20	145	65.3	0.00	0.00	3742	0.26	0.14	17450	5	14848	19234	18546	0.94	0.14	88.8
9: 15	115	67.2	0.00	0.00	3742	0.07	0.14	17451	1	14849	19234	18554	0.94	0.14	88.8

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
11: 20	125	69.3	0.00	0.00	3742	0.07	0.14	17453	1	14850	19234	18563	0.94	0.14	88.8

RUN NO: 6
DATE:

COTTER PILOT PLANT
H&N PROJECT NO. 3055.00

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
19: 0	0	0.0	6.00	0.87	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
21: 15	135	2.2	6.50	0.87	771	0.44	2.33	141	88	88	877	60	2.33	1.46	0.5
21: 50	35	2.8	6.30	0.87	965	0.58	2.36	189	30	118	1098	80	2.34	-1.49	0.6
22: 30	40	3.5	6.30	0.87	1186	0.80	2.40	267	49	167	1350	113	2.36	1.52	0.9
23: 0	30	4.0	6.50	0.87	1358	1.13	2.42	349	52	220	1545	147	2.37	1.54	1.2
23: 35	35	4.5	6.50	0.87	1558	1.45	2.45	475	80	301	1772	198	2.39	1.57	1.7
0: 5	30	5.0	6.50	0.87	1729	1.70	2.63	610	89	390	1967	249	2.44	1.75	2.2
0: 40	35	5.6	6.40	0.87	1926	2.22	2.83	831	152	543	2191	327	2.53	1.95	3.1
1: 0	20	6.0	6.50	0.87	2040	2.94	2.94	1004	121	665	2321	386	2.60	2.07	3.8
2: 0	60	7.0	6.60	0.87	2388	3.99	3.29	1794	579	1244	2717	625	2.86	2.41	7.2
2: 55	55	7.9	6.40	0.87	2698	5.33	3.61	2854	801	2046	3069	919	3.10	2.73	11.9
4: 0	65	9.0	6.00	0.87	3040	5.83	3.44	4160	973	3019	3459	1298	3.20	2.56	17.6
5: 0	60	10.0	5.90	0.87	3352	5.94	3.29	5334	859	3879	3813	1654	3.22	2.41	22.6
6: 0	60	11.0	6.00	0.87	3668	5.68	3.13	6403	769	4649	4173	1996	3.20	2.25	27.1
6: 25	25	11.4	6.00	0.00	3668	5.68	3.06	6839	436	5085	4323	2138	3.19	3.06	29.7
7: 15	50	12.2	6.00	0.87	3932	5.68	2.93	7675	585	5670	4623	2422	3.16	2.06	33.1
8: 15	60	13.2	5.00	0.87	4195	4.39	2.78	8410	502	6173	4923	2686	3.13	1.90	36.0
9: 20	65	14.3	6.00	0.42	4362	4.39	2.61	9157	625	5798	5313	2972	3.08	2.19	39.7
11: 0	100	16.0	6.00	0.42	4617	5.47	2.35	10447	1057	7856	5913	3519	2.96	1.93	45.3
13: 0	120	18.0	6.00	0.42	4924	5.71	2.04	11850	1110	8966	6633	4205	2.81	1.62	52.3
15: 0	120	20.0	6.00	0.42	5231	5.80	1.73	13059	912	9879	7353	4902	2.66	1.30	57.7
17: 0	120	22.0	6.00	0.42	5527	5.51	1.42	14001	660	10539	8073	5563	2.51	0.99	61.5
19: 10	130	24.1	6.00	0.42	5870	5.27	1.08	14747	454	10993	8853	6249	2.35	0.66	64.2
20: 0	50	25.0	0.00	0.00	5870	5.27	1.04	15024	276	11269	8853	6513	2.30	1.04	65.8
20: 20	20	25.3	6.00	0.42	5921	4.12	1.03	15109	49	11319	8973	6595	2.29	0.60	66.1
21: 0	40	26.0	6.00	0.42	6023	4.12	0.99	15273	94	11413	9213	6760	2.25	0.57	66.6
21: 10	10	26.1	0.00	0.00	6023	4.12	0.99	15314	40	11454	9213	6801	2.25	0.99	66.9
21: 30	20	26.5	6.00	0.42	6074	4.12	0.97	15394	45	11499	9333	6884	2.23	0.54	67.1
22: 15	45	27.2	6.00	0.13	6110	3.16	0.93	15528	114	11614	9603	7026	2.20	0.80	67.8
22: 30	15	27.5	0.00	0.00	6110	3.16	0.92	15572	43	11658	9603	7074	2.20	0.92	68.1
23: 15	45	28.2	5.70	0.13	6144	2.90	0.88	15688	98	11756	9860	7204	2.17	0.75	68.6
1: 0	105	30.0	6.00	0.13	6228	4.37	0.84	16077	328	12085	10490	7663	2.09	0.71	70.6
3: 10	130	32.1	5.00	0.13	6314	5.13	0.80	16611	444	12530	11140	8330	1.99	0.66	73.2
6: 0	170	35.0	5.00	0.13	6427	4.95	0.73	17230	507	13038	11990	9172	1.87	0.60	76.1
7: 20	80	36.3	5.00	0.13	6481	5.33	0.70	17532	244	13282	12390	9599	1.82	0.57	77.5
9: 15	115	38.2	5.00	0.13	6557	5.14	0.64	17914	303	13586	12965	10190	1.75	0.51	79.3
11: 20	125	40.3	5.00	0.13	6640	5.10	0.58	18286	286	13873	13590	10828	1.68	0.45	81.0
13: 0	100	42.0	5.00	0.13	6707	5.20	0.53	18563	207	14081	14090	11348	1.63	0.39	82.2
13: 40	40	42.6	6.00	0.00	6707	5.20	0.51	18670	106	14187	14330	11556	1.61	0.51	82.8
15: 0	80	44.0	6.00	0.00	6707	5.60	0.47	18881	211	14398	14810	12005	1.57	0.47	84.1
17: 0	120	46.0	6.00	0.00	6707	5.77	0.41	19165	284	14683	15530	12698	1.50	0.41	85.7
18: 0	60	47.0	6.00	0.00	6707	5.90	0.37	19299	134	14817	15890	13052	1.47	0.37	86.5
19: 0	60	48.0	6.00	0.00	6707	6.06	0.34	19426	126	14944	16250	13416	1.44	0.34	87.3
21: 0	120	50.0	6.00	0.00	6707	6.64	0.30	19671	244	15188	16970	14213	1.38	0.30	88.7
22: 0	60	51.0	6.00	0.00	6707	5.92	0.28	19772	101	15290	17330	14568	1.35	0.28	89.3
23: 0	60	52.0	6.00	0.00	6707	5.80	0.26	19865	92	15382	17690	14916	1.33	0.26	89.3
1: 0	120	54.0	6.00	0.00	6707	5.62	0.22	20016	151	15533	18410	15591	1.28	0.22	90.7
3: 0	120	56.0	6.00	0.00	6707	5.93	0.20	20164	148	15682	19130	16303	1.23	0.20	91.6
5: 0	120	58.0	6.00	0.00	6707	5.48	0.19	20290	126	15808	19850	16962	1.19	0.19	92.3
6: 0	60	59.0	0.00	0.00	6707	5.45	0.18	20351	60	15868	19850	17289	1.17	0.18	92.7

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
6: 28	28	59.4	0.00	0.00	6707	4.74	0.18	203[illegible]	24	15892	19850	17422	1.16	0.18	92.8
7: 5	37	60.0	0.00	0.00	6707	3.73	0.17	2039[illegible]	24	15917	19850	17560	1.16	0.17	92.9
9: 0	115	62.0	0.00	0.00	6707	1.34	0.15	20423	24	15941	19850	17715	1.15	0.15	93.1
10: 30	90	63.5	0.00	0.00	6707	0.74	0.16	20435	11	15952	19850	17781	1.14	0.16	93.1
12: 0	90	65.0	0.00	0.00	6707	0.49	0.17	20443	8	15960	19850	17826	1.14	0.17	93.2
13: 20	80	66.3	0.00	0.00	6707	0.37	0.18	20448	5	15966	19850	17856	1.14	0.18	93.2
14: 30	70	67.5	0.00	0.00	6707	0.26	0.19	20452	3	15970	19850	17875	1.14	0.19	93.2
15: 30	60	68.5	0.00	0.00	6707	0.26	0.19	20455	3	15973	19850	17891	1.14	0.19	93.3

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
12: 0	0	0.0	6.00	1.10	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
14: 45	165	2.7	6.00	1.10	1093	0.35	1.65	95	31	31	990	57	1.65	0.54	0.1
15: 0	15	3.0	6.00	1.10	1193	0.86	1.65	116	7	38	1080	70	1.64	0.54	0.2
17: 0	120	5.0	6.00	1.10	1989	2.09	2.96	862	467	506	1800	321	2.67	1.86	3.0
19: 0	120	7.0	6.00	1.10	2784	4.98	3.07	2700	1178	1684	2520	919	2.93	1.97	10.0
21: 0	120	9.0	6.00	1.10	3580	6.41	3.18	5150	1599	3283	3240	1689	3.04	2.07	19.6
22: 0	60	10.0	6.00	1.10	3978	4.80	3.02	6020	551	3835	3600	1977	3.04	1.91	22.9
22: 44	44	10.7	6.00	0.58	4131	4.80	2.90	6633	489	4324	3864	2188	3.03	2.31	25.8
23: 0	16	11.0	6.00	0.58	4187	5.80	2.85	6898	211	4535	3960	2281	3.02	2.27	27.1
1: 0	120	13.0	6.00	0.58	4607	5.20	2.53	8479	1216	5752	4680	2905	2.91	1.9[illegible]	34.3
3: 0	120	15.0	6.00	0.58	5027	5.14	2.20	9843	1003	6756	5400	3523	2.79	1.6[illegible]	40.4
4: 19	79	16.3	6.00	0.20	5124	4.90	1.99	10615	692	7449	5874	3910	2.71	1.75	44.5
5: 0	41	17.0	6.00	0.20	5175	4.55	1.88	10966	313	7762	6120	4097	2.67	1.67	46.4
6: 28	88	18.4	6.00	0.20	5283	4.73	1.75	11697	645	8407	6648	4513	2.59	1.54	50.2
7: 0	32	19.0	6.00	0.58	5395	4.73	1.70	11955	170	8577	6840	4665	2.56	1.12	51.2
9: 0	120	21.0	6.00	0.58	5814	4.93	1.53	12861	560	9138	7560	5257	2.44	0.94	54.6
11: 0	120	23.0	6.00	0.58	6234	6.28	1.38	13907	605	9744	8280	6011	2.31	0.80	58.2
12: 0	60	24.0	6.00	0.58	6444	6.19	1.31	14396	272	10017	8640	6382	2.25	0.73	59.8
13: 0	60	25.0	6.00	0.20	6518	6.24	1.24	14862	389	10406	9000	6757	2.19	1.04	62.2
13: 20	20	25.3	6.00	0.20	6542	6.05	1.22	15010	123	10529	9120	6878	2.18	1.01	62.9
14: 30	70	26.5	7.00	0.20	6643	6.17	1.13	15502	403	10933	9610	7310	2.12	0.93	65.3
16: 30	120	28.5	7.00	0.20	6815	6.64	0.99	16295	629	11563	10450	8108	2.00	0.79	69.1
18: 0	90	30.0	7.00	0.20	6944	6.57	0.90	16832	415	11978	11080	8699	1.93	0.70	71.6
20: 0	120	32.0	7.00	0.20	7116	6.47	0.79	17448	456	12434	11920	9476	1.84	0.58	74.3
22: 0	120	34.0	6.50	0.20	7276	6.43	0.67	17969	363	12798	12700	10249	1.75	0.47	76.5
0: 10	130	36.1	6.50	0.20	7450	6.28	0.57	18442	304	13103	13545	11066	1.66	0.37	78.3
0: 30	20	36.5	6.50	0.00	7450	6.28	0.56	18513	70	13173	13675	11192	1.65	0.56	78.7
2: 0	90	38.0	7.00	0.00	7450	6.95	0.49	18823	310	13484	14305	11818	1.59	0.49	80.6
4: 0	120	40.0	7.00	0.00	7450	6.85	0.40	19158	334	13819	15145	12641	1.51	0.40	82.6
6: 0	120	42.0	7.00	0.00	7450	6.91	0.31	19423	264	14083	15985	13470	1.44	0.31	84.2
8: 0	120	44.0	7.00	0.00	7450	5.81	0.27	19617	193	14277	16825	14168	1.38	0.27	85.3
9: 15	75	45.2	7.00	0.00	7450	6.44	0.25	19738	121	14399	17350	14651	1.34	0.25	86.1
9: 30	15	45.5	7.00	0.00	7450	6.88	0.24	19764	25	14424	17455	1[illegible]754	1.33	0.24	86.2
11: 0	90	47.0	7.00	0.00	7450	6.88	0.21	19898	133	14558	18085	15374	1.29	0.21	87.0
13: 0	120	49.0	7.00	0.00	7450	7.02	0.17	20046	148	14707	18925	16217	1.23	0.17	87.9
14: 0	60	50.0	7.00	0.00	7450	6.67	0.16	20111	64	14772	19345	16617	1.21	0.16	88.3
15: 0	60	51.0	7.00	0.00	7450	6.65	0.14	20170	59	14831	19765	17016	1.18	0.14	88.6
16: 0	60	52.0	7.00	0.00	7450	6.67	0.13	20224	53	14884	20185	17417	1.16	0.13	89.0
17: 0	60	53.0	7.00	0.00	7450	6.65	0.12	20272	47	14932	20605	17816	1.13	0.12	89.2
18: 0	60	54.0	7.00	0.00	7450	6.65	0.10	20314	42	14974	21025	18215	1.11	0.10	89.5
19: 0	60	55.0	7.00	0.00	7450	6.45	0.09	20350	35	15010	21445	18602	1.09	0.09	89.7
20: 0	60	56.0	0.00	0.00	7450	6.27	0.07	20378	28	15039	21445	18979	1.07	0.07	89.9
21: 0	60	57.0	0.00	0.00	7450	4.50	0.08	20401	22	15061	21445	19250	1.05	0.08	90.0
22: 0	60	58.0	0.00	0.00	7450	1.95	0.09	20411	10	15072	21445	19367	1.05	0.09	90.1
23: 0	60	59.0	0.00	0.00	7450	1.18	0.09	20418	6	15079	21445	19438	1.05	0.09	90.1
24: 0	60	60.0	0.00	0.00	7450	0.84	0.10	20424	5	15084	21445	19488	1.04	0.10	90.1
1: 0	60	61.0	0.00	0.00	7450	0.65	0.10	20428	4	15088	21445	19528	1.04	0.10	90.2
2: 0	60	62.0	0.00	0.00	7450	0.49	0.10	20431	3	15092	21445	19558	1.04	0.10	90.2
3: 0	60	63.0	0.00	0.00	7450	0.39	0.11	20434	2	15094	21445	19582	1.04	0.11	90.2
4: 0	60	64.0	0.00	0.00	7450	0.34	0.11	20436	2	15097	21445	19603	1.04	0.11	90.2

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
5: 0	60	65.0	0.00	0.00	7450	0.29	0.12	20438	2	15099	21445	19620	1.04	0.12	90.2
6: 0	60	66.0	0.00	0.00	7450	0.27	0.12	20440	2	15101	21445	19637	1.04	0.12	90.2
7: 0	60	67.0	0.00	0.00	7450	0.24	0.12	20442	1	15103	21445	19651	1.04	.0.12	90.3

H&N PROJECT NO. 3055.00

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
22: 15	0	0.0	5.50	1.09	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
0: 30	135	2.2	5.50	1.09	810	0.84	1.59	182	57	57	742	114	1.59	0.50	0.4
2: 0	90	3.7	5.50	1.09	1351	2.02	2.10	567	185	243	1237	296	1.91	.1.01	1.7
4: 0	120	5.7	5.50	1.09	2072	3.99	2.79	1905	815	1058	1897	776	2.45	1.70	7.4
6: 0	120	7.7	5.50	1.09	2792	4.35	2.71	3325	848	1907	2557	1298	2.56	1.62	13.3
6: 40	40	8.4	5.50	1.09	3033	4.63	2.69	3823	296	2203	2777	1484	2.57	1.59	15.4
7: 30	50	9.2	5.50	1.09	3333	4.80	2.65	4461	375	2579	3052	1724	2.58	1.56	18.1
9: 15	105	11.0	5.50	1.09	3963	5.35	2.59	5917	842	3421	3630	2285	2.58	1.49	24.0
10: 30	75	12.2	5.50	0.48	4161	5.35	2.43	6893	783	4204	4042	2687	2.56	1.95	29.5
11: 0	30	12.7	5.50	0.48	4241	5.64	2.36	7294	319	4524	4207	2956	2.55	1.88	31.7
13: 0	120	14.7	5.50	0.48	4557	5.79	2.11	8763	1135	5659	4867	3551	2.46	1.63	39.7
14: 0	60	15.7	5.50	0.48	4716	5.87	1.98	9464	531	6191	5197	3904	2.42	1.50	43.4
15: 0	60	16.7	5.50	0.48	4874	5.33	1.86	10059	441	6633	5527	4224	2.38	1.38	46.5
16: 0	60	17.7	5.50	0.48	5033	5.26	1.73	10606	395	7028	5857	4539	2.33	1.25	49.3
16: 0	0	17.7	5.50	0.48	5033	5.26	1.73	10606	0	7028	5857	4539	2.33	1.25	49.3
17: 0	60	18.7	6.00	0.48	5205	6.02	1.60	11186	406	7435	6217	4901	2.29	1.12	52.2
18: 0	60	19.7	6.50	0.48	5393	6.53	1.52	11783	408	7843	6607	5293	2.22	1.04	55.0
19: 0	60	20.7	7.00	0.48	5594	6.73	1.43	12363	385	8229	7027	5697	2.16	0.95	57.7
20: 0	60	21.7	7.00	0.48	5796	6.61	1.35	12898	345	8574	7447	6094	2.11	0.87	60.2
22: 0	120	23.7	7.00	0.15	5926	6.64	1.18	13839	817	9391	8287	6891	2.00	1.02	65.9
24: 0	120	25.7	6.50	0.15	6047	6.24	1.01	14596	640	10032	9067	7640	1.91	0.85	70.4
2: 0	120	27.7	6.00	0.15	6159	6.13	0.83	15214	503	10536	9787	8377	1.81	0.68	73.9
4: 0	120	29.7	6.00	0.15	6270	6.03	0.75	15757	431	10967	10507	9101	1.73	0.59	77.0
6: 0	120	31.7	6.30	0.15	6387	6.23	0.66	16252	378	11346	11263	9850	1.64	0.50	79.6
8: 0	120	33.7	6.50	0.15	6508	7.00	0.57	16733	350	11676	12043	10690	1.56	0.41	82.1
10: 0	120	35.7	6.00	0.15	6620	5.96	0.48	17078	234	11910	12763	11406	1.49	0.32	83.7
12: 0	120	37.7	8.00	0.00	6620	8.42	0.40	17490	412	12342	13723	12417	1.40	0.40	86.6
14: 0	120	39.7	8.00	0.00	6620	8.22	0.33	17820	329	12672	14683	13403	1.32	0.33	88.9
14: 30	30	40.2	8.00	0.00	6620	8.22	0.31	17897	77	12750	14923	13650	1.31	0.31	89.5
16: 0	90	41.7	8.70	0.00	6620	8.67	0.25	18099	202	12952	15706	14431	1.25	0.25	90.9
18: 0	120	43.7	9.00	0.00	6620	9.60	0.18	18313	213	13165	16786	15583	1.17	0.18	92.4
20: 0	120	45.7	9.50	0.00	6620	9.53	0.14	18475	162	13328	17926	16727	1.10	0.14	93.6
21: 0	60	46.7	9.50	0.00	6620	9.09	0.12	18541	65	13393	18496	17273	1.07	0.12	94.0
22: 0	60	47.7	9.50	0.00	6620	9.59	0.09	18597	56	13450	19066	17848	1.04	0.09	94.4
22: 15	15	48.0	0.00	0.00	6620	9.59	0.10	18612	14	13464	19066	17992	1.03	0.10	94.5
23: 0	45	48.7	0.00	0.00	6620	4.90	0.10	18635	23	13488	19066	18213	1.02	0.10	94.7
24: 0	60	49.7	0.00	0.00	6620	2.27	0.11	18651	15	13503	19066	18349	1.01	0.11	94.8
1: 0	60	50.7	0.00	0.00	6620	1.30	0.12	18661	9	13513	19066	18427	1.01	0.12	94.9
2: 0	60	51.7	0.00	0.00	6620	0.90	0.12	18667	6	13520	19066	18481	1.01	0.12	94.9
3: 0	60	52.7	0.00	0.00	6620	0.80	0.13	18674	6	13526	19066	18530	1.00	0.13	94.9
4: 0	60	53.7	0.00	0.00	6620	0.65	0.13	18679	5	13531	19066	18569	1.00	0.13	95.0
5: 0	60	54.7	0.00	0.00	6620	0.42	0.13	18682	3	13535	19066	18594	1.00	0.13	95.0
6: 0	60	55.7	0.00	0.00	6620	0.40	0.13	18686	3	13538	19066	18618	1.00	0.13	95.0
7: 0	60	56.7	0.00	0.00	6620	0.37	0.13	18689	3	13541	19066	18641	1.00	0.13	95.1

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
4: 0	0	0.0	6.00	1.23	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
5: 45	105	1.7	6.00	1.23	775	0.50	1.23	64	0	0	630	52	1.23	0.00	0.0
8: 0	135	4.0	6.00	1.23	1772	0.72	2.05	264	79	79	1440	149	1.76	0.82	0.6
9: 0	60	5.0	6.00	1.23	2215	0.85	2.27	381	53	133	1800	201	1.89	1.04	1.0
10: 0	60	6.0	6.00	1.23	2658	0.96	2.39	519	67	200	2160	258	2.00	1.16	1.5
11: 0	60	7.0	6.00	1.23	3102	3.90	2.51	1108	301	501	2520	492	2.24	1.28	3.9
12: 0	60	8.0	6.00	1.23	3545	3.47	2.64	1659	293	795	2880	701	2.36	1.40	6.2
13: 0	60	9.0	6.00	1.23	3988	5.30	2.59	2484	433	1229	3240	1019	2.43	1.36	9.6
14: 0	60	10.0	6.00	1.23	4431	6.10	2.55	3417	482	1712	3600	1385	2.46	1.31	13.3
15: 0	60	11.0	6.00	1.23	4874	6.29	2.50	4362	480	2192	3960	1762	2.47	1.27	17.1
16: 0	60	12.0	6.00	1.23	5317	5.30	2.45	5144	390	2582	4320	2080	2.47	1.22	20.2
16: 15	15	12.2	6.00	0.53	5366	5.30	2.43	5337	150	2733	4410	2160	2.47	1.89	21.3
17: 0	45	13.0	6.50	0.53	5522	5.88	2.34	5958	478	3212	4702	2424	2.45	1.80	25.1
18: 0	60	14.0	6.50	0.53	5731	6.19	2.23	6787	630	3842	5092	2796	2.42	1.69	30.0
19: 0	60	15.0	6.50	0.53	5939	6.29	2.11	7585	596	4439	5482	3173	2.38	1.58	34.7
20: 0	60	16.0	6.50	0.53	6148	6.45	2.00	8361	568	5007	5872	3561	2.34	1.46	39.1
21: 0	60	17.0	6.50	0.53	6357	6.71	1.88	9119	542	5549	6262	3964	2.30	1.34	43.4
22: 0	60	18.0	6.50	0.53	6565	6.35	1.75	9789	466	6016	6652	4345	2.25	1.22	47.0
22: 15	15	18.2	6.50	0.53	6617	6.35	1.72	9954	113	6129	6750	4441	2.24	1.19	47.9
24: 0	105	20.0	6.50	0.53	6983	6.68	1.51	11017	686	6816	7432	5143	2.14	0.97	53.3
2: 0	120	22.0	6.50	0.53	7400	6.63	1.26	12027	584	7401	8212	5939	2.02	0.73	57.9
4: 0	120	24.0	6.50	0.53	7817	6.59	1.14	12930	480	7881	8992	6730	1.92	0.60	61.6
6: 0	120	26.0	6.50	0.53	8235	6.58	1.01	13732	379	8260	9772	7521	1.82	0.48	64.6
6: 15	15	26.2	6.50	0.17	8252	6.58	1.00	13832	82	8342	9870	7619	1.81	0.83	65.2
8: 0	105	28.0	6.20	0.17	8365	5.84	0.88	14377	437	8780	10521	8233	1.74	0.71	68.6
10: 0	120	30.0	6.20	0.17	8496	6.11	0.76	14935	429	9209	11265	8966	1.66	0.58	72.0
12: 0	120	32.0	6.20	0.17	8626	6.31	0.68	15456	388	9598	12009	9724	1.58	0.51	75.0
14: 0	120	34.0	6.20	0.17	8756	6.19	0.61	15912	326	9924	12753	10467	1.52	0.43	77.6
16: 0	120	36.0	6.20	0.17	8886	6.00	0.54	16302	263	10188	13497	11187	1.45	0.36	79.7
18: 0	120	38.0	6.20	0.17	9016	6.20	0.46	16650	217	10406	14241	11931	1.39	0.29	81.4
18: 30	30	38.5	6.20	0.00	9016	6.20	0.45	16734	83	10490	14427	12117	1.38	0.45	82.0
20: 0	90	40.0	6.70	0.00	9016	6.65	0.39	16972	237	10727	15030	12716	1.33	0.39	83.9
22: 0	120	42.0	6.70	0.00	9016	6.63	0.32	17231	259	10987	15834	13512	1.27	0.32	85.9
24: 0	120	44.0	6.70	0.00	9016	6.65	0.25	17435	203	11191	16638	14311	1.21	0.25	87.5
2: 0	120	46.0	6.70	0.00	9016	6.63	0.18	17581	146	11337	17442	15107	1.16	0.18	88.6
4: 0	120	48.0	6.70	0.00	9016	6.68	0.16	17714	132	11469	18246	15910	1.11	0.16	89.7
6: 0	120	50.0	6.70	0.00	9016	6.61	0.14	17829	115	11585	19050	16700	1.06	0.14	90.6
8: 0	120	52.0	7.00	0.00	9016	7.08	0.12	17937	107	11693	19890	17553	1.02	0.12	91.4
10: 0	120	54.0	7.00	0.00	9016	6.52	0.10	18022	84	11778	20730	18336	0.98	0.10	92.1
10: 30	30	54.5	0.00	0.00	9016	6.50	0.11	18044	22	11800	20730	18531	0.97	0.11	92.3
11: 30	60	55.5	0.00	0.00	9016	4.10	0.13	18076	32	11832	20730	18777	0.96	0.13	92.5
12: 30	60	56.5	0.00	0.00	9016	2.14	0.14	18095	18	11851	20730	18906	0.95	0.14	92.7
13: 30	60	57.5	0.00	0.00	9016	1.25	0.15	18107	11	11863	20730	18981	0.95	0.15	92.8

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
16: 20	0	0.0	6.50	0.00	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
18: 0	100	1.6	6.50	0.00	0	0.00	0.00	0	0	0	650	0	0.00	0.00	0.0
18: 30	30	2.1	6.50	0.00	0	0.44	1.41	19	19	19	845	13	1.41	1.41	0.1
19: 0	30	2.6	6.50	0.00	0	0.54	1.41	41	22	41	1040	29	1.41	1.41	0.2
19: 30	30	3.1	6.50	0.00	0	0.68	1.23	67	25	67	1235	50	1.33	1.23	0.3
20: 0	30	3.6	6.50	0.00	0	0.74	1.04	90	23	90	1430	72	1.24	1.04	0.5
20: 30	30	4.1	6.50	0.00	0	0.50	1.12	107	16	107	1625	87	1.22	1.12	0.6
21: 0	30	4.6	6.50	0.00	0	1.05	1.20	145	38	145	1820	119	1.22	1.20	0.8
21: 30	30	5.1	6.50	0.00	0	1.04	1.58	195	49	195	2015	150	1.29	1.58	1.1
22: 0	30	5.6	6.50	0.00	0	1.32	1.96	273	78	273	2210	190	1.43	1.96	1.5
23: 0	60	6.6	6.50	0.00	0	2.30	2.65	639	366	639	2600	328	1.94	2.65	3.6
0: 15	75	7.9	6.50	0.00	0	4.49	3.51	1823	1183	1823	3087	665	2.73	3.51	10.4
1: 0	45	8.6	6.50	0.00	0	5.03	3.50	2616	793	2616	3380	892	2.93	3.50	15.0
2: 0	60	9.6	6.50	0.00	0	5.26	3.98	3875	1258	3875	3770	1208	3.20	3.98	22.2
3: 0	60	10.6	6.50	0.00	0	5.53	3.30	4972	1097	4972	4160	1540	3.22	3.30	28.5
4: 0	60	11.6	6.50	0.00	0	5.90	2.92	6009	1036	6009	4550	1895	3.17	2.92	34.4
5: 15	75	12.9	6.50	0.00	0	6.27	2.61	7240	1230	7240	5037	2365	3.06	2.61	41.5
6: 0	45	13.6	6.50	0.00	0	6.79	2.42	7982	742	7982	5330	2671	2.98	2.42	45.7
8: 5	125	15.7	6.50	0.00	0	6.32	1.91	9493	1510	9493	6142	3462	2.74	1.91	54.4
10: 0	115	17.6	6.50	0.00	0	6.40	1.43	10548	1055	10548	6890	4198	2.51	1.43	60.5
12: 10	130	19.8	6.50	0.00	0	6.12	1.19	11502	953	11502	7735	4994	2.30	1.19	65.9
14: 30	140	22.1	6.50	0.00	0	7.30	0.94	12470	968	12470	8645	6016	2.07	0.94	71.5
16: 0	90	23.6	6.50	0.00	0	5.69	0.98	12975	504	12975	9230	6529	1.98	0.98	74.4
18: 10	130	25.8	6.50	0.00	0	6.13	0.55	13414	439	13414	10075	7326	1.83	0.55	76.9
18: 45	35	26.4	6.50	0.00	0	6.13	0.53	13528	113	13528	10302	7541	1.79	0.53	77.5
21: 0	135	28.6	6.00	0.00	0	6.03	0.45	13895	367	13895	11112	8355	1.66	0.45	79.7
22: 0	60	29.6	6.50	0.00	0	7.43	0.41	14080	185	14080	11502	8801	1.59	0.41	80.7
24: 0	120	31.6	6.50	0.00	0	4.43	0.34	14264	183	14264	12282	9333	1.52	0.34	81.8
2: 0	120	33.6	6.50	0.00	0	6.04	0.27	14463	198	14463	13062	10059	1.43	0.27	82.9
4: 0	120	35.6	6.50	0.00	0	6.29	0.24	14648	185	14648	13842	10815	1.35	0.24	84.0
6: 0	120	37.6	7.00	0.00	0	6.86	0.21	14826	177	14826	14682	11638	1.27	0.21	85.0
8: 15	135	39.9	7.20	0.00	0	6.52	0.18	14987	161	14987	15654	12519	1.19	0.18	85.9
9: 0	45	40.6	6.50	0.00	0	6.52	0.17	15038	50	15038	15947	12812	1.17	0.17	86.2
10: 5	65	41.7	7.00	0.00	0	4.32	0.15	15087	49	15087	16402	13126	1.14	0.15	86.5
10: 15	10	41.9	6.00	0.00	0	6.29	0.15	15097	9	15097	16462	13189	1.14	0.15	86.5
12: 0	105	43.6	6.00	0.00	0	5.47	0.15	15185	87	15185	17092	13763	1.10	0.15	87.0
13: 10	70	44.8	5.50	0.00	0	5.20	0.15	15240	54	15240	17477	14127	1.07	0.15	87.4
13: 10	0	44.8	6.00	0.00	0	5.20	0.15	15240	0	15240	17477	14127	1.07	0.15	87.4
13: 15	5	44.9	6.00	0.00	0	5.20	0.15	15244	3	15244	17507	14153	1.07	0.15	87.4
14: 30	75	46.1	5.50	0.00	0	5.37	0.14	15303	59	15303	17919	14556	1.05	0.14	87.7
16: 30	120	48.1	6.00	0.00	0	5.40	0.14	15396	93	15396	18639	15204	1.01	0.14	88.2
18: 0	90	49.6	6.00	0.00	0	5.75	0.14	15469	72	15469	19179	15722	0.98	0.14	88.7
20: 0	120	51.6	6.50	0.00	0	6.55	0.12	15571	101	15571	19959	16508	0.94	0.12	89.3
22: 0	120	53.6	6.00	0.00	0	6.29	0.11	15659	87	15659	20679	17264	0.90	0.11	89.8
1: 0	180	56.6	6.00	0.00	0	6.12	0.10	15773	114	15773	21759	18366	0.85	0.10	90.4
2: [illegible]	60	57.6	6.00	0.00	0	6.26	0.09	15808	34	15808	22119	18742	0.84	0.09	90.6
4: 0	120	59.6	6.00	0.00	0	6.04	0.08	15870	61	15870	22839	19467	0.81	0.08	91.0
6: 0	120	61.6	6.20	0.00	0	9.53	0.07	15960	90	15960	23583	20612	0.77	0.07	91.5
7: 30	90	63.1	6.20	0.00	0	6.22	0.07	16001	41	16001	24141	21171	0.75	0.07	91.7
11: 25	235	67.0	6.20	0.00	0	6.43	0.06	16094	92	16094	25599	22683	0.70	0.06	91.3

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
12: 15	50	67.9	6.20	0.00	0	12.27	0.06	16132	37	16132	25908	23297	0.69	0.06	92.5
13: 0	45	68.6	6.20	0.00	0	6.32	0.06	16149	17	16149	26187	23581	0.68	0.06	92.6
15: 0	120	70.6	0.00	0.00	0	6.05	0.05	16192	43	16192	26187	24308	0.66	0.05	92.9
15: 30	30	71.1	0.00	0.00	0	7.34	0.05	16205	13	16205	26187	24529	0.66	0.05	92.9
16: 0	30	71.6	0.00	0.00	0	4.68	0.05	16213	8	16213	26187	24669	0.65	0.05	92.9
16: 20	20	72.1	0.00	0.00	0	3.88	0.06	16221	7	16221	26187	24786	0.65	0.06	93.0
17: 15	45	72.9	0.00	0.00	0	2.34	0.06	16229	8	16229	26187	24913	0.65	0.06	93.0
17: 40	25	73.3	0.00	0.00	0	2.58	0.06	16233	4	16233	26187	24979	0.64	0.06	93.1
18: 20	40	74.0	0.00	0.00	0	1.92	0.07	16239	5	16239	26187	25055	0.64	0.07	93.1
19: 30	70	75.1	0.00	0.00	0	4.30	0.07	16261	22	16261	26187	25356	0.64	0.07	93.2
20: 0	30	75.6	0.00	0.00	0	0.97	0.07	16264	2	16264	26187	25386	0.64	0.07	93.2
20: 30	30	76.1	0.00	0.00	0	0.90	0.08	16266	2	16266	26187	25413	0.64	0.08	93.2
21: 0	30	76.6	0.00	0.00	0	0.78	0.08	16268	1	16268	26187	25436	0.63	0.08	93.3
21: 30	30	77.1	0.00	0.00	0	0.72	0.08	16270	1	16270	26187	25458	0.63	0.08	93.3
22: 0	30	77.6	0.00	0.00	0	0.63	0.09	16271	1	16271	26187	25477	0.63	0.09	93.3
22: 30	30	78.1	0.00	0.00	0	0.60	0.09	16273	1	16273	26187	25495	0.63	0.09	93.3
23: 0	30	78.6	0.00	0.00	0	0.58	0.09	16275	1	16275	26187	25512	0.63	0.09	93.3
23: 30	30	79.1	0.00	0.00	0	0.52	0.10	16277	1	16277	26187	25528	0.63	0.10	93.3
24: 0	30	79.6	0.00	0.00	0	0.42	0.10	16278	1	16278	26187	25541	0.63	0.10	93.3
1: 0	60	80.6	0.00	0.00	0	0.42	0.10	16281	2	16281	26187	25566	0.63	0.10	93.3
2: 0	60	81.6	0.00	0.00	0	0.39	0.09	16283	2	16283	26187	25590	0.63	0.09	93.3
3: 0	60	82.6	0.00	0.00	0	0.33	0.08	16284	1	16284	26187	25610	0.63	0.08	93.4
4: 0	60	83.6	0.00	0.00	0	0.30	0.07	16286	1	16286	26187	25629	0.63	0.07	93.4
5: 0	60	84.6	0.00	0.00	0	0.28	0.10	16288	1	16288	26187	25646	0.63	0.10	93.4
6: 0	60	85.6	0.00	0.00	0	0.26	0.12	16290	1	16290	26187	25662	0.63	0.12	93.4
8: 15	135	87.9	0.00	0.00	0	0.21	0.17	16295	5	16295	26187	25691	0.63	0.17	93.4

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
16: 20	0	0.0	11.50	0.00	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
17: 45	85	1.4	11.50	0.00	0	0.00	0.00	0	0	0	977	3	0.00	0.00	0.0
19: 12	87	2.8	12.00	0.00	0	2.71	2.52	596	596	596	2021	236	2.52	2.52	3.0
19: 30	18	3.1	12.00	0.00	0	4.36	2.90	824	228	824	2237	315	2.61	2.90	4.2
20: 0	30	3.6	12.00	0.00	0	4.98	3.51	1350	525	1350	2597	464	2.90	3.51	6.9
20: 30	30	4.1	12.00	0.00	0	5.27	3.61	1921	571	1921	2957	622	3.08	3.61	9.9
21: 0	30	4.6	12.00	0.00	0	7.93	3.71	2804	882	2804	3317	860	3.25	3.71	14.5
21: 35	35	5.2	11.50	0.00	0	9.28	3.77	4029	1224	4029	3720	1185	3.39	3.77	20.8
22: 0	25	5.6	11.50	0.00	0	9.55	3.01	4750	720	4750	4007	1424	3.33	3.01	24.5
22: 30	30	6.1	11.50	0.00	0	10.60	3.61	5898	1148	5898	4352	1742	3.38	3.61	30.5
23: 0	30	6.6	11.50	0.00	0	9.90	3.40	6909	1011	6909	4697	2039	3.38	3.40	35.7
24: 0	60	7.6	11.50	0.00	0	12.14	2.69	8873	1963	8873	5387	2768	3.20	2.69	45.9
1: 0	60	8.6	11.50	0.00	0	12.23	1.97	10326	1453	10326	6077	3502	2.94	1.97	53.4
2: 0	60	9.6	11.50	0.00	0	12.39	1.45	11410	1084	11410	6767	4246	2.68	1.45	59.0
4: 0	120	11.6	11.50	0.00	0	11.75	0.98	12802	1391	12802	8147	5657	2.26	0.98	66.2
6: 0	120	13.6	11.50	0.00	0	11.20	0.51	13494	692	13494	9527	7001	1.92	0.51	69.8
7: 30	90	15.1	11.50	0.00	0	11.20	0.45	13949	455	13949	10562	8009	1.74	0.45	72.1
9: 25	115	17.0	11.50	0.00	0	10.87	0.37	14415	465	14415	11885	9260	1.55	0.37	74.5
11: 25	120	19.0	11.50	0.00	0	12.91	0.28	14861	446	14861	13265	10810	1.37	0.28	76.8
13: 0	95	20.6	11.50	0.00	0	6.23	0.22	14993	131	14993	14357	11402	1.31	0.22	77.5
14: 0	60	21.6	11.50	0.00	0	10.06	0.20	15116	123	15116	15047	12006	1.25	0.20	78.2
15: 0	60	22.6	11.50	0.00	0	11.20	0.18	15241	125	15241	15737	12678	1.20	0.18	78.8
16: 0	60	23.6	11.50	0.00	0	11.45	0.16	15357	116	15357	16427	13366	1.14	0.16	79.4
17: 0	60	24.6	11.50	0.00	0	11.62	0.15	15462	105	15462	17117	14063	1.09	0.15	80.0
19: 30	150	27.1	11.50	0.00	0	10.60	0.13	15674	211	15674	18842	15655	1.00	0.13	81.1
20: 30	60	28.1	11.50	0.00	0	10.55	0.12	15754	79	15754	19532	16288	0.96	0.12	81.5
21: 30	60	29.1	11.50	0.00	0	9.60	0.11	15822	67	15822	20222	16864	0.93	0.11	81.8
22: 30	60	30.1	11.50	0.00	0	11.02	0.11	15895	73	15895	20912	17525	0.90	0.11	82.2
23: 0	30	30.6	11.50	0.00	0	13.61	0.10	15939	44	15939	21257	17934	0.88	0.10	82.4
24: 0	60	31.6	11.50	0.00	0	11.23	0.10	16007	68	16007	21947	18608	0.86	0.10	82.8
1: 0	60	32.6	11.50	0.00	0	15.00	0.09	16092	84	16092	22637	19508	0.82	0.09	83.2
2: 0	60	33.6	11.50	0.00	0	11.76	0.08	16154	61	16154	23327	20214	0.79	0.08	83.5
3: 0	60	34.6	11.50	0.00	0	11.15	0.08	16209	54	16209	24017	20884	0.77	0.08	83.8
4: 0	60	35.6	11.50	0.00	0	10.74	0.07	16258	49	16258	24707	21529	0.75	0.07	84.1
5: 0	60	36.6	11.50	0.00	0	10.58	0.07	16304	45	16304	25397	22164	0.73	0.07	84.3
6: 0	60	37.6	11.50	0.00	0	10.26	0.06	16345	41	16345	26087	22780	0.71	0.06	84.5
8: 15	135	39.9	11.50	0.00	0	10.81	0.05	16430	84	16430	27640	24240	0.67	0.05	85.0
10: 15	120	41.9	11.50	0.00	0	16.59	0.05	16531	100	16531	29020	26232	0.63	0.05	85.5
11: 0	45	42.6	11.50	0.00	0	10.78	0.04	16554	22	16554	29537	26717	0.61	0.04	85.6
12: 0	60	43.6	11.50	0.00	0	6.19	0.04	16572	18	16572	30227	27089	0.61	0.04	85.7
12: 20	20	44.0	0.00	0.00	0	3.99	0.05	16576	4	16576	30227	27169	0.61	0.05	85.7
13: 0	40	44.6	0.00	0.00	0	2.85	0.05	16582	5	16582	30227	27283	0.60	0.05	85.8
13: 30	30	45.1	0.00	0.00	0	3.04	0.05	16587	4	16587	30227	27375	0.60	0.05	85.8
14: 0	30	45.6	0.00	0.00	0	1.64	0.05	16590	2	16590	30227	27424	0.60	0.05	85.8
14: 30	30	46.1	0.00	0.00	0	1.42	0.06	16592	2	16592	30227	27466	0.60	0.06	85.8
15: 0	30	46.6	0.00	0.00	0	1.18	0.06	16595	2	16595	30227	27502	0.60	0.06	85.8
19: 0	180	49.6	0.00	0.00	0	0.58	0.07	16602	7	16602	30227	27607	0.60	0.07	85.9

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
19: 45	0	0.0	4.70	0.00	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
22: 30	165	2.7	4.70	0.00	0	0.00	0.00	0	0	0	775	0	0.00	0.00	0.0
23: 15	45	3.5	4.70	0.00	0	1.66	5.37	402	402	402	987	74	5.37	5.37	1.6
24: 0	45	4.2	4.70	0.00	0	1.83	5.34	843	441	343	1198	157	5.35	5.34	3.4
0: 30	30	4.7	4.70	0.00	0	2.02	5.32	1167	323	1167	1339	218	5.34	5.32	4.7
1: 0	30	5.2	4.70	0.00	0	2.05	5.38	1499	332	1499	1480	279	5.35	5.38	6.0
1: 30	30	5.7	4.70	0.00	0	2.09	5.45	1841	342	1841	1621	342	5.37	5.45	7.4
2: 0	30	6.2	4.70	0.00	0	2.26	5.55	2219	377	2219	1762	410	5.40	5.55	8.9
2: 30	30	6.7	4.70	0.00	0	2.78	5.65	2691	472	2691	1903	494	5.44	5.65	10.8
3: 0	30	7.2	4.70	0.00	0	3.10	5.55	3208	516	3208	2044	587	5.46	5.55	12.9
4: 0	60	8.2	4.70	0.00	0	3.80	5.35	4432	1223	4432	2326	815	5.43	5.35	17.9
5: 0	60	9.2	4.70	0.00	0	4.12	4.74	5606	1174	5606	2608	1063	5.27	4.74	22.6
6: 0	60	10.2	4.70	0.00	0	4.20	4.13	6651	1045	6651	2890	1315	5.05	4.13	26.8
8: 15	135	12.5	4.70	0.00	0	4.67	2.97	8526	1875	8526	3525	1946	4.38	2.97	34.4
10: 15	120	14.5	4.70	0.00	0	4.73	2.39	9886	1359	9886	4089	2515	3.93	2.39	39.9
12: 0	105	16.2	4.70	0.00	0	4.36	1.88	10751	864	10751	4582	2973	3.61	1.88	43.4
14: 0	120	18.2	4.70	0.00	0	4.69	1.30	11488	737	11488	5146	3537	3.24	1.30	46.4
15: 45	105	20.0	5.00	0.00	0	4.88	1.20	12108	619	12108	5671	4049	2.98	1.20	48.9
20: 0	255	24.2	5.00	0.00	0	4.97	0.96	13330	1222	13330	6946	5318	2.50	0.96	53.8
22: 0	120	26.2	5.00	0.00	0	5.01	0.85	13842	511	13842	7546	5920	2.33	0.85	55.9
24: 0	120	28.2	5.00	0.00	0	5.05	0.73	14288	446	14288	8146	6527	2.18	0.73	57.7
2: 0	120	30.2	5.00	0.00	0	4.51	0.66	14650	361	14650	8746	7068	2.07	0.66	59.2
4: 0	120	32.2	5.00	0.00	0	4.62	0.60	14984	334	14984	9346	7623	1.96	0.60	60.5
6: 0	120	34.2	5.00	0.00	0	4.98	0.53	15304	320	15304	9946	8222	1.86	0.53	61.8
8: 45	165	37.0	5.00	0.00	0	5.05	0.44	15674	369	15674	10771	9056	1.73	0.44	63.3
10: 0	75	38.2	5.50	0.00	0	4.77	0.43	15829	154	15829	11184	9414	1.68	0.43	63.9
12: 0	120	40.2	5.50	0.00	0	4.84	0.41	16071	242	16071	11844	9995	1.60	0.41	64.9
14: 0	120	42.2	5.50	0.00	0	5.03	0.40	16313	241	16313	12504	10599	1.53	0.40	65.9
17: 0	180	45.2	5.00	0.00	0	5.55	0.37	16688	375	16688	13404	11598	1.43	0.37	67.4
18: 0	60	46.2	5.00	0.00	0	5.21	0.36	16804	115	16804	13704	11911	1.41	0.36	67.9
19: 0	60	47.2	5.00	0.00	0	4.66	0.35	16903	99	16903	14004	12190	1.38	0.35	68.3
21: 0	120	49.2	5.00	0.00	0	5.13	0.32	17106	202	17106	14604	12807	1.33	0.32	69.1
23: 0	120	51.2	5.00	0.00	0	5.07	0.30	17290	184	17290	15204	13416	1.28	0.30	69.8
24: 0	60	52.2	5.00	0.00	0	5.07	0.29	17378	88	17378	15504	13720	1.26	0.29	70.2
1: 0	60	53.2	5.00	0.00	0	4.80	0.27	17458	79	17458	15804	14009	1.24	0.27	70.5
3: 0	120	55.2	5.00	0.00	0	5.53	0.25	17625	166	17625	16404	14673	1.20	0.25	71.2
5: 0	120	57.2	5.00	0.00	0	4.88	0.23	17760	135	17760	17004	15258	1.16	0.23	71.7
7: 0	120	59.2	5.00	0.00	0	4.79	0.21	17881	120	17881	17604	15833	1.12	0.21	72.2
9: 0	120	61.2	5.00	0.00	0	4.81	0.19	17991	109	17991	18204	16411	1.09	0.19	72.7
11: 0	120	63.2	5.00	0.00	0	4.23	0.16	18077	85	18077	18804	16919	1.06	0.16	73.0
13: 0	120	65.2	0.00	0.00	0	4.70	0.15	18166	89	18166	18804	17483	1.03	0.15	73.4
15: 0	120	67.2	5.00	0.00	0	3.89	0.14	18236	69	18236	19404	17950	1.01	0.14	73.7
17: 0	120	69.2	5.00	0.00	0	4.92	0.13	18318	82	18318	20004	18542	0.98	0.13	74.0
19: 0	120	71.2	5.00	0.00	0	4.79	0.13	18395	77	18395	20604	19117	0.96	0.13	74.3
21: 0	120	73.2	5.00	0.00	0	5.09	0.12	18474	78	18474	21204	19728	0.93	0.12	74.6
22: 0	60	74.2	0.00	0.00	0	4.37	0.12	18507	33	18507	21204	19991	0.92	0.12	74.8
23: 0	60	75.2	0.00	0.00	0	2.25	0.13	18526	18	18526	21204	20126	0.92	0.13	74.8
24: 0	60	76.2	0.00	0.00	0	1.48	0.14	18539	13	18539	21204	20215	0.91	0.14	74.9
1: 0	60	77.2	0.00	0.00	0	1.04	0.15	18549	9	18549	21204	20278	0.91	0.15	74.9
2: 0	60	78.2	0.00	0.00	0	0.77	0.16	18557	7	18557	21204	20324	0.91	0.16	75.0

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
3: 0	60	79.2	0.00	0.00	0	0.65	0.17	18564	6	18564	21204	20364	0.91	0.17	75.0
4: 0	60	80.2	0.00	0.00	0	0.50	0.17	18569	5	18569	21204	20394	0.91	0.17	75.0
5: 0	60	81.2	0.00	0.00	0	0.45	0.18	18574	4	18574	21204	20421	0.90	0.18	75.0
6: 0	60	82.2	0.00	0.00	0	0.38	0.18	1857[illegible]	4	18578	21204	20444	0.90	0.18	75.0
7: 0	60	83.2	0.00	0.00	0	0.33	0.19	18582	3	18582	21204	20464	0.90	0.19	75.1
8: 30	90	84.7	0.00	0.00	0	0.29	0.19	18587	5	18587	21204	20490	0.90	0.19	75.1

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
17: 0	0	0.0	16.50	0.00	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
18: 0	60	1.0	16.50	0.00	0	0.00	0.00	0	0	0	990	0	0.00	0.00	0.0
18: 0	0	1.0	16.50	0.00	0	0.58	1.07	0	0	0	990	0	0.00	1.07	0.0
18: 30	30	1.5	16.50	0.00	0	0.55	1.57	26	26	26	1485	16	1.57	1.57	0.1
19: 0	30	2.0	16.50	0.00	0	1.23	2.08	103	76	103	1980	53	1.92	2.08	0.5
19: 30	30	2.5	16.50	0.00	0	3.20	2.97	388	285	388	2475	149	2.59	2.97	1.9
20: 0	30	3.0	16.50	0.00	0	5.59	3.36	1036	648	1036	2970	317	3.26	3.36	5.2
20: 30	30	3.5	16.50	0.00	0	10.45	3.31	2234	1197	2234	3465	631	3.54	3.31	11.2
21: 0	30	4.0	16.50	0.00	0	10.20	3.77	3390	1156	3390	3960	937	3.61	3.77	17.0
21: 30	30	4.5	16.50	0.00	0	10.79	3.46	4510	1120	4510	4455	1261	3.57	3.46	22.7
22: 0	30	5.0	16.50	0.00	0	12.21	3.14	5662	1151	5662	4950	1627	3.47	3.14	28.5
22: 30	30	5.5	16.50	0.00	0	13.20	2.78	676	1101	6763	5445	2023	3.34	2.78	34.0
23: 0	30	6.0	16.50	0.00	0	13.38	2.41	7735	971	7735	5940	2425	3.18	2.41	38.9
23: 30	30	6.5	16.50	0.00	0	14.63	2.05	8638	903	8638	6435	2864	3.01	2.05	43.4
24: 0	30	7.0	16.50	0.00	0	12.75	1.69	9287	648	9287	6930	3247	2.86	1.69	46.7
24: 30	30	7.5	16.50	0.00	0	12.52	1.45	9834	546	9834	7425	3623	2.71	1.45	49.5
1: 0	30	8.0	16.50	0.00	0	18.41	1.22	10509	675	10509	7920	4175	2.51	1.22	52.9
1: 30	30	8.5	16.50	0.00	0	17.35	0.99	11024	515	11024	8415	4696	2.34	0.99	55.5
2: 0	30	9.0	16.50	0.00	0	18.36	0.76	11457	432	11457	8910	5262	2.17	0.76	57.6
3: 0	60	10.0	16.50	0.00	0	16.30	0.67	12114	656	12114	9900	6240	1.94	0.67	60.9
4: 0	60	11.0	16.50	0.00	0	12.08	0.57	12532	418	12532	10890	6966	1.79	0.57	63.1
5: 0	60	12.0	16.50	0.00	0	14.15	0.48	12942	410	12942	11880	7815	1.65	0.48	65.1
6: 0	60	13.0	16.50	0.00	0	14.88	0.38	13290	347	13290	12870	8708	1.52	0.38	66.9
7: 0	60	14.0	16.50	0.00	0	15.05	0.34	13599	308	13599	13860	9611	1.41	0.34	68.4
9: 0	60	15.0	16.50	0.00	0	16.17	0.29	13884	285	13884	14850	10582	1.31	0.29	69.9
10: 0	120	17.0	16.50	0.00	0	16.68	0.19	14283	398	14283	16830	12584	1.13	0.19	71.9
11: 0	60	18.0	16.50	0.00	0	18.16	0.18	14484	201	14484	17820	13674	1.05	0.18	72.9
12: 0	60	19.0	16.50	0.00	0	17.00	0.17	14660	175	14660	18810	14694	0.99	0.17	73.3
12: 45	45	19.7	16.50	0.00	0	17.00	0.16	14783	123	14783	19552	15459	0.95	0.16	74.4
13: 0	15	20.0	0.00	0.00	0	12.70	0.15	14813	30	14813	19552	15649	0.94	0.15	74.5
14: 0	60	21.0	0.00	0.00	0	6.50	0.14	14869	56	14869	19552	16039	0.92	0.14	74.8
15: 0	60	22.0	16.50	0.00	0	4.09	0.14	14904	35	14904	20542	16295	0.91	0.14	75.0
16: 0	60	23.0	16.50	0.00	0	12.00	0.14	15007	102	15007	21532	17005	0.88	0.14	75.5
17: 0	60	24.0	16.50	0.00	0	16.24	0.12	15132	124	15132	22522	17980	0.84	0.12	76.1
18: 0	60	25.0	16.50	0.00	0	15.56	0.11	15237	104	15237	23512	18914	0.80	0.11	76.7
19: 0	60	26.0	16.50	0.00	0	15.33	0.10	15331	93	15331	24502	19834	0.77	0.10	77.1
20: 0	60	27.0	16.50	0.00	0	15.92	0.09	15419	87	15419	25492	20789	0.74	0.09	77.6
21: 0	60	28.0	16.50	0.00	0	13.43	0.08	15485	66	15485	26482	21596	0.71	0.08	77.9
22: 0	60	29.0	16.50	0.00	0	16.10	0.07	15554	69	15554	27472	22562	0.68	0.07	78.3
23: 0	60	30.0	16.50	0.00	0	16.42	0.06	15619	65	15619	28462	23548	0.66	0.06	78.6
24: 0	60	31.0	16.50	0.00	0	16.08	0.05	15676	56	15676	29452	24512	0.63	0.05	78.9
1: 0	60	32.0	0.00	0.00	0	8.31	0.05	15703	26	15703	29452	25011	0.62	0.05	79.0
2: 0	60	33.0	0.00	0.00	0	3.63	0.05	15715	12	15715	29452	25229	0.62	0.05	79.1
3: 0	60	34.0	0.00	0.00	0	2.07	0.05	15722	7	15722	29452	25354	0.62	0.05	79.1
4: 0	60	35.0	0.00	0.00	0	1.40	0.06	15727	5	15727	29452	25438	0.61	0.06	79.1
5: 0	60	36.0	0.00	0.00	0	1.01	0.06	15731	3	15731	29452	25499	0.61	0.06	79.2
6: 0	60	37.0	0.00	0.00	0	0.77	0.06	15734	2	15734	29452	25545	0.61	0.06	79.2
7: 0	60	38.0	0.00	0.00	0	0.61	0.06	15736	2	15736	29452	25583	0.61	0.06	79.2
8: 0	60	39.0	0.00	0.00	0	0.61	0.06	15738	2	15738	29452	25620	0.61	0.06	79.2

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
15:30	0	0.0	1.40	0.00	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
23:0	450	7.5	1.40	0.00	0	0.32	1.27	470	470	470	630	369	1.27	1.27	3.6
23:30	30	8.0	1.40	0.00	0	0.95	1.28	506	36	506	672	397	1.27	1.28	3.9
24:0	30	8.5	1.40	0.00	0	0.57	1.28	528	22	528	714	415	1.27	1.28	4.1
24:30	30	9.0	1.40	0.00	0	0.43	1.61	549	21	549	756	428	1.28	1.61	4.3
1:0	30	9.5	1.40	0.00	0	0.34	1.93	569	19	569	798	438	1.29	1.93	4.4
1:30	30	10.0	1.40	0.00	0	0.32	2.35	592	22	592	840	447	1.32	2.35	4.6
2:0	30	10.5	1.40	0.00	0	0.31	2.76	618	26	618	882	457	1.35	2.76	4.8
2:30	30	11.0	1.40	0.00	0	0.33	3.00	649	30	649	924	467	1.38	3.00	5.0
3:0	30	11.5	1.40	0.00	0	0.36	3.24	685	35	685	966	478	1.43	3.24	5.3
4:0	60	12.5	1.40	0.00	0	0.45	3.03	767	82	767	1050	505	1.51	3.03	6.0
5:0	60	13.5	1.40	0.00	0	0.86	2.82	913	145	913	1134	557	1.63	2.82	7.1
6:0	60	14.5	1.40	0.00	0	1.20	2.61	1103	189	1103	1218	630	1.75	2.61	8.6
7:0	60	15.5	1.40	0.00	0	1.23	2.40	1280	177	1280	1302	704	1.81	2.40	10.0
9:0	120	17.5	1.40	0.00	0	1.39	2.49	1697	416	1697	1470	870	1.94	2.49	13.2
11:0	120	19.5	1.40	0.00	0	1.33	2.58	2113	415	2113	1638	1031	2.04	2.58	16.5
13:0	120	21.5	0.00	0.00	0	1.33	2.67	2542	429	2542	1638	1192	2.13	2.67	19.8
15:0	120	23.5	1.40	0.00	0	1.15	2.77	2925	382	2925	1806	1330	2.19	2.77	22.8
17:0	120	25.5	1.40	0.00	0	0.93	2.57	3213	288	3213	1974	1442	2.22	2.57	25.1
19:0	120	27.5	1.40	0.00	0	2.13	2.38	3824	610	3824	2142	1698	2.25	2.38	29.9
21:0	120	29.5	1.40	0.00	0	1.22	2.28	4186	362	4186	2310	1857	2.25	2.28	32.7
22:0	120	31.5	1.40	0.00	0	1.31	2.15	4527	340	4527	2478	2015	2.24	2.15	35.4
1:0	120	33.5	1.40	0.00	0	1.28	2.02	4838	310	4838	2646	2169	2.23	2.02	37.8
3:0	120	35.5	1.40	0.00	0	1.34	1.88	5143	305	5143	2814	2330	2.20	1.88	40.2
5:0	120	37.5	1.40	0.00	0	1.32	1.75	5423	279	5423	2982	2489	2.17	1.75	42.4
7:0	120	39.5	1.40	0.00	0	1.36	1.66	5696	272	5696	3150	2653	2.14	1.66	44.5
9:0	120	41.5	1.40	0.00	0	0.90	1.58	5867	171	5867	3318	2761	2.12	1.58	45.8
11:0	120	43.5	1.40	0.00	0	0.84	1.49	6017	150	6017	3486	2862	2.10	1.49	47.0
14:0	180	46.5	1.40	0.00	0	1.18	1.35	6307	289	6307	3738	3075	2.05	1.35	49.3
16:0	120	48.5	1.40	0.00	0	1.18	1.34	6498	190	6498	3906	3218	2.01	1.34	50.8
18:0	120	50.5	1.40	0.00	0	1.18	1.32	6686	188	6686	4074	3360	1.98	1.32	52.3
20:0	120	52.5	1.40	0.00	0	1.20	1.30	6876	189	6876	4242	3505	1.96	1.30	53.7
22:0	120	54.5	1.30	0.00	0	1.27	1.28	7074	197	7074	4398	3658	1.93	1.28	55.3
24:0	120	56.5	1.40	0.00	0	1.20	1.24	7253	179	7253	4566	3802	1.90	1.24	56.7
2:0	120	58.5	1.40	0.00	0	1.27	1.20	7437	184	7437	4734	3955	1.88	1.20	58.1
4:0	120	60.5	1.40	0.00	0	1.28	1.16	7617	179	7617	4902	4109	1.85	1.16	59.5
6:0	120	62.5	1.40	0.00	0	1.23	1.12	7784	166	7784	5070	4258	1.82	1.12	60.8
8:0	120	64.5	1.40	0.00	0	1.31	1.09	7957	172	7957	5238	4416	1.80	1.09	62.2
10:0	120	66.5	1.40	0.00	0	1.40	1.06	8135	178	8135	5406	4584	1.77	1.06	63.6
12:0	120	68.5	1.40	0.00	0	1.35	1.03	8303	167	8303	5574	4747	1.74	1.03	64.9
14:0	120	70.5	1.40	0.00	0	39	1.00	8471	167	8471	5742	4915	1.72	1.00	66.2
16:0	120	72.5	1.40	0.00	0	1.39	0.95	8630	159	8630	5910	5082	1.69	0.95	67.5
18:0	120	74.5	1.40	0.00	0	1.25	0.91	8768	137	8768	6078	5232	1.67	0.91	68.5
20:0	120	76.5	1.40	0.00	0	1.22	0.87	8895	127	8895	6246	5379	1.65	0.87	69.5
22:0	120	78.5	1.40	0.00	0	1.14	0.82	9010	114	9010	6414	5516	1.63	0.82	70.4
24:0	120	80.5	1.40	0.00	0	1.15	0.80	9120	110	9120	6582	5655	1.61	0.80	71.3
2:0	120	82.5	1.40	0.00	0	1.20	0.77	9232	111	9232	6750	5799	1.59	0.77	72.2
4:0	120	84.5	1.40	0.00	0	1.18	0.74	9337	105	9337	6918	5941	1.57	0.74	73.0
6:0	120	86.5	1.40	0.00	0	1.24	0.71	9444	106	9444	7086	6091	1.55	0.71	73.8
8:0	120	88.5	1.30	0.00	0	1.23	0.69	9548	103	9548	7242	6239	1.53	0.69	74.6

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
10: 0	120	90.5	1.30	0.00	0	1.45	0.67	9666	117	9666	7399	6414	1.50	0.67	75.6
12: 0	120	92.5	1.30	0.00	0	1.24	0.65	9764	98	9764	7554	6563	1.48	0.65	76.3
14: 0	120	94.5	1.30	0.00	0	1.30	0.63	9863	99	9863	7710	6720	1.46	0.63	77.1
16: 0	120	96.5	1.30	0.00	0	1.26	0.62	9958	94	9958	7866	6872	1.44	0.62	77.8
18: 0	120	98.5	1.30	0.00	0	1.30	0.60	10052	94	10052	8022	7028	1.43	0.60	78.6
20: 0	120	100.5	1.30	0.00	0	1.20	0.57	10136	83	10136	8178	7173	1.41	0.57	79.2
22: 0	120	102.5	1.30	0.00	0	1.25	0.55	10219	82	10219	8334	7323	1.39	0.55	79.9
24: 0	120	104.5	1.30	0.00	0	1.29	0.52	10300	81	10300	8490	7478	1.37	0.52	80.5
2: 0	120	106.5	1.30	0.00	0	1.29	0.49	10378	77	10378	8646	7634	1.35	0.49	81.1
4: 0	120	108.5	1.30	0.00	0	1.31	0.48	10454	76	10454	8802	7792	1.34	0.48	81.7
6: 0	120	110.5	1.30	0.00	0	1.30	0.48	10530	75	10530	8958	7949	1.32	0.48	82.3
8: 0	120	112.5	1.30	0.00	0	1.24	0.47	10600	70	10600	9114	8098	1.30	0.47	82.9
10: 0	120	114.5	1.30	0.00	0	1.21	0.46	10668	67	10668	9270	8244	1.29	0.46	83.4
12: 0	120	116.5	1.30	0.00	0	0.88	0.45	10716	48	10716	9426	8350	1.28	0.45	83.8
14: 0	120	118.5	1.30	0.00	0	0.60	0.45	10749	33	10749	9582	8423	1.27	0.45	84.0
16: 0	120	120.5	1.30	0.00	0	0.39	0.44	10771	21	10771	9738	8471	1.27	0.44	84.2
18: 0	120	122.5	1.30	0.00	0	0.69	0.44	10807	36	10807	9894	8554	1.26	0.44	84.5
20: 0	120	124.5	1.30	0.00	0	0.76	0.43	10847	39	10847	10050	8645	1.25	0.43	84.8
22: 0	120	126.5	1.30	0.00	0	0.94	0.42	10896	48	10896	10206	8758	1.24	0.42	85.2
24: 0	120	128.5	1.30	0.00	0	1.33	0.42	10964	68	10964	10362	8913	1.22	0.42	85.7
2: 0	120	130.5	1.30	0.00	0	1.42	0.41	11036	71	11036	10518	9090	1.21	0.41	86.3
4: 0	120	132.5	1.30	0.00	0	1.38	0.40	11102	66	11102	10674	9256	1.19	0.40	86.8
6: 0	120	134.5	1.40	0.00	0	1.35	0.38	11166	63	11166	10842	9419	1.18	0.38	87.3
12: 30	390	141.0	0.00	0.00	0	1.33	0.33	11339	173	11339	10842	9941	1.14	0.33	88.7
13: 30	60	142.0	1.10	0.00	0	1.28	0.32	11365	25	11365	10908	10018	1.13	0.32	88.8
14: 0	30	142.5	1.28	0.00	0	1.28	0.32	11377	12	11377	10946	10056	1.12	0.32	88.9
18: 30	270	147.0	1.50	0.00	0	1.50	0.31	11503	125	11503	11351	10461	1.09	0.31	89.9
22: 30	240	151.0	1.25	0.00	0	1.25	0.29	11593	89	11593	11651	10762	1.07	0.29	90.6
7: 30	540	160.0	1.24	0.00	0	1.23	0.26	11769	176	11769	12321	11430	1.02	0.26	92.0
8: 30	60	161.0	0.00	0.00	0	1.23	0.26	11788	19	11788	12321	11504	1.02	0.26	92.2
9: 15	45	161.7	1.20	0.00	0	1.23	0.25	11803	14	11803	12375	11560	1.02	0.25	92.3
20: 30	675	173.0	1.23	0.00	0	1.23	0.21	11983	180	11983	13205	12392	0.96	0.21	93.7
7: 10	640	183.6	1.23	0.00	0	1.23	0.19	12134	150	12134	13992	13181	0.92	0.19	94.9
17: 0	590	193.5	1.23	0.00	0	1.23	0.16	12255	120	12255	14718	13907	0.88	0.16	95.8
7: 0	840	207.5	1.24	0.00	0	1.23	0.13	12391	136	12391	15759	14949	0.82	0.13	96.9
8: 30	90	209.0	0.00	0.00	0	1.23	0.12	12405	14	12405	15759	15060	0.82	0.12	97.0
10: 0	90	210.5	0.00	0.00	0	1.20	0.12	12418	13	12418	15759	15168	0.81	0.12	97.1
11: 40	100	212.1	0.00	0.00	0	0.85	0.11	12428	10	12428	15759	15253	0.81	0.11	97.2
14: 0	140	214.5	0.00	0.00	0	0.58	0.12	12439	10	12439	15759	15335	0.81	0.12	97.3
17: 30	210	218.0	0.00	0.00	0	0.34	0.14	12449	10	12449	15759	15408	0.80	0.14	97.3
20: 0	150	220.5	0.00	0.00	0	0.26	0.15	12455	6	12455	15759	15447	0.80	0.15	97.4

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
16: 30	0	0.0	4.00	0.00	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
20: 45	255	4.2	4.00	0.00	0	0.00	0.00	0	0	0	1020	0	0.00	0.00	0.0
21: 30	45	5.0	4.00	0.00	0	0.16	0.[illegible]	6	6	6	1200	7	0.91	0.91	0.0
22: 0	30	5.5	4.00	0.00	0	0.44	1.[illegible]	29	22	29	1320	20	1.40	1.67	0.2
22: 30	30	6.0	4.00	0.00	0	0.49	2.44	65	36	65	1440	35	1.83	2.44	0.5
23: 0	30	6.5	4.00	0.00	0	0.53	3.02	113	48	113	1560	51	2.20	3.02	0.9
23: 30	30	7.0	4.00	0.00	0	0.76	3.61	196	82	196	1680	74	2.63	3.61	1.5
24: 0	30	7.5	4.00	0.00	0	1.47	3.93	370	174	370	1800	118	3.12	3.93	2.9
24: 30	30	8.0	4.00	0.00	0	1.70	4.26	588	218	588	1920	169	3.46	4.26	4.7
1: 0	30	8.5	4.00	0.00	0	2.14	4.29	865	276	865	2040	234	3.69	4.29	6.9
1: 30	30	9.0	4.00	0.00	0	2.31	4.33	1166	301	1166	2160	303	3.84	4.33	9.3
2: 0	30	9.5	4.00	0.00	0	2.38	4.25	1470	304	1470	2280	375	3.92	4.25	11.7
3: 0	60	10.5	4.00	0.00	0	2.66	4.09	2125	654	2125	2520	534	3.97	4.09	17.0
4: 0	60	11.5	4.00	0.00	0	2.94	3.82	2802	677	2802	2760	711	3.93	3.82	22.4
5: 0	60	12.5	4.00	0.00	0	3.08	3.55	3460	657	3460	3000	897	3.85	3.55	27.6
6: 0	60	13.5	4.00	0.00	0	3.10	3.23	4062	602	4062	3240	1083	3.75	3.23	32.5
7: 0	60	14.5	4.00	0.00	0	3.82	2.92	4733	670	4733	3480	1312	3.60	2.92	37.8
10: 30	210	18.0	4.00	0.00	0	3.70	1.81	6146	1413	6146	4320	2089	2.94	1.81	49.1
11: 45	75	19.2	4.00	0.00	0	3.84	1.68	6631	464	6631	4620	2378	2.78	1.68	53.0
12: 0	15	19.5	4.00	0.00	0	3.84	1.65	6726	95	6726	4680	2435	2.76	1.65	53.8
14: 15	135	21.7	4.00	0.00	0	4.10	1.40	7503	776	7503	5220	2989	2.51	1.40	60.0
16: 30	135	24.0	4.00	0.00	0	4.08	1.15	8139	636	8139	5760	3540	2.29	1.15	65.1
19: 0	150	26.5	4.00	0.00	0	4.48	0.87	8727	588	8727	6360	4213	2.07	0.87	69.8
21: 0	120	28.5	4.00	0.00	0	4.01	0.79	9109	382	9109	6840	4694	1.94	0.79	72.8
23: 0	120	30.5	4.00	0.00	0	3.89	0.71	9442	333	9442	7320	5162	1.82	0.71	75.5
1: 0	120	32.5	4.00	0.00	0	3.74	0.63	9726	283	9726	7800	5610	1.73	0.63	77.9
3: 0	120	34.5	4.00	0.00	0	3.65	0.55	9968	241	9968	8280	6049	1.64	0.55	79.7
[illegible]	120	36.5	4.00	0.00	0	3.41	0.47	10163	195	10163	8760	6459	1.57	0.47	81.3
7: 0	120	38.5	4.00	0.00	0	3.78	0.40	10346	182	10346	9240	6913	1.49	0.40	82.7
9: 0	120	40.5	4.00	0.00	0	3.97	0.32	10502	156	10502	9720	7390	1.42	0.32	84.0
11: 30	150	43.0	4.00	0.00	0	3.98	0.23	10643	140	10643	10320	7987	1.33	0.23	85.1
16: 10	280	47.6	4.00	0.00	0	4.42	0.21	10907	264	10907	11440	9227	1.18	0.21	87.2
19: 0	1[illegible]	50.5	4.00	0.00	0	4.45	0.20	11058	151	11058	12120	9995	1.10	0.20	88.4
21: 0	120	52.5	4.00	0.00	0	3.78	0.19	11145	86	11145	12600	10440	1.06	0.19	89.1
22: 0	60	53.5	0.00	0.00	0	3.78	0.18	11188	42	11188	12600	10667	1.04	0.18	89.5
1: 30	210	57.0	4.00	0.00	0	3.03	0.17	11296	108	11296	13440	11304	0.99	0.17	90.3
3: 30	120	59.0	4.00	0.00	0	3.03	0.16	11356	59	11356	13920	11667	0.97	0.16	90.8
5: 30	120	61.0	4.00	0.00	0	2.97	0.15	11411	54	11411	14400	12024	0.94	0.15	91.2
6: 0	30	61.5	4.00	0.00	0	3.28	0.15	11426	14	11426	14520	12122	0.94	0.15	91.4
7: 30	90	63.0	4.00	0.00	0	3.45	0.14	11471	45	11471	14880	12433	0.92	0.14	91.7
8: 0	30	63.5	4.00	0.00	0	3.64	0.14	11486	15	11486	15000	12542	0.91	0.14	91.9
9: 0	60	64.5	4.00	0.00	0	3.76	0.13	11518	31	11518	15240	12768	0.90	0.13	92.1
10: 0	60	65.5	4.00	0.00	0	3.75	0.13	11548	30	11548	15480	12993	0.88	0.13	92.3
11: 0	60	66.5	4.00	0.00	0	3.70	0.13	11577	29	11577	15720	13216	0.87	0.13	92.[illegible]
13: 0	120	68.5	4.00	0.00	0	4.00	0.12	11636	59	11636	16200	13676	0.84	0.12	93.0
15: 0	120	70.5	4.00	0.00	0	4.31	0.11	11696	59	11696	16680	14213	0.82	0.11	93.5
17: 0	120	72.5	4.00	0.00	0	4.13	0.10	11749	53	11749	17160	14710	0.79	0.10	93.9
19: 0	120	74.5	4.00	0.00	0	3.97	0.09	11796	47	11796	17640	15187	0.77	0.09	94.3
21: 0	120	76.5	3.50	0.00	0	3.62	0.09	11836	39	11836	18060	15623	0.75	0.09	94.[illegible]
23: 0	120	78.5	3.50	0.00	0	3.51	0.08	11870	34	11870	18480	16044	0.73	0.09	94.[illegible]

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
1: 0	120	80.5	3.50	0.00	0	3.24	0.07	11900	29	11900	18900	16445	0.72	0.07	95.2
3: 0	120	82.5	3.50	0.00	0	1.11	0.06	11909	8	11909	19320	16579	0.71	0.06	95.2
5: 0	120	84.5	3.50	0.00	0	3.29	0.05	11931	22	11931	19740	16974	0.70	0.05	95.4
7: 0	120	86.5	3.50	0.00	0	3.32	0.04	11951	19	11951	20160	17373	0.68	0.04	95.6
9: 0	120	88.5	3.50	0.00	0	3.32	0.04	11967	16	11967	20580	17772	0.67	0.04	95.7
10: 0	60	89.5	3.50	0.00	0	3.46	0.03	11975	7	11975	20790	17980	0.66	0.03	95.7
11: 0	60	90.5	8.00	0.00	0	3.82	0.03	11983	7	11993	21270	18209	0.65	0.03	95.8
11: 30	30	91.0	8.00	0.00	0	4.35	0.03	11987	4	11987	21510	18340	0.65	0.03	95.8
12: 0	30	91.5	8.00	0.00	0	5.54	0.03	11992	5	11992	21750	18506	0.64	0.03	95.9
14: 0	120	93.5	8.00	0.00	0	6.30	0.02	12014	21	12014	22710	19323	0.62	0.02	96.1
15: 0	60	94.5	0.00	0.00	0	6.83	0.02	12025	10	12025	22710	19733	0.60	0.02	96.1
15: 30	30	95.0	0.00	0.00	0	5.38	0.02	12029	4	12029	22710	19895	0.60	0.02	96.2
16: 0	30	95.5	0.00	0.00	0	4.60	0.02	12032	3	12032	22710	20033	0.60	0.02	96.2
16: 30	30	96.0	0.00	0.00	0	3.99	0.02	12035	2	12035	22710	20152	0.59	0.02	96.2
17: 0	30	96.5	0.00	0.00	0	2.85	0.02	12037	2	12037	22710	20238	0.59	0.02	96.2
17: 30	30	97.0	0.00	0.00	0	2.20	0.02	12039	1	12039	22710	20304	0.59	0.02	96.3
18: 0	30	97.5	0.00	0.00	0	1.80	0.02	12040	1	12040	22710	20358	0.59	0.02	96.3
18: 30	30	98.0	0.00	0.00	0	1.57	0.02	12041	1	12041	22710	20406	0.59	0.02	96.3
19: 0	30	98.5	0.00	0.00	0	1.21	0.02	12042	1	12042	22710	20442	0.58	0.02	96.3
20: 0	60	99.5	0.00	0.00	0	0.97	0.03	12044	1	12044	22710	20500	0.58	0.03	96.3
21: 0	60	100.5	0.00	0.00	0	0.69	0.03	12046	1	12046	22710	20542	0.58	0.03	96.3
22: 0	60	101.5	0.00	0.00	0	0.60	0.02	12047	1	12047	22710	20579	0.58	0.02	96.3
23: 0	60	102.5	0.00	0.00	0	0.55	0.01	12048	0	12048	22710	20612	0.58	0.01	96.3

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
16: 0	0	0.0	26.00	0.00	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
17: 0	60	1.0	0.00	0.00	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
17: 30	30	1.5	26.00	0.00	0	1.55	3.32	154	154	154	780	46	3.32	3.32	0.7
18: 0	30	2.0	26.00	0.00	0	7.84	3.32	938	783	938	1560	281	3.32	3.32	4.7
18: 30	30	2.5	26.00	0.00	0	14.33	3.26	2339	1401	2339	2340	711	3.28	3.26	11.7
19: 0	30	3.0	26.00	0.00	0	16.86	3.18	3952	1612	3952	3120	1217	3.24	3.18	19.3
19: 30	30	3.5	26.00	0.00	0	19.04	2.64	5461	1508	5461	3900	1789	3.05	2.64	27.3
20: 0	30	4.0	26.00	0.00	0	19.64	2.09	6695	1234	6695	4680	2378	2.81	2.09	33.5
20: 30	30	4.5	26.00	0.00	0	19.62	1.61	7647	952	7647	5460	2967	2.57	1.61	38.3
21: 0	30	5.0	26.00	0.00	0	27.08	1.13	8572	925	8572	6240	3779	2.26	1.13	42.9
22: 0	60	6.0	26.00	0.00	0	25.87	0.95	10056	1484	10056	7800	5332	1.88	0.95	50.4
23: 0	60	7.0	26.00	0.00	0	24.89	0.77	11209	1152	11209	9360	6825	1.64	0.77	56.2
24: 0	60	8.0	26.00	0.00	0	26.51	0.63	12218	1008	12218	10920	8416	1.45	0.63	61.2
1: 0	60	9.0	26.00	0.00	0	28.88	0.49	13078	859	13078	12480	10149	1.28	0.49	65.5
2: 0	60	10.0	26.00	0.00	0	29.01	0.35	13701	623	13701	14040	11890	1.15	0.35	68.7
3: 0	60	11.0	26.00	0.00	0	27.47	0.22	14064	362	14064	15600	13539	1.03	0.22	70.5
4: 0	60	12.0	26.00	0.00	0	29.52	0.19	14402	338	14402	17160	15310	0.94	0.19	72.2
5: 0	60	13.0	26.00	0.00	0	25.47	0.16	14650	247	14650	18720	16839	0.86	0.16	73.4
6: 0	60	14.0	26.00	0.00	0	26.60	0.13	14860	210	14860	20280	18435	0.80	0.13	74.5
7: 0	60	15.0	26.00	0.00	0	25.64	0.10	15019	158	15019	21840	19974	0.75	0.10	75.3
8: 0	60	16.0	26.00	0.00	0	27.18	0.08	15164	145	15164	23400	21605	0.70	0.08	76.0
9: 0	60	17.0	26.00	0.00	0	28.87	0.07	15292	128	15292	24960	23338	0.65	0.07	76.6
9: 30	30	17.5	26.00	0.00	0	21.93	0.07	15339	46	15339	25740	23996	0.63	0.07	76.9
10: 30	60	18.5	26.00	0.00	0	22.01	0.06	15424	84	15424	27300	25317	0.60	0.06	77.3
11: 0	30	19.0	26.00	0.00	0	22.87	0.06	15466	41	15466	28080	26003	0.59	0.06	77.5
11: 30	30	19.5	0.00	0.00	0	22.83	0.05	15505	39	15505	28080	26688	0.58	0.05	77.7
12: 0	30	20.0	0.00	0.00	0	14.32	0.05	15529	23	15529	28080	27118	0.57	0.05	77.8
13: 0	60	21.0	0.00	0.00	0	6.82	0.05	15552	23	15552	28080	27527	0.56	0.05	77.9
13: 30	30	21.5	0.00	0.00	0	5.25	0.05	15561	9	15561	28080	27684	0.56	0.05	78.0
14: 0	30	22.0	0.00	0.00	0	3.85	0.05	15568	6	15568	28080	27800	0.55	0.05	78.0
14: 30	30	22.5	0.00	0.00	0	2.78	0.06	15573	5	15573	28080	27884	0.55	0.06	78.0
15: 0	30	23.0	0.00	0.00	0	2.47	0.06	15577	4	15577	28080	27958	0.55	0.06	78.1
15: 30	30	23.5	0.00	0.00	0	2.00	0.06	15581	3	15581	28080	28018	0.55	0.06	78.1
16: 0	30	24.0	0.00	0.00	0	1.70	0.06	15585	3	15585	28080	29069	0.55	0.06	78.1
17: 0	60	25.0	0.00	0.00	0	1.25	0.07	15590	5	15590	28080	29144	0.55	0.07	78.1
18: 0	60	26.0	0.00	0.00	0	1.09	0.07	15595	4	15595	28080	29209	0.55	0.07	78.2

H&N PROJECT NO. 3055.00

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
11: 20	0	0.0	11.60	0.00	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
13: 0	90	1.5	11.60	0.00	0	0.00	0.00	0	0	0	1044	0	0.00	0.00	0.0
13: 30	30	2.0	11.60	0.00	0	1.04	2.01	63	63	63	1392	31	2.01	2.01	0.3
14: 0	30	2.5	11.60	0.00	0	2.76	2.58	277	214	277	1740	114	2.42	2.58	1.6
14: 30	30	3.0	11.60	0.00	0	3.86	3.15	643	365	643	2088	230	2.79	3.15	3.8
15: 0	30	3.5	11.60	0.00	0	4.95	3.72	1196	553	1196	2436	378	3.15	3.72	7.1
15: 30	30	4.0	11.60	0.00	0	5.23	3.55	1754	557	1754	2784	535	3.27	3.55	10.4
16: 0	30	4.5	11.60	0.00	0	6.60	3.38	2425	671	2425	3132	733	3.30	3.38	14.3
17: 0	60	5.5	11.60	0.00	0	9.40	3.11	4185	1759	4185	3828	1297	3.22	3.11	24.8
18: 0	60	6.5	11.60	0.00	0	9.90	2.57	5712	1527	5712	4524	1891	3.01	2.57	33.8
19: 0	60	7.5	11.60	0.00	0	10.18	2.25	7087	1375	7087	5220	2502	2.83	2.25	42.0
20: 0	60	8.5	11.60	0.00	0	11.37	1.93	8405	1317	8405	5916	3185	2.63	1.93	49.8
21: 0	60	9.5	11.60	0.00	0	12.04	1.60	9567	1162	9567	6612	3908	2.44	1.60	56.7
22: 0	60	10.5	11.60	0.00	0	11.65	1.28	10467	899	10467	7308	4607	2.27	1.28	62.1
23: 0	60	11.5	11.60	0.00	0	11.55	1.10	11231	763	11231	8004	5300	2.11	1.10	66.6
24: 0	60	12.5	11.60	0.00	0	11.43	0.91	11860	628	11860	8700	5986	1.98	0.91	70.3
1: 0	60	13.5	11.60	0.00	0	11.54	0.73	12366	506	12366	9396	6679	1.85	0.73	73.3
2: 0	60	14.5	11.60	0.00	0	11.58	0.54	12745	378	12745	10092	7374	1.72	0.54	75.6
3: 0	60	15.5	11.60	0.00	0	11.47	0.49	13086	341	13086	10788	8062	1.62	0.49	77.6
4: 0	60	16.5	11.60	0.00	0	11.49	0.44	13394	308	13394	11484	8752	1.53	0.44	79.4
5: 0	60	17.5	11.60	0.00	0	11.61	0.39	13671	276	13671	12180	9449	1.44	0.39	81.1
6: 0	60	18.5	11.60	0.00	0	11.45	0.34	13910	239	13910	12876	10136	1.37	0.34	82.5
7: 0	60	19.5	11.60	0.00	0	11.55	0.29	14118	207	14118	13572	10829	1.30	0.29	83.7
8: 0	60	20.5	11.50	0.00	0	11.44	0.26	14298	180	14298	14262	11516	1.24	0.26	84.8
9: 0	60	21.5	11.50	0.00	0	8.61	0.22	14416	117	14416	14952	12033	1.19	0.22	85.5
10: 0	60	22.5	12.00	0.00	0	11.12	0.19	14543	127	14543	15672	12701	1.14	0.19	86.2
11: 0	60	23.5	12.00	0.00	0	12.51	0.17	14672	129	14672	16392	13452	1.09	0.17	87.0
12: 0	60	24.5	12.00	0.00	0	13.13	0.15	14794	121	14794	17112	14240	1.03	0.15	87.7
13: 0	60	25.5	12.00	0.00	0	13.20	0.13	14901	106	14901	17832	15032	0.99	0.13	88.4
14: 0	60	26.5	12.00	0.00	0	13.20	0.11	14992	91	14992	18552	15824	0.94	0.11	88.9
15: 0	60	27.5	12.00	0.00	0	11.84	0.11	15077	84	15077	19272	16534	0.91	0.11	89.4
16: 0	60	28.5	0.00	0.00	0	11.00	0.12	15157	80	15157	19272	17194	0.88	0.12	89.9
17: 0	60	29.5	0.00	0.00	0	4.41	0.12	15191	33	15191	19272	17459	0.87	0.12	90.1
18: 0	60	30.5	0.00	0.00	0	2.03	0.12	15207	15	15207	19272	17581	0.86	0.12	90.2
19: 0	60	31.5	0.00	0.00	0	1.24	0.15	15218	11	15218	19272	17656	0.86	0.15	90.2
20: 0	60	32.5	0.00	0.00	0	0.97	0.17	15228	10	15228	19272	17714	0.85	0.17	90.3
21: 0	60	33.5	0.00	0.00	0	0.70	0.17	15236	7	15236	19272	17756	0.85	0.17	90.3
22: 0	60	34.5	0.00	0.00	0	0.55	0.17	15242	5	15242	19272	17790	0.85	0.17	90.4
23: 0	60	35.5	0.00	0.00	0	0.38	0.18	15246	4	15246	19272	17813	0.85	0.18	90.4
24: 0	60	36.5	0.00	0.00	0	0.55	0.19	15252	6	15252	19272	17847	0.85	0.19	90.4

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
11: 30	0	0.0	12.00	0.00	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
11: 50	20	0.3	12.00	0.00	0	0.00	0.00	0	0	0	240	0	0.00	0.00	0.0
12: 0	10	0.5	12.00	0.00	0	1.93	0.86	16	16	16	360	19	0.86	0.86	0.2
13: 0	60	1.5	12.00	0.00	0	6.40	1.45	576	559	576	1080	403	1.42	1.45	9.9
13: 30	30	2.0	12.00	0.00	0	9.14	1.54	999	423	999	1440	677	1.47	1.54	17.3
14: 0	30	2.5	12.00	0.00	0	11.63	1.63	1569	569	1569	1800	1026	1.52	1.63	27.2
14: 30	30	3.0	12.00	0.00	0	12.03	1.42	2084	515	2084	2160	1297	1.50	1.42	36.1
15: 0	30	3.5	12.00	0.00	0	10.86	1.22	2483	398	2483	2520	1713	1.44	1.22	43.0
15: 30	30	4.0	12.00	0.00	0	8.29	0.92	2712	229	2712	2880	1962	1.38	0.92	47.0
16: 0	30	4.5	12.00	0.00	0	12.80	0.61	2950	237	2950	3240	2346	1.25	0.61	51.1
17: 0	60	5.5	12.00	0.00	0	12.60	0.47	3306	356	3306	3960	3102	1.06	0.47	57.3
18: 0	60	6.5	12.00	0.00	0	12.40	0.32	3545	239	3545	4680	3846	0.92	0.32	61.4
19: 0	60	7.5	12.00	0.00	0	11.07	0.28	3733	187	3733	5400	4511	0.82	0.28	64.7
20: 0	60	8.5	12.00	0.00	0	12.69	0.24	3916	183	3916	6120	5273	0.74	0.24	67.8
21: 0	60	9.5	12.00	0.00	0	12.30	0.20	4071	154	4071	6840	6041	0.67	0.20	70.5
22: 0	60	10.5	12.00	0.00	0	12.69	0.16	4192	121	4192	7560	6802	0.61	0.16	72.6
23: 0	60	11.5	12.00	0.00	0	12.41	0.16	4312	119	4312	8290	7547	0.57	0.16	74.7
23: 30	30	12.0	0.00	0.00	0	3.02	0.19	4329	17	4329	8280	7638	0.56	0.19	75.0
24: 0	30	12.5	0.00	0.00	0	1.33	0.22	4338	8	4338	8280	7678	0.56	0.22	75.2
24: 30	30	13.0	0.00	0.00	0	0.80	0.24	4344	5	4344	8290	7702	0.56	0.24	75.3
1: 0	30	13.5	0.00	0.00	0	0.48	0.26	4348	3	4348	8290	7717	0.56	0.26	75.3
1: 30	30	14.0	0.00	0.00	0	0.43	0.28	4352	3	4352	8290	7730	0.56	0.28	75.4
2: 0	30	14.5	0.00	0.00	0	0.34	0.30	4355	3	4355	8290	7740	0.56	0.30	75.4
2: 30	30	15.0	0.00	0.00	0	0.19	0.31	4357	1	4357	8290	7746	0.56	0.31	75.5
3: 0	30	15.5	0.00	0.00	0	0.18	0.33	4358	1	4358	8290	7752	0.56	0.33	75.5
3: 30	30	16.0	0.00	0.00	0	0.15	0.34	4360	1	4360	8290	7756	0.56	0.34	75.5
4: 0	30	16.5	0.00	0.00	0	0.14	0.35	4362	1	4362	8290	7761	0.56	0.35	75.6
4: 30	30	17.0	0.00	0.00	0	0.07	0.35	4362	0	4362	8290	7763	0.56	0.35	75.6
5: 0	30	17.5	0.00	0.00	0	0.07	0.35	4363	0	4363	8290	7765	0.56	0.35	75.6

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
19: 0	0	0.0	6.20	0.00	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
20: 40	100	1.6	6.20	0.00	0	0.00	0.00	0	0	0	620	0	0.00	0.00	0.0
22: 0	80	3.0	6.20	0.00	0	0.26	1.88	39	39	39	1116	21	1.88	1.88	0.2
22: 30	30	3.5	6.20	0.00	0	0.44	1.88	64	24	64	1302	34	1.88	1.88	0.3
23: 0	30	4.0	6.20	0.00	0	0.55	1.88	95	31	95	1488	50	1.88	1.88	0.4
23: 30	30	4.5	6.20	0.00	0	0.72	1.89	137	41	137	1674	72	1.88	1.89	0.6
24: 0	30	5.0	6.20	0.00	0	1.10	2.94	234	97	234	1860	105	2.21	2.94	1.1
24: 30	30	5.5	6.20	0.00	0	1.59	3.99	425	190	425	2046	153	2.76	3.99	2.1
1: 0	30	6.0	6.20	0.00	0	2.91	4.33	803	378	803	2232	240	3.33	4.33	4.0
1: 30	30	6.5	6.20	0.00	0	4.35	4.67	1414	610	1414	2418	371	3.80	4.67	7.1
2: 0	30	7.0	6.20	0.00	0	4.63	4.63	2058	644	2058	2604	510	4.03	4.63	10.3
3: 0	60	8.0	6.20	0.00	0	5.26	4.56	3498	1439	3498	2976	826	4.23	4.56	17.6
4: 0	60	9.0	6.20	0.00	0	5.73	4.14	4926	1427	4926	3348	1170	4.20	4.14	24.8
5: 0	60	10.0	6.20	0.00	0	5.84	3.73	6234	1308	6234	3720	1521	4.09	3.73	31.4
6: 0	60	11.0	6.20	0.00	0	6.14	3.36	7472	1238	7472	4092	1889	3.95	3.36	37.7
7: 0	60	12.0	6.20	0.00	0	6.24	2.99	8592	1119	8592	4464	2264	3.79	2.99	43.4
9: 0	120	14.0	6.20	0.00	0	6.16	2.24	10255	1662	10255	5208	3003	3.41	2.24	51.8
11: 0	120	16.0	6.20	0.00	0	6.19	1.90	11673	1418	11673	5952	3747	3.11	1.90	58.9
13: 0	120	18.0	6.20	0.00	0	6.07	1.56	12816	1142	12816	6696	4476	2.86	1.56	64.7
15: 0	120	20.0	6.20	0.00	0	6.21	1.22	13730	913	13730	7440	5222	2.62	1.22	69.3
17: 0	120	22.0	6.20	0.00	0	6.05	0.88	14372	642	14372	8184	5949	2.41	0.88	72.6
19: 0	120	24.0	6.20	0.00	0	6.06	0.75	14919	546	14919	8928	6677	2.23	0.75	75.3
21: 0	120	26.0	6.20	0.00	0	6.20	0.61	15379	460	15379	9672	7422	2.07	0.61	77.6
23: 0	120	28.0	6.20	0.00	0	6.15	0.51	15762	382	15762	10416	8160	1.93	0.51	79.6
1: 0	120	30.0	6.20	0.00	0	5.66	0.41	16045	283	16045	11160	8840	1.81	0.41	81.0
3: 0	120	32.0	6.20	0.00	0	5.22	0.37	16280	234	16280	11904	9467	1.71	0.37	82.2
5: 0	120	34.0	6.20	0.00	0	6.11	0.33	16523	243	16523	12648	10201	1.61	0.33	83.4
7: 0	120	36.0	6.20	0.00	0	6.12	0.29	16737	213	16737	13392	10936	1.53	0.29	84.5
9: 0	120	38.0	6.20	0.00	0	6.20	0.24	16920	183	16920	14136	11680	1.44	0.24	85.4
10: 0	60	39.0	6.20	0.00	0	6.14	0.23	17008	87	17008	14508	12049	1.41	0.23	85.9
11: 30	90	40.5	6.20	0.00	0	6.14	0.22	17130	122	17130	15066	12601	1.35	0.22	86.5
12: 0	30	41.0	6.20	0.00	0	6.11	0.21	17170	39	17170	15252	12785	1.34	0.21	86.7
14: 0	120	43.0	6.20	0.00	0	6.01	0.19	17312	141	17312	15996	13507	1.28	0.19	87.4
16: 0	120	45.0	6.20	0.00	0	6.07	0.18	17446	134	17446	16740	14237	1.22	0.18	88.1
19: 0	180	48.0	6.20	0.00	0	6.04	0.16	17626	180	17626	17856	15324	1.15	0.16	89.0
21: 0	120	50.0	6.20	0.00	0	6.11	0.15	17739	112	17739	18600	16058	1.10	0.15	89.6
23: 0	120	52.0	6.20	0.00	0	6.04	0.14	17842	102	17842	19344	16783	1.06	0.14	90.1
1: 0	120	54.0	6.20	0.00	0	5.91	0.14	17943	100	17943	20088	17493	1.02	0.14	90.6
3: 0	120	56.0	6.20	0.00	0	5.97	0.14	18045	101	18045	20832	18210	0.99	0.14	91.1
5: 0	120	58.0	6.20	0.00	0	6.28	0.14	18153	107	18153	21576	18965	0.95	0.14	91.7
7: 0	120	60.0	6.20	0.00	0	5.90	0.14	18254	101	18254	22320	19673	0.92	0.14	92.2
9: 0	120	62.0	6.20	0.00	0	5.96	0.10	18331	76	18331	23064	20388	0.89	0.10	92.6
10: 0	60	63.0	6.20	0.00	0	5.88	0.08	18362	31	18362	23436	20741	0.88	0.08	92.7
10: 30	30	63.5	0.00	0.00	0	5.88	0.09	18378	16	18378	23436	20918	0.87	0.09	92.8
10: 50	20	63.8	0.00	0.00	0	5.55	0.09	18389	10	18389	23436	21029	0.87	0.09	92.8
12: 0	70	65.0	0.00	0.00	0	2.22	0.10	18405	15	18405	23436	21184	0.86	0.10	92.9
12: 30	30	65.5	0.00	0.00	0	1.84	0.10	18410	5	18410	23436	21240	0.86	0.10	93.0
13: 0	30	66.0	0.00	0.00	0	1.28	0.10	18415	4	18415	23436	21279	0.86	0.10	93.0
13: 30	30	66.5	0.00	0.00	0	1.19	0.11	18418	3	18418	23436	21314	0.86	0.11	93.0
14: 0	30	67.0	0.00	0.00	0	0.93	0.11	18422	3	18422	23436	21342	0.86	0.11	93.0

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
14: 30	30	67.5	0.00	0.00	0	0.77	0.11	18424	2	18424	23436	21366	0.86	0.11	93.0
15: 0	30	68.0	0.00	0.00	0	0.67	0.11	18427	2	18427	23436	21386	0.86	0.11	93.0
15: 30	30	68.5	0.00	0.00	0	0.58	0.12	18429	2	18429	23436	21404	0.86	0.12	93.0
16: 30	60	69.5	0.00	0.00	0	0.54	0.12	18433	4	18433	23436	21436	0.85	0.12	93.1

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
18: 30	0	0.0	5.60	0.00	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
24: 45	375	6.2	5.60	0.00	0	0.00	0.00	0	0	0	2100	0	0.00	0.00	0.0
1: 30	45	7.0	5.60	0.00	0	0.87	5.07	199	199	199	2352	39	5.07	5.07	1.0
2: 0	30	7.5	5.60	0.00	0	1.53	5.59	458	258	458	2520	85	5.35	5.59	2.3
2: 30	30	8.0	5.60	0.00	0	2.37	6.10	893	435	893	2688	156	5.69	6.10	4.5
3: 0	30	8.5	5.60	0.00	0	2.86	5.98	1407	513	1407	2856	242	5.79	5.98	7.1
3: 30	30	9.0	5.60	0.00	0	3.25	5.36	1979	572	1979	3024	340	5.81	5.36	9.9
4: 0	30	9.5	5.60	0.00	0	3.64	5.63	2596	616	2596	3192	449	5.77	5.63	13.0
4: 30	30	10.0	5.60	0.00	0	4.06	5.40	3255	659	3255	3360	571	5.69	5.40	16.4
5: 0	30	10.5	5.60	0.00	0	4.31	5.09	3914	658	3914	3528	701	5.58	5.09	19.7
5: 30	30	11.0	5.60	0.00	0	4.59	4.77	4573	658	4573	3696	839	5.45	4.77	23.0
6: 30	60	12.0	5.60	0.00	0	5.16	4.15	5860	1286	5860	4032	1148	5.10	4.15	29.5
7: 30	60	13.0	5.60	0.00	0	5.60	3.52	7045	1184	7045	4368	1484	4.74	3.52	35.5
8: 30	60	14.0	5.60	0.00	0	5.60	3.24	8134	1089	8134	4704	1820	4.46	3.24	41.0
10: 0	90	15.5	5.60	0.00	0	5.58	2.81	9550	1416	9550	5208	2323	4.11	2.81	48.1
12: 0	120	17.5	5.60	0.00	0	5.60	2.36	11142	1591	11142	5880	2995	3.72	2.36	56.2
14: 30	150	20.0	5.60	0.00	0	5.50	1.80	12629	1487	12629	6720	3820	3.30	1.80	63.7
18: 0	210	23.5	5.60	0.00	0	5.38	1.01	13775	1145	13775	7896	4951	2.78	1.01	69.3
20: 0	120	25.5	5.60	0.00	0	5.50	0.89	14364	589	14364	8568	5611	2.55	0.89	72.4
22: 0	120	27.5	5.60	0.00	0	5.56	0.77	14878	514	14878	9240	6279	2.36	0.77	75.0
24: 0	120	29.5	5.60	0.00	0	5.56	0.64	15312	433	15312	9912	6947	2.20	0.64	77.2
2: 0	120	31.3	5.60	0.00	0	5.53	0.52	15662	350	15662	10584	7612	2.05	0.52	79.0
4: 0	120	33.5	5.60	0.00	0	5.52	0.47	15980	317	15980	11256	8275	1.93	0.47	80.6
6: 0	120	35.5	5.60	0.00	0	5.62	0.43	16270	290	16270	11928	8950	1.81	0.43	82.0
10: 30	270	40.0	5.60	0.00	0	5.50	0.32	16747	476	16747	13440	10435	1.60	0.32	84.4
11: 45	75	41.2	5.60	0.00	0	5.46	0.30	16872	124	16872	13860	10844	1.55	0.30	85.1
12: 0	15	41.5	5.60	0.00	0	5.46	0.30	16896	24	16896	13944	10926	1.54	0.30	85.2
14: 15	135	43.7	5.60	0.00	0	5.70	0.27	17106	209	17106	14700	11696	1.46	0.27	86.2
16: 0	105	45.5	5.60	0.00	0	5.51	0.24	17250	144	17250	15288	12275	1.40	0.24	87.0
19: 0	180	48.5	6.00	0.00	0	6.06	0.20	17478	228	17478	16368	13367	1.30	0.20	88.1
21: 0	120	50.5	6.00	0.00	0	5.70	0.19	17610	132	17610	17088	14052	1.25	0.19	88.8
23: 0	120	52.5	5.20	0.00	0	5.35	0.17	17724	113	17724	17712	14695	1.20	0.17	89.4
1: 0	120	54.5	5.20	0.00	0	5.15	0.16	17824	99	17824	18336	15313	1.16	0.16	89.9
3: 0	120	56.5	5.20	0.00	0	5.15	0.14	17913	89	17913	18960	15931	1.12	0.14	90.3
5: 0	120	58.5	5.20	0.00	0	5.21	0.13	18000	86	18000	19584	16557	1.08	0.13	90.7
7: 10	130	60.6	5.50	0.00	0	5.10	0.13	18088	87	18088	20299	17220	1.05	0.13	91.2
9: 0	110	62.5	5.50	0.00	0	5.47	0.12	18164	75	18164	20904	17822	1.01	0.12	91.6
11: 30	150	65.0	5.50	0.00	0	5.70	0.11	18265	100	18265	21729	18678	0.97	0.11	92.1
16: 10	280	69.6	5.50	0.00	0	5.60	0.12	18464	199	18464	23269	20248	0.91	0.12	93.1
19: 0	170	72.5	5.50	0.00	0	5.82	0.13	18595	130	18595	24204	21238	0.87	0.13	93.7
21: 0	120	74.5	5.50	0.00	0	5.70	0.13	18688	93	18688	24864	21922	0.85	0.13	94.2
23: 0	120	76.5	5.50	0.00	0	5.45	0.11	18765	76	18765	25524	22578	0.83	0.11	[illegible]
1: 0	120	78.5	5.50	0.00	0	5.23	0.09	18826	61	18826	26184	23206	0.81	0.09	[illegible]
3: 0	120	80.5	5.50	0.00	0	5.18	0.07	18875	49	18875	26844	23829	0.79	0.07	[illegible]
5: 0	120	82.5	5.50	0.00	0	5.23	0.06	18913	37	18913	27504	24457	0.77	0.06	95.4
7: 0	120	84.5	7.60	0.00	0	7.60	0.05	18966	52	18966	28416	25269	0.74	0.05	[illegible]
8: 0	60	85.5	5.60	0.00	0	6.42	0.05	18988	21	18988	28752	25754	0.73	0.05	95.7
9: 0	60	86.5	5.60	0.00	0	5.80	0.05	19007	19	19007	29088	26102	0.72	0.05	[illegible]
10: 0	60	87.5	5.60	0.00	0	5.48	0.05	19025	17	19025	29424	26431	0.71	0.05	[illegible]
11: 0	60	88.5	5.60	0.00	0	5.38	0.04	19041	15	19041	29760	26754	0.71	0.04	[illegible]

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
12: 0	60	89.5	5.60	0.00	0	5.36	0.04	19055	14	19055	30096	27076	0.70	0.04	96.1
13: 0	60	90.5	5.60	0.00	0	5.43	0.03	19068	12	19068	30432	27402	0.69	0.03	96.1
14: 30	90	92.0	8.00	0.00	0	5.43	0.03	19087	19	19087	31152	27891	0.68	0.03	96.2
15: 0	30	92.5	0.00	0.00	0	5.43	0.03	19093	6	19093	31152	28054	0.68	0.03	96.3
15: 30	30	93.0	0.00	0.00	0	5.40	0.03	19100	6	19100	31152	28216	0.67	0.03	96.3
16: 0	30	93.5	0.00	0.00	0	4.75	0.04	19105	5	19105	31152	28359	0.67	0.04	96.3
16: 50	50	94.3	0.00	0.00	0	3.68	0.04	19113	7	19113	31152	28543	0.66	0.04	96.4
17: 0	10	94.5	0.00	0.00	0	3.08	0.03	19114	1	19114	31152	28574	0.66	0.03	96.4
17: 50	50	95.3	0.00	0.00	0	2.36	0.04	19119	4	19119	31152	28692	0.66	0.04	96.4
18: 0	10	95.5	0.00	0.00	0	1.78	0.04	19119	0	19119	31152	28710	0.66	0.04	96.4
18: 50	50	96.3	0.00	0.00	0	1.31	0.04	19123	3	19123	31152	28801	0.66	0.04	96.4
19: 0	10	96.5	0.00	0.00	0	1.54	0.04	19124	0	19124	31152	28816	0.66	0.04	96.4
21: 0	120	98.5	0.00	0.00	0	0.78	0.04	19128	3	19128	31152	28910	0.66	0.04	96.4

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
18: 0	0	0.0	2.40	0.00	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
23: 0	300	5.0	2.40	0.00	0	0.00	0.00	0	0	0	720	0	0.00	0.00	0.0
23: 30	30	5.5	2.40	0.00	0	0.21	0.81	5	5	5	792	6	0.81	0.81	0.0
24: 0	30	6.0	2.40	0.00	0	0.21	0.94	11	6	11	864	12	0.88	0.94	0.1
24: 30	30	6.5	2.40	0.00	0	0.22	1.06	18	7	18	936	19	0.94	1.06	0.2
1: 0	30	7.0	2.40	0.00	0	0.22	1.27	27	8	27	1008	26	1.03	1.27	0.3
1: 30	30	7.5	2.40	0.00	0	0.22	1.49	37	10	37	1080	32	1.12	1.49	0.4
2: 30	60	9.5	2.40	0.00	0	0.26	1.93	67	30	67	1224	48	1.38	1.93	0.7
3: 30	60	9.5	2.40	0.00	0	0.38	2.37	122	55	122	1368	71	1.70	2.37	1.4
4: 30	60	10.5	2.40	0.00	0	0.48	2.48	194	71	194	1512	100	1.92	2.48	2.2
5: 30	60	11.5	2.40	0.00	0	0.84	2.58	325	130	325	1656	151	2.14	2.58	3.7
6: 30	60	12.5	2.40	0.00	0	1.21	2.12	480	155	480	1800	224	2.14	2.12	5.5
7: 30	60	13.5	2.40	0.00	0	2.08	1.67	689	209	689	1944	349	1.97	1.67	7.9
9: 0	90	15.0	2.40	0.00	0	2.27	1.52	1000	311	1000	2160	554	1.80	1.52	11.6
11: 30	150	17.5	2.40	0.00	0	2.35	1.49	1528	527	1528	2520	906	1.68	1.49	17.7
16: 10	280	22.1	2.40	0.00	0	2.42	1.45	2512	984	2512	3192	1584	1.58	1.45	29.1
19: 0	170	25.0	2.40	0.00	0	2.57	1.42	3135	622	3135	3600	2021	1.55	1.42	36.3
21: 0	120	27.0	2.40	0.00	0	2.21	1.40	3508	372	3508	3888	2287	1.53	1.40	40.7
22: 0	60	28.0	0.00	0.00	0	2.05	1.37	3677	168	3677	3888	2410	1.52	1.37	42.6
1: 30	210	31.5	2.40	0.00	0	1.20	1.25	3992	315	3992	4392	2662	1.49	1.25	46.3
3: 30	120	33.5	2.40	0.00	0	1.44	1.18	4197	205	4197	4680	2835	1.48	1.18	48.7
5: 30	120	35.5	2.40	0.00	0	1.88	1.11	4449	251	4449	4968	3061	1.45	1.11	51.6
7: 30	120	37.5	2.40	0.00	0	2.45	1.04	4756	307	4756	5256	3355	1.41	1.04	55.1
8: 0	30	38.0	2.40	0.00	0	2.19	1.02	4824	67	4824	5328	3421	1.41	1.02	55.9
9: 0	60	39.0	2.40	0.00	0	2.41	0.99	4968	143	4968	5472	3566	1.39	0.99	57.6
10: 0	60	40.0	2.40	0.00	0	2.36	0.96	5104	136	5104	5616	3708	1.37	0.96	59.2
11: 0	60	41.0	2.40	0.00	0	2.20	0.92	5226	122	5226	5760	3840	1.36	0.92	60.6
13: 0	120	43.0	2.40	0.00	0	2.32	0.85	5466	239	5466	6048	4119	1.32	0.85	63.4
15: 30	150	45.5	2.40	0.00	0	2.25	0.80	5737	271	5737	6408	4457	1.28	0.80	66.5
17: 0	90	47.0	2.40	0.00	0	2.34	0.77	5900	163	5900	6624	4668	1.26	0.77	68.4
19: 0	120	49.0	2.40	0.00	0	1.97	0.73	6073	172	6073	6912	4904	1.23	0.73	70.4
21: 0	120	51.0	2.40	0.00	0	1.93	0.68	6233	160	6233	7200	5137	1.21	0.68	72.3
23: 0	120	53.0	2.40	0.00	0	2.17	0.61	6394	161	6394	7488	5398	1.18	0.61	74.1
1: 0	120	55.0	2.40	0.00	0	2.22	0.54	6540	146	6540	7776	5665	1.15	0.54	75.8
3: 0	120	57.0	2.40	0.00	0	2.47	0.47	6682	141	6682	8064	5961	1.12	0.47	77.5
5: 0	120	59.0	2.80	0.00	0	2.56	0.40	6807	125	6807	8400	6270	1.08	0.40	78.9
7: 0	120	61.0	2.80	0.00	0	2.94	0.36	6935	127	6935	8736	6623	1.04	0.36	80.4
9: 0	120	63.0	2.80	0.00	0	2.89	0.31	7043	108	7043	9072	6970	1.01	0.31	81.7
10: 0	60	64.0	2.80	0.00	0	2.87	0.29	7094	50	7094	9240	7142	0.99	0.29	82.3
12: 0	120	66.0	2.80	0.00	0	2.74	0.24	7174	80	7174	9576	7472	0.96	0.24	83.2
14: 0	120	68.0	2.80	0.00	0	2.76	0.22	7250	75	7250	9912	7803	0.92	0.22	84.1
16: 0	120	70.0	2.80	0.00	0	2.75	0.21	7319	69	7319	10248	8134	0.89	0.21	84.9
18: 0	120	72.0	2.80	0.00	0	2.73	0.19	7383	63	7383	10584	8461	0.87	0.19	85.6
19: 0	60	73.0	[illegible]	0.00	0	2.77	0.18	7414	31	7414	10758	8628	0.85	0.18	86.0
20: 0	60	74.0	[illegible]	0.00	0	2.77	0.19	7446	32	7446	10932	8794	0.84	0.19	86.3
22: 0	120	76.0	3.00	0.00	0	2.90	0.20	7517	71	7517	11292	9142	0.82	0.20	87.2
24: 0	120	78.0	3.00	0.00	0	3.04	0.21	7596	78	7596	11652	9508	0.79	0.21	88.1
2: 0	120	80.0	3.00	0.00	0	3.15	0.19	7665	68	7665	12012	9887	0.77	0.19	88.9
4: 0	120	82.0	3.00	0.00	0	2.98	0.14	7717	52	7717	12372	10246	0.75	0.14	89.5
6: 0	120	84.0	3.00	0.00	0	3.10	0.12	7764	46	7764	12732	10618	0.73	0.12	90.0

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
9: 0	120	86.0	3.00	0.00	0	3.17	0.10	7804	40	7804	13092	10999	0.70	0.10	90.5
9: 30	90	87.5	3.00	0.00	0	3.28	0.09	7834	29	7834	13362	11295	0.69	0.09	90.3
10: 30	60	88.5	3.00	0.00	0	3.17	0.09	7851	17	7851	13542	11485	0.68	0.09	91.0
11: 30	60	89.5	3.00	0.00	0	3.08	0.09	7868	16	7868	13722	11670	0.67	0.09	91.2
13: 50	140	91.8	3.00	0.00	0	3.28	0.08	7908	39	7908	14142	12131	0.65	0.08	91.7
15: 0	70	93.0	3.00	0.00	0	3.16	0.08	7926	18	7926	14352	12352	0.64	0.08	91.9
16: 0	60	94.0	3.00	0.00	0	3.21	0.08	7942	15	7942	14532	12545	0.63	0.08	92.1
18: 15	135	96.2	3.00	0.00	0	3.01	0.07	7974	31	7974	14937	12952	0.61	0.07	92.5
20: 0	105	98.0	3.50	0.00	0	3.39	0.07	8001	27	8001	15304	13308	0.60	0.07	92.8
22: 0	120	100.0	3.50	0.00	0	3.75	0.07	8034	33	8034	15724	13758	0.58	0.07	93.2
23: 0	60	101.0	0.00	0.00	0	3.75	0.07	8050	16	8050	15724	13983	0.57	0.07	93.4
23: 30	30	101.5	0.00	0.00	0	2.35	0.08	8058	7	8058	15724	14069	0.57	0.08	93.4
24: 0	30	102.0	0.00	0.00	0	2.09	0.10	8065	6	8065	15724	14132	0.57	0.10	93.5
1: 0	60	103.0	0.00	0.00	0	1.58	0.13	8078	13	8078	15724	14227	0.56	0.13	93.7
1: 30	30	103.5	0.00	0.00	0	1.46	0.17	8086	7	8086	15724	14271	0.56	0.17	93.8
2: 0	30	104.0	0.00	0.00	0	1.09	0.21	8093	6	8093	15724	14304	0.56	0.21	93.8
2: 30	30	104.5	0.00	0.00	0	1.00	0.21	8099	6	8099	15724	14334	0.56	0.21	93.9
3: 0	30	105.0	0.00	0.00	0	1.00	0.21	8106	6	8106	15724	14364	0.56	0.21	94.0
4: 30	90	106.5	0.00	0.00	0	0.58	0.22	8117	11	8117	15724	14417	0.56	0.22	94.1

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
19: 10	0	0.0	4.10	0.00	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
22: 0	170	2.8	4.10	0.00	0	0.00	0.00	0	0	0	697	0	0.00	0.00	0.0
1: 30	210	6.3	0.00	0.00	0	0.00	0.00	0	0	0	697	0	0.00	0.00	0.0
3: 30	120	8.3	4.10	0.00	0	0.00	0.00	0	0	0	1189	0	0.00	0.00	0.0
4: 0	30	8.8	4.10	0.00	0	0.24	0.78	5	5	5	1312	7	0.78	0.78	0.0
4: 30	30	9.3	4.10	0.00	0	0.66	2.10	47	42	47	1435	27	1.75	2.10	0.5
5: 0	30	9.8	4.10	0.00	0	1.33	3.43	184	137	184	1558	67	2.75	3.43	2.1
5: 30	30	10.3	4.10	0.00	0	1.87	3.57	386	201	386	1681	123	3.12	3.57	4.4
6: 0	30	10.8	4.10	0.00	0	2.19	3.70	629	243	629	1804	189	3.32	3.70	7.2
6: 30	30	11.3	4.10	0.00	0	2.31	3.59	879	249	879	1927	258	3.39	3.59	10.0
8: 30	120	13.3	4.10	0.00	0	3.14	3.14	2067	1187	2067	2419	636	3.24	3.14	23.7
9: 0	30	13.8	4.10	0.00	0	3.27	3.03	2365	298	2365	2542	734	3.21	3.03	27.1
10: 0	60	14.8	4.10	0.00	0	3.59	2.68	2944	578	2944	2788	950	3.09	2.68	33.7
11: 0	60	15.8	4.10	0.00	0	3.78	2.33	3474	529	3474	3034	1177	2.95	2.33	39.8
13: 0	120	17.8	4.10	0.00	0	3.80	1.63	4219	745	4219	3526	1634	2.58	1.63	48.3
15: 0	120	19.8	4.10	0.00	0	3.95	1.32	4846	626	4846	4018	2109	2.29	1.32	55.5
17: 0	120	21.8	4.10	0.00	0	3.87	1.00	5315	469	5315	4510	2574	2.06	1.00	60.9
19: 0	120	23.8	4.10	0.00	0	3.16	0.87	5647	331	5647	5002	2954	1.91	0.87	64.7
21: 0	120	25.8	4.10	0.00	0	3.34	0.74	5944	297	5944	5494	3355	1.77	0.74	68.1
23: 0	120	27.8	4.10	0.00	0	3.99	0.60	6236	291	6236	5986	3834	1.62	0.60	71.5
1: 0	120	29.8	4.10	0.00	0	4.27	0.47	6480	244	6480	6478	4347	1.49	0.47	74.3
3: 0	120	31.8	4.10	0.00	0	4.52	0.39	6692	211	6692	6970	4890	1.36	0.39	76.7
5: 0	120	33.8	4.10	0.00	0	4.62	0.30	6860	168	6860	7462	5445	1.25	0.30	78.6
7: 0	120	35.8	4.10	0.00	0	4.45	0.26	7004	143	7004	7954	5979	1.17	0.26	80.3
9: 0	120	37.8	4.10	0.00	0	4.45	0.23	7129	125	7129	8446	6513	1.09	0.23	81.7
10: 0	60	38.8	4.10	0.00	0	3.31	0.18	7166	36	7166	8692	6712	1.06	0.18	82.1
12: 0	120	40.8	4.10	0.00	0	4.39	0.17	7257	91	7257	9184	7239	1.00	0.17	83.2
14: 0	120	42.8	4.20	0.00	0	4.38	0.16	7345	87	7345	9688	7765	0.94	0.16	84.2
16: 0	120	44.8	4.20	0.00	0	4.31	0.15	7426	81	7426	10192	8283	0.89	0.15	85.1
18: 0	120	46.8	4.20	0.00	0	4.20	0.14	7501	74	7501	10696	8787	0.85	0.14	86.0
20: 0	120	48.8	4.20	0.00	0	4.20	0.13	7570	69	7570	11200	9291	0.81	0.13	86.8
22: 0	120	50.8	4.20	0.00	0	4.26	0.12	7636	66	7636	11704	9803	0.77	0.12	87.5
24: 0	120	52.8	4.20	0.00	0	4.28	0.11	7697	61	7697	12208	10317	0.74	0.11	88.2
2: 0	120	54.8	4.20	0.00	0	4.15	0.11	7753	55	7753	12712	10815	0.71	0.11	88.9
4: 0	120	56.8	4.20	0.00	0	3.76	0.10	7801	47	7801	13216	11267	0.69	0.10	89.4
6: 0	120	58.8	4.20	0.00	0	3.85	0.09	7847	45	7847	13720	11730	0.66	0.09	89.9
8: 0	120	60.8	4.20	0.00	0	3.83	0.09	7890	43	7890	14224	12191	0.64	0.09	90.4
9: 30	90	62.3	4.20	0.00	0	4.10	0.09	7923	33	7923	14602	12560	0.63	0.09	90.8
10: 30	60	63.3	4.20	0.00	0	4.37	0.08	7946	22	7946	14854	12822	0.61	0.08	91.1
11: 30	60	64.3	4.20	0.00	0	4.32	0.08	7967	21	7967	15106	13082	0.60	0.08	91.3
13: 50	140	66.6	4.20	0.00	0	4.46	0.07	8013	45	8013	15694	13708	0.58	0.07	91.9
15: 0	70	67.8	4.20	0.00	0	4.29	0.07	8034	21	8034	15988	14008	0.57	0.07	92.1
16: 0	60	68.8	4.20	0.00	0	4.19	0.06	8052	17	8052	16240	14260	0.56	0.06	92.3
18: 15	135	71.0	4.20	0.00	0	4.19	0.06	8088	36	8088	16807	14826	0.54	0.06	92.7
20: 0	105	72.8	4.10	0.00	0	4.06	0.06	8115	26	8115	17237	15253	0.53	0.06	93.0
22: 0	120	74.8	4.10	0.00	0	4.08	0.05	8143	28	8143	17729	15743	0.51	0.05	93.3
24: 0	120	76.8	4.10	0.00	0	4.24	0.05	8171	28	8171	18221	16252	0.50	0.05	93.7
2: 0	120	78.8	4.10	0.00	0	4.22	0.05	8197	25	8197	18713	16760	0.48	0.05	94.0
4: 30	150	81.3	4.10	0.00	0	4.07	0.04	8226	29	8226	19328	17370	0.47	0.04	94.2
6: 30	120	83.3	0.00	0.00	0	4.09	0.04	8247	21	8247	19328	17861	0.46	0.04	94.5

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
7: 0	30	83.3	0.00	0.00	0	4.04	0.04	8252	5	8252	19328	17992	0.45	0.04	94.6
7: 30	30	84.3	0.00	0.00	0	3.01	0.04	8256	4	8256	19328	18073	0.45	0.04	94.6
8: 20	50	85.1	0.00	0.00	0	1.70	0.04	8260	4	8260	19328	18158	0.45	0.04	94.7
9: 0	40	85.8	0.00	0.00	0	1.16	0.05	8263	2	8263	19328	18205	0.45	0.05	94.7
9: 30	30	86.3	0.00	0.00	0	0.93	0.05	8264	1	8264	19328	18233	0.45	0.05	94.7
10: 0	30	86.8	0.00	0.00	0	0.79	0.05	8265	1	8265	19328	18257	0.45	0.05	94.8
10: 30	30	87.3	0.00	0.00	0	0.66	0.05	8267	1	8267	19328	18277	0.45	0.05	94.8

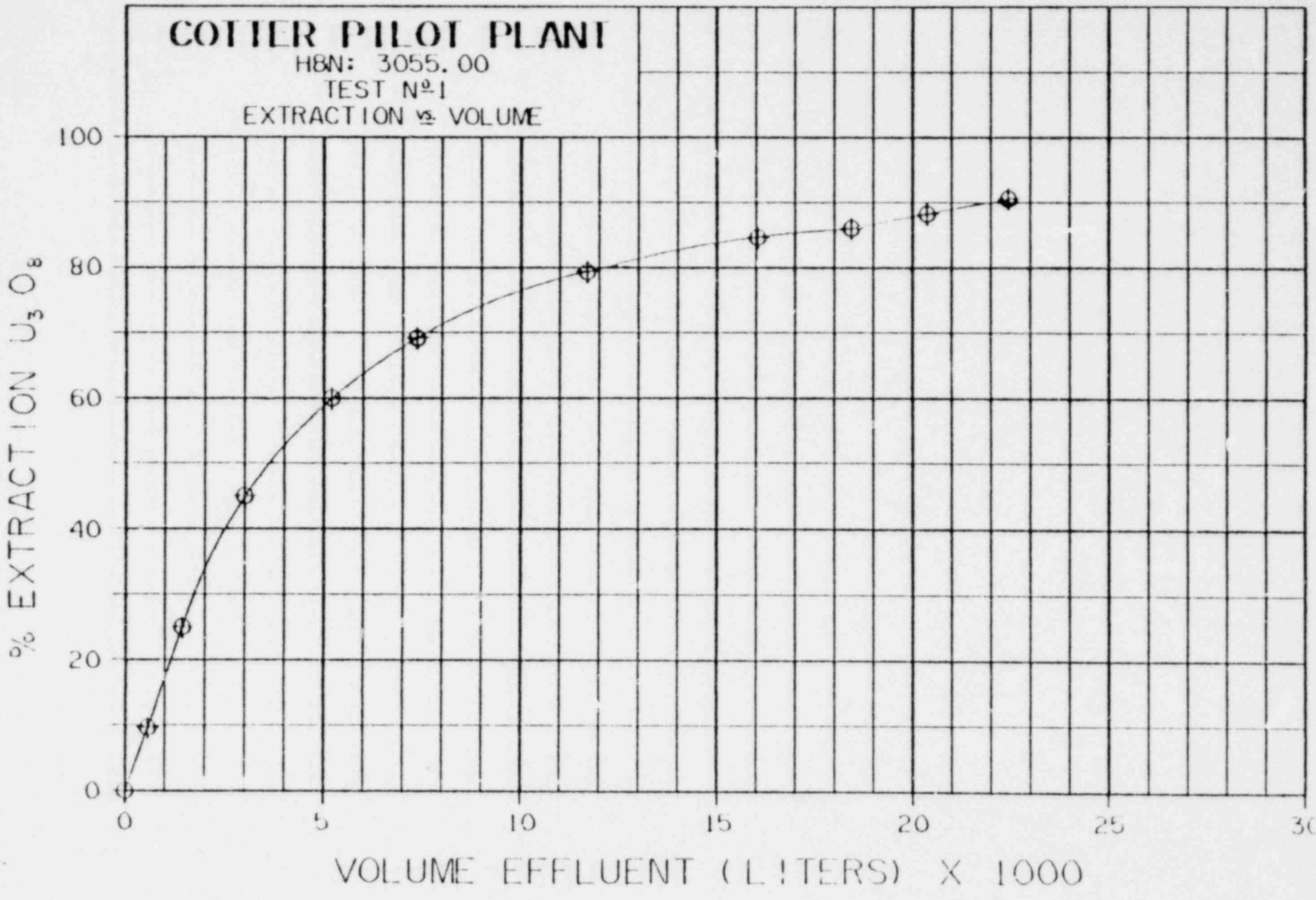
TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U3O8 SPRAY G/L	SU3O8 SPRAY G	EFFL L/MIN	U3O8 EFFL G/L	SU3O8 EFFL G	NET U3O8 EFFL G	NET SU3O8 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U3O8 EFFL G/L	NET U3O8 EFFL G/L	PCNT REC
19: 10	0	0.0	3.00	0.00	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
21: 0	110	1.8	3.00	0.00	0	0.00	0.00	0	0	0	330	0	0.00	0.00	0.0
22: 0	60	2.8	0.00	0.00	0	0.00	0.00	0	0	0	330	0	0.00	0.00	0.0
1: 30	210	6.3	3.00	0.00	0	0.00	0.00	0	0	0	960	0	0.00	0.00	0.0
7: 0	330	11.8	3.00	0.00	0	1.70	2.75	1545	1545	1545	1950	561	2.75	2.75	18.4
8: 0	60	12.8	3.00	0.00	0	2.04	2.75	1882	337	1882	2130	683	2.75	2.75	22.4
9: 0	60	13.8	3.00	0.00	0	2.32	2.75	2266	384	2266	2310	822	2.75	2.75	27.0
10: 0	60	14.8	3.00	0.00	0	2.54	2.46	2643	376	2643	2490	975	2.71	2.46	31.5
11: 0	60	15.8	3.00	0.00	0	2.89	2.16	3018	375	3018	2670	1148	2.62	2.16	36.0
13: 0	120	17.8	3.00	0.00	0	3.35	1.57	3651	632	3651	3030	1550	2.35	1.57	43.5
14: 0	60	18.8	3.00	0.00	0	3.32	1.27	3906	254	3906	3210	1750	2.23	1.27	46.6
15: 0	60	19.8	3.00	0.00	0	3.42	1.21	4156	249	4156	3390	1955	2.12	1.21	49.5
17: 0	120	21.8	3.00	0.00	0	4.02	1.08	4680	524	4680	3750	2439	1.91	1.08	55.8
19: 0	120	23.8	3.00	0.00	0	2.86	1.01	5030	350	5030	4110	2783	1.80	1.01	60.0
21: 0	120	25.8	3.00	0.00	0	2.56	0.95	5324	293	5324	4470	3091	1.72	0.95	63.5
23: 0	120	27.8	3.00	0.00	0	2.61	0.77	5567	243	5567	4830	3405	1.63	0.77	66.4
1: 0	120	29.8	3.00	0.00	0	2.92	0.59	5775	208	5775	5190	3755	1.53	0.59	68.9
3: 0	120	31.8	3.00	0.00	0	2.74	0.50	5942	167	5942	5550	4085	1.45	0.50	70.9
5: 0	120	33.8	3.00	0.00	0	2.79	0.41	6083	140	6083	5910	4420	1.37	0.41	72.5
7: 0	120	35.8	3.00	0.00	0	2.56	0.37	6197	114	6197	6270	4728	1.31	0.37	73.9
9: 0	120	37.8	3.00	0.00	0	2.74	0.32	6304	106	6304	6630	5057	1.24	0.32	75.2
10: 0	60	38.8	3.00	0.00	0	3.12	0.32	6365	61	6365	6810	5244	1.21	0.32	75.9
12: 0	120	40.8	3.00	0.00	0	3.12	0.33	6490	124	6490	7170	5619	1.15	0.33	77.4
14: 0	120	42.8	3.00	0.00	0	3.26	0.32	6615	125	6615	7530	6011	1.10	0.32	78.9
16: 0	120	44.8	3.30	0.00	0	3.39	0.31	6742	126	6742	7926	6418	1.05	0.31	80.4
18: 0	120	46.8	3.30	0.00	0	3.32	0.28	6854	112	6854	8322	6817	1.00	0.28	81.7
20: 0	120	48.8	3.30	0.00	0	3.37	0.25	6956	102	6956	8718	7222	0.96	0.25	83.0
22: 0	120	50.8	3.30	0.00	0	3.44	0.23	7053	97	7053	9114	7636	0.92	0.23	84.1
24: 0	120	52.8	3.30	0.00	0	3.55	0.21	7145	92	7145	9510	8062	0.88	0.21	85.2
2: 0	120	54.8	3.30	0.00	0	3.25	0.19	7223	77	7223	9906	8454	0.85	0.19	86.1
4: 0	120	56.8	3.00	0.00	0	2.80	0.17	7282	59	7282	10266	8790	0.82	0.17	86.8
6: 0	120	58.8	2.50	0.00	0	2.78	0.16	7336	54	7336	10566	9124	0.80	0.16	87.5
8: 0	120	60.8	2.50	0.00	0	2.40	0.15	7380	43	7380	10866	9412	0.78	0.15	88.0
8: 30	30	61.3	2.50	0.00	0	2.40	0.15	7391	11	7391	10941	9484	0.77	0.15	88.1
9: 30	60	62.3	2.50	0.00	0	2.39	0.16	7414	22	7414	11091	9627	0.77	0.16	88.4
10: 30	60	63.3	3.50	0.00	0	3.09	0.16	7445	30	7445	11301	9813	0.75	0.16	88.8
11: 30	60	64.3	3.50	0.00	0	3.57	0.16	7480	34	7480	11511	10027	0.74	0.16	89.2
13: 50	140	66.6	3.50	0.00	0	3.63	0.15	7557	77	7557	12001	10537	0.71	0.15	90.1
14: 0	10	66.8	6.50	0.00	0	3.63	0.15	7563	5	7563	12066	10573	0.71	0.15	90.2
15: 0	60	67.8	6.50	0.00	0	6.41	0.14	7617	54	7617	12456	10958	0.69	0.14	90.8
16: 0	60	68.8	6.50	0.00	0	6.93	0.13	7672	54	7672	12846	11374	0.67	0.13	91.5
18: 15	135	71.0	6.50	0.00	0	6.45	0.13	7788	116	7788	13723	12245	0.63	0.13	92.9
20: 0	105	72.8	6.50	0.00	0	6.46	0.13	7882	93	7882	14406	12924	0.60	0.13	94.0
22: 0	120	74.8	6.50	0.00	0	6.27	0.14	7987	105	7987	15186	13677	0.58	0.14	95.3
23: 0	60	75.8	0.00	0.00	0	6.27	0.14	8040	53	8040	15186	14053	0.57	0.14	95.9
23: 30	30	76.3	0.00	0.00	0	3.12	0.14	8053	13	8053	15186	14147	0.56	0.14	96.1
24: 0	30	76.8	0.00	0.00	0	1.51	0.13	8060	6	8060	15186	14193	0.56	0.13	96.1
1: 0	60	77.8	0.00	0.00	0	0.92	0.12	8066	6	8066	15186	14248	0.56	0.12	96.2
1: 30	30	78.3	0.00	0.00	0	0.77	0.13	8069	3	8069	15186	14271	0.56	0.13	96.2
2: 0	30	78.8	0.00	0.00	0	0.51	0.14	8072	2	8072	15186	14296	0.56	0.14	96.2

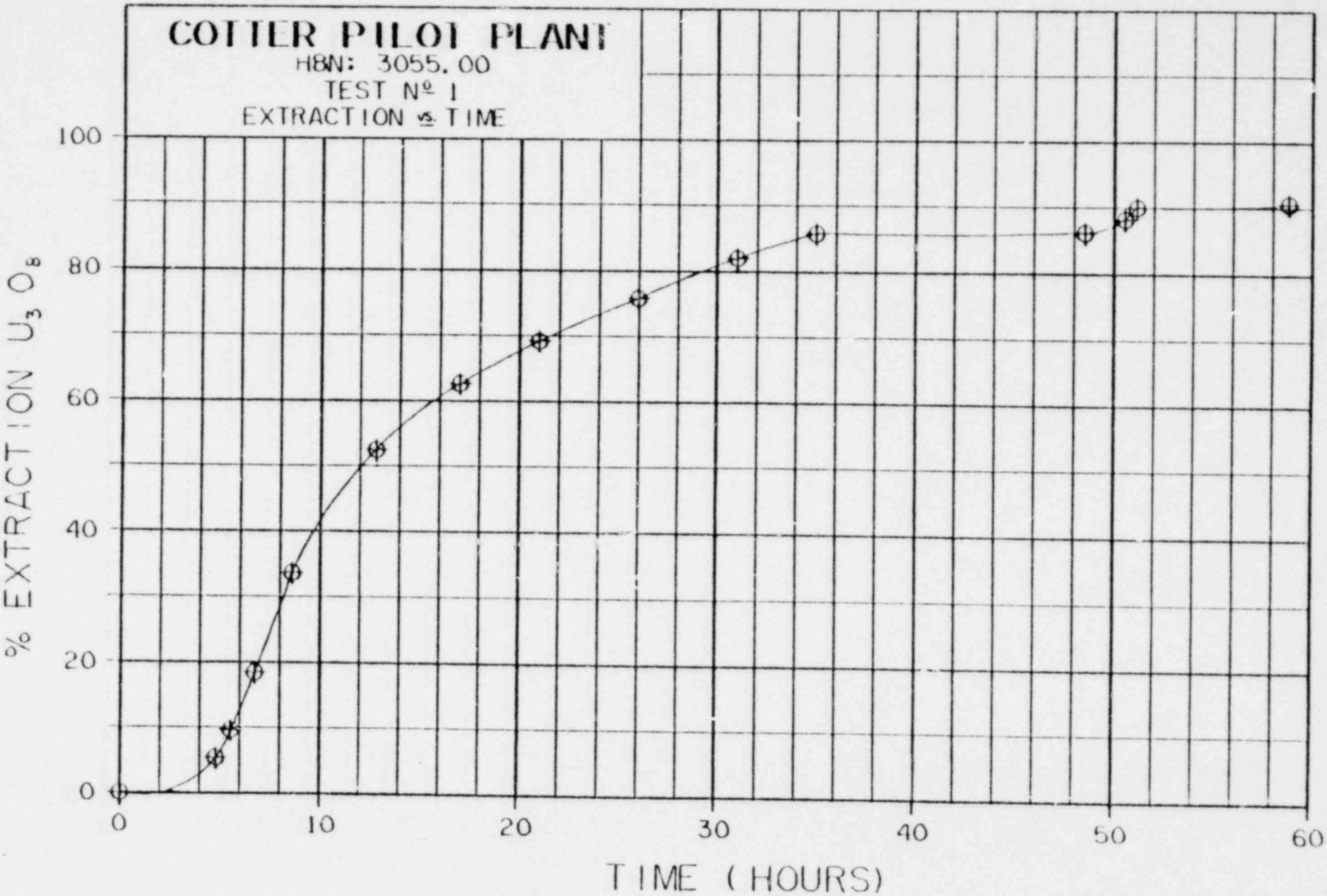
TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
2: 30	30	79.3	0.00	0.00	0	0.41	0.14	8073	1	8073	15186	14299	0.56	0.14	96.3
3: 0	30	79.8	0.00	0.00	0	0.30	0.15	8075	1	8075	15186	14308	0.56	0.15	96.3
4: 30	90	81.3	0.00	0.00	0	0.13	0.16	8077	1	8077	15186	14320	0.56	0.16	96.3

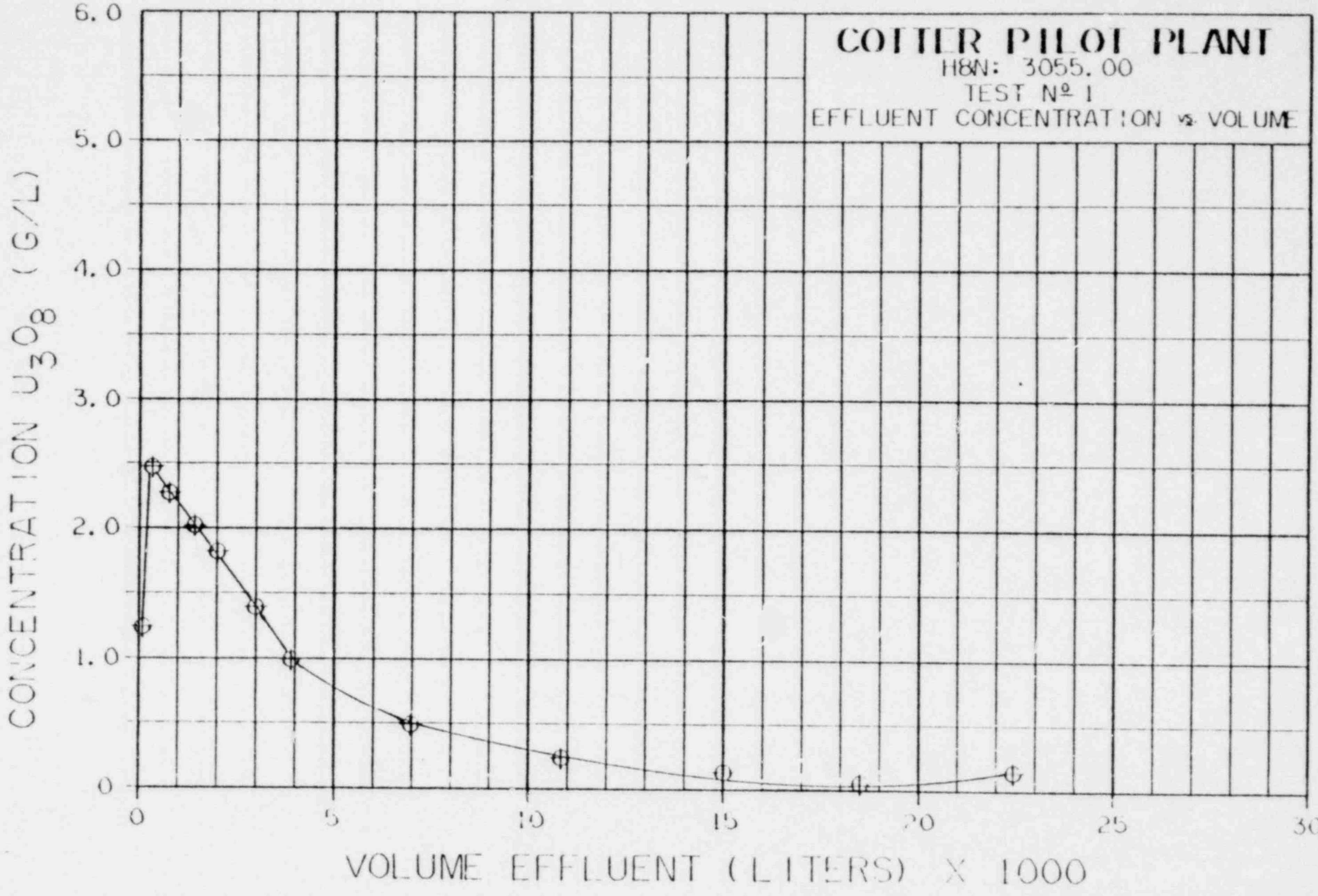
TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
9: 30	0	0.0	3.60	0.00	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
11: 30	120	2.0	3.60	0.00	0	0.00	0.00	0	0	0	432	0	0.00	0.00	0.0
12: 30	60	3.0	3.60	0.00	0	0.00	0.00	0	0	0	648	0	0.00	0.00	0.0
12: 30	0	3.0	3.60	0.00	0	0.17	2.94	0	0	0	648	0	0.00	2.94	0.0
13: 0	30	3.5	3.60	0.00	0	0.17	2.74	14	14	14	756	5	2.74	2.74	0.1
13: 30	30	4.0	3.60	0.00	0	0.19	2.55	30	15	30	864	11	2.64	2.55	0.3
14: 0	30	4.5	3.60	0.00	0	0.22	2.71	48	18	48	972	18	2.67	2.71	0.4
14: 30	30	5.0	3.60	0.00	0	0.22	2.88	68	19	68	1080	24	2.73	2.88	0.6
15: 0	30	5.5	3.60	0.00	0	0.39	2.90	102	34	102	1188	36	2.78	2.90	1.0
15: 30	30	6.0	3.60	0.00	0	0.56	2.91	152	49	152	1296	53	2.82	2.91	1.5
16: 0	30	6.5	3.60	0.00	0	0.99	3.38	253	101	253	1404	83	3.02	3.38	2.5
16: 30	30	7.0	3.60	0.00	0	1.20	3.85	392	139	392	1512	119	3.27	3.85	4.0
17: 0	30	7.5	3.60	0.00	0	1.68	4.17	603	211	603	1620	170	3.54	4.17	6.1
17: 30	30	8.0	3.60	0.00	0	1.98	4.49	871	268	871	1728	229	3.79	4.49	8.9
18: 0	30	8.5	3.60	0.00	0	2.00	4.36	1134	262	1134	1836	290	3.90	4.36	11.6
19: 0	60	9.5	3.60	0.00	0	2.20	4.10	1675	541	1675	2052	422	3.96	4.10	17.1
20: 0	60	10.5	3.60	0.00	0	2.52	3.83	2257	581	2257	2268	573	3.95	3.83	23.1
22: 0	120	12.5	3.60	0.00	0	2.95	3.30	3429	1172	3429	2700	928	3.69	3.30	35.1
24: 0	120	14.5	3.60	0.00	0	3.48	2.52	4484	1054	4484	3132	1346	3.33	2.52	45.9
2: 0	120	16.5	3.60	0.00	0	3.60	1.73	5232	748	5232	3564	1778	2.94	1.73	53.6
4: 0	120	18.5	3.60	0.00	0	3.56	1.45	5854	621	5854	3996	2205	2.65	1.45	59.9
6: 0	120	20.5	3.60	0.00	0	3.65	1.17	6369	514	6369	4428	2644	2.40	1.17	65.2
8: 0	120	22.5	3.60	0.00	0	3.48	0.89	6744	374	6744	4860	3062	2.20	0.89	69.1
9: 30	90	24.0	3.60	0.00	0	3.60	0.68	6966	222	6966	5184	3386	2.05	0.68	71.3
10: 30	60	25.0	3.60	0.00	0	3.68	0.65	7110	143	7110	5400	3607	1.97	0.65	72.8
11: 30	60	26.0	3.60	0.00	0	3.63	0.61	7244	134	7244	5616	3825	1.89	0.61	74.2
13: 50	140	28.3	3.60	0.00	0	3.61	0.51	7506	261	7506	6120	4332	1.73	0.51	76.9
15: 0	70	29.5	3.60	0.00	0	4.04	0.46	7637	131	7637	6372	4615	1.65	0.46	78.2
16: 0	60	30.5	3.60	0.00	0	3.66	0.44	7735	98	7735	6588	4835	1.59	0.44	79.2
18: 15	135	32.7	3.60	0.00	0	3.24	0.40	7911	175	7911	7074	5273	1.50	0.40	81.0
20: 0	105	34.5	3.60	0.00	0	3.70	0.36	8053	142	8053	7452	5662	1.42	0.36	82.5
22: 0	120	36.5	3.60	0.00	0	3.05	0.32	8173	119	8173	7884	6023	1.35	0.32	83.7
24: 0	120	38.5	3.60	0.00	0	3.14	0.28	8281	108	8281	8316	6406	1.29	0.28	84.8
2: 0	120	40.5	3.60	0.00	0	3.28	0.25	8382	101	8382	8748	6800	1.23	0.25	85.9
4: 30	150	43.0	4.00	0.00	0	3.36	0.22	8493	111	8493	9348	7305	1.16	0.22	87.0
7: 0	150	45.5	4.00	0.00	0	3.29	0.20	8595	101	8595	9948	7798	1.10	0.20	88.0
9: 0	120	47.5	4.00	0.00	0	3.32	0.19	8684	89	8684	10428	8257	1.05	0.19	88.9
11: 5	125	49.5	4.00	0.00	0	4.06	0.17	8774	89	8774	10928	8766	1.00	0.17	89.9
13: 0	115	51.5	4.00	0.00	0	4.08	0.15	8849	74	8849	11388	9235	0.95	0.15	90.6
14: 20	80	52.8	4.00	0.00	0	4.08	0.14	8896	47	8896	11708	9561	0.93	0.14	91.1
15: 30	70	54.0	4.00	0.00	0	3.91	0.13	8934	37	8934	11988	9836	0.90	0.13	91.5
17: 0	90	55.5	4.00	0.00	0	3.72	0.12	8974	40	8974	12348	10171	0.88	0.12	91.9
18: 30	90	57.0	5.70	0.00	0	3.72	0.10	9010	35	9010	12861	10507	0.85	0.10	92.3
19: 0	30	57.5	5.70	0.00	0	5.55	0.10	9027	16	9027	13032	10673	0.84	0.10	92.5
21: 0	120	59.5	5.70	0.00	0	5.62	0.08	9081	54	9081	13716	11348	0.80	0.08	93.0
23: 0	120	61.5	5.70	0.00	0	5.54	0.05	9120	39	9120	14400	12013	0.75	0.05	93.4
1: 0	120	63.5	5.70	0.00	0	5.67	0.06	9165	44	9165	15084	12694	0.72	0.06	93.9
3: 0	120	65.5	5.70	0.00	0	5.53	0.07	9213	47	9213	15768	13359	0.68	0.07	94.4
5: 0	120	67.5	5.70	0.00	0	5.72	0.07	9266	52	9266	16452	14045	0.65	0.07	94.9
5: 0	0	67.5	0.00	0.00	0	5.72	0.07	9266	0	9266	16452	14045	0.65	0.07	94.9

TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
5: 30	30	68.0	0.00	0.00	0	6.17	0.07	9281	14	9281	16452	14230	0.65	0.07	95.1
7: 0	90	69.5	0.00	0.00	0	1.70	0.08	9293	12	9293	16452	14384	0.64	0.08	95.2
8: 0	60	70.5	0.00	0.00	0	0.74	0.08	9297	3	9297	16452	14429	0.64	0.08	95.2
8: 30	30	71.0	0.00	0.00	0	0.46	0.08	9299	1	9299	16452	14442	0.64	0.08	95.2
9: 15	45	71.7	0.00	0.00	0	0.46	0.09	9300	1	9300	16452	14463	0.64*	0.09	95.3

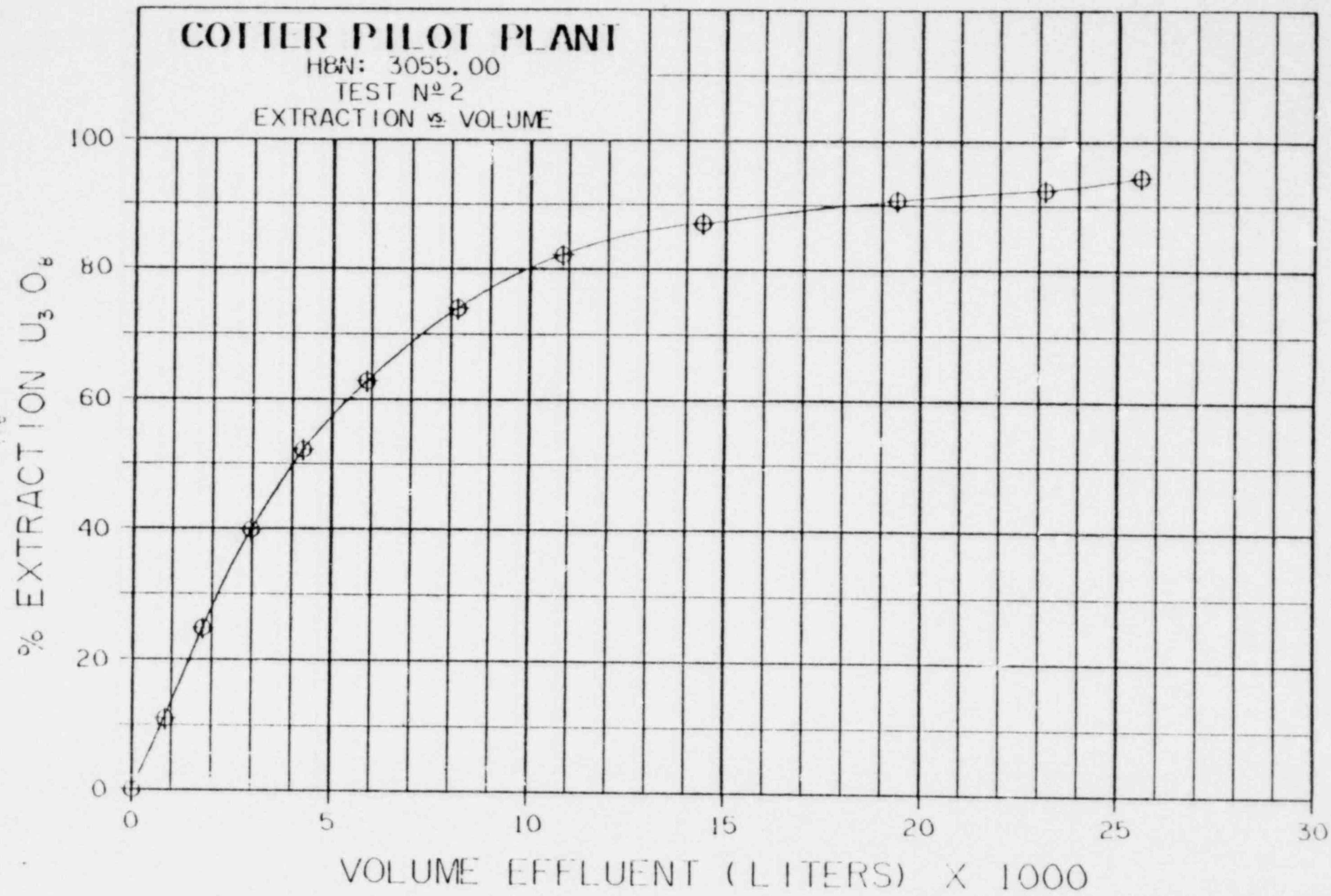
TIME	DT MIN	CUM TIME HRS	SPRAY L/MIN	U308 SPRAY G/L	SU308 SPRAY G	EFFL L/MIN	U308 EFFL G/L	SU308 EFFL G	NET U308 EFFL G	NET SU308 EFFL G	CUM VOL SPRAY L	CUM VOL EFFL L	CUM U308 EFFL G/L	NET U308 EFFL G/L	PCNT REC
14: 45	0	0.0	8.00	0.00	0	0.00	0.00	0	0	0	0	0	0.00	0.00	0.0
17: 35	170	2.3	8.00	0.00	0	0.00	0.00	0	0	0	1360	0	0.00	0.00	0.0
18: 10	35	3.4	8.00	0.00	0	0.33	0.87	10	10	10	1640	11	0.87	0.87	0.0
18: 40	30	3.9	8.00	0.00	0	0.49	0.87	23	12	23	1880	26	0.87	0.87	0.2
19: 30	50	4.7	8.00	0.00	0	2.14	2.33	273	250	273	2280	133	2.04	2.33	2.5
20: 0	30	5.2	8.00	0.00	0	5.34	3.21	788	514	788	2520	293	2.68	3.21	7.2
20: 30	30	5.7	8.00	0.00	0	6.18	3.25	1392	603	1392	2760	479	2.90	3.25	12.7
21: 0	30	6.2	8.00	0.00	0	6.69	3.29	2052	660	2052	3000	680	3.01	3.29	18.7
21: 30	30	6.7	8.00	0.00	0	6.93	3.15	2708	656	2708	3240	888	3.04	3.15	24.7
22: 0	30	7.2	8.00	0.00	0	7.50	3.01	3387	678	3387	3480	1113	3.04	3.01	30.9
23: 0	60	8.2	8.00	0.00	0	7.01	2.57	4469	1082	4469	3960	1534	2.91	2.57	40.8
24: 0	60	9.2	8.00	0.00	0	6.93	2.12	5352	883	5352	4440	1950	2.74	2.12	48.9
1: 0	60	10.2	8.00	0.00	0	8.20	1.84	6261	908	6261	4920	2442	2.56	1.84	57.2
2: 0	60	11.2	8.00	0.00	0	6.49	1.56	6872	610	6872	5400	2831	2.42	1.56	62.8
4: 30	150	13.7	8.00	0.00	0	7.87	1.05	8122	1250	8122	6600	4012	2.02	1.05	74.2
7: 10	160	16.4	0.00	0.00	0	7.41	0.51	8735	612	8735	6600	5199	1.67	0.51	79.8
9: 0	110	18.2	12.00	0.00	0	10.59	0.38	9187	452	9187	7920	6365	1.44	0.38	83.9
11: 5	125	20.3	12.00	0.00	0	10.66	0.24	9511	323	9511	9420	7699	1.23	0.24	86.9
13: 0	115	22.2	12.00	0.00	0	11.22	0.10	9652	140	9652	10800	8989	1.07	0.10	88.2
14: 10	70	23.4	16.00	0.00	0	11.22	0.10	9730	78	9730	11920	9774	0.99	0.10	88.9
15: 20	70	24.5	16.00	0.00	0	14.68	0.09	9823	92	9823	13040	10802	0.90	0.09	89.7
16: 30	70	25.7	12.00	0.00	0	12.00	0.08	9891	68	9891	13880	11642	0.84	0.08	90.4
17: 0	30	26.2	12.00	0.00	0	10.43	0.07	9915	24	9915	14240	11955	0.82	0.07	90.6
17: 30	30	26.7	16.00	0.00	0	10.43	0.07	9937	22	9937	14720	12268	0.80	0.07	90.8
19: 30	60	27.7	0.00	0.00	0	7.20	0.06	9965	27	9965	14720	12700	0.78	0.06	91.0
18: 50	20	28.0	20.00	0.00	0	7.20	0.06	9974	8	9974	15120	12844	0.77	0.06	91.1
19: 0	10	28.2	20.00	0.00	0	5.70	0.06	9977	3	9977	15320	12902	0.77	0.06	91.1
21: 0	120	30.2	20.00	0.00	0	13.09	0.05	10090	112	10090	17720	15073	0.66	0.05	92.2
23: 0	120	32.2	20.00	0.00	0	16.39	0.04	10179	88	10179	20120	17041	0.59	0.04	93.0
24: 30	90	33.7	0.00	0.00	0	10.52	0.03	10216	36	10216	20120	17988	0.56	0.03	93.3
1: 0	30	34.2	0.00	0.00	0	4.72	0.03	10221	5	10221	20120	18130	0.56	0.03	93.4
1: 30	30	34.7	0.00	0.00	0	2.89	0.03	10224	3	10224	20120	18216	0.56	0.03	93.4
2: 0	30	35.2	0.00	0.00	0	2.05	0.04	10227	2	10227	20120	18278	0.55	0.04	93.4
2: 30	30	35.7	0.00	0.00	0	0.93	0.04	10228	1	10228	20120	18306	0.55	0.04	93.4
3: 0	30	36.2	0.00	0.00	0	1.00	0.04	10229	1	10229	20120	18336	0.55	0.04	93.4
3: 30	30	36.7	0.00	0.00	0	0.88	0.04	10230	1	10230	20120	18363	0.55	0.04	93.5
4: 0	30	37.2	0.00	0.00	0	0.76	0.04	10231	1	10231	20120	18386	0.55	0.04	93.5
5: 0	60	38.2	0.00	0.00	0	0.58	0.04	10233	1	10233	20120	18421	0.55	0.04	93.5
7: 0	120	40.2	0.00	0.00	0	0.38	0.04	10235	2	10235	20120	18467	0.55	0.04	93.5

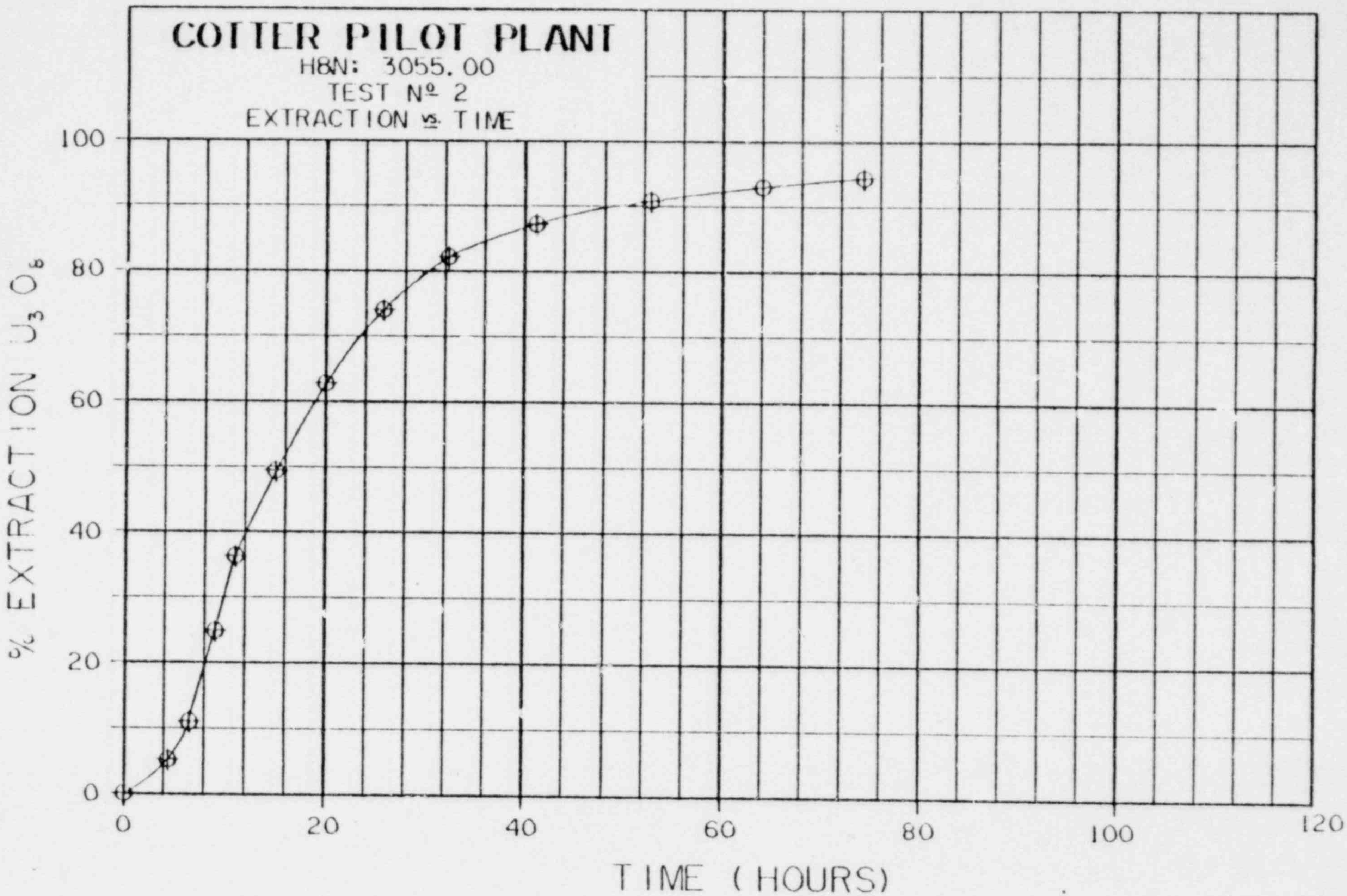

COTTER PILOT PLANT
HBN: 3055.00
TEST Nº1
EXTRACTION vs VOLUME
% EXTRACTION U_3O_8
100
80
60
40
20
0
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000

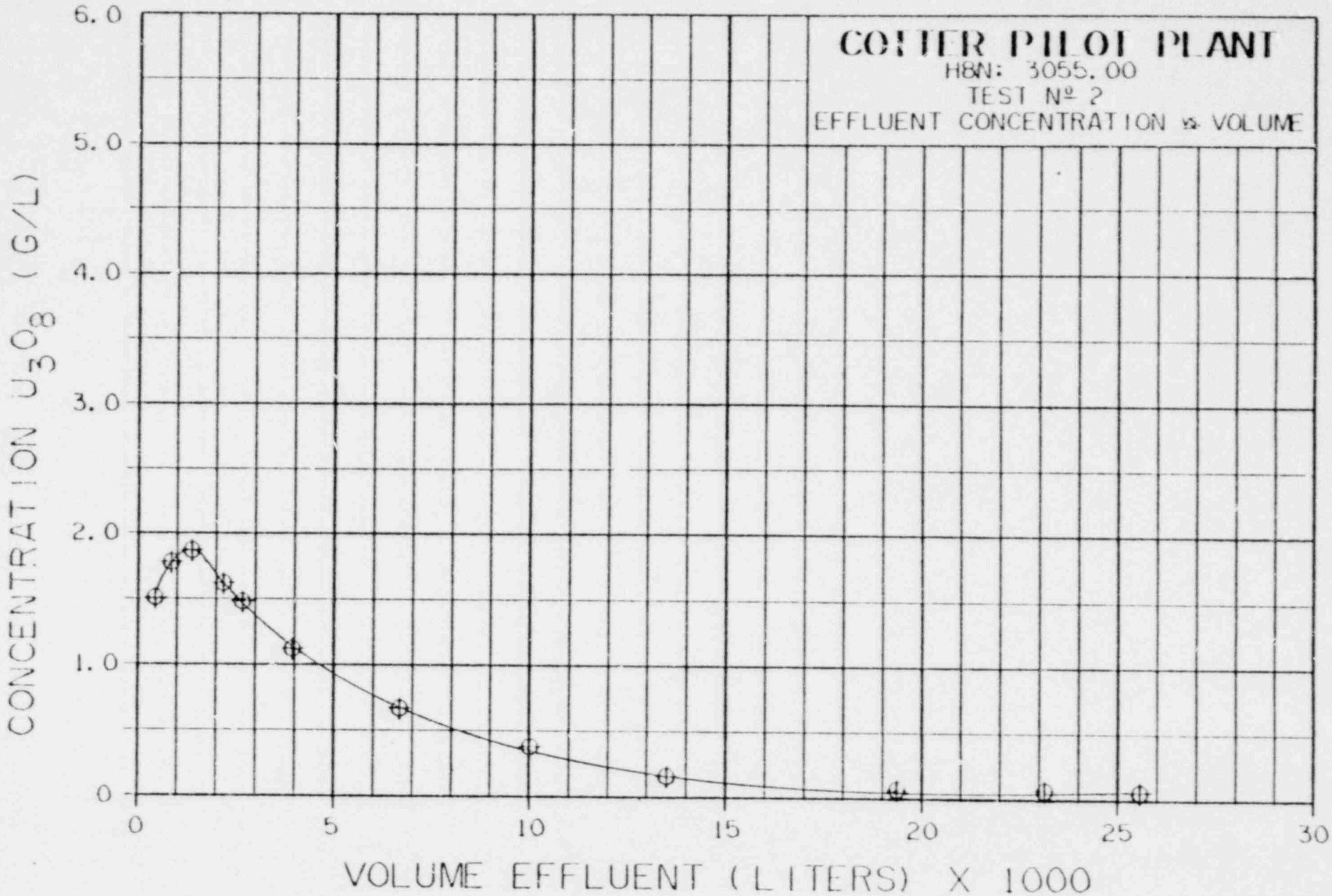

COTTER PILOT PLANT
HBN: 3055.00
TEST Nº 1
EXTRACTION vs TIME
% EXTRACTION U_3O_8
TIME (HOURS)
0
20
40
60
80
100
0
10
20
30
40
50
60

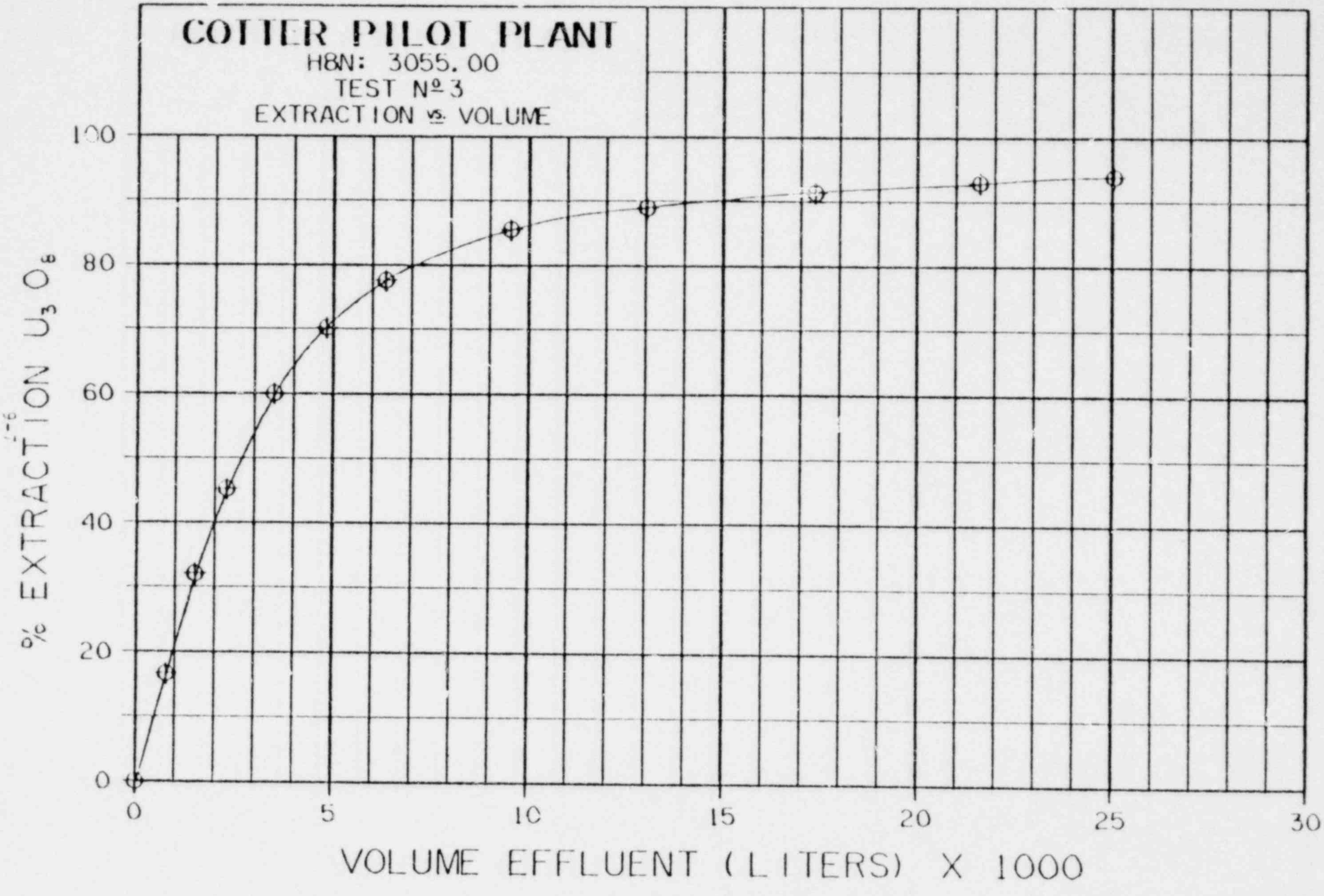


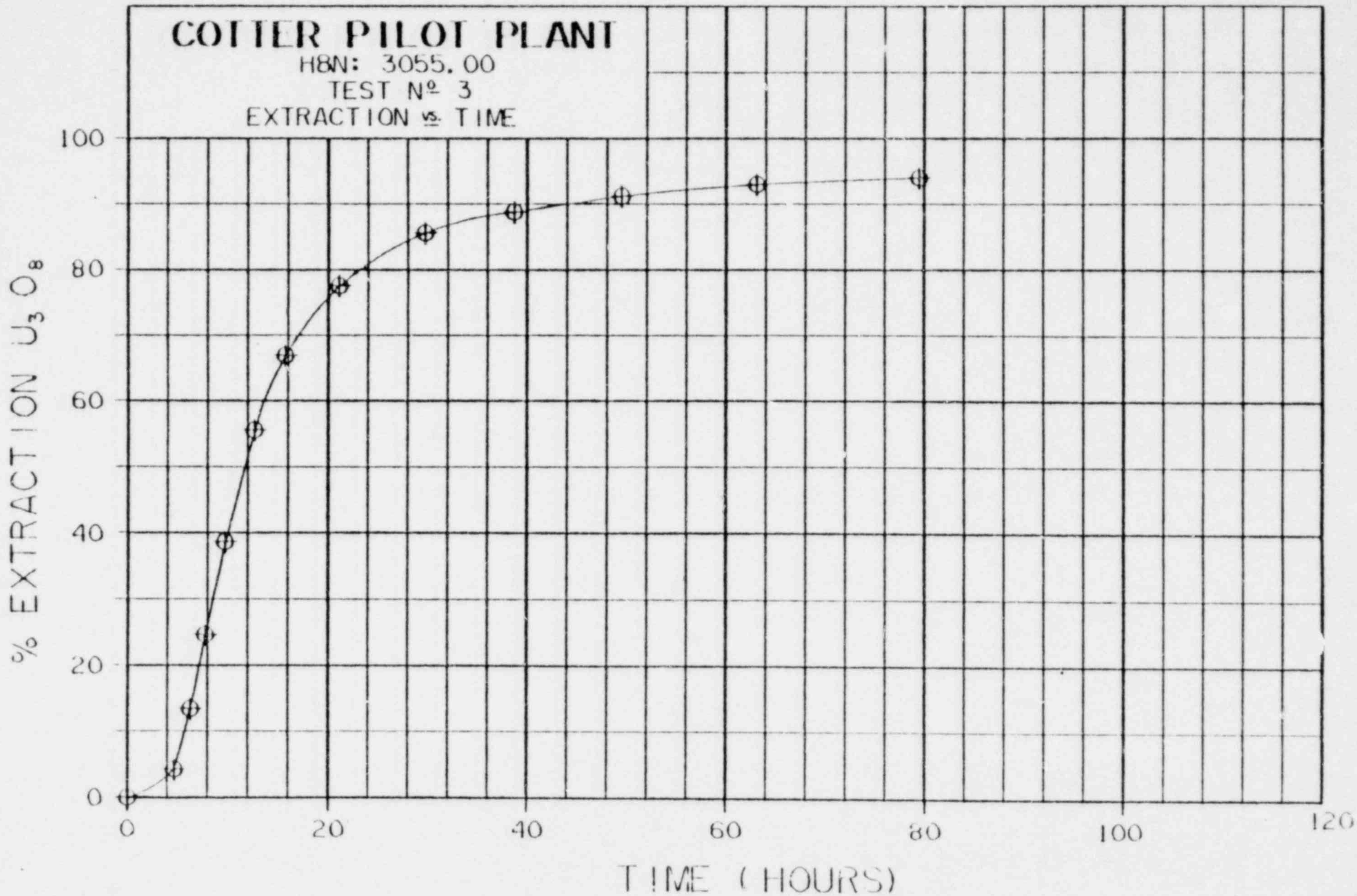
COTTER PILOT PLANT
H8N: 3055.00
TEST № 1
EFFLUENT CONCENTRATION vs VOLUME
CONCENTRATION U3O8 (G/L)
6.0
5.0
4.0
3.0
2.0
1.0
0
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000

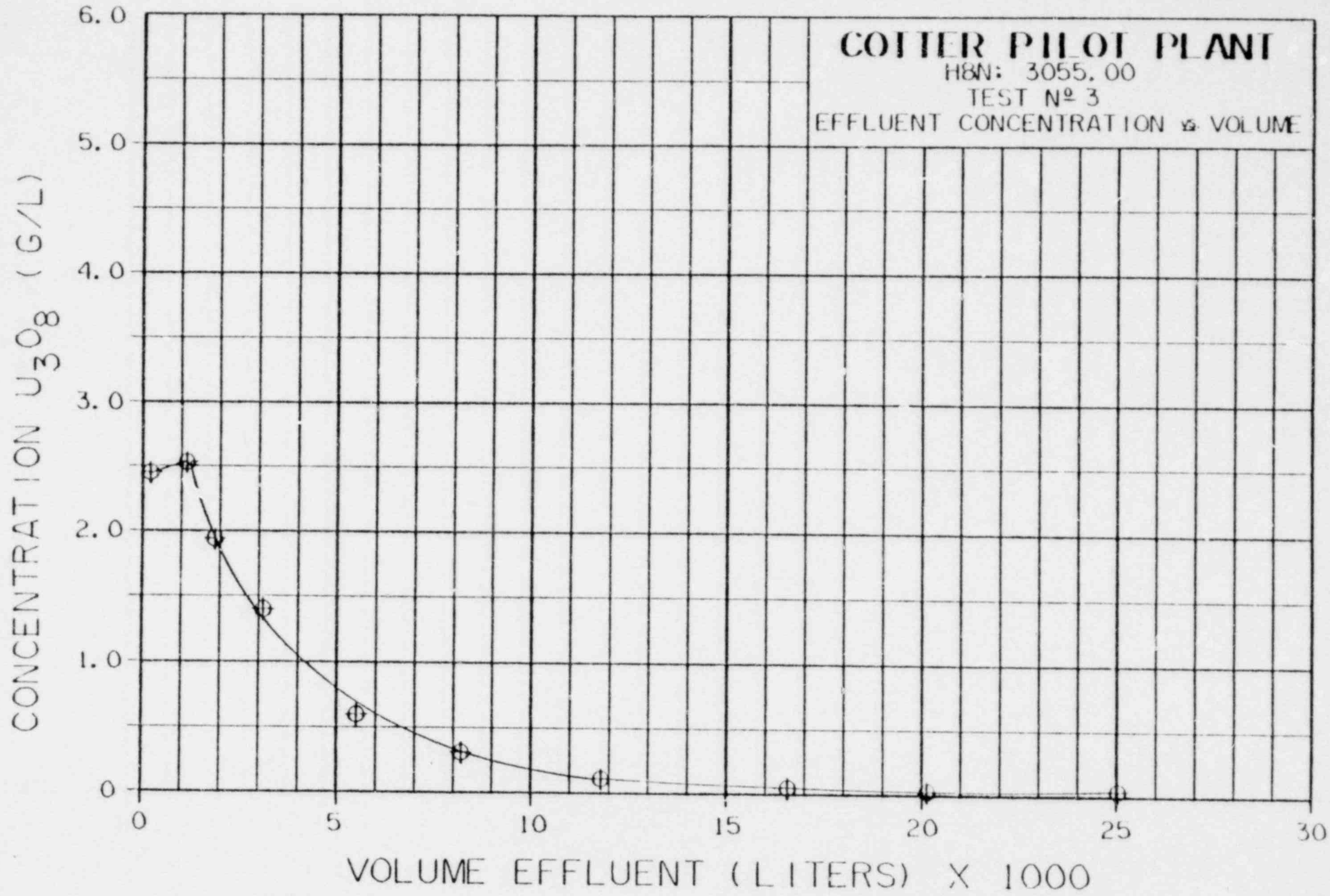

COTTER PILOT PLANT
H&N: 3055.00
TEST № 2
EXTRACTION vs VOLUME
% EXTRACTION U_3O_8
0
20
40
60
80
100
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000

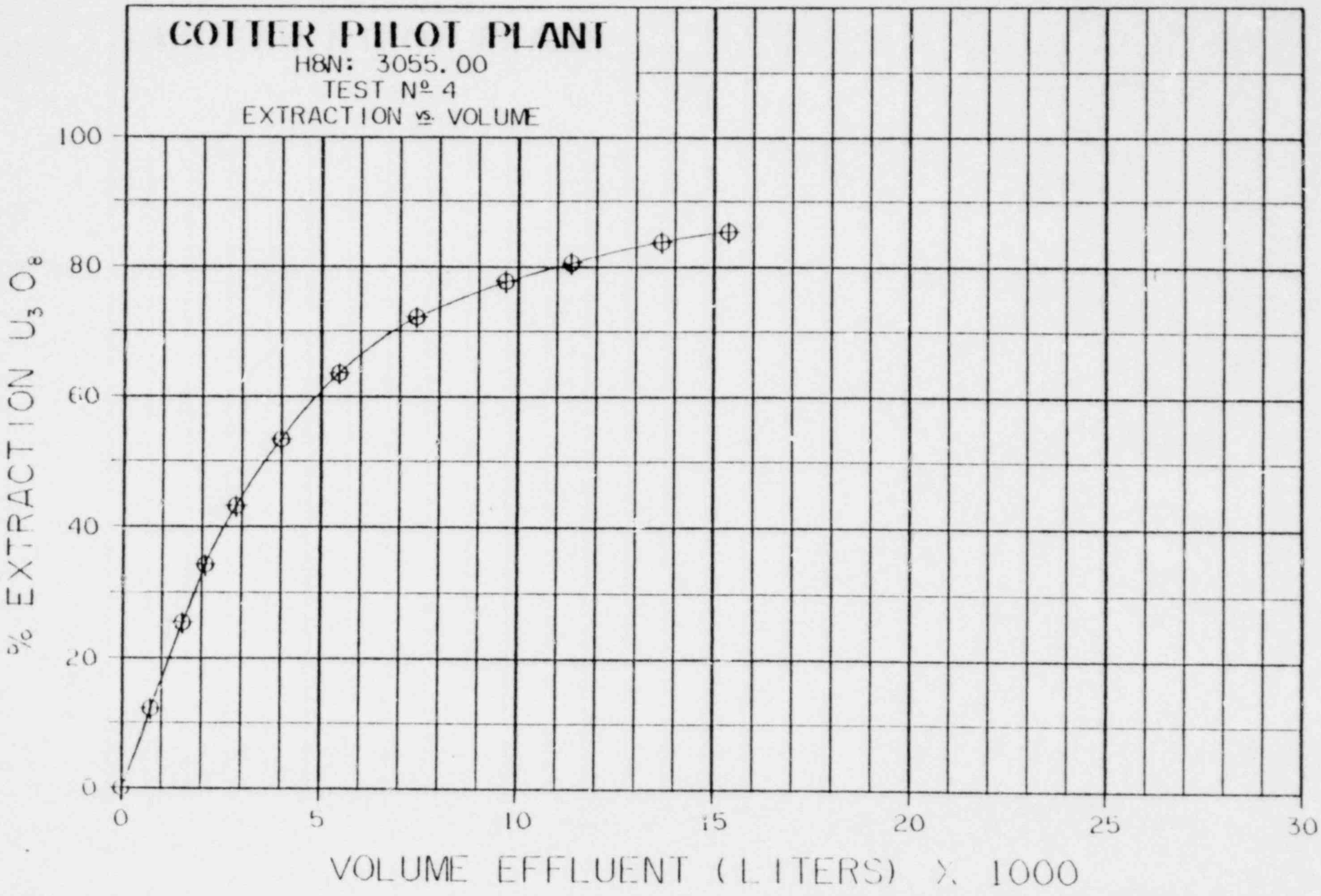

COTTER PILOT PLANT
H8N: 3055.00
TEST № 2
EXTRACTION vs. TIME
100
80
60
40
20
0
% EXTRACTION U_3O_8
0
20
40
60
80
100
120
TIME (HOURS)

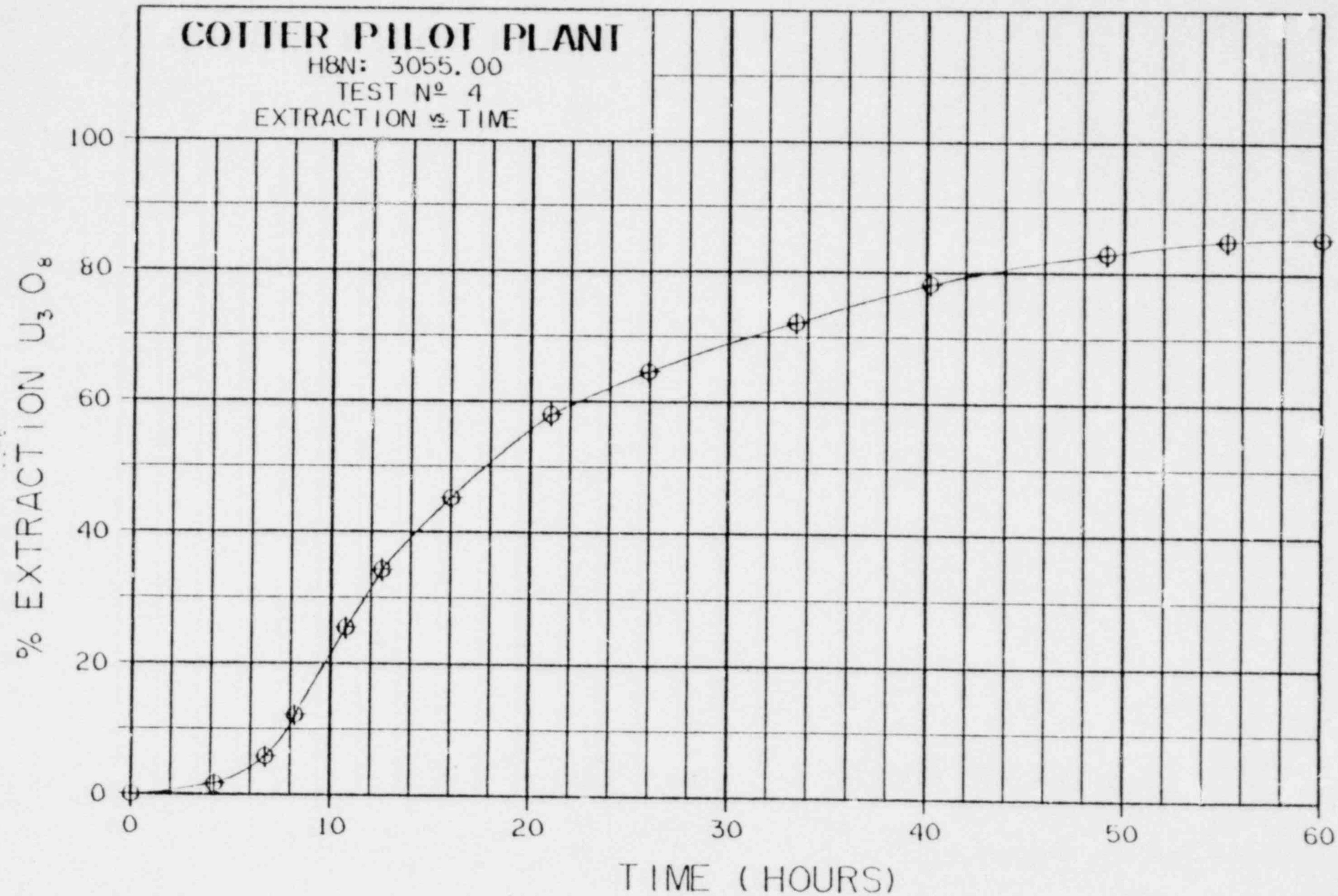

COTTER PILOT PLANT
HBN: 3055.00
TEST Nº 2
EFFLUENT CONCENTRATION vs VOLUME
6.0
5.0
4.0
3.0
2.0
1.0
0
0
5
10
15
20
25
30
CONCENTRATION U_3O_8 (G/L)
VOLUME EFFLUENT (LITERS) X 1000

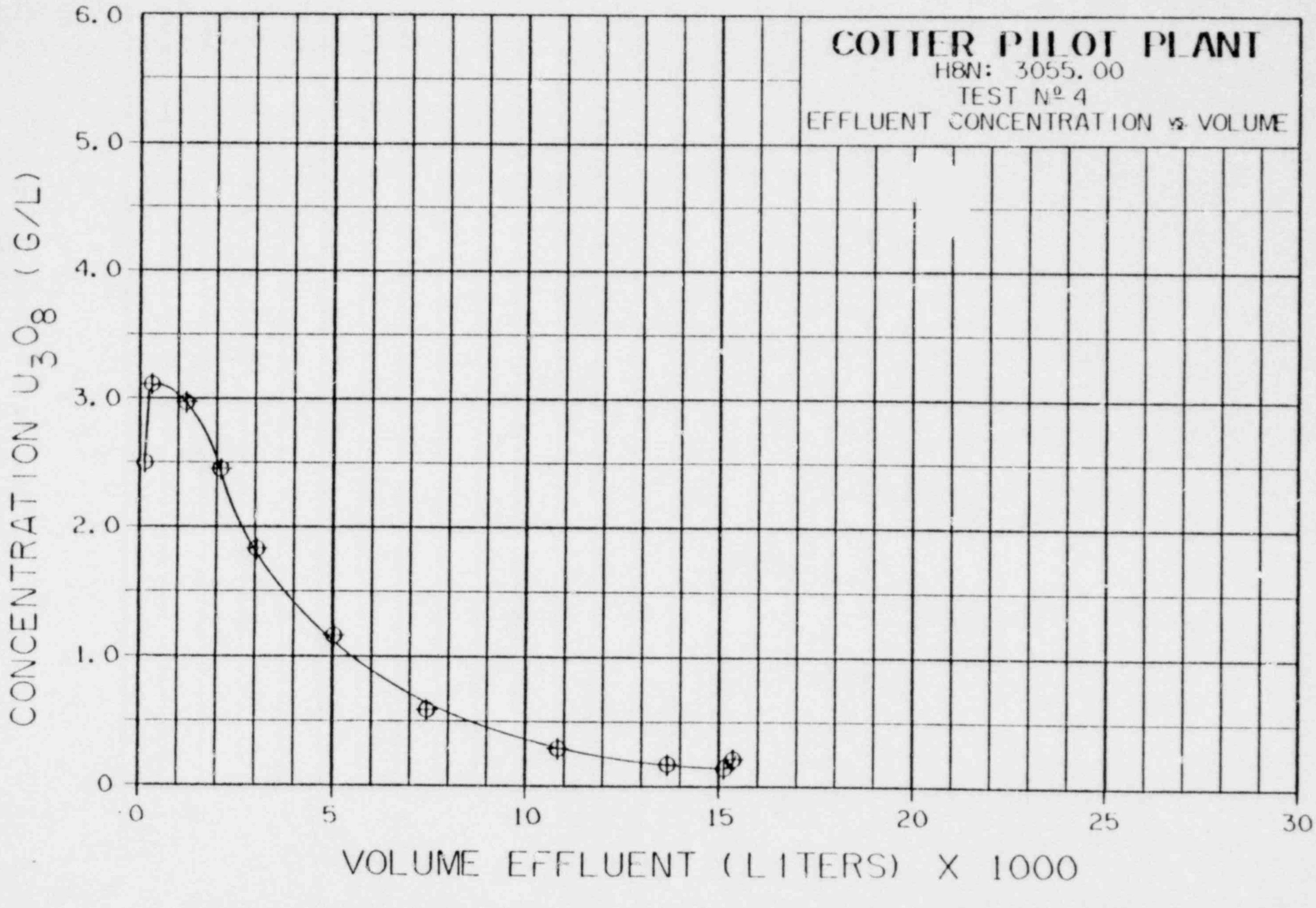

COTTER PILOT PLANT
H8N: 3055.00
TEST № 3
EXTRACTION vs. VOLUME
% EXTRACTION U_3O_8
0
20
40
60
80
100
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000

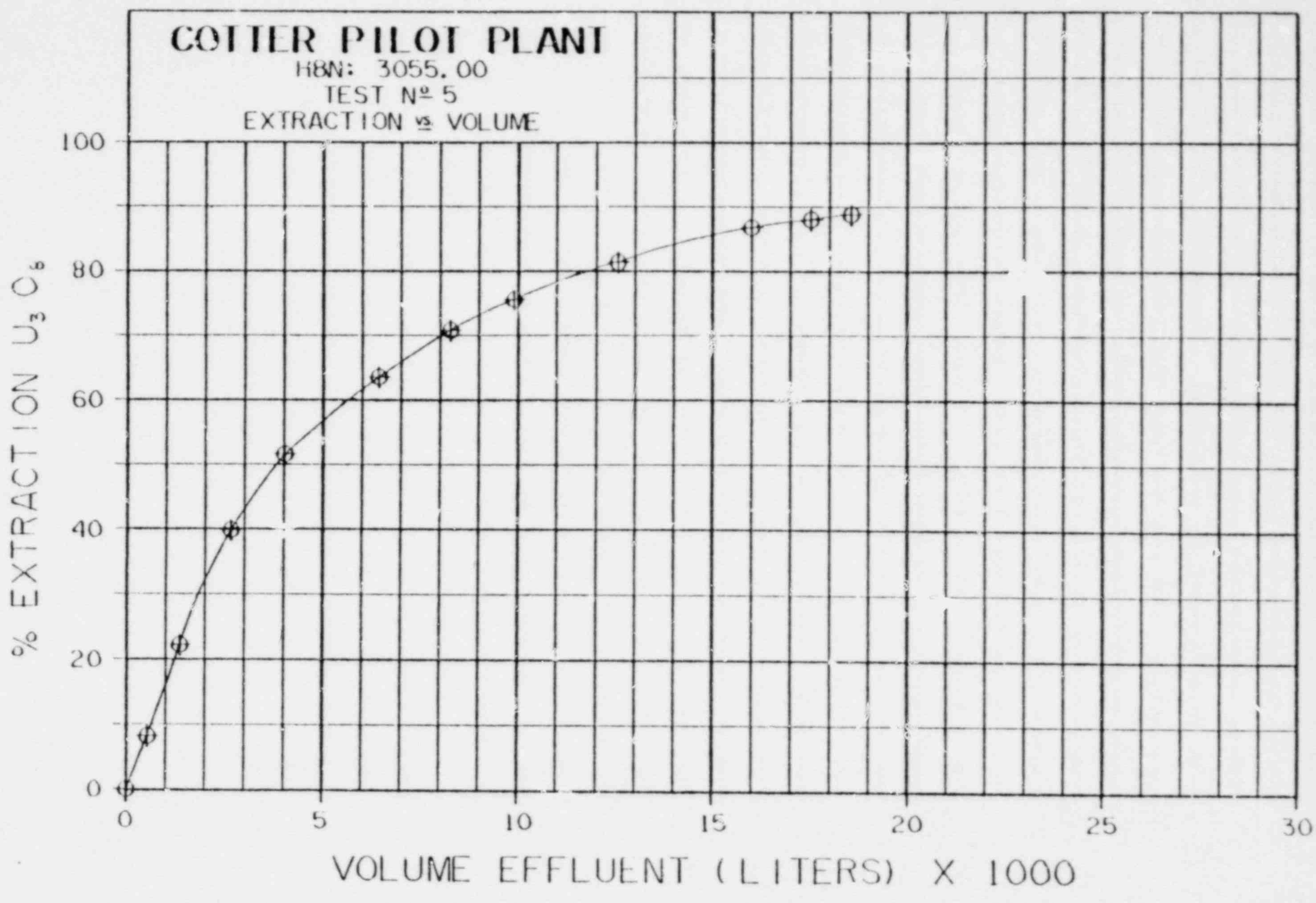

COTTER PILOT PLANT
H8N: 3055.00
TEST № 3
EXTRACTION vs. TIME
% EXTRACTION U_3O_8
100
80
60
40
20
0
0
20
40
60
80
100
120
TIME (HOURS)

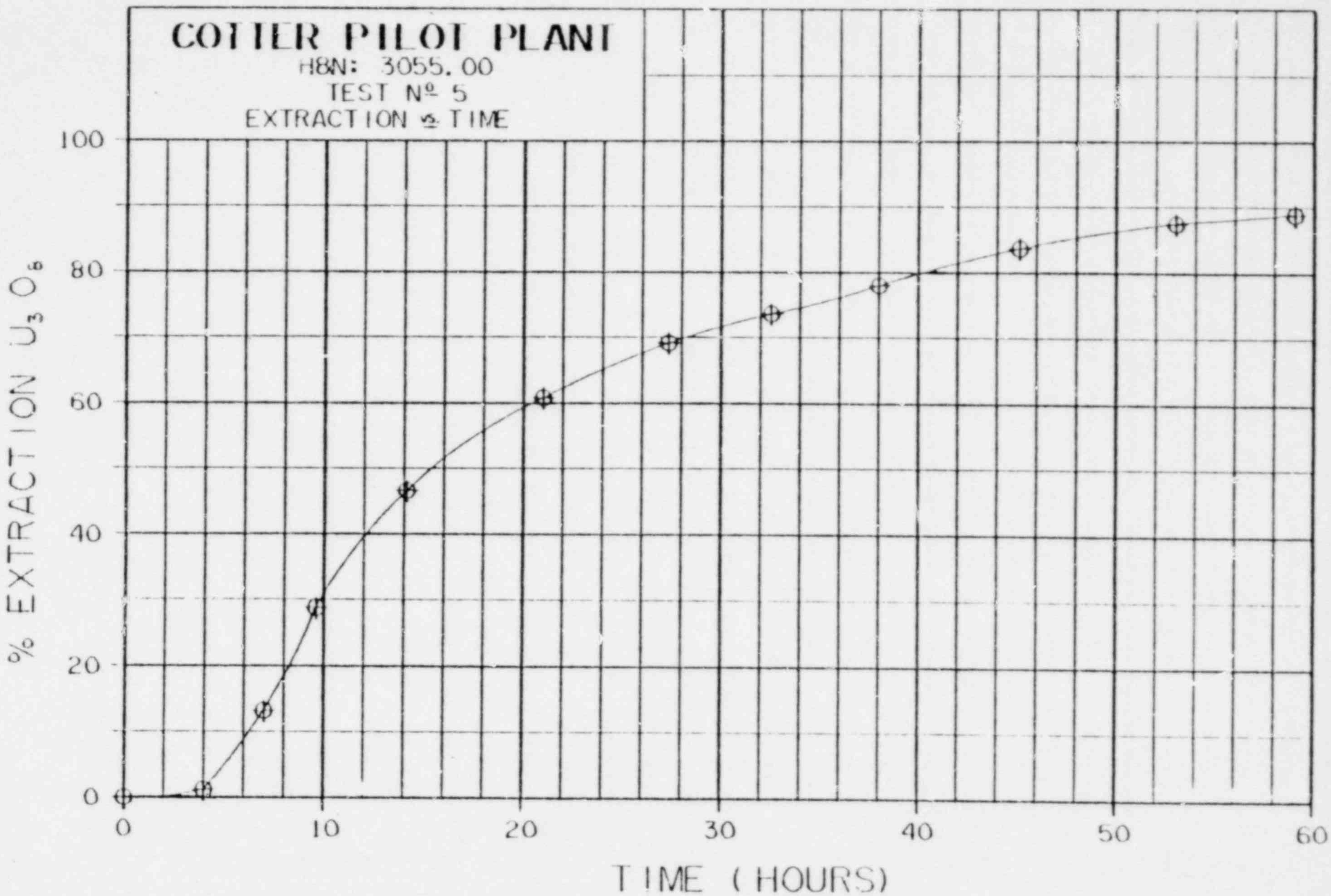

COTTER PILOT PLANT
H8N: 3055.00
TEST № 3
EFFLUENT CONCENTRATION vs VOLUME
6.0
5.0
4.0
3.0
2.0
1.0
0
CONCENTRATION U_3O_8 (G/L)
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000

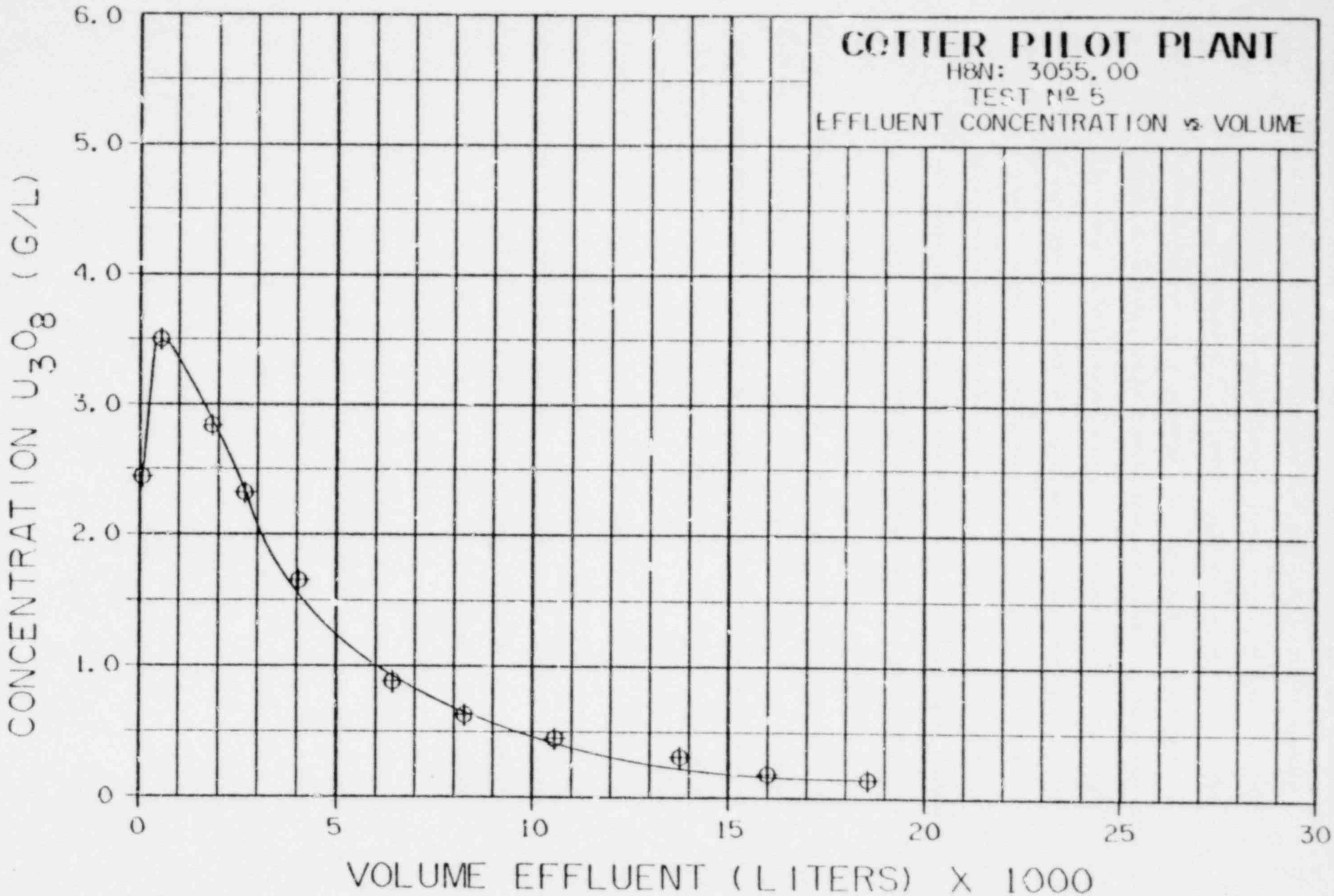

COTTER PILOT PLANT
H&N: 3055.00
TEST № 4
EXTRACTION vs VOLUME
% EXTRACTION U_3O_8
VOLUME EFFLUENT (LITERS) X 1000
0
20
40
60
80
100
5
10
15
20
25
30

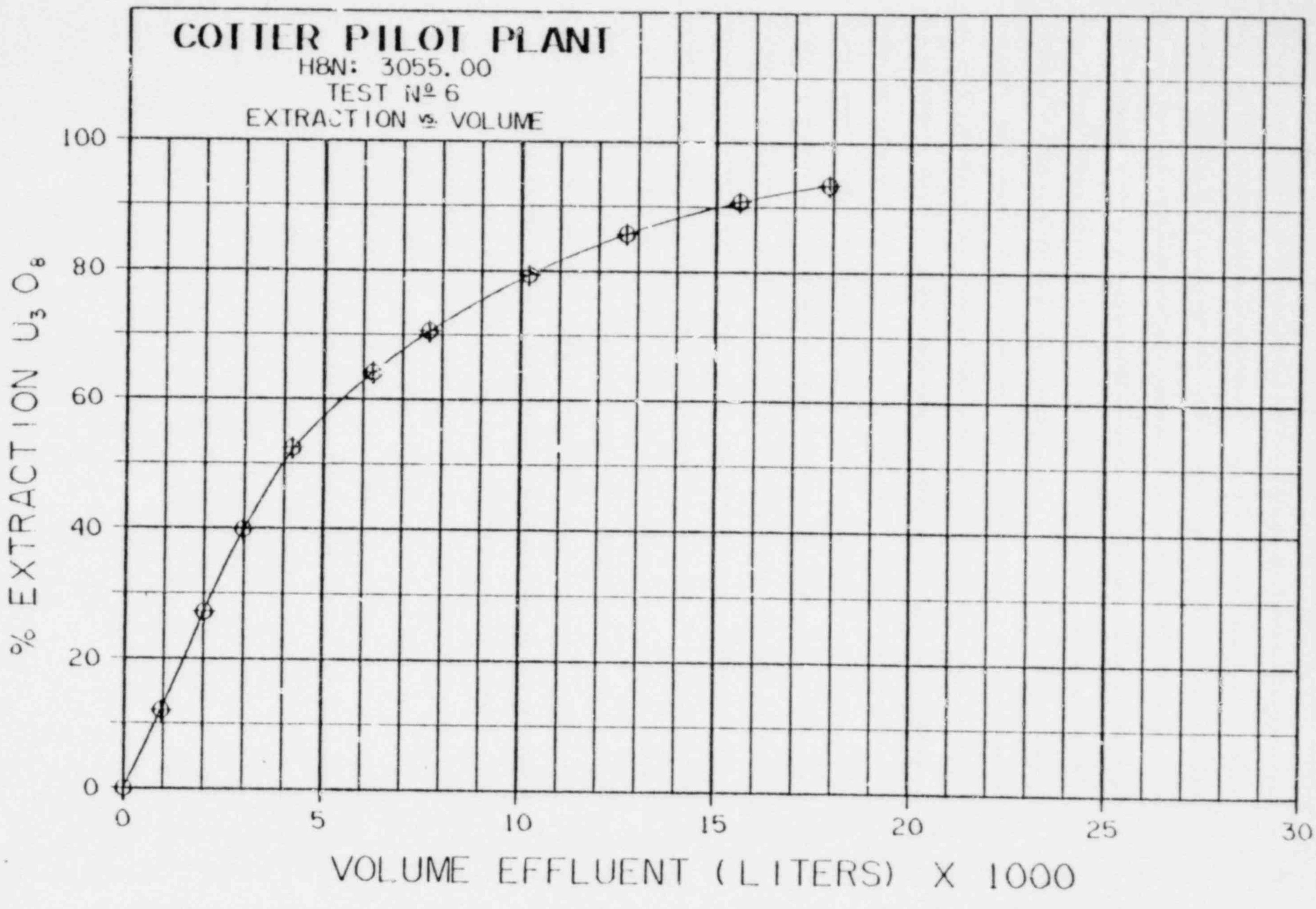

COTTER PILOT PLANT
H8N: 3055.00
TEST № 4
EXTRACTION vs TIME
% EXTRACTION U3 O8
100
80
60
40
20
0
0
10
20
30
40
50
60
TIME (HOURS)


COTTER PILOT PLANT
H8N: 3055.00
TEST № 4
EFFLUENT CONCENTRATION vs VOLUME
6.0
5.0
4.0
3.0
2.0
1.0
0
CONCENTRATION U3O8 (G/L)
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000

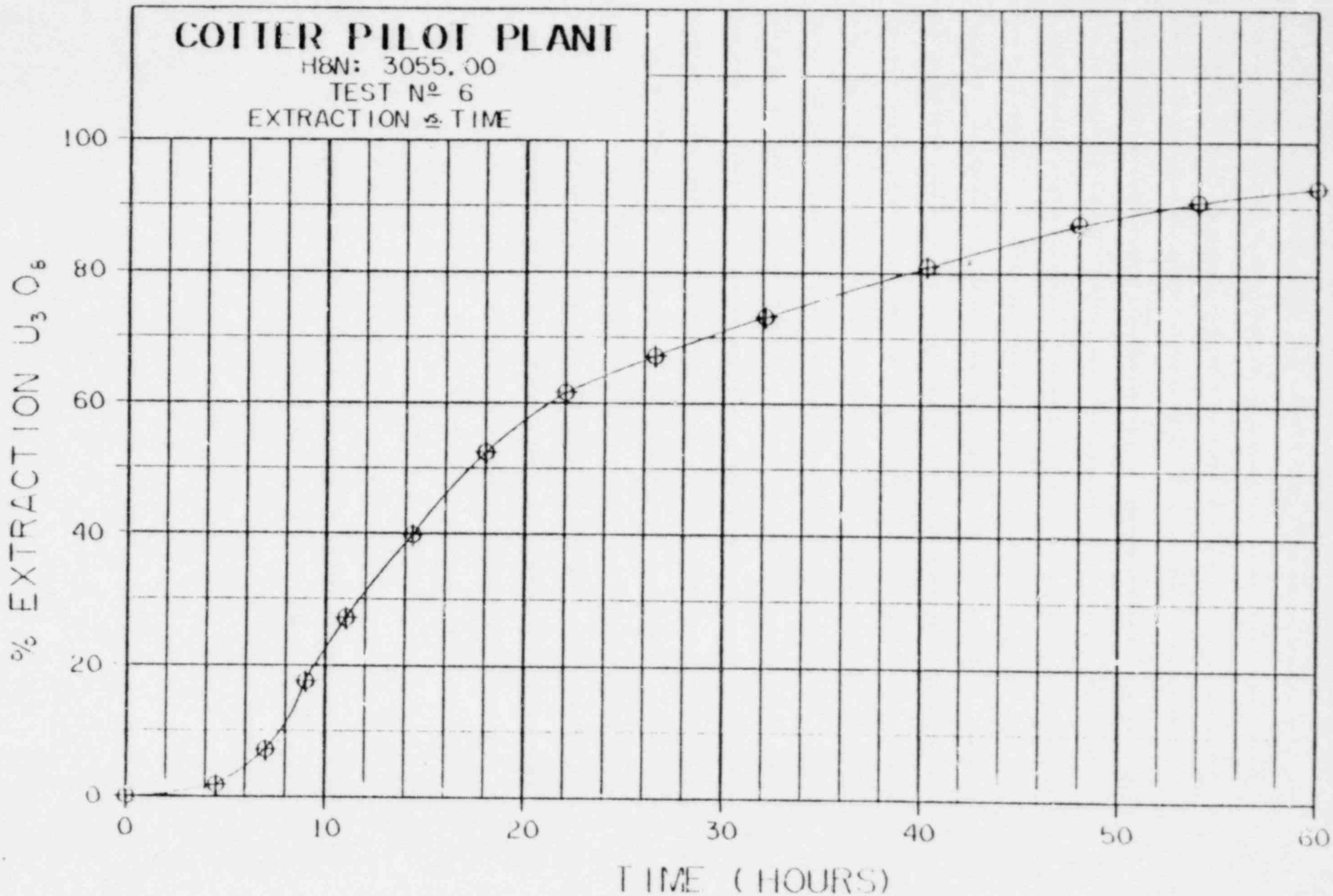

COTTER PILOT PLANT
HBN: 3055.00
TEST № 5
EXTRACTION vs VOLUME
% EXTRACTION U3 O8
VOLUME EFFLUENT (LITERS) X 1000
0
20
40
60
80
100
0
5
10
15
20
25
30

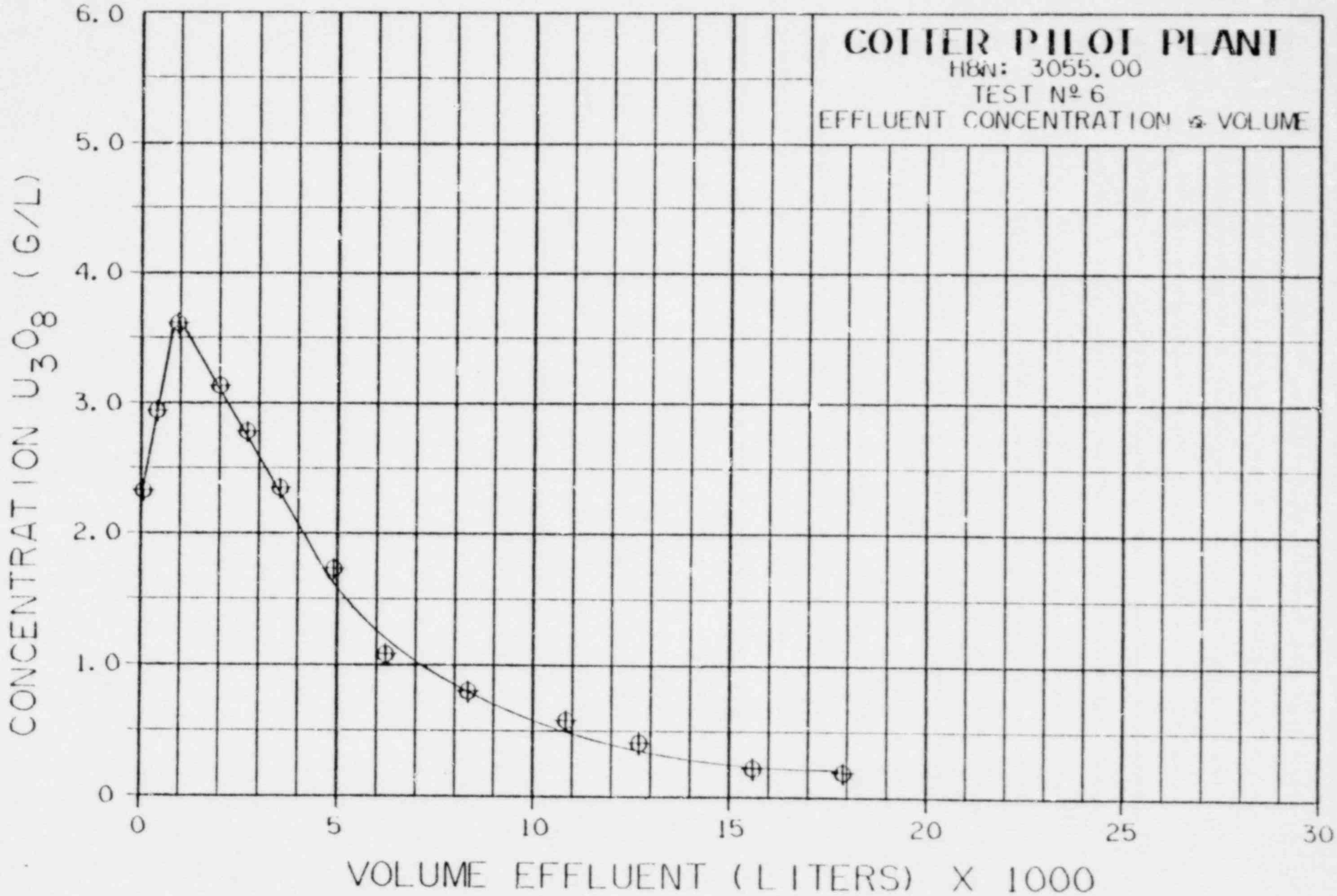

COTTER PILOT PLANT
H8N: 3055.00
TEST № 5
EXTRACTION vs TIME
% EXTRACTION U_3O_8
TIME (HOURS)
0
20
40
60
80
100
0
10
20
30
40
50
60

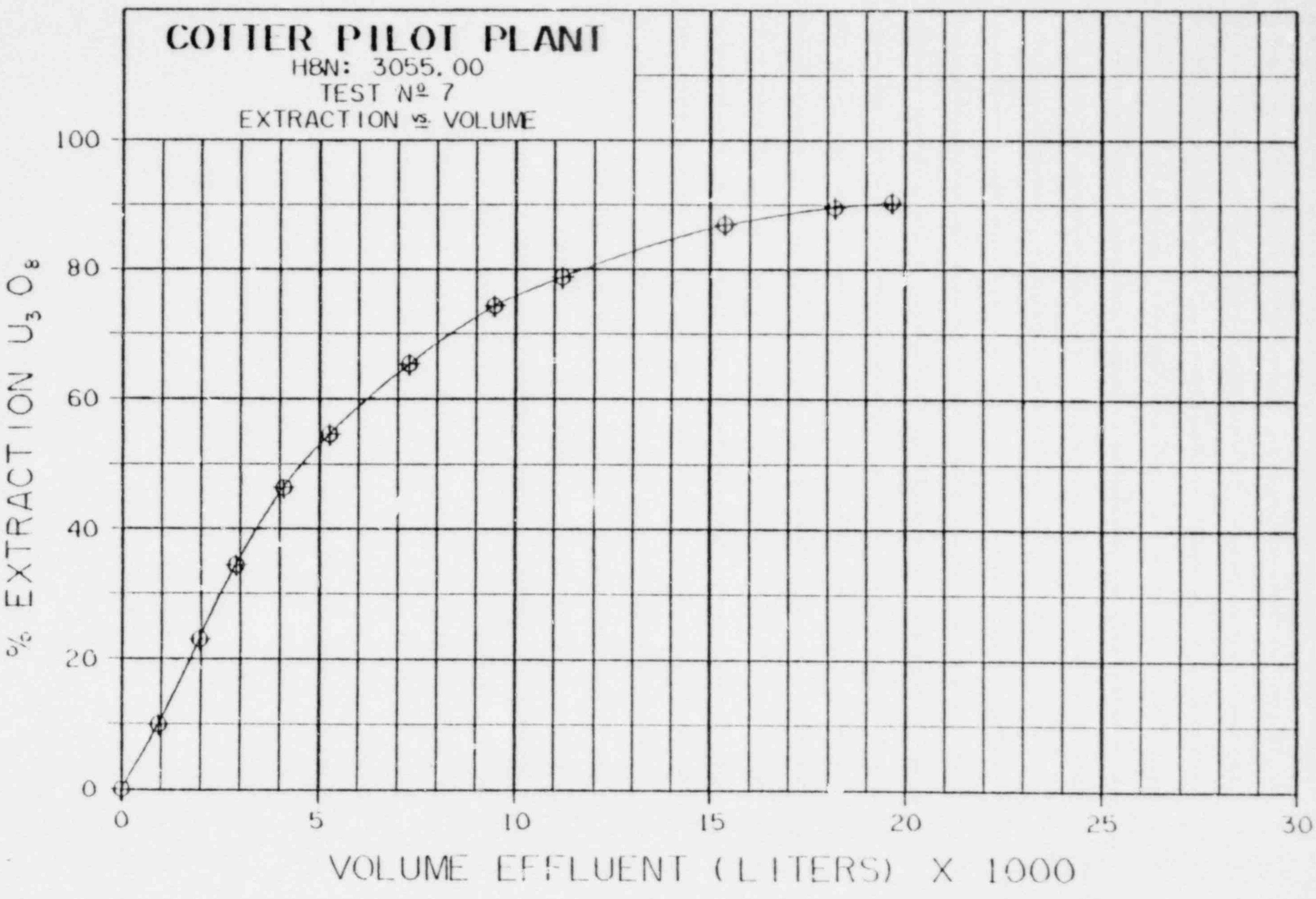

COTTER PILOT PLANT
H8N: 3055.00
TEST № 5
EFFLUENT CONCENTRATION vs VOLUME
CONCENTRATION U_3O_8 (G/L)
6.0
5.0
4.0
3.0
2.0
1.0
0
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000

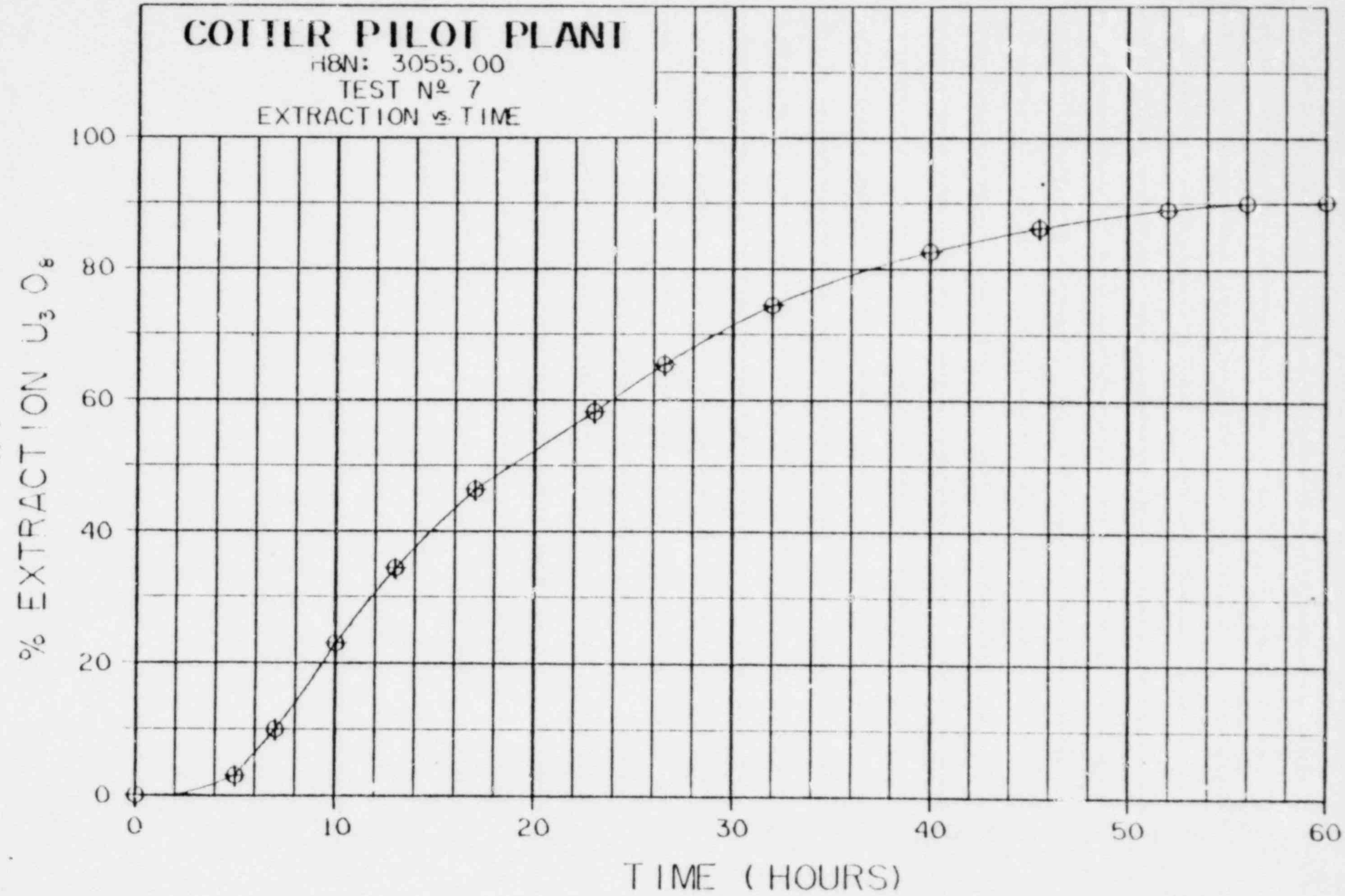


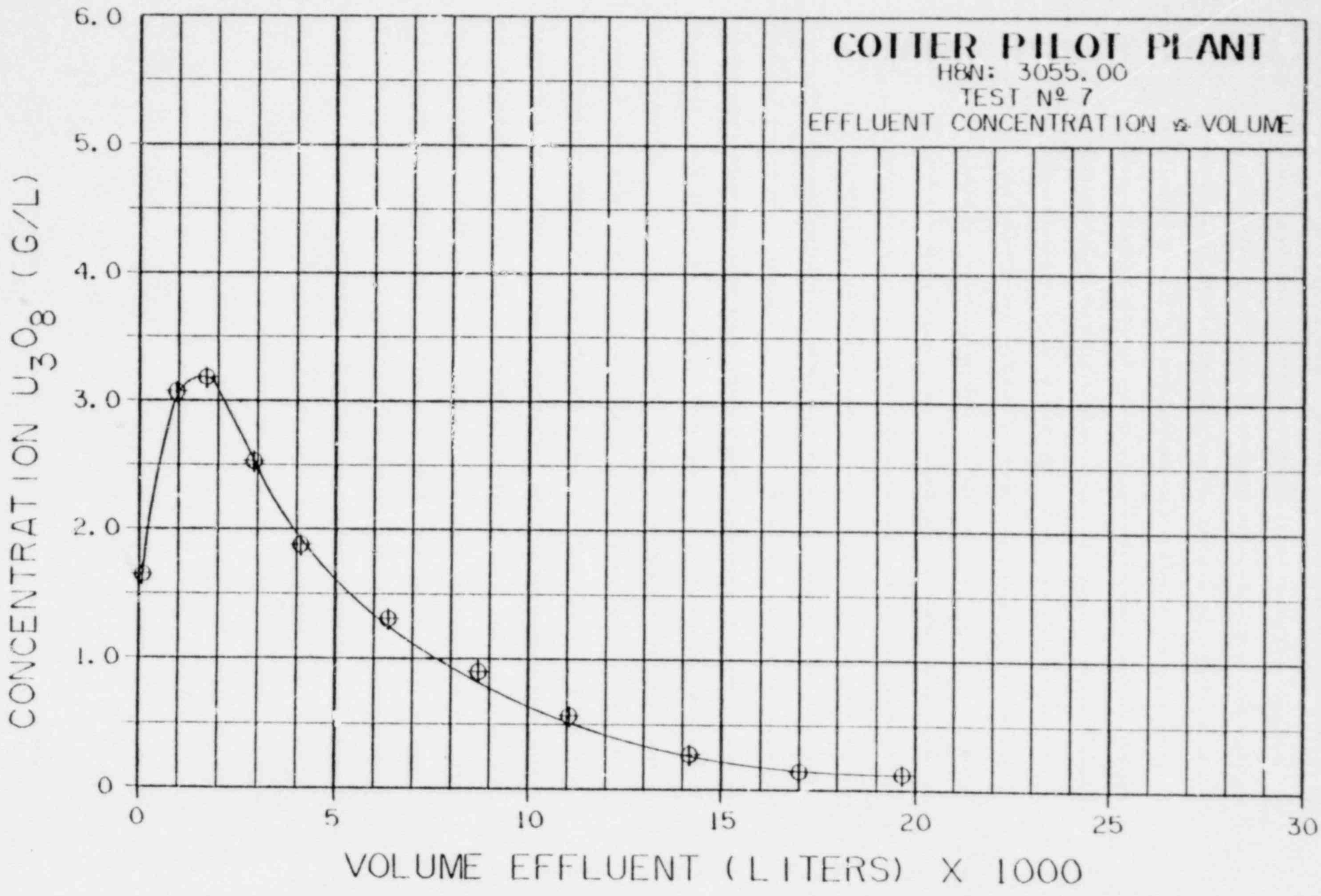
COTTER PILOT PLANT
H8N: 3055.00
TEST № 6
EXTRACTION vs VOLUME
% EXTRACTION U_3O_8
0
20
40
60
80
100
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000

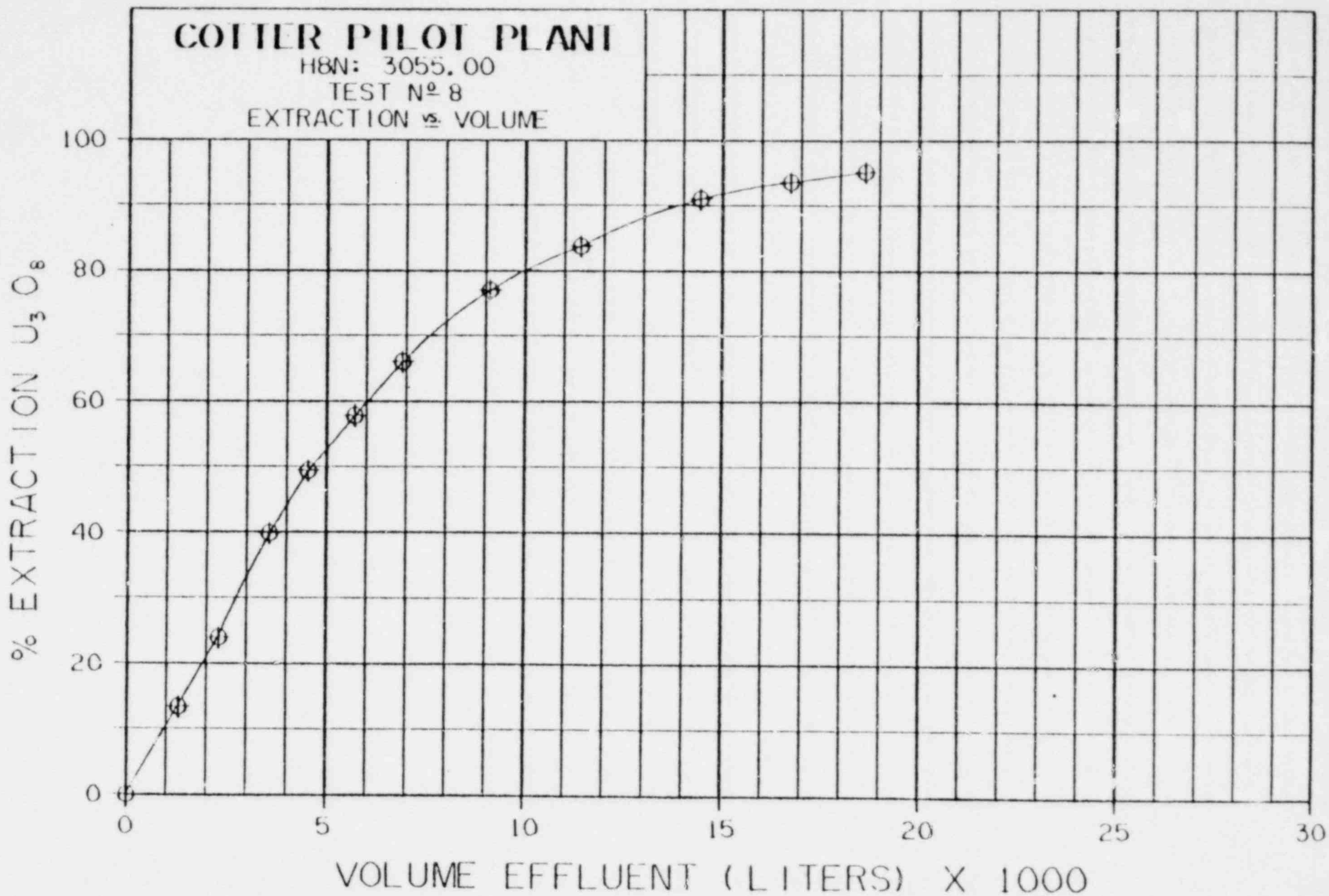

COTTER PILOT PLANT
H8N: 3055.00
TEST Nº 6
EXTRACTION vs TIME
% EXTRACTION U3 O8
TIME (HOURS)
0
20
40
60
80
100
10
30
50


COTTER PILOT PLANT
H&W: 3055.00
TEST № 6
EFFLUENT CONCENTRATION vs VOLUME
CONCENTRATION U3O8 (G/L)
6.0
5.0
4.0
3.0
2.0
1.0
0
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000

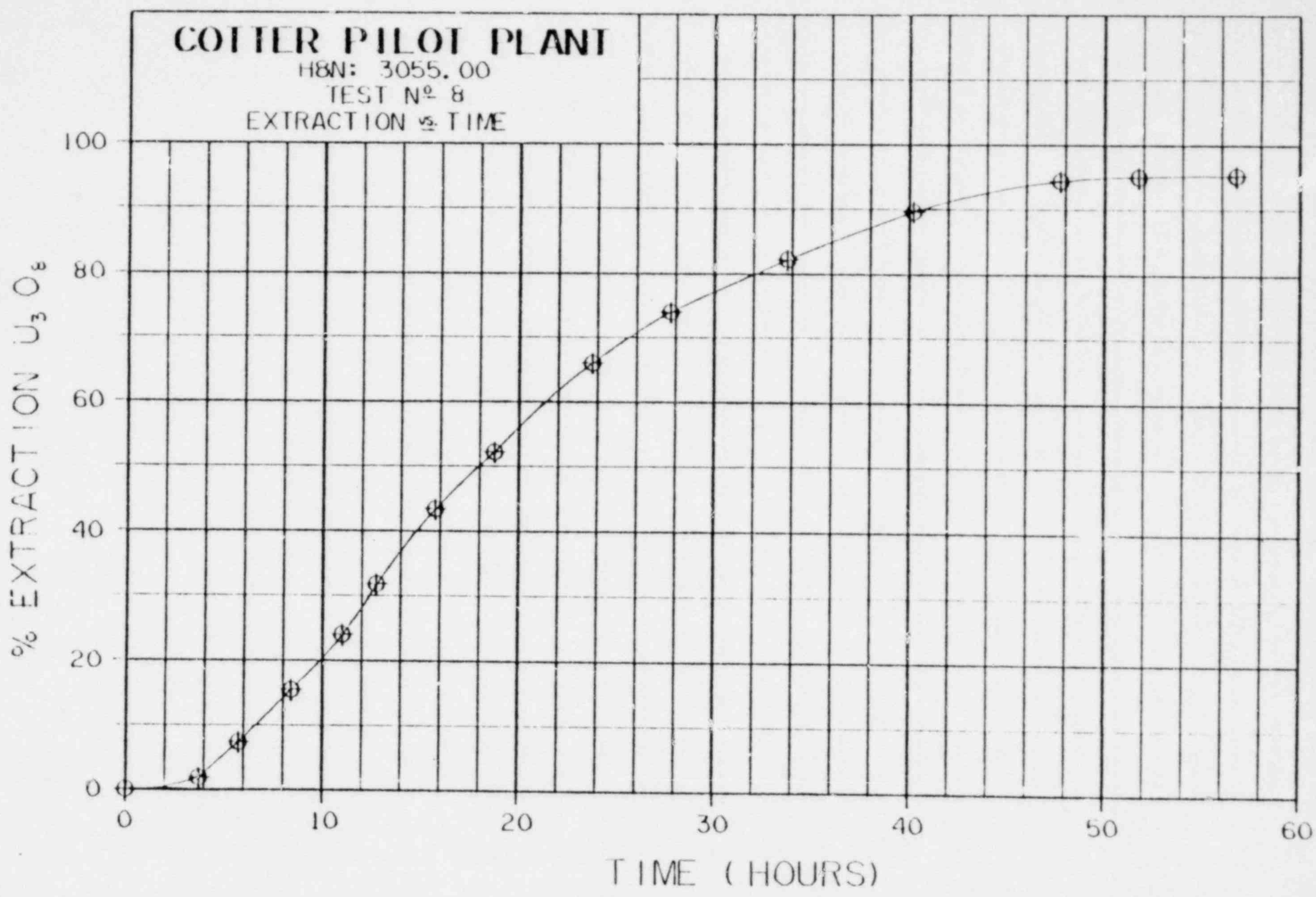

COTTER PILOT PLANT
H8N: 3055.00
TEST № 7
EXTRACTION vs VOLUME
% EXTRACTION U3 O8
0
20
40
60
80
100
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000


COTTER PILOT PLANT
H8N: 3055.00
TEST № 7
EXTRACTION vs TIME
100
80
60
40
20
0
% EXTRACTION U_3O_8
0
10
20
30
40
50
60
TIME (HOURS)

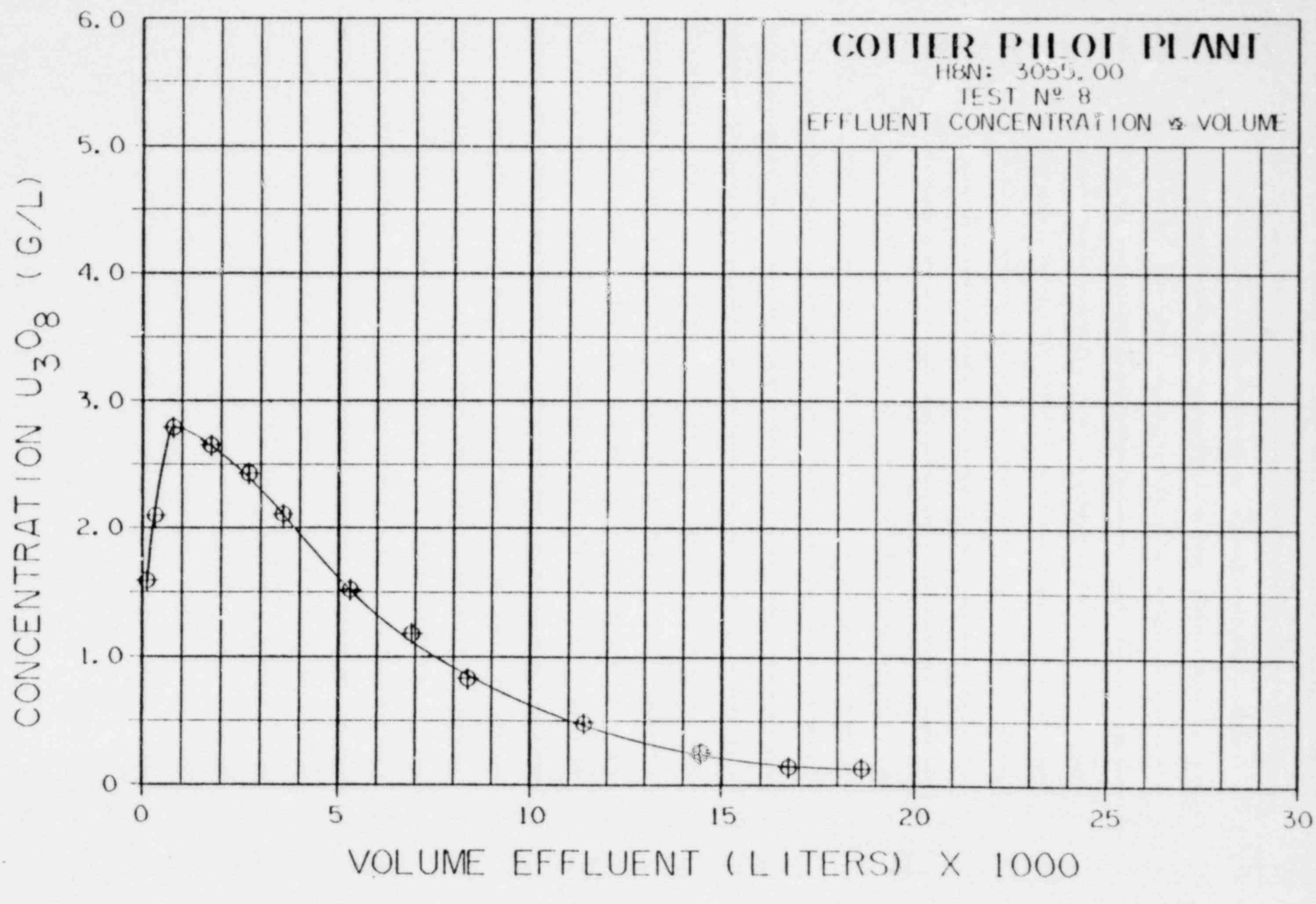

COTTER PILOT PLANT
H&N: 3055.00
TEST № 7
EFFLUENT CONCENTRATION vs VOLUME
CONCENTRATION U3O8 (G/L)
6.0
5.0
4.0
3.0
2.0
1.0
0
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000

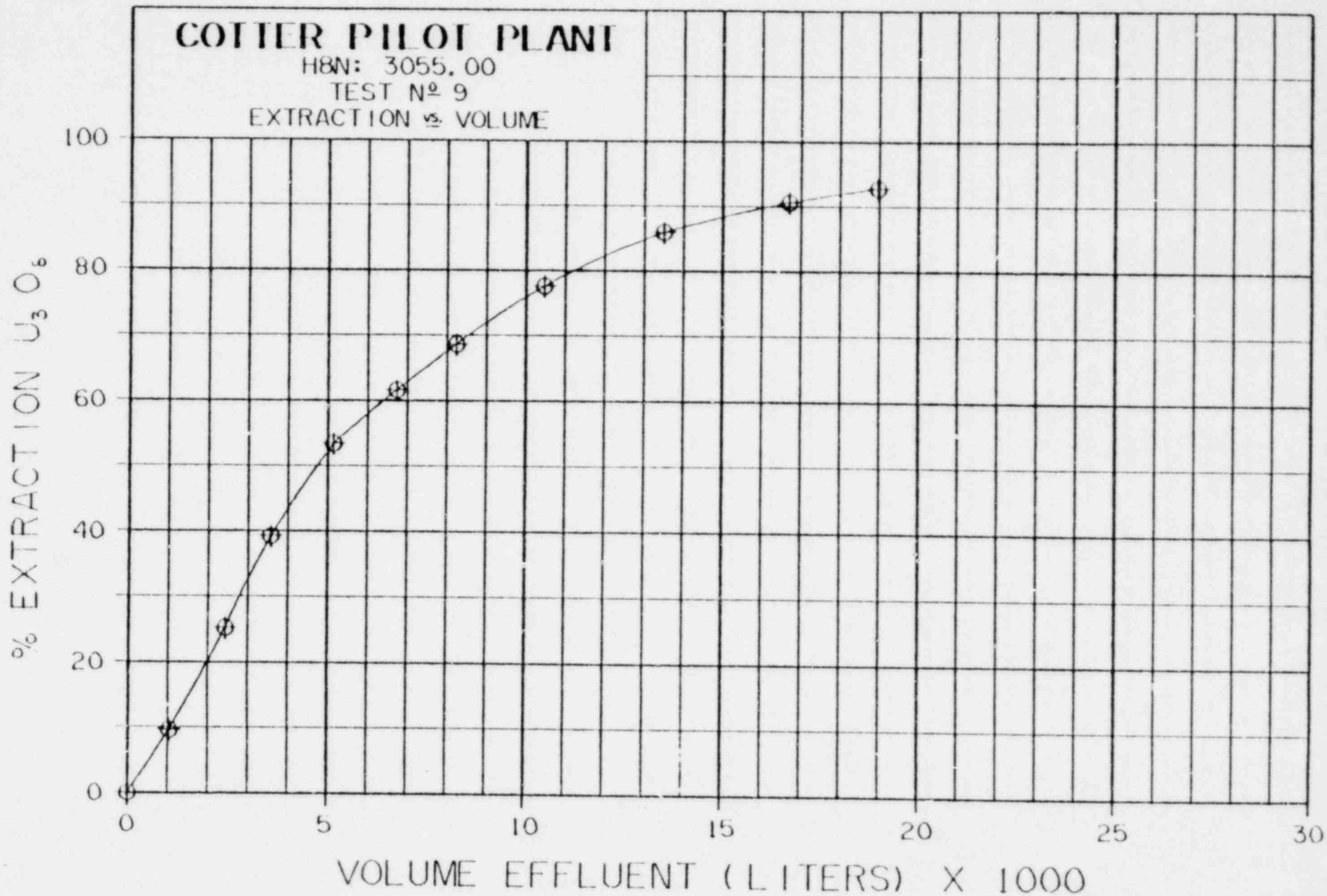


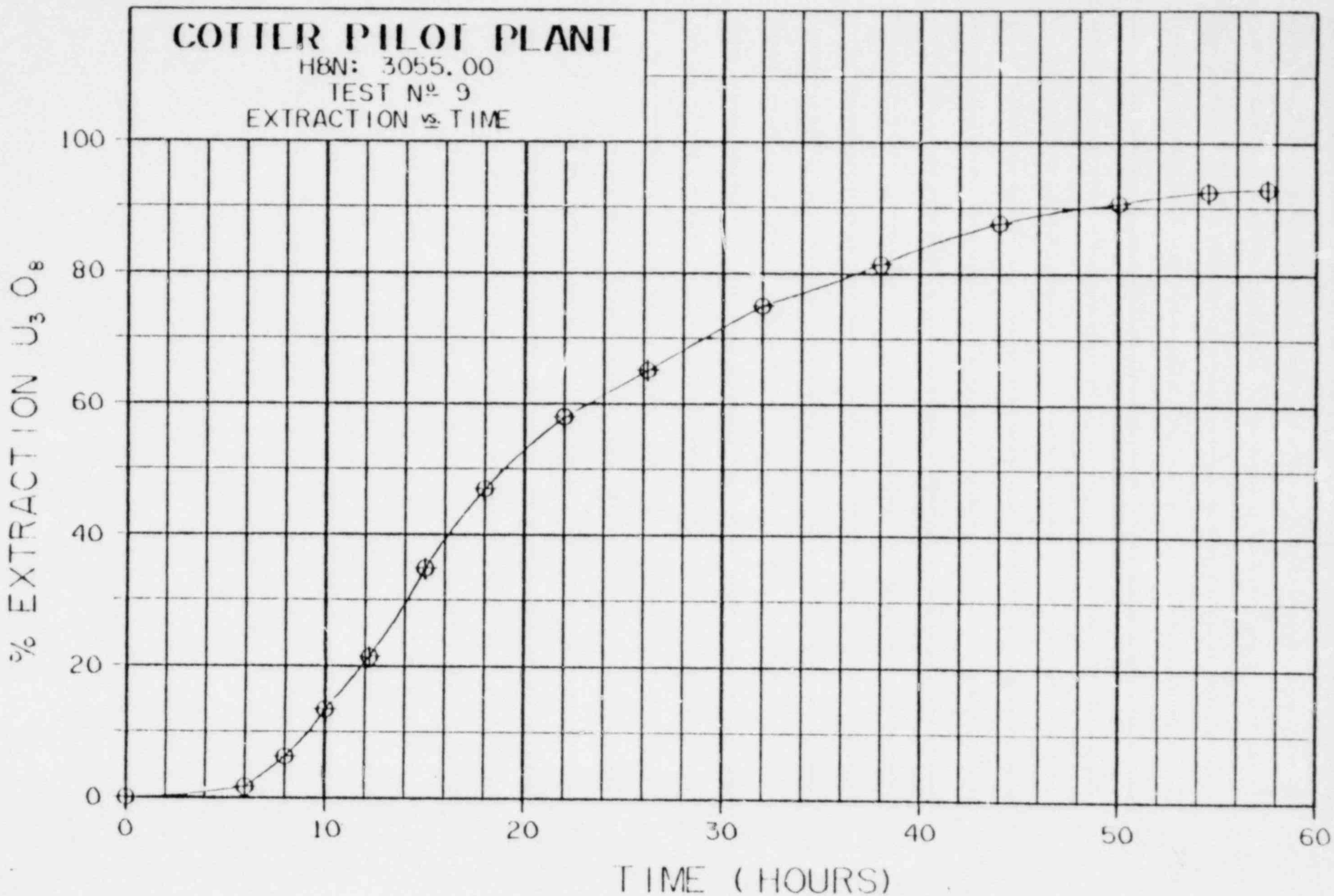
COTTER PILOT PLANT
HBN: 3055.00
TEST Nº 8
EXTRACTION vs. VOLUME
100
80
60
40
20
0
% EXTRACTION U_3O_8
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000

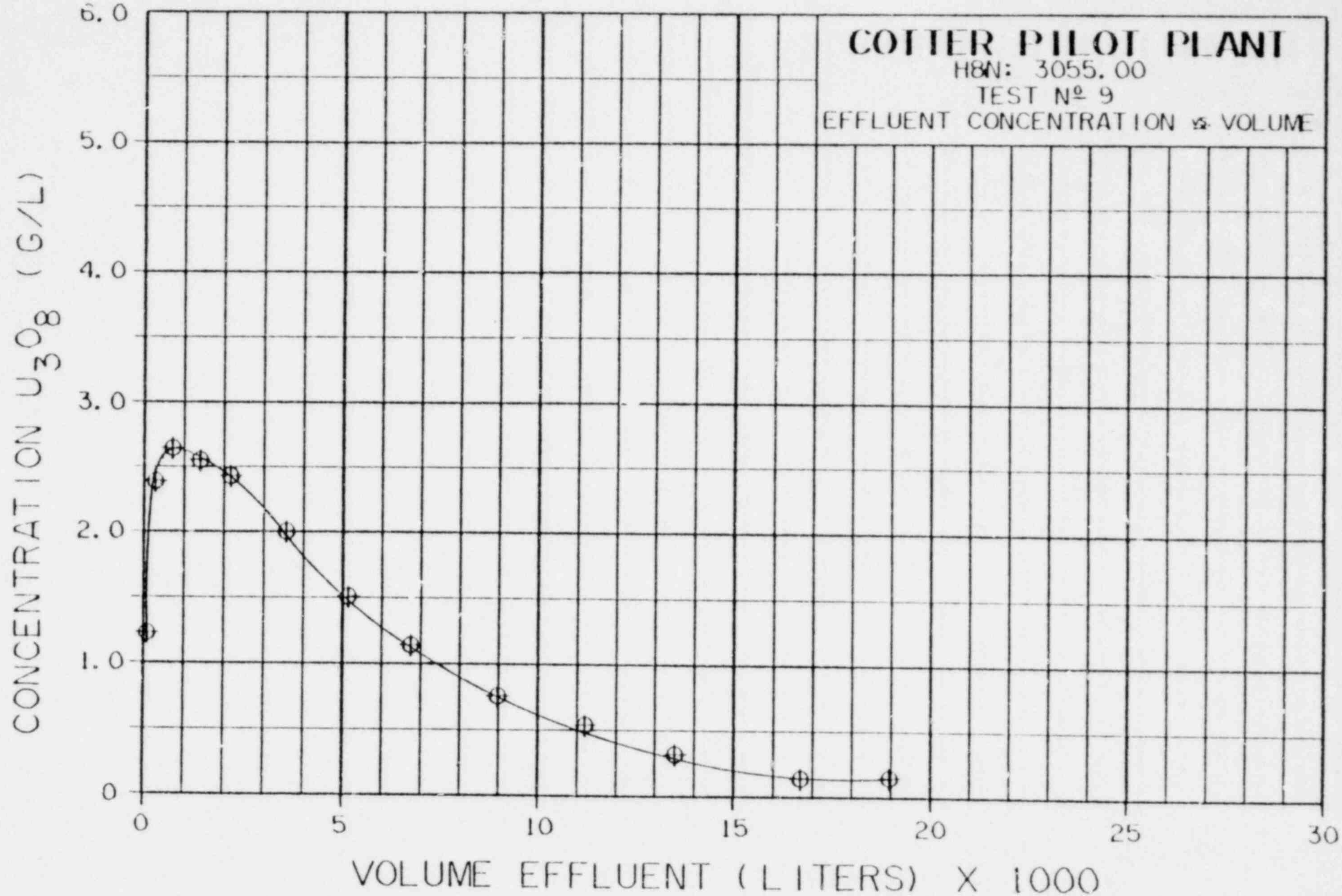


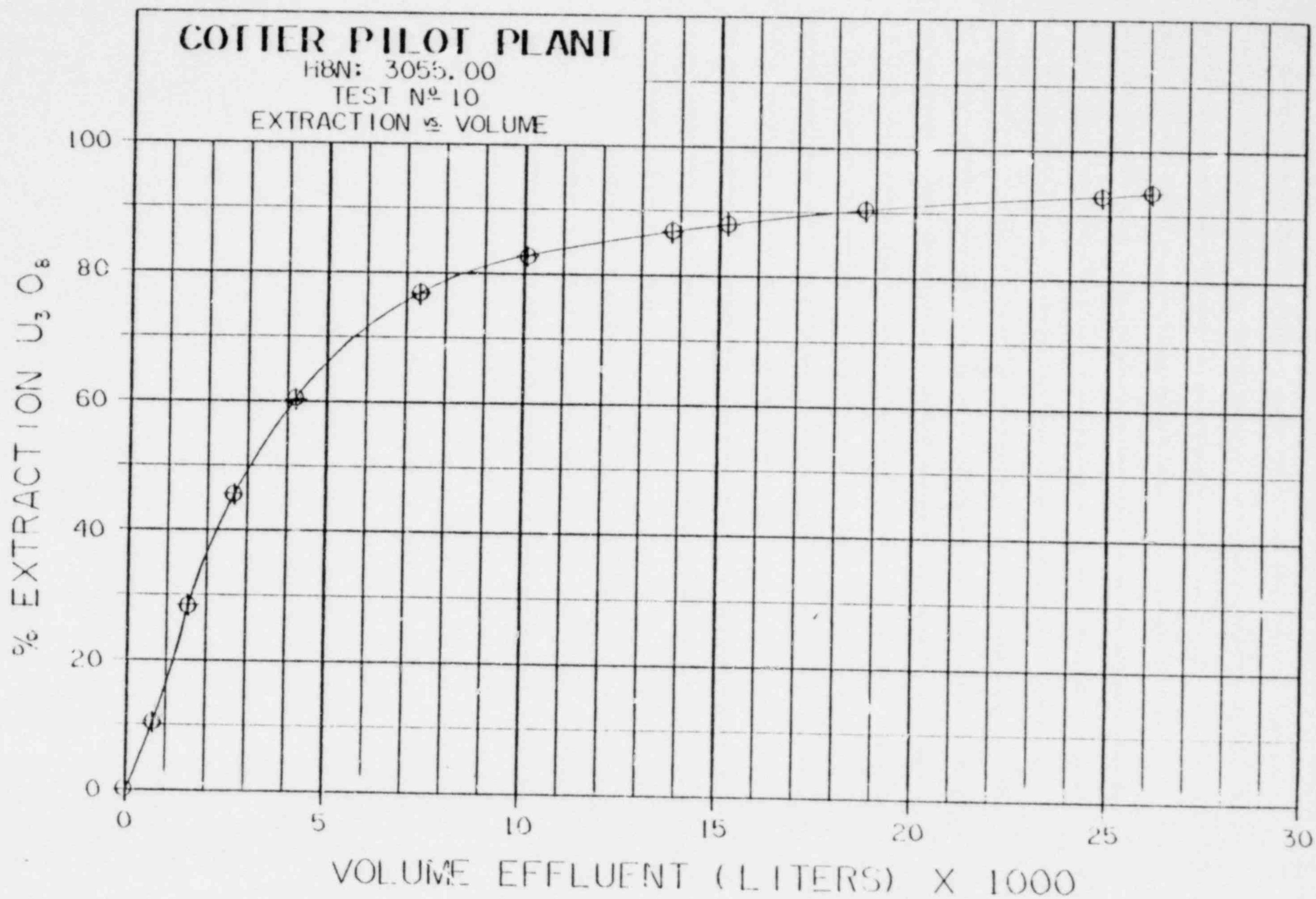
COTTER PILOT PLANT
H8N: 3055.00
TEST № 8
EXTRACTION vs TIME
% EXTRACTION U3 O8
TIME (HOURS)
0
10
20
30
40
50
60
80
100

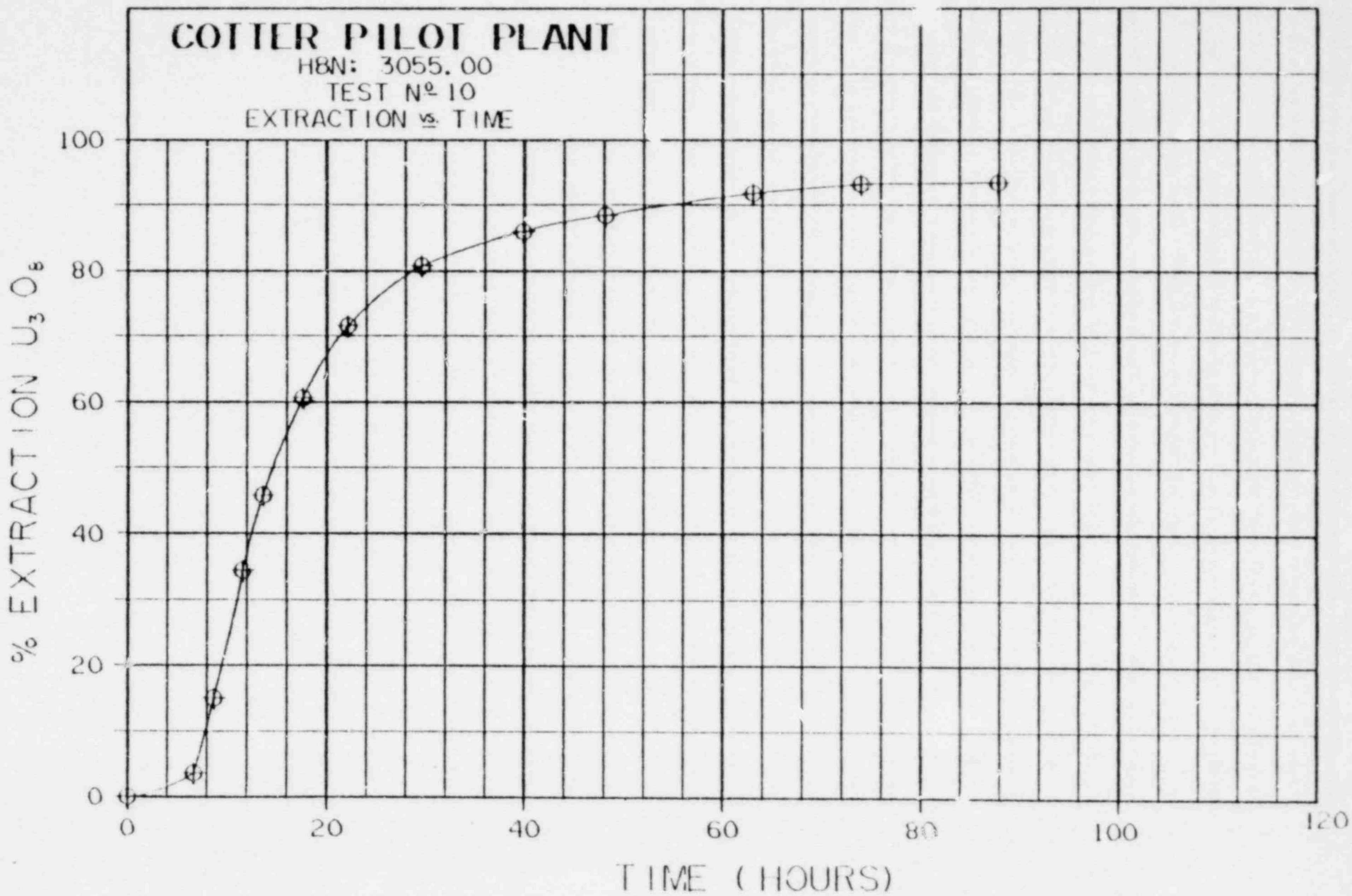

COTTER PILOT PLANT
HBN: 3055.00
TEST Nº 8
EFFLUENT CONCENTRATION vs VOLUME
6.0
5.0
4.0
3.0
2.0
1.0
0
CONCENTRATION U3O8 (G/L)
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000


COTTER PILOT PLANT
H8N: 3055.00
TEST № 9
EXTRACTION vs. VOLUME
% EXTRACTION U_3O_8
0
20
40
60
80
100
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000

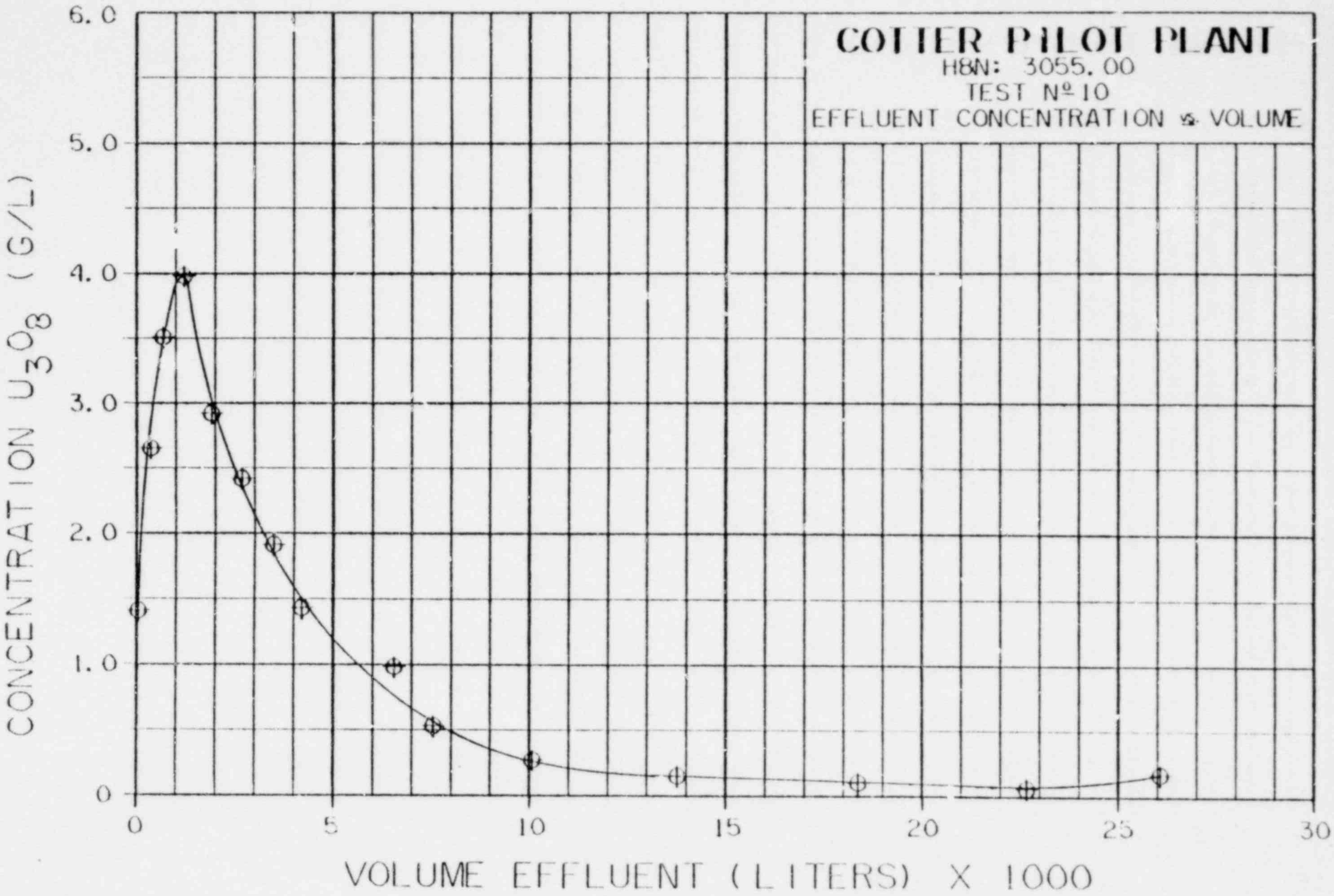

COTTER PILOT PLANT
H&N: 3055.00
TEST № 9
EXTRACTION vs TIME
% EXTRACTION U_3O_8
0
20
40
60
80
100
0
10
20
30
40
50
60
TIME (HOURS)

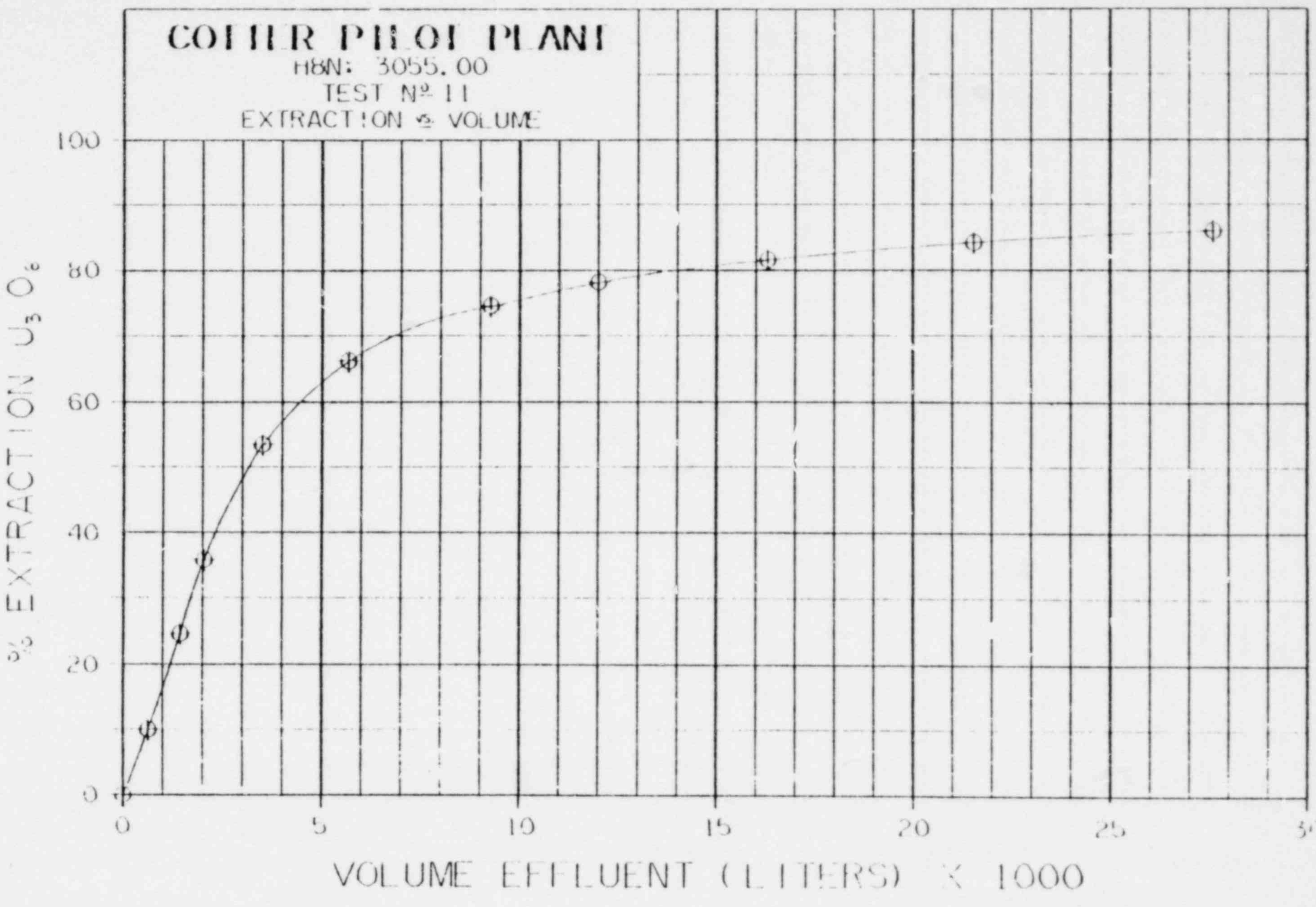

COTTER PILOT PLANT
H8N: 3055.00
TEST № 9
EFFLUENT CONCENTRATION vs VOLUME
CONCENTRATION U3O8 (G/L)
6.0
5.0
4.0
3.0
2.0
1.0
0
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000


COTTER PILOT PLANT
HBN: 3055.00
TEST № 10
EXTRACTION vs. VOLUME
% EXTRACTION U_3O_8
100
80
60
40
20
0
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000

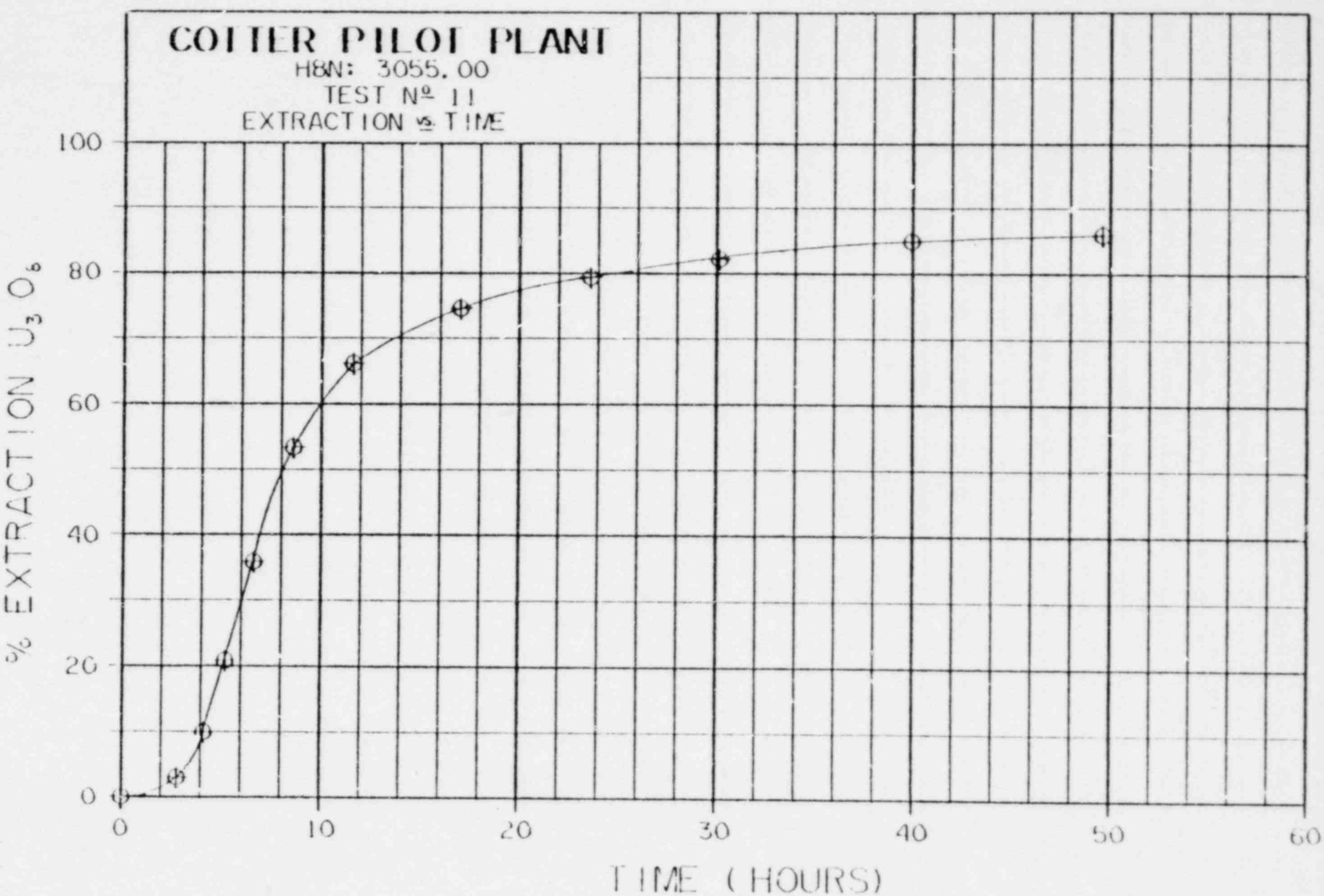


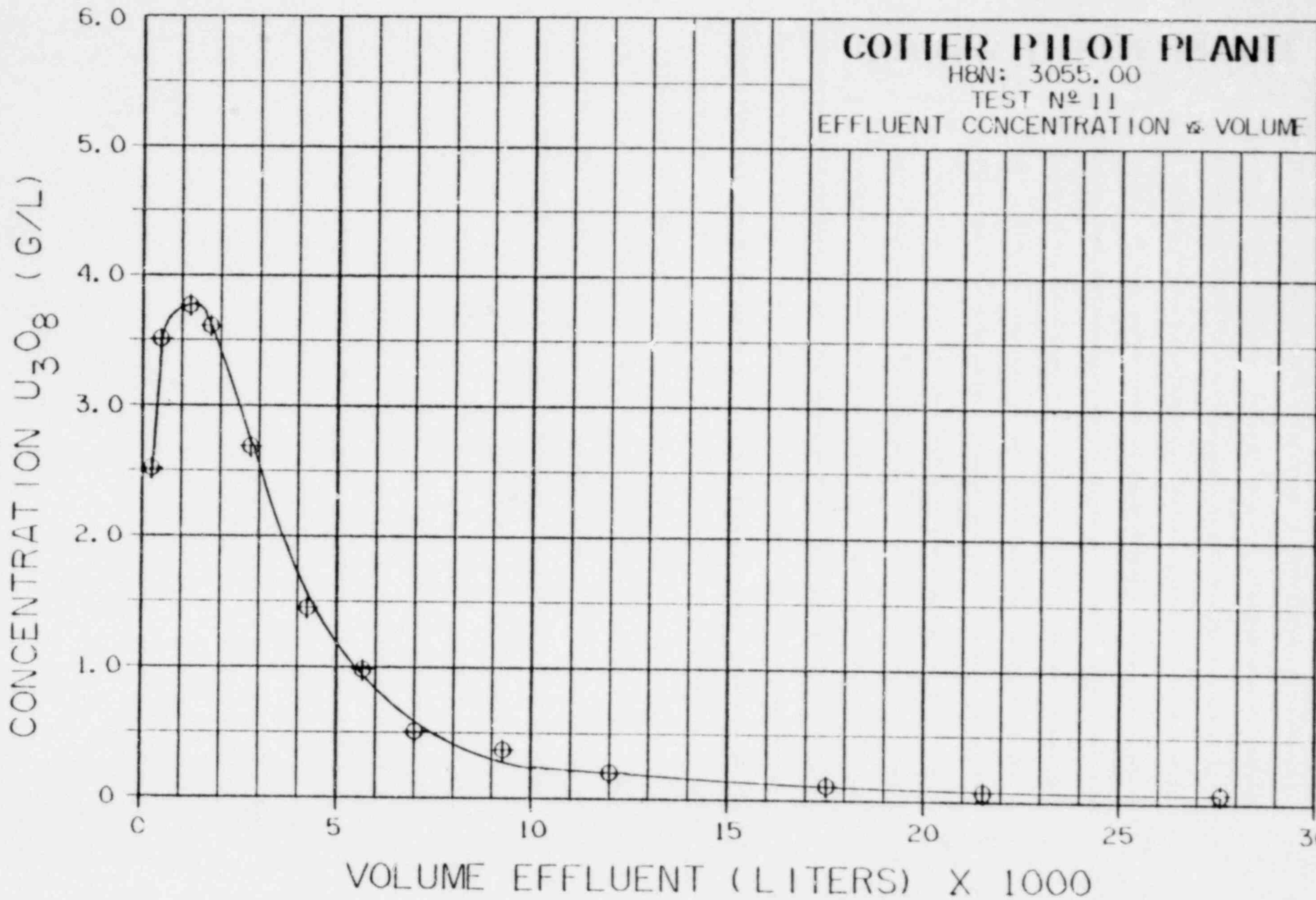
COTTER PILOT PLANT
H8N: 3055.00
TEST Nº 10
EXTRACTION vs TIME
100
80
60
40
20
0
% EXTRACTION U3 O8
0
20
40
60
80
100
120
TIME (HOURS)

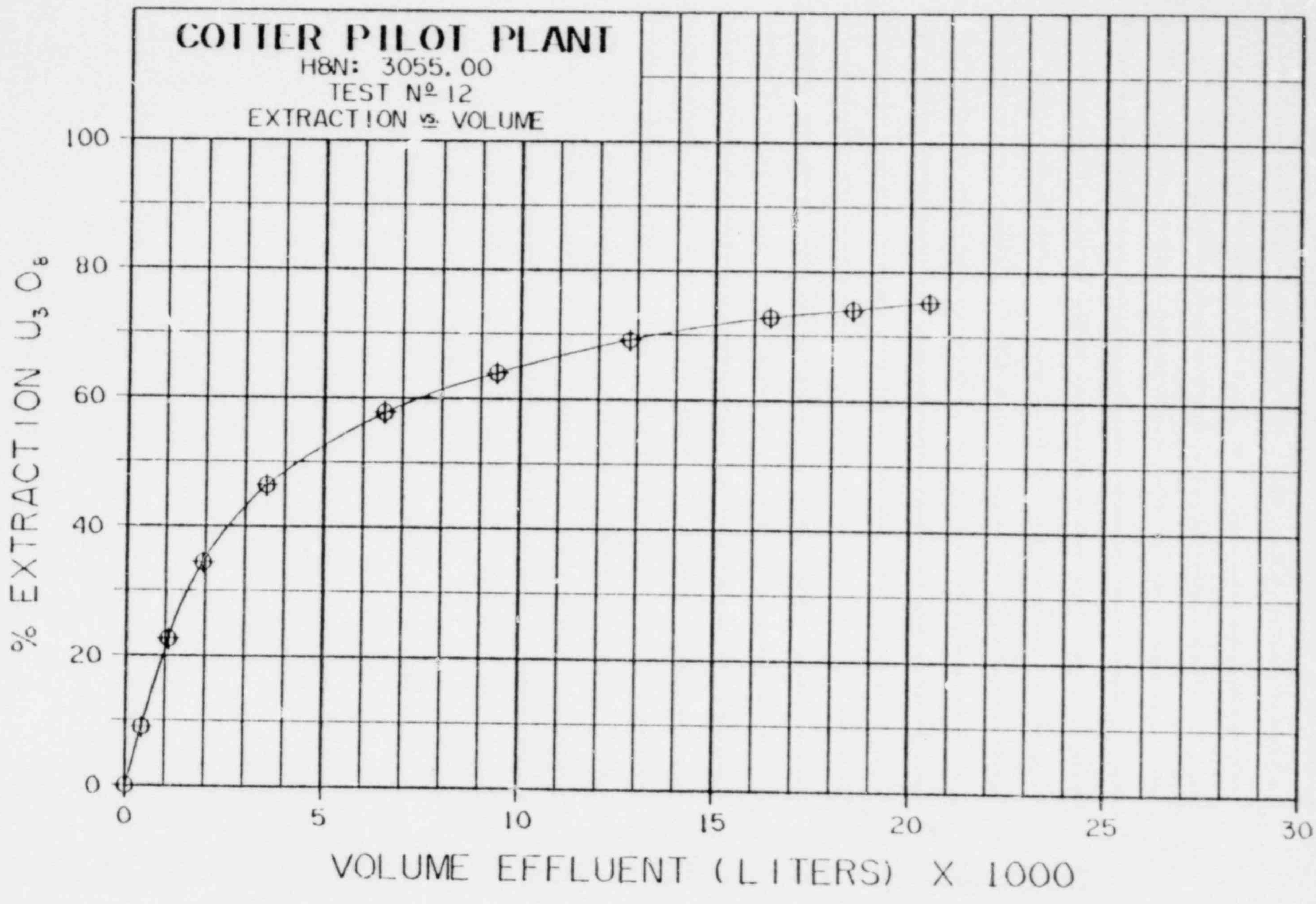

COTTER PILOT PLANT
H&N: 3055.00
TEST № 10
EFFLUENT CONCENTRATION vs VOLUME
CONCENTRATION U3O8 (G/L)
6.0
5.0
4.0
3.0
2.0
1.0
0
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000

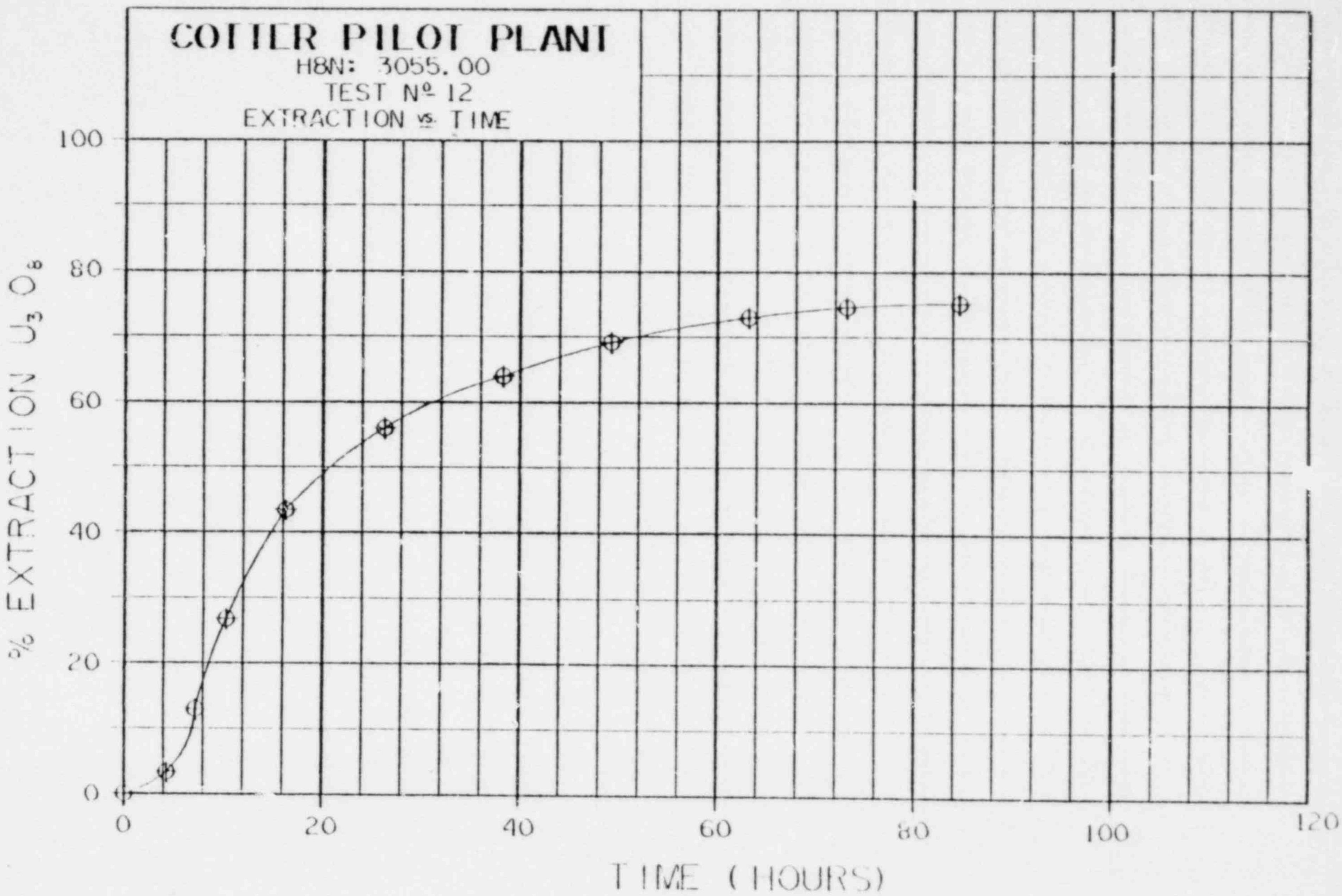


COTTER PILOT PLANT
H&N: 3055.00
TEST № 11
EXTRACTION vs VOLUME
100
80
60
40
20
0
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000
% EXTRACTION U_3O_8

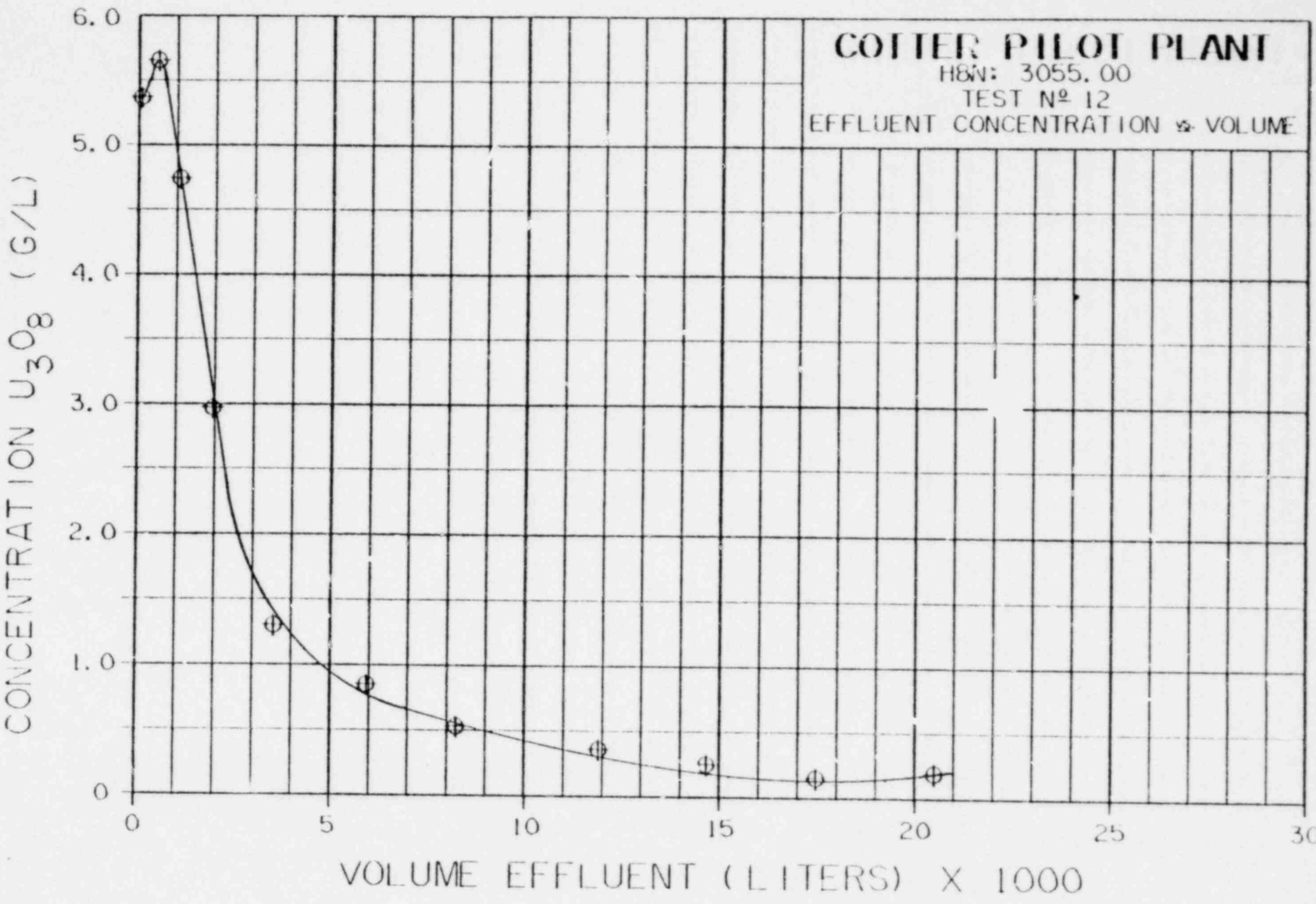

COTTER PILOT PLANT
H8N: 3055.00
TEST № 11
EXTRACTION vs TIME
% EXTRACTION U3 O8
TIME (HOURS)
0
20
40
60
80
100
10
30
50
60

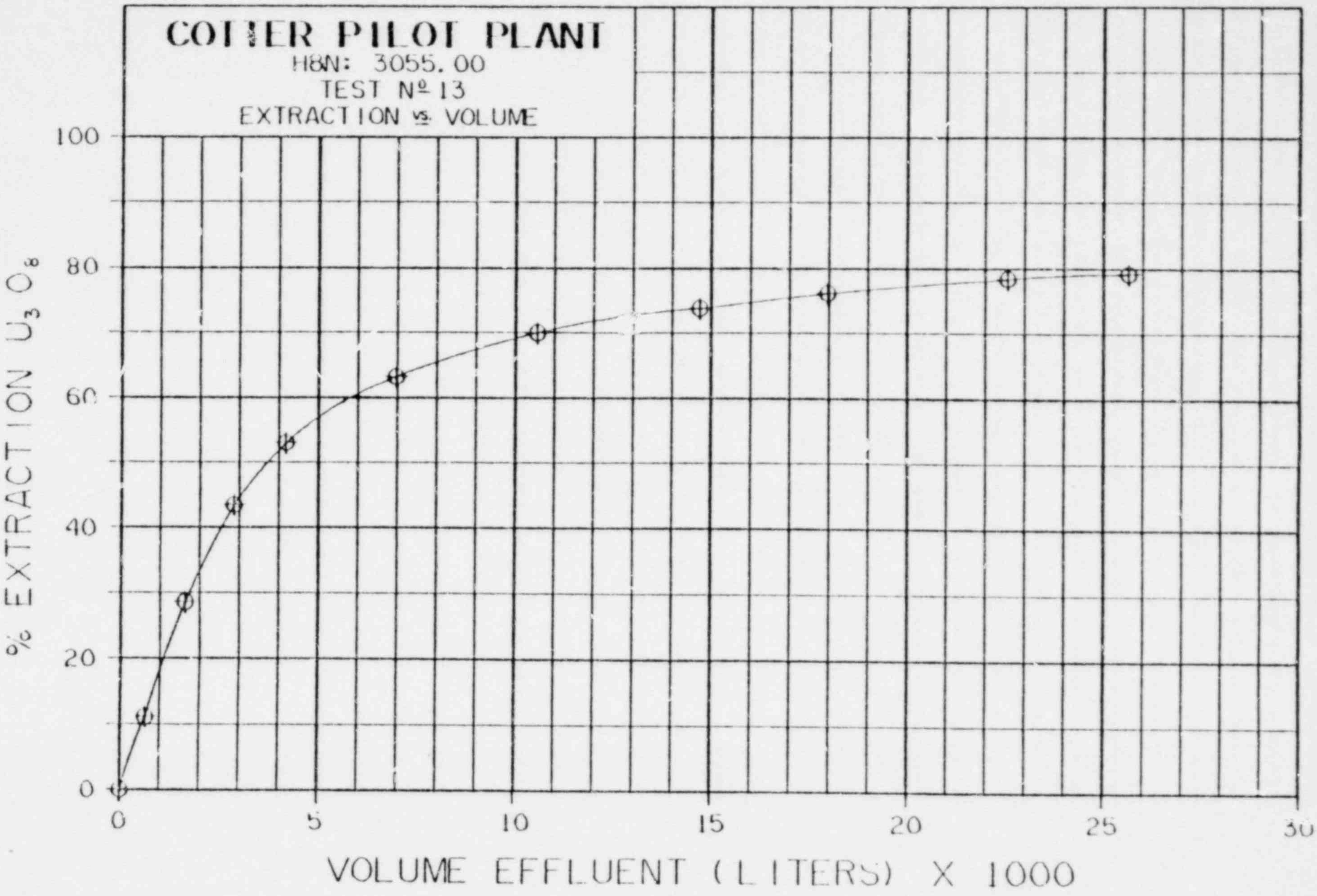

COTTER PILOT PLANT
HBN: 3055.00
TEST № 11
EFFLUENT CONCENTRATION vs VOLUME
CONCENTRATION U_3O_8 (G/L)
6.0
5.0
4.0
3.0
2.0
1.0
0
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000


COTTER PILOT PLANT
H&N: 3055.00
TEST Nº 12
EXTRACTION vs VOLUME
100
80
60
40
20
0
0
5
10
15
20
25
30
% EXTRACTION U_3O_8
VOLUME EFFLUENT (LITERS) X 1000

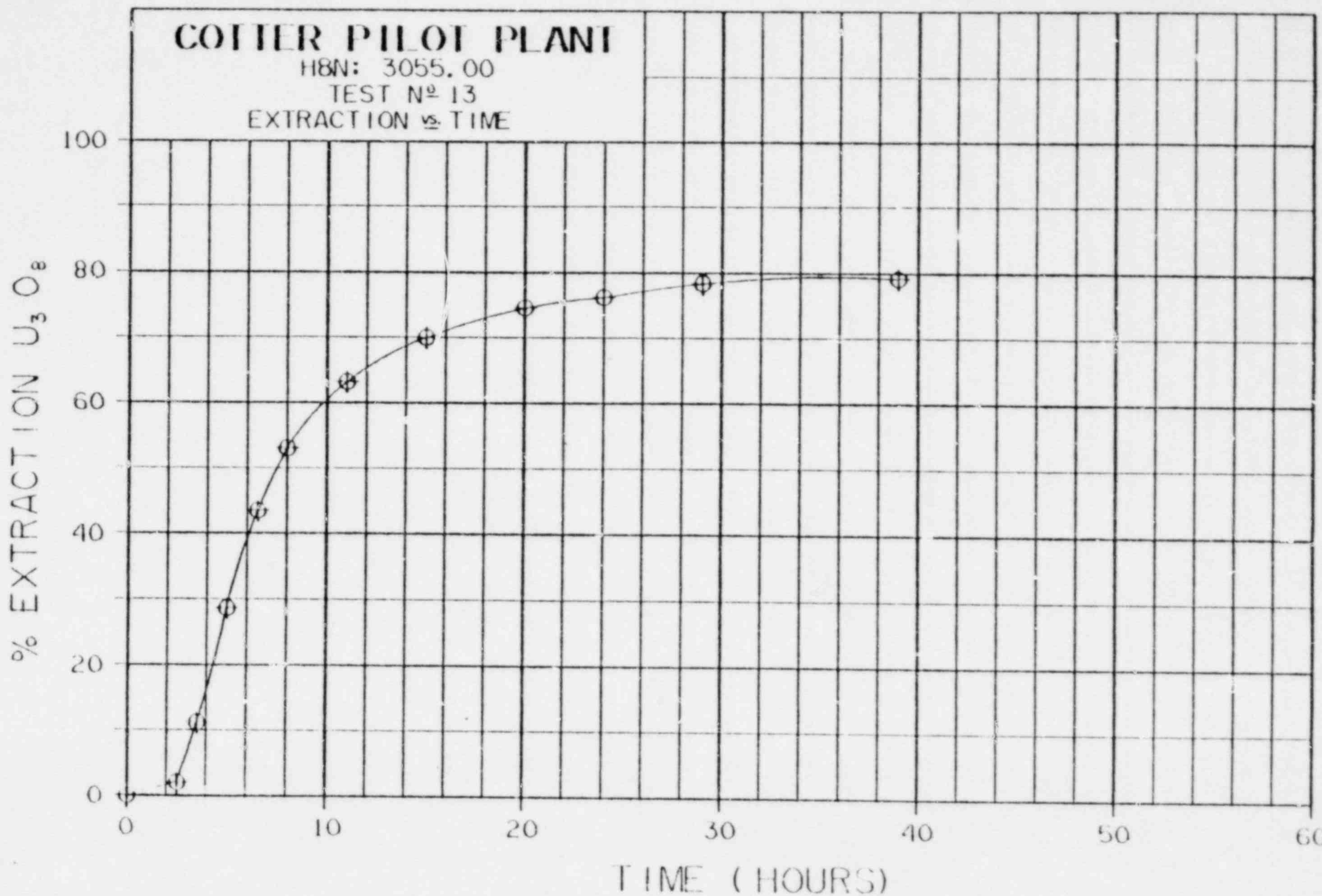


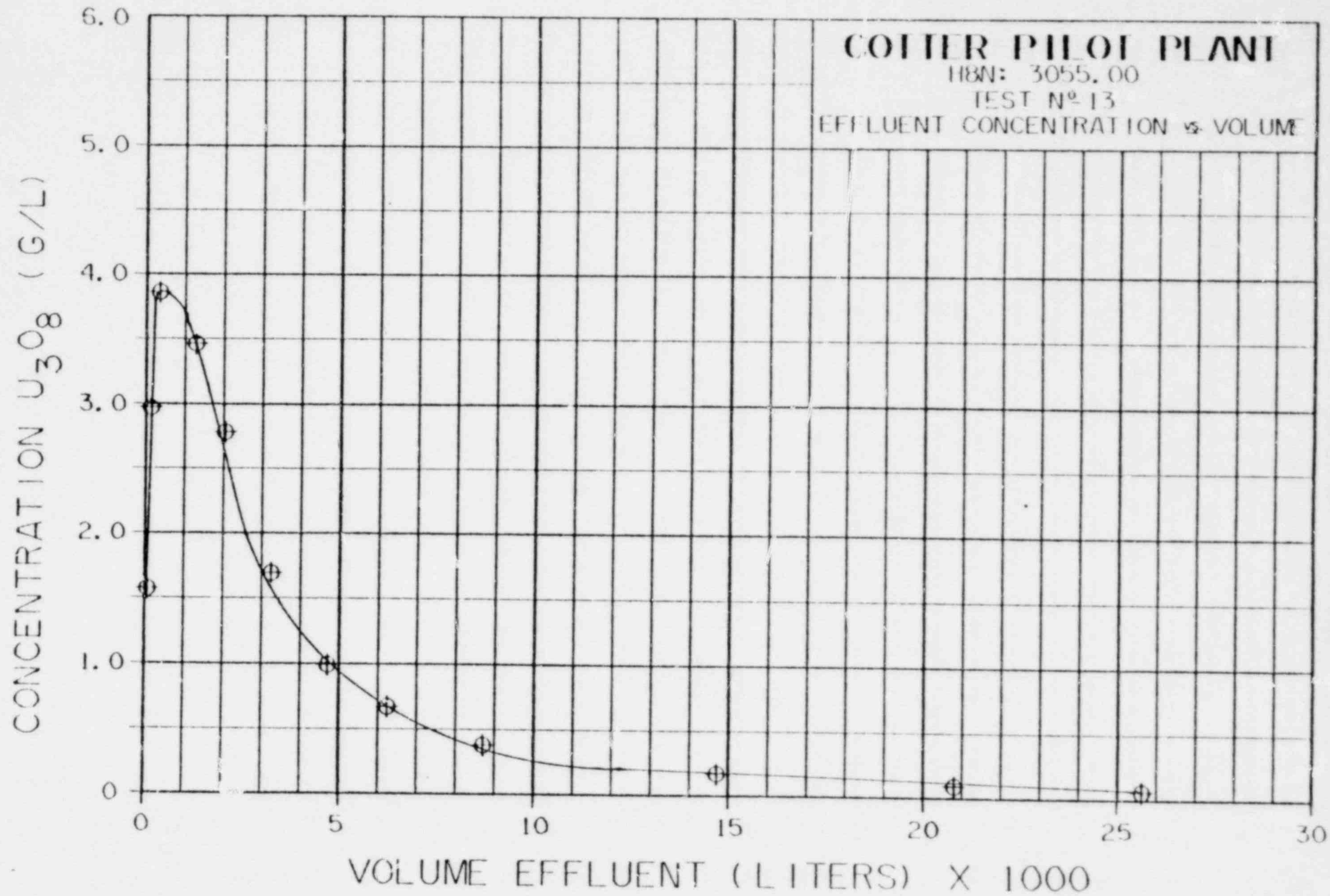
COTTER PILOT PLANT
HBN: 3055.00
TEST № 12
EXTRACTION vs TIME
% EXTRACTION U_3O_8
100
80
60
40
20
0
0
20
40
60
80
100
120
TIME (HOURS)

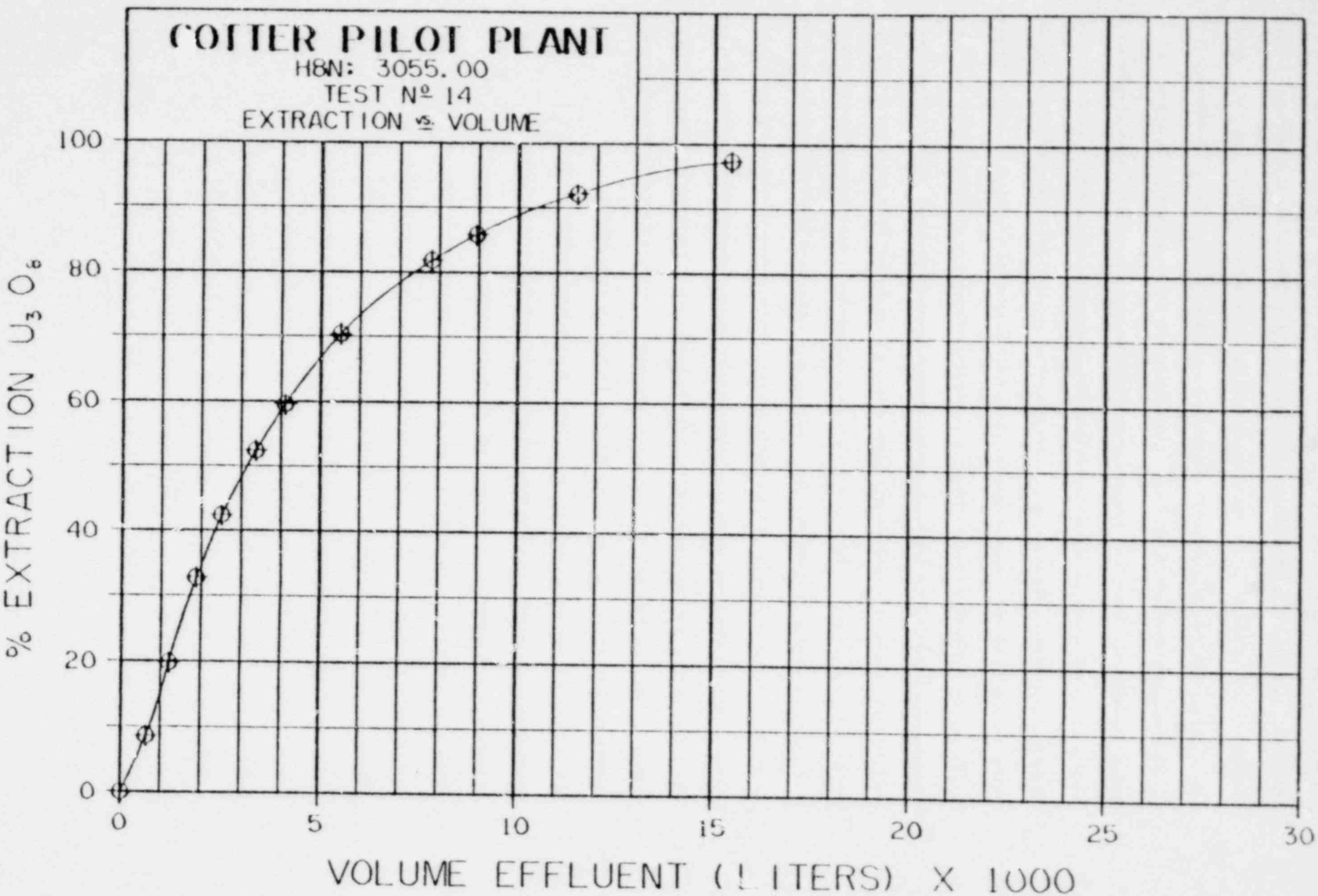

COTTER PILOT PLANT
H&W: 3055.00
TEST Nº 12
EFFLUENT CONCENTRATION vs VOLUME
6.0
5.0
4.0
3.0
2.0
1.0
0
0
5
10
15
20
25
30
CONCENTRATION U_3O_8 (G/L)
VOLUME EFFLUENT (LITERS) X 1000



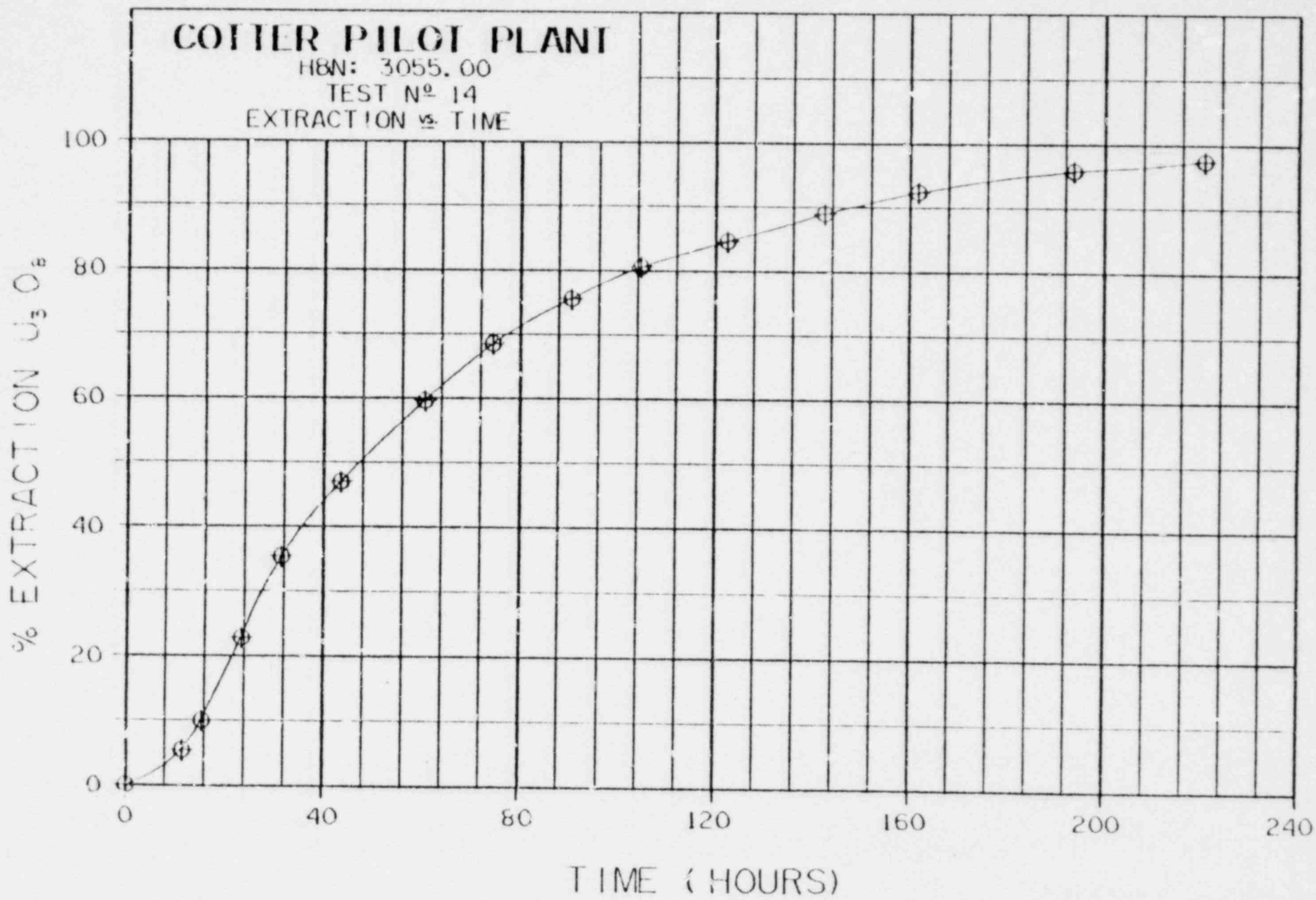
COTTER PILOT PLANT
H8N: 3055.00
TEST Nº 13
EXTRACTION vs VOLUME
% EXTRACTION U3 O8
100
80
60
40
20
0
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000

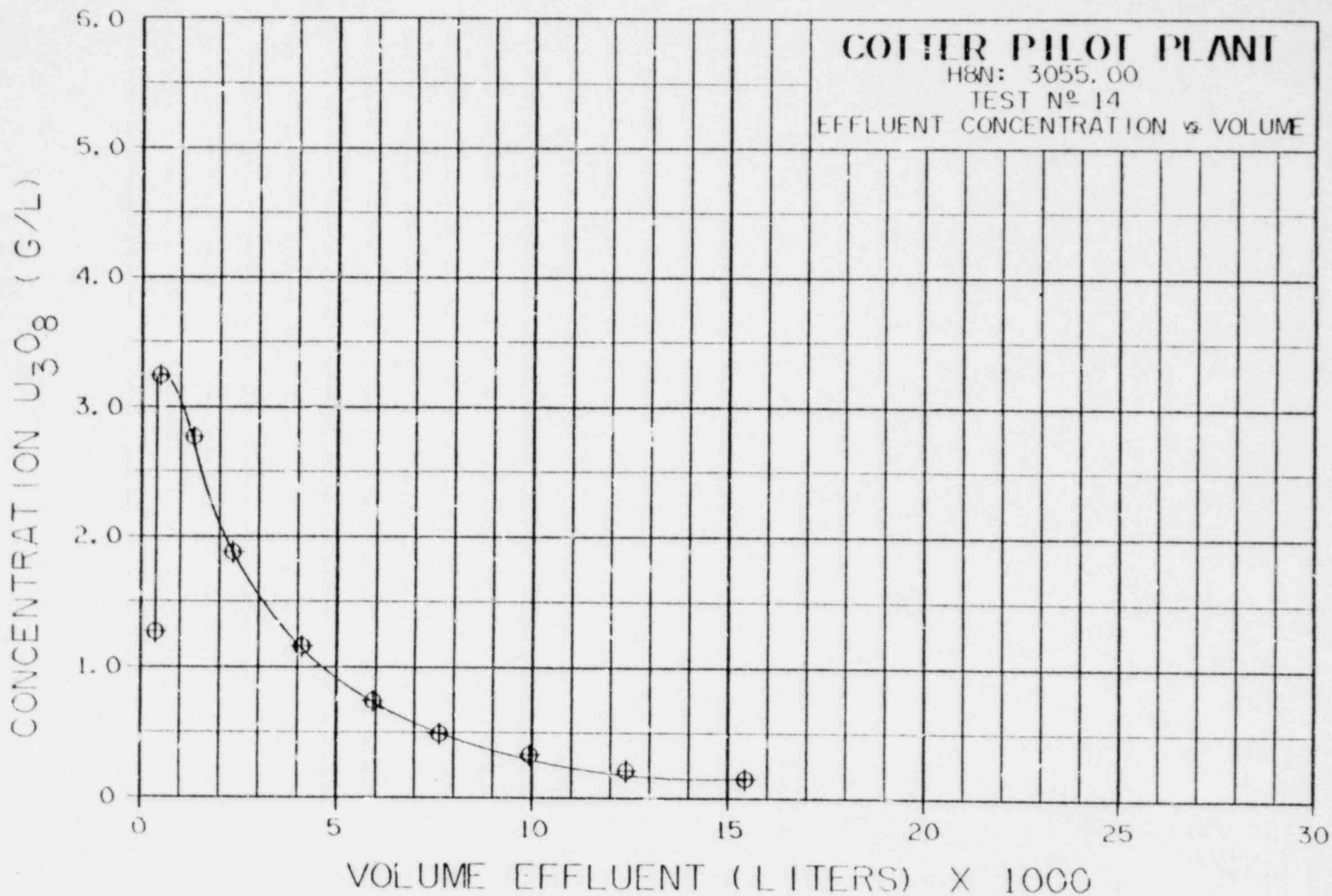

COTTER PILOT PLANT
H8N: 3055.00
TEST Nº 13
EXTRACTION vs TIME
100
80
60
40
20
0
0
10
20
30
40
50
60
% EXTRACTION U3 O8
TIME (HOURS)

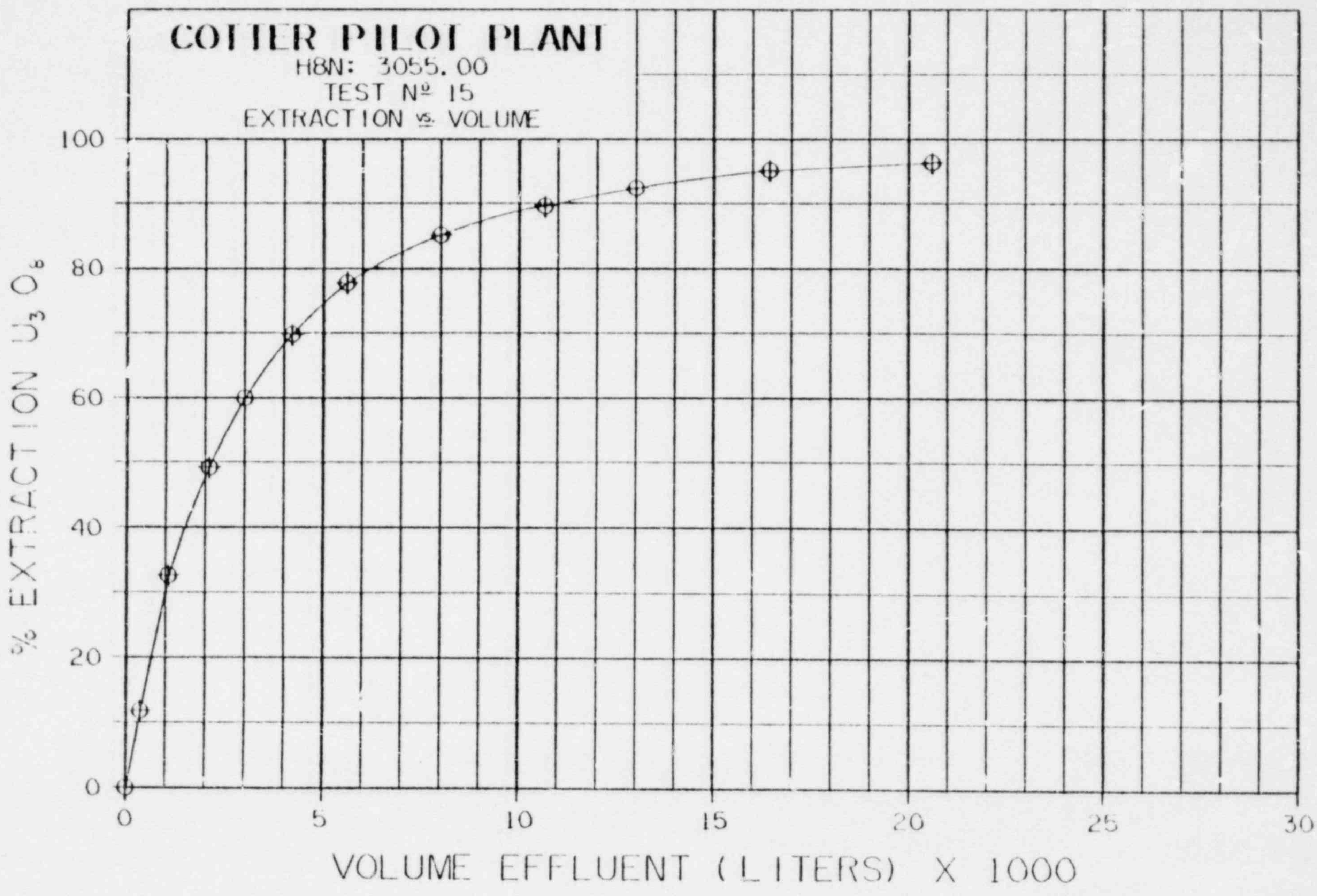

COTTER PILOT PLANT
HBN: 3055.00
TEST Nº 13
EFFLUENT CONCENTRATION vs VOLUME
CONCENTRATION U_3O_8 (G/L)
6.0
5.0
4.0
3.0
2.0
1.0
0
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000

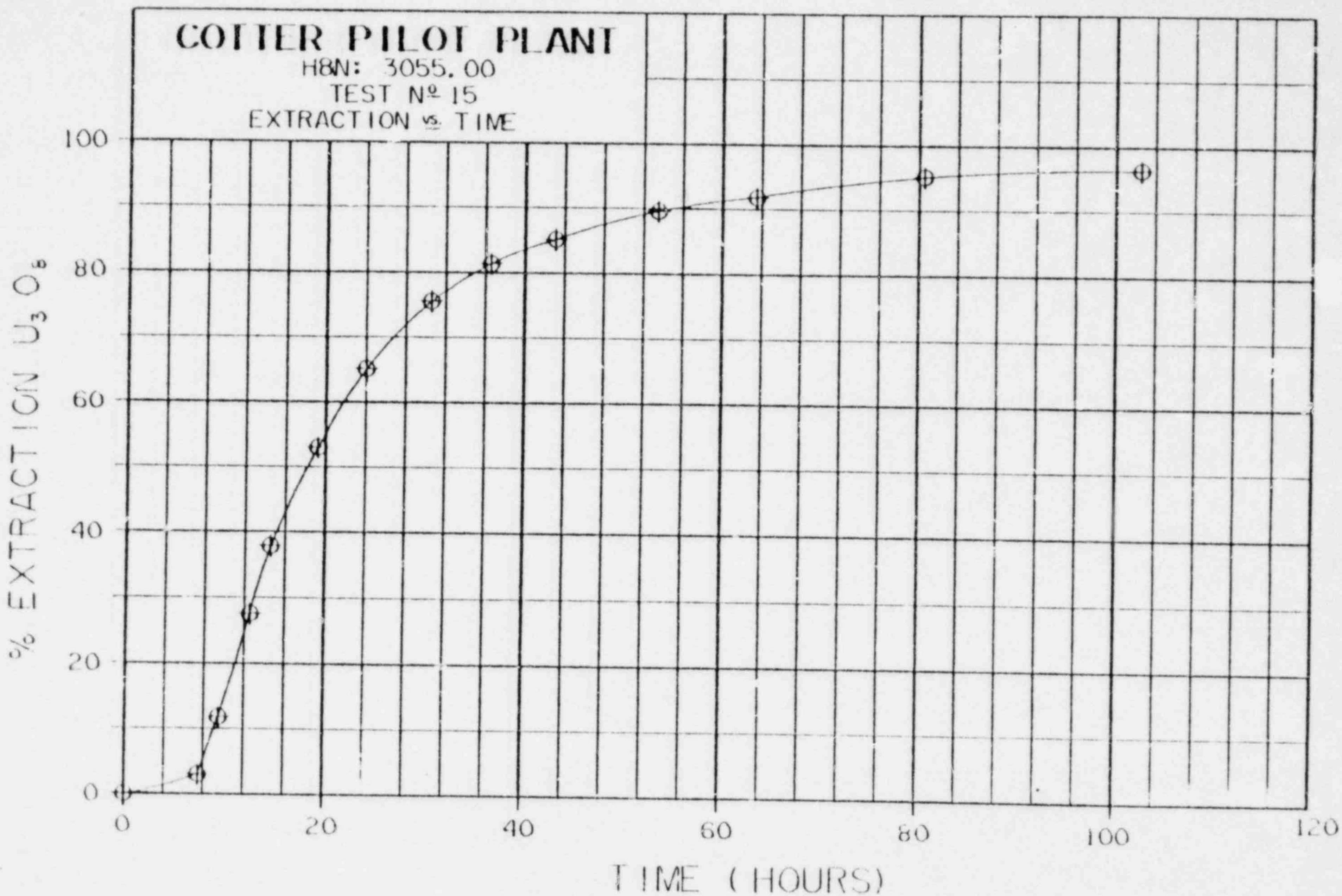


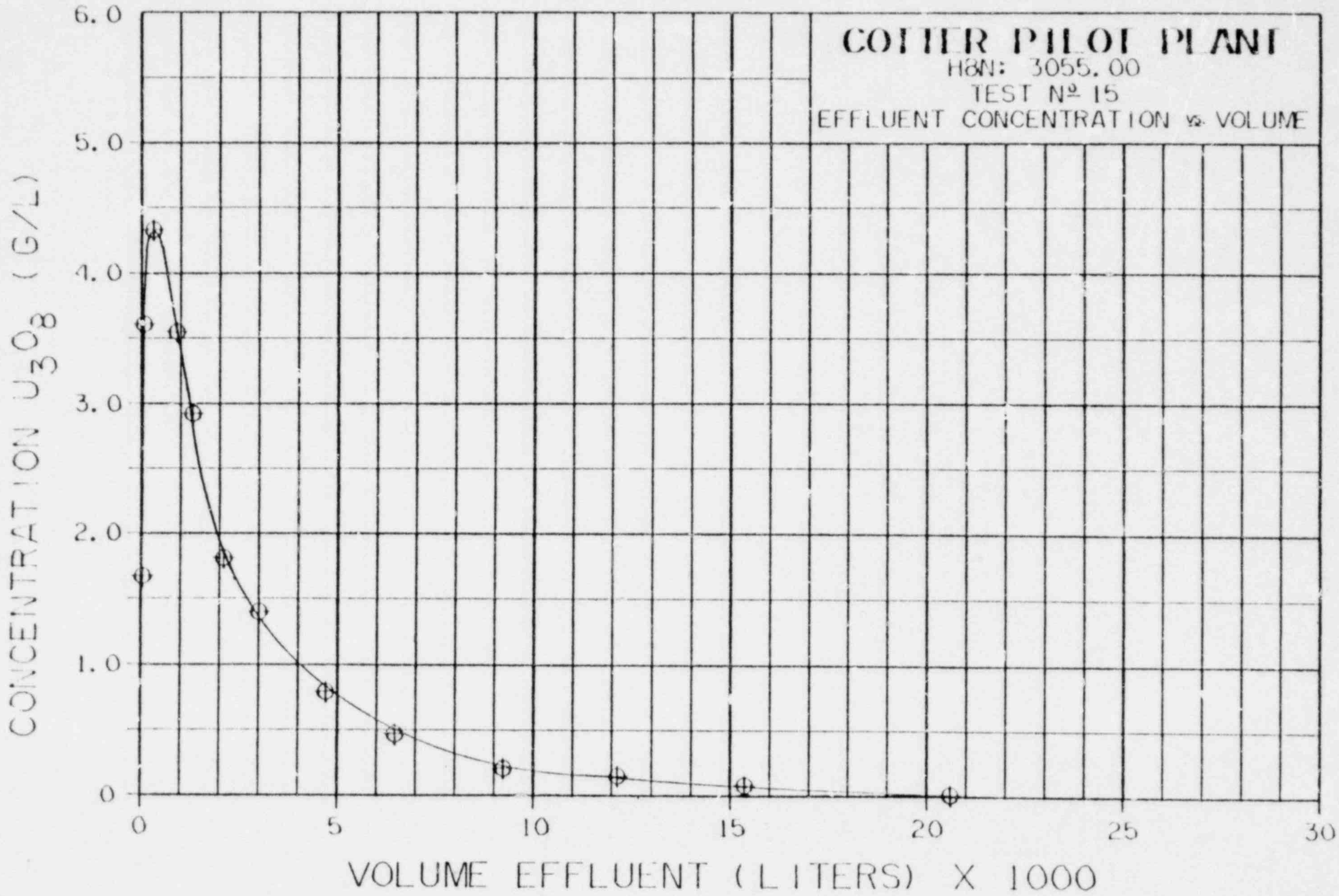
COTTER PILOT PLANT
HBN: 3055.00
TEST № 14
EXTRACTION vs VOLUME
% EXTRACTION U_3O_8
100
80
60
40
20
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000


COTTER PILOT PLANT
HBN: 3055.00
TEST № 14
EXTRACTION vs TIME
% EXTRACTION U3 O8
0
20
40
60
80
100
0
40
80
120
160
200
240
TIME (HOURS)

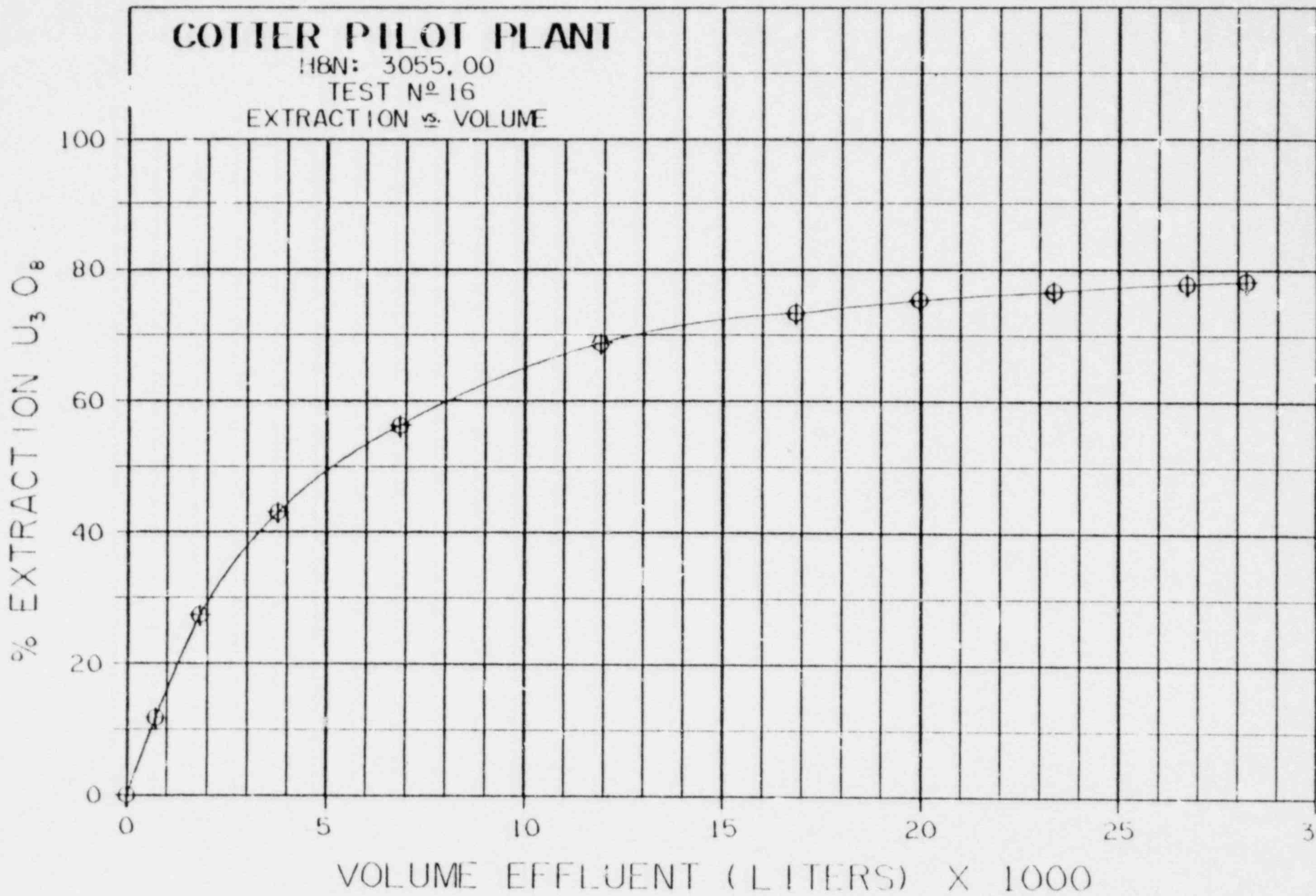

COTTER PILOT PLANT
H&N: 3055.00
TEST № 14
EFFLUENT CONCENTRATION vs VOLUME
6.0
5.0
4.0
3.0
2.0
1.0
0
CONCENTRATION U3O8 (G/L)
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000


COTTER PILOT PLANT
H8N: 3055.00
TEST Nº 15
EXTRACTION vs. VOLUME
% EXTRACTION U_3O_8
VOLUME EFFLUENT (LITERS) X 1000
0
20
40
60
80
100
0
5
10
15
20
25
30

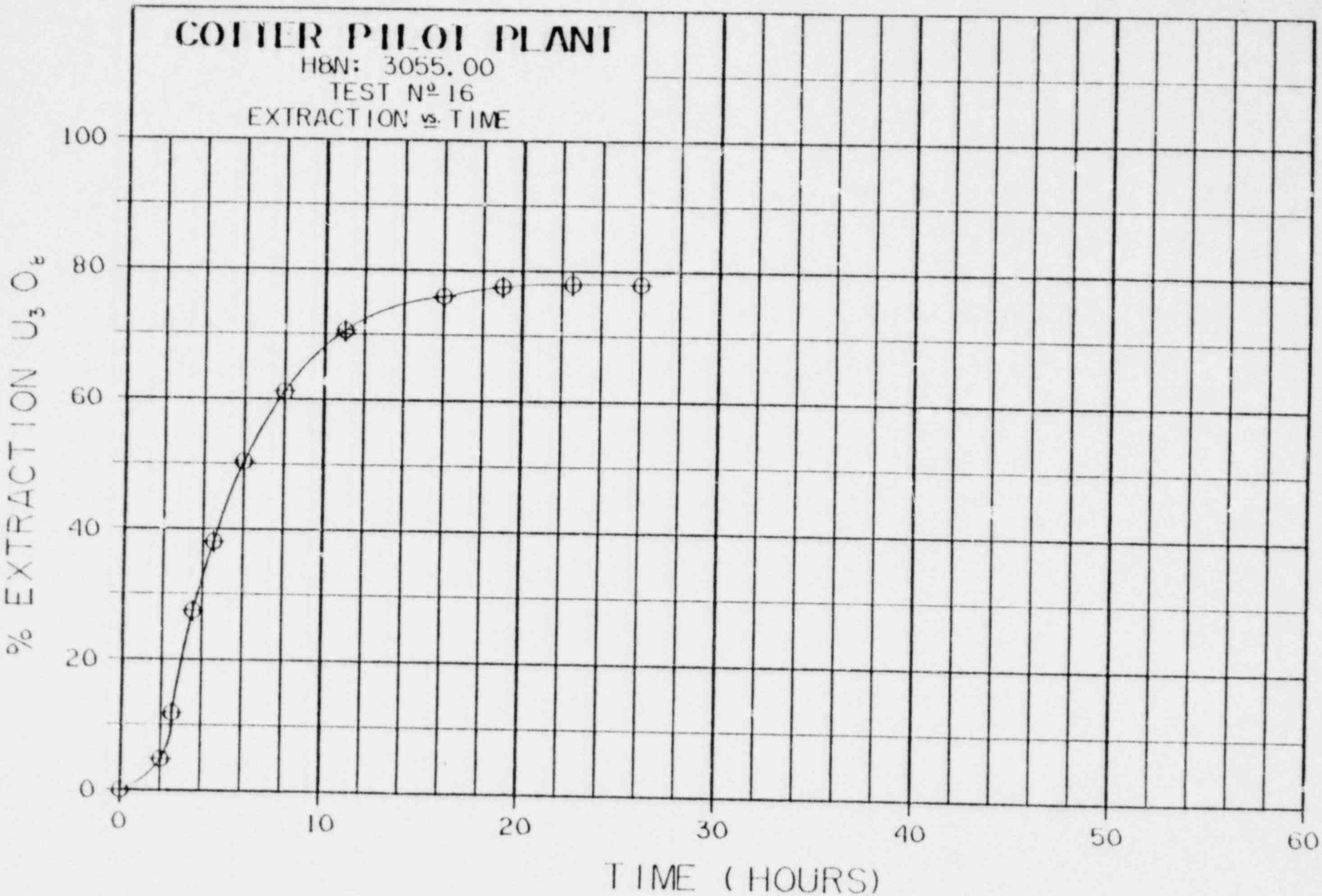

COTTER PILOT PLANT
H8N: 3055.00
TEST Nº 15
EXTRACTION vs. TIME
100
80
60
40
20
0
% EXTRACTION U_3O_8
0
20
40
60
80
100
120
TIME (HOURS)



COTTER PILOT PLANT
H&N: 3055.00
TEST Nº 15
EFFLUENT CONCENTRATION vs VOLUME
6.0
5.0
4.0
3.0
2.0
1.0
0
CONCENTRATION U3O8 (G/L)
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000



COTTER PILOT PLANT
HBN: 3055.00
TEST Nº 16
EXTRACTION vs VOLUME
% EXTRACTION U_3O_8
100
80
60
40
20
0
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000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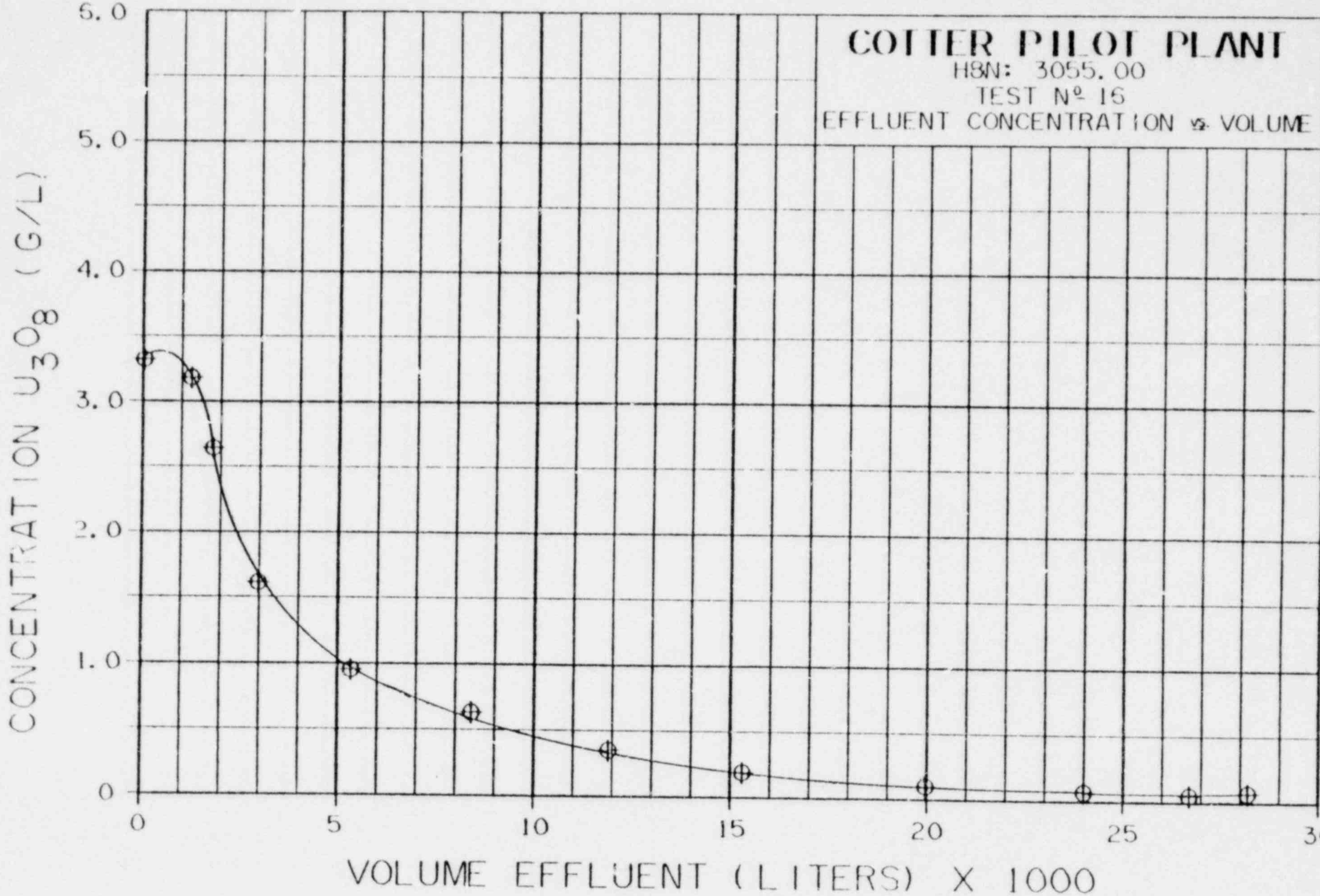
H&N: 3055.00
TEST № 16
EXTRACTION vs. TIME
% EXTRACTION U_3O_8
100
80
60
40
20
0
0
10
20
30
40
50
60
TIME (HOURS)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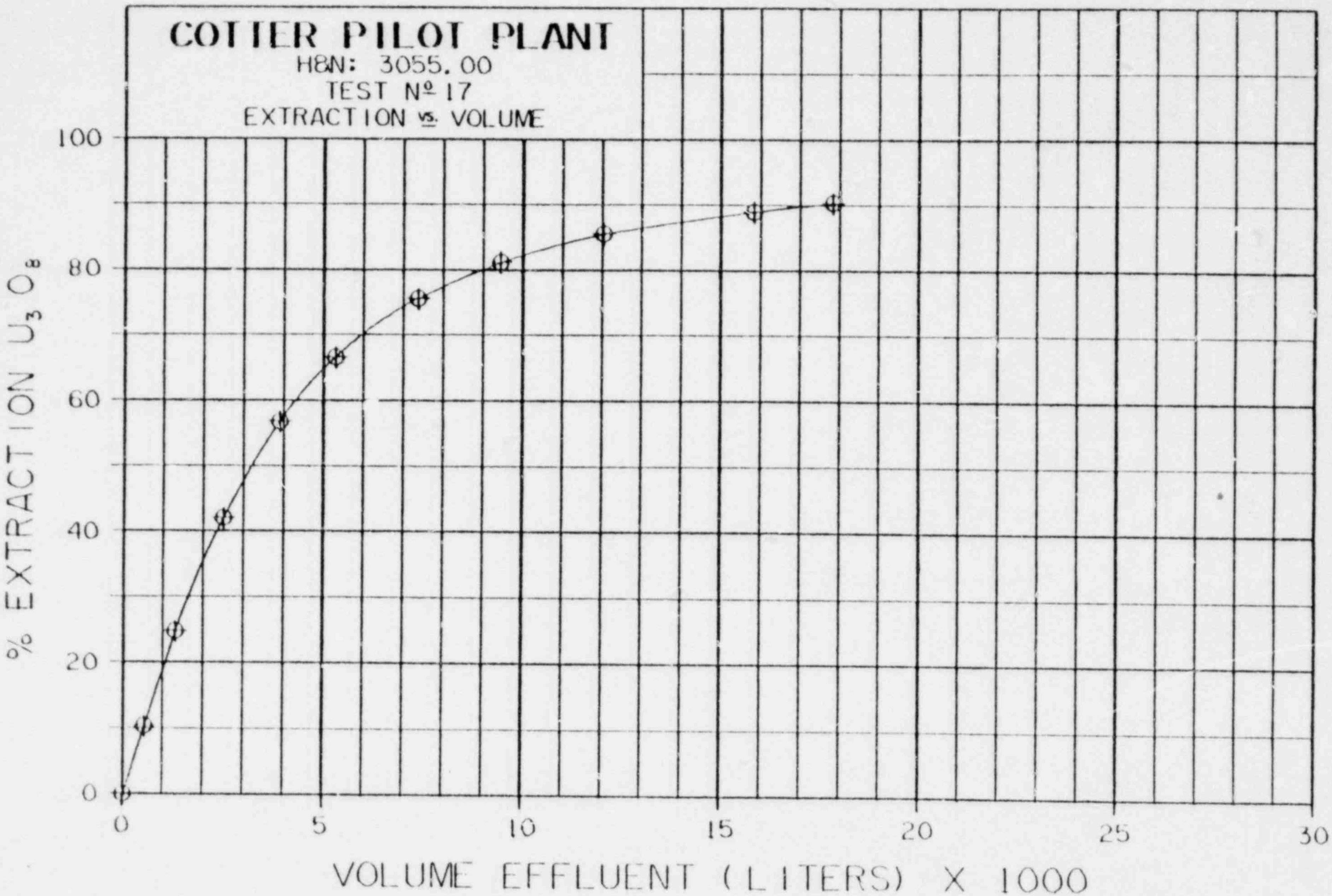
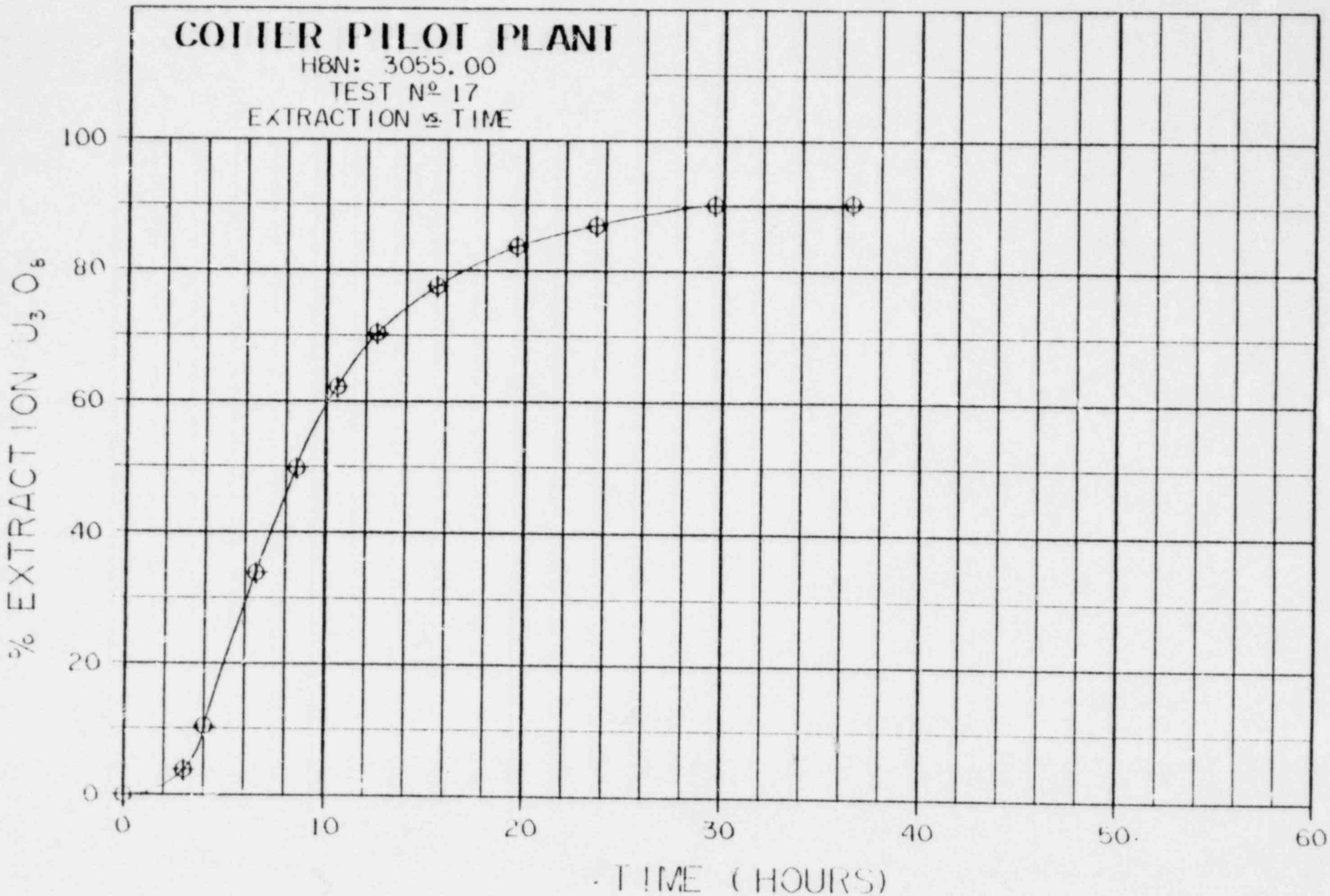
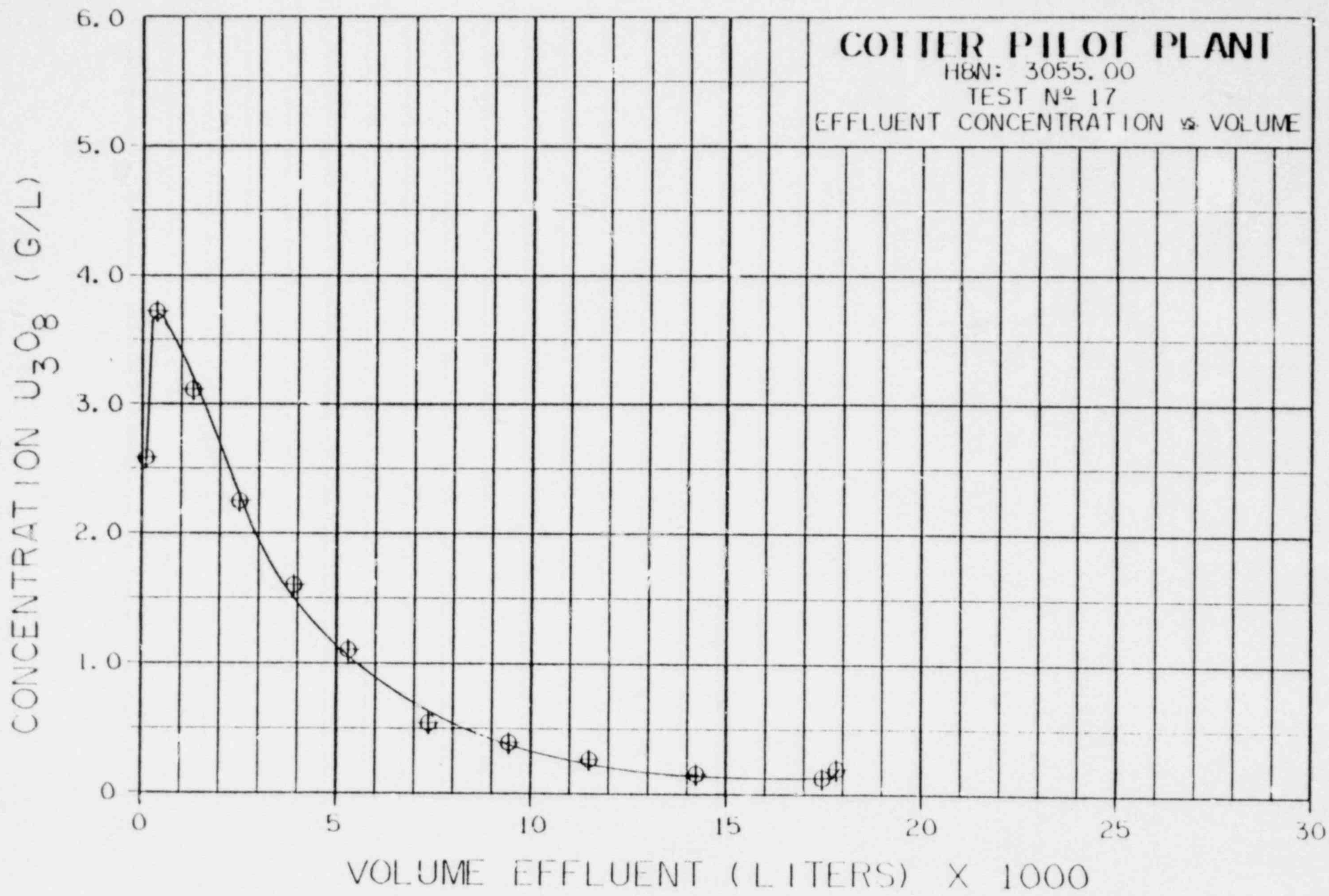
H8N: 3055.00
TEST Nº 16
EFFLUENT CONCENTRATION vs VOLUME
CONCENTRATION U3O8 (G/L)
6.0
5.0
4.0
3.0
2.0
1.0
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000

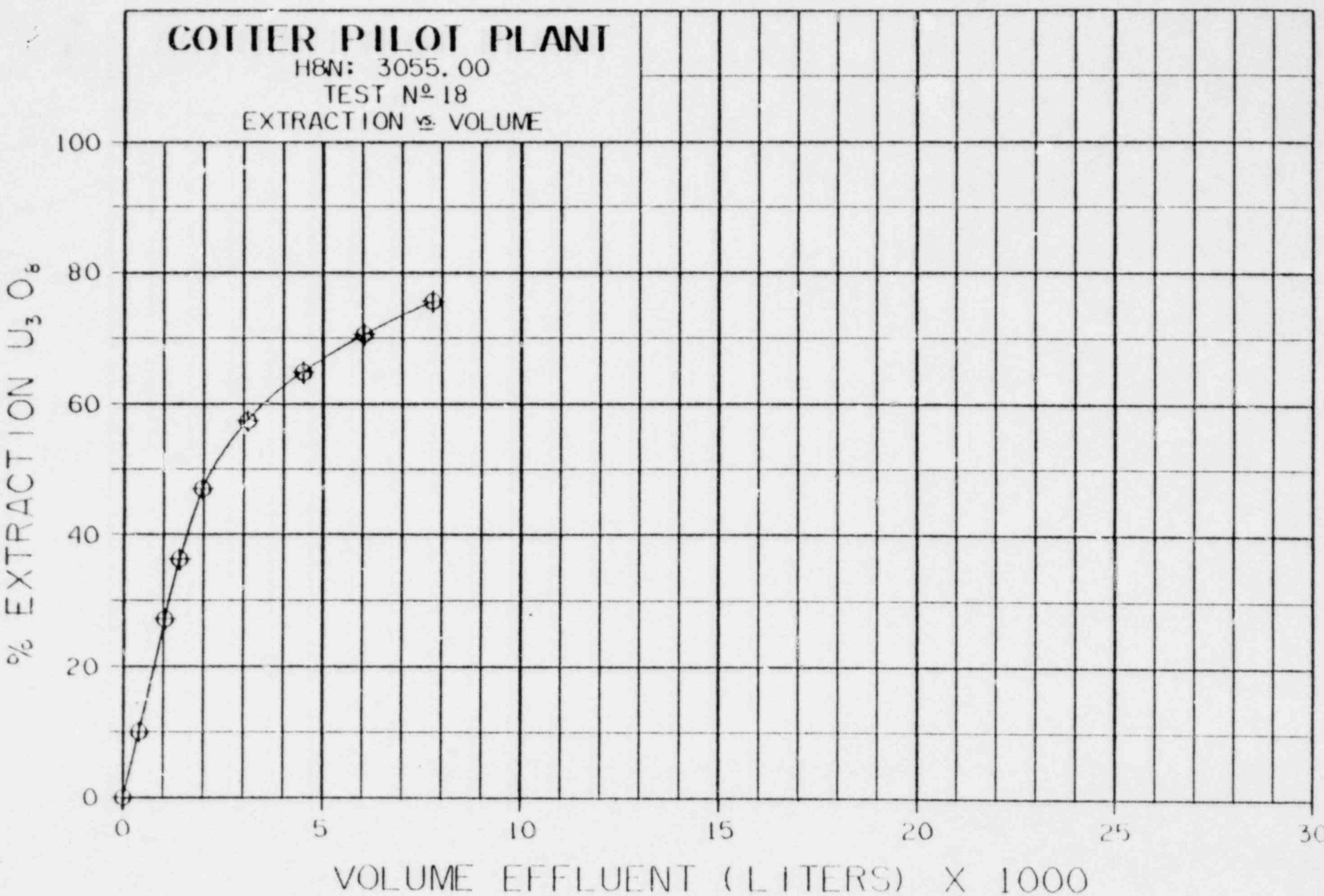


COTTER PILOT PLANT
H8N: 3055.00
TEST № 17
EXTRACTION vs. VOLUME
100
80
60
40
20
0
% EXTRACTION U3O8
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000

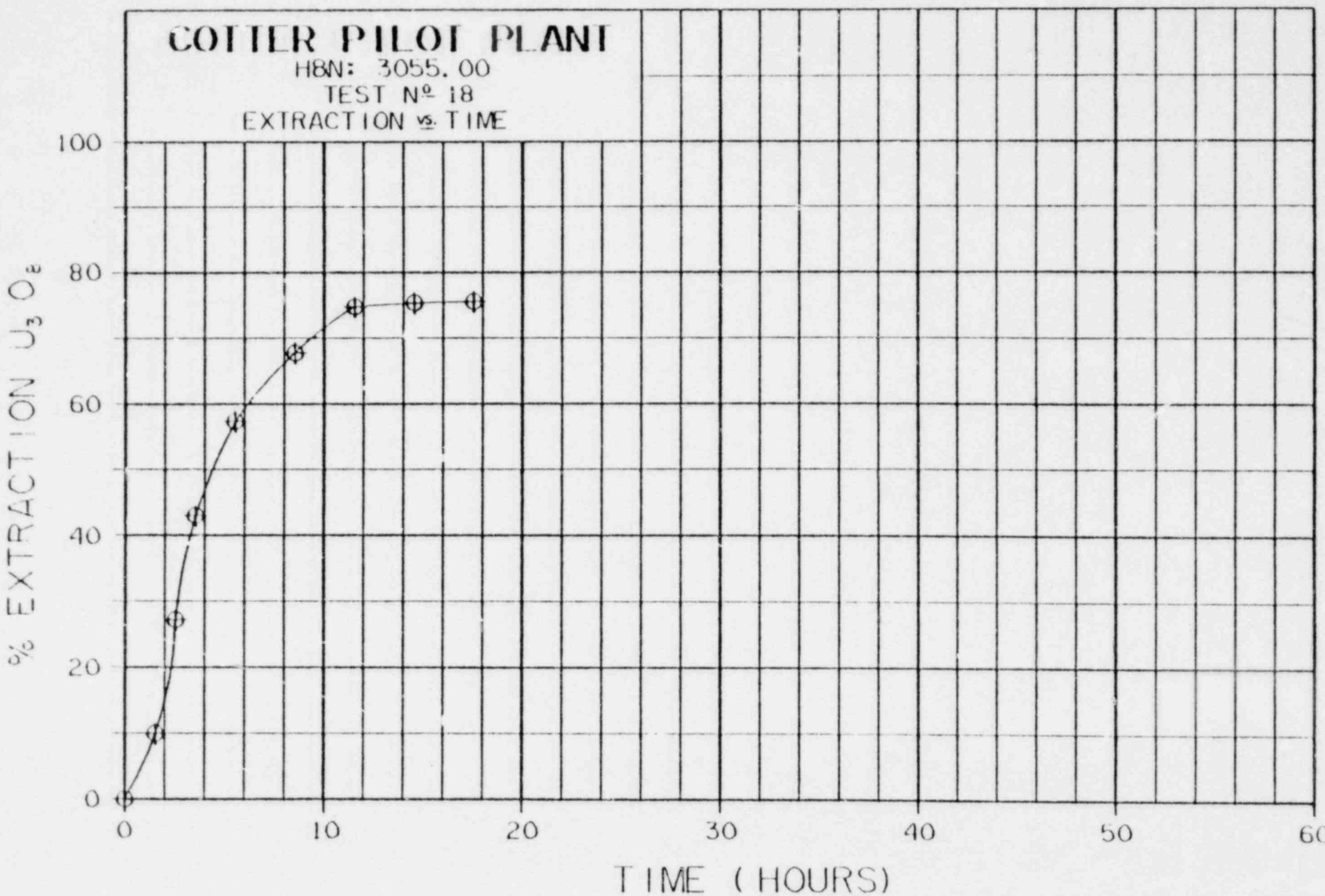

COTTER PILOT PLANT
HBN: 3055.00
TEST Nº 17
EXTRACTION vs. TIME
% EXTRACTION U_3O_8
100
80
60
40
20
0
0
10
20
30
40
50
60
TIME (HOURS)

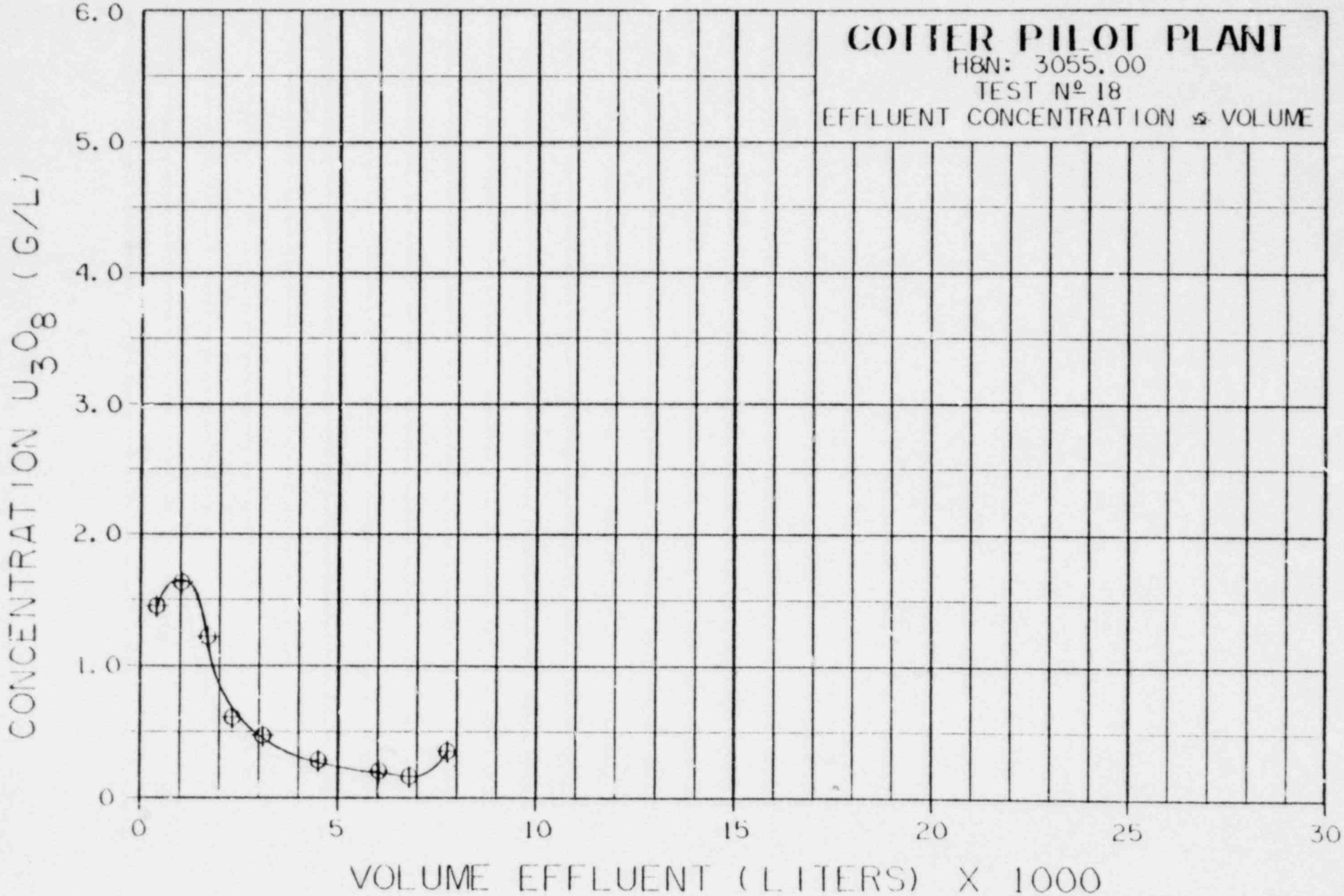


COTTER PILOT PLANT
HBN: 3055.00
TEST Nº 17
EFFLUENT CONCENTRATION vs VOLUME
6.0
5.0
4.0
3.0
2.0
1.0
0
CONCENTRATION U3O8 (G/L)
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000



COTTER PILOT PLANT
H8N: 3055.00
TEST Nº 18
EXTRACTION vs. VOLUME
100
80
60
40
20
0
% EXTRACTION U3 O8
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000


COTTER PILOT PLANT
H8N: 3055.00
TEST Nº 18
EXTRACTION vs. TIME
100
80
60
40
20
0
% EXTRACTION U_3O_8
0
10
20
30
40
50
60
TIME (HOURS)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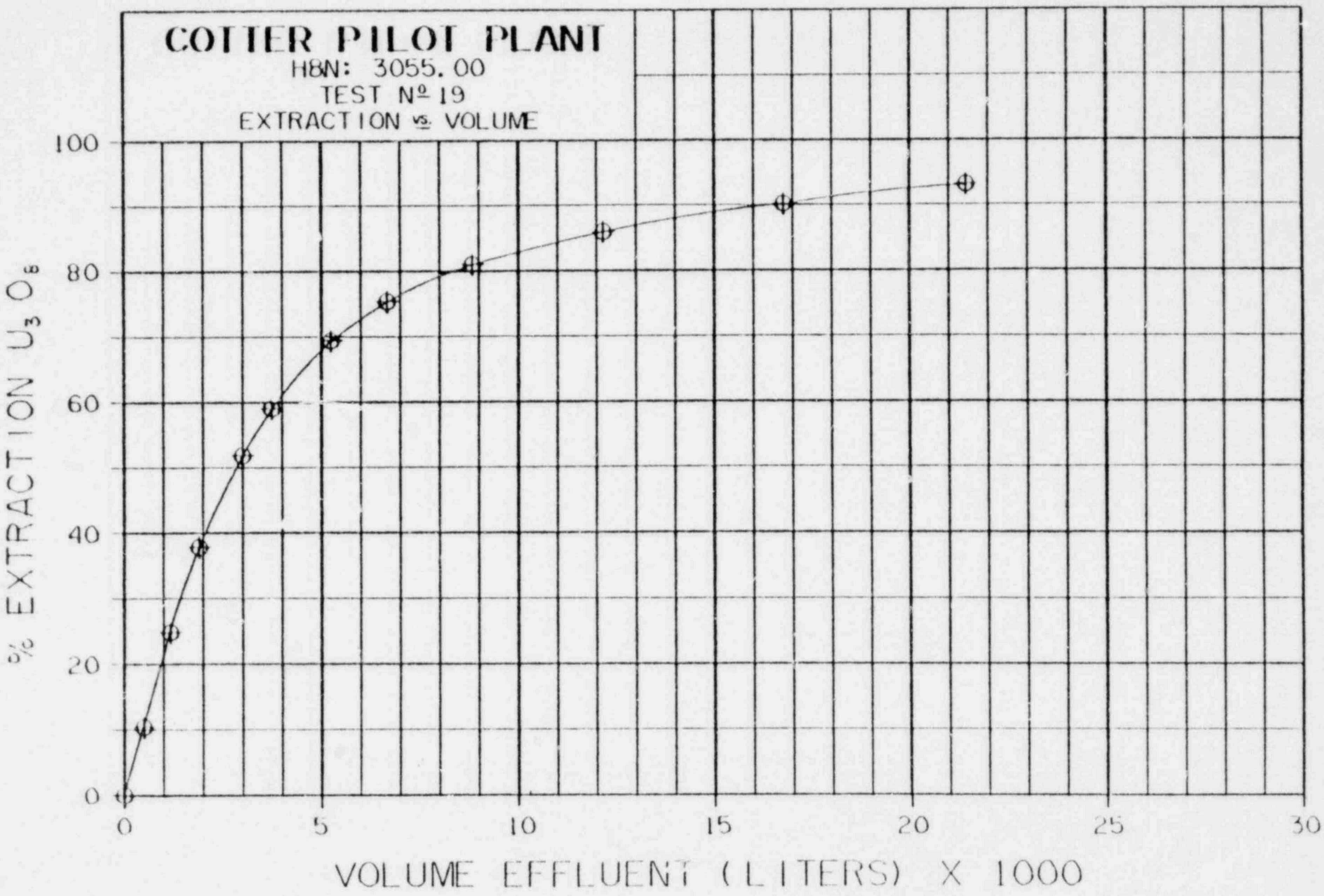
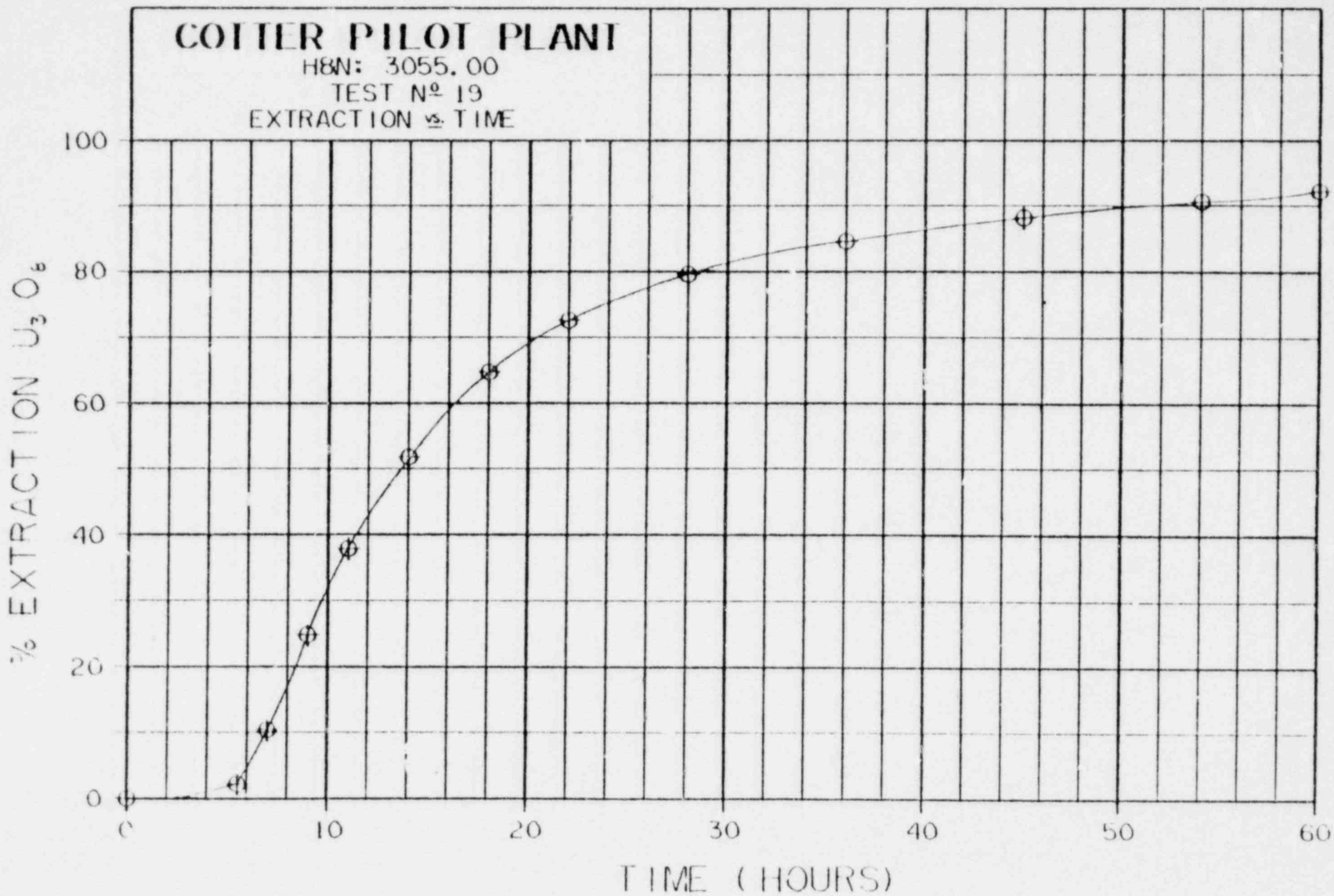
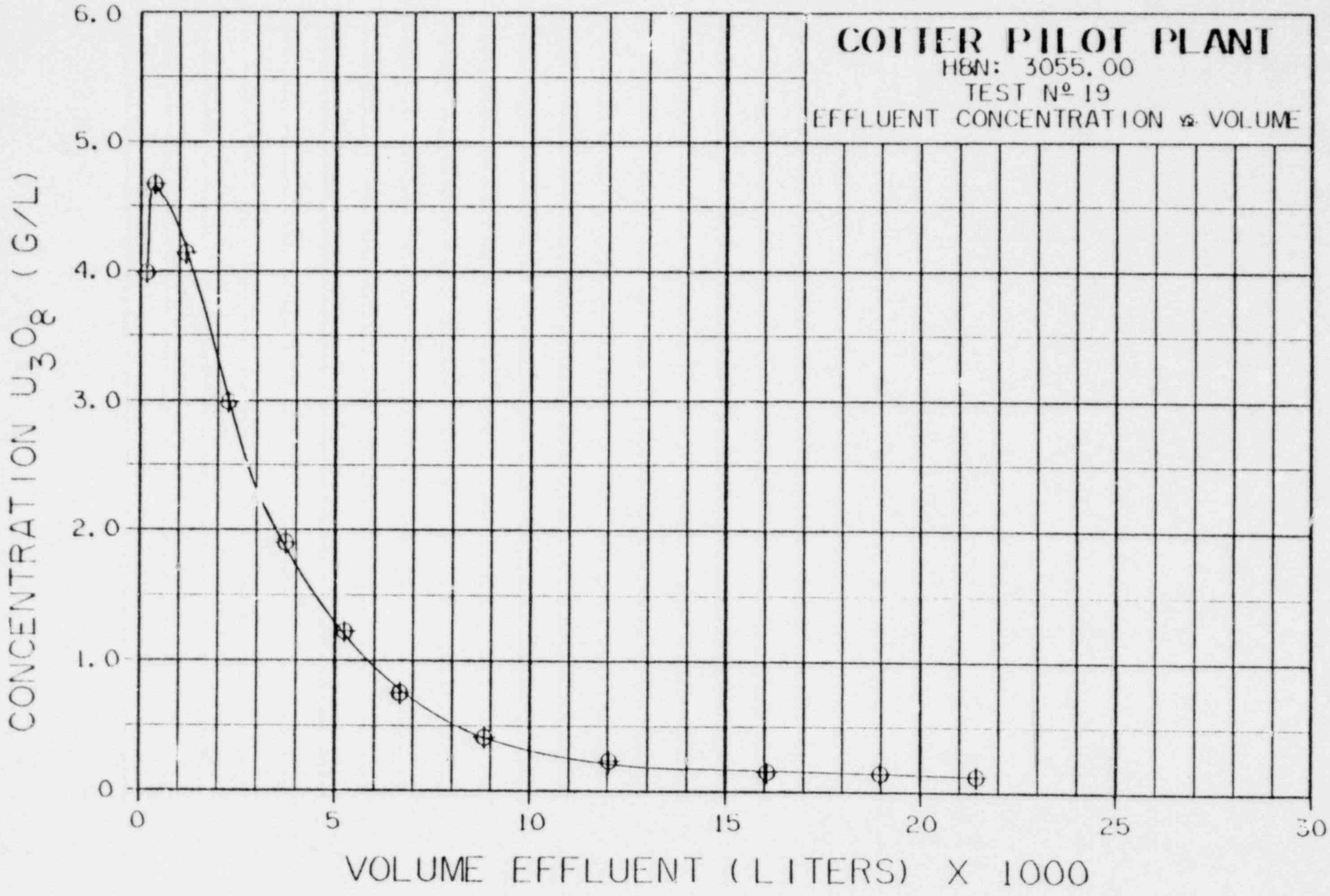
H8N: 3055.00
TEST Nº 18
EFFLUENT CONCENTRATION vs VOLUME
6.0
5.0
4.0
3.0
2.0
1.0
0
CONCENTRATION U3O8 (G/L)
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000


COTTER PILOT PLANT
H8N: 3055.00
TEST Nº 19
EXTRACTION vs VOLUME
% EXTRACTION U_3O_8
VOLUME EFFLUENT (LITERS) X 1000
100
80
60
40
20
0
5
10
15
20
25
30


COTTER PILOT PLANT
H8N: 3055.00
TEST № 19
EXTRACTION vs TIME
% EXTRACTION U3 O8
TIME (HOURS)
100
80
60
40
20
0
0
10
20
30
40
50
60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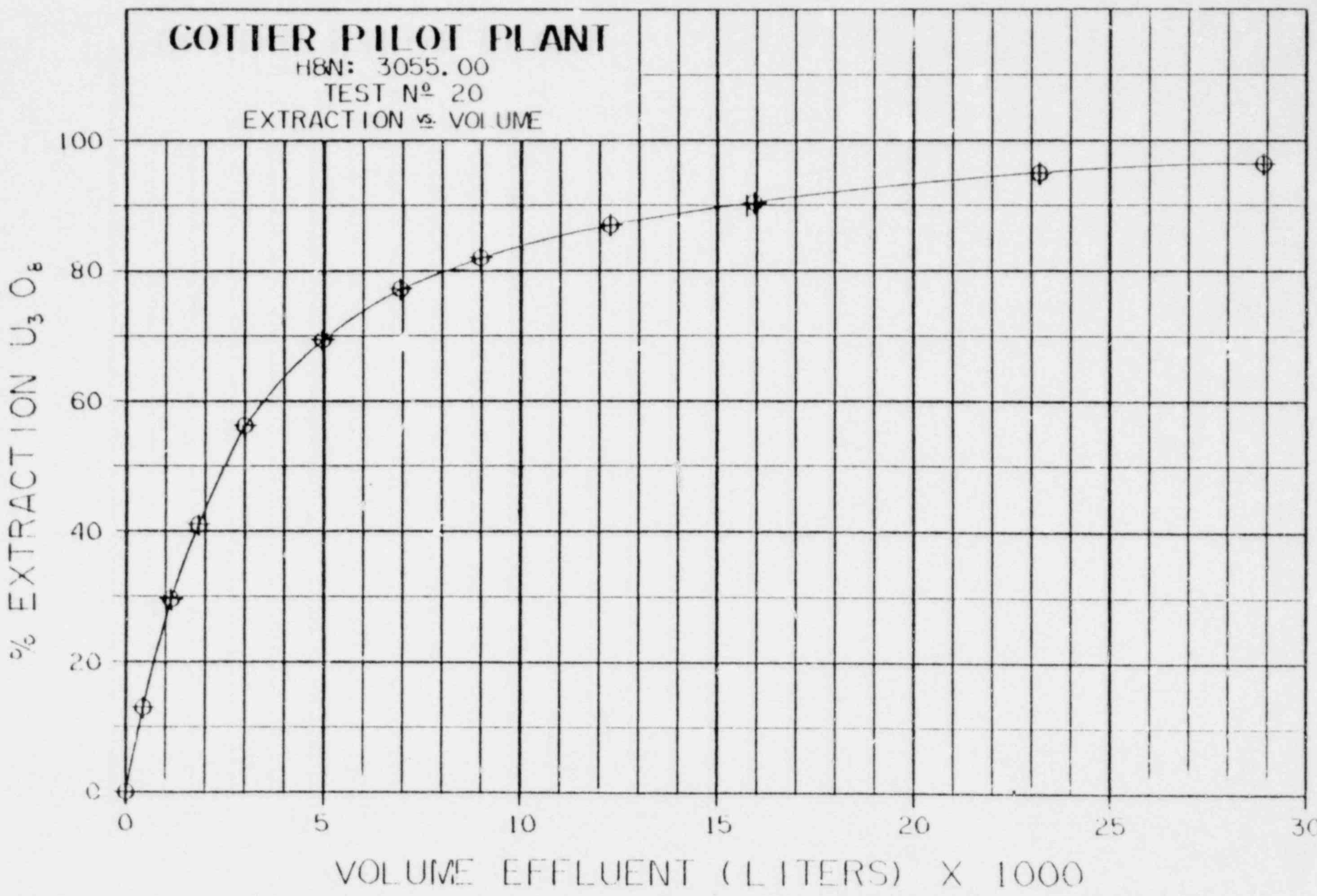
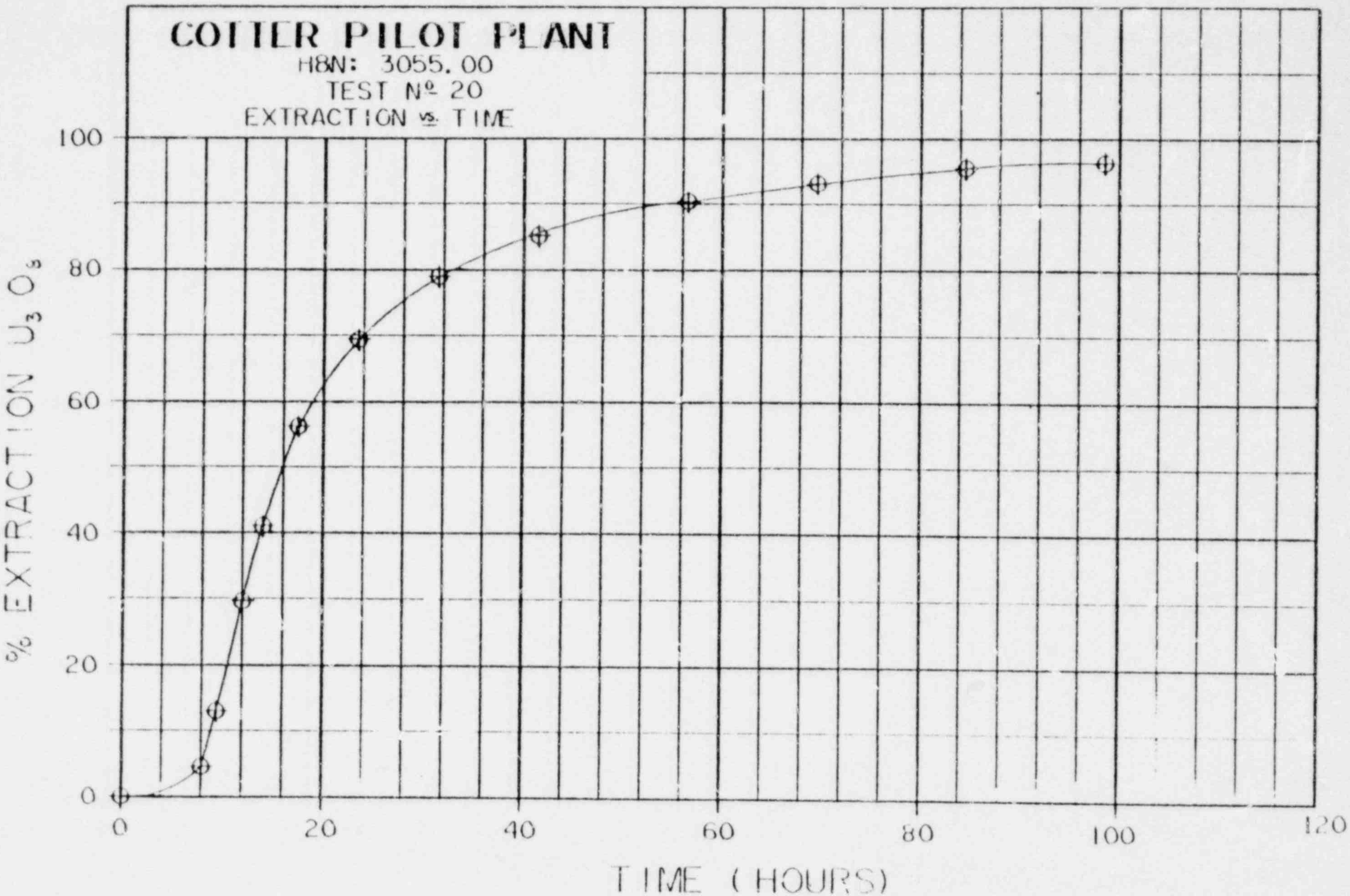
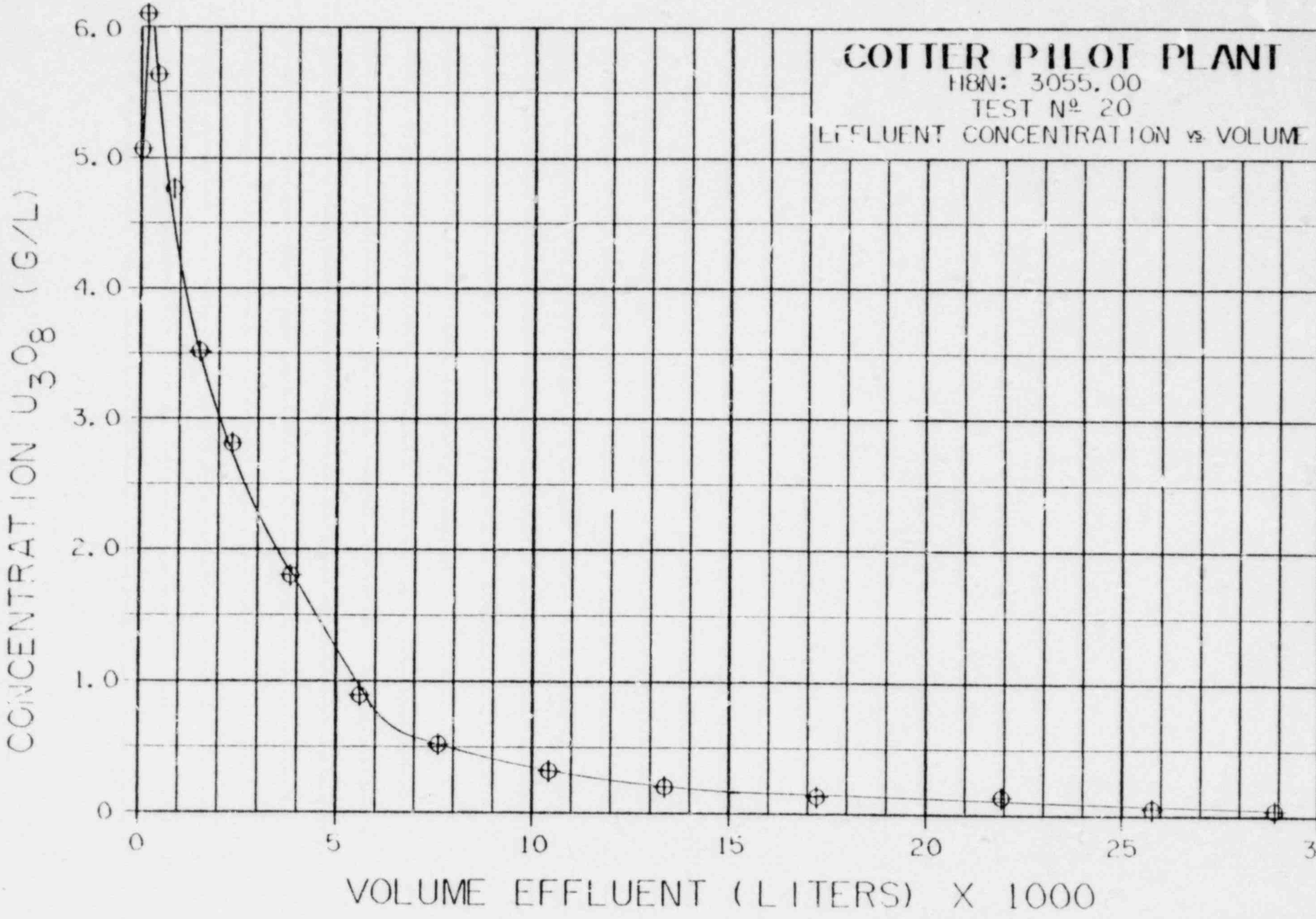
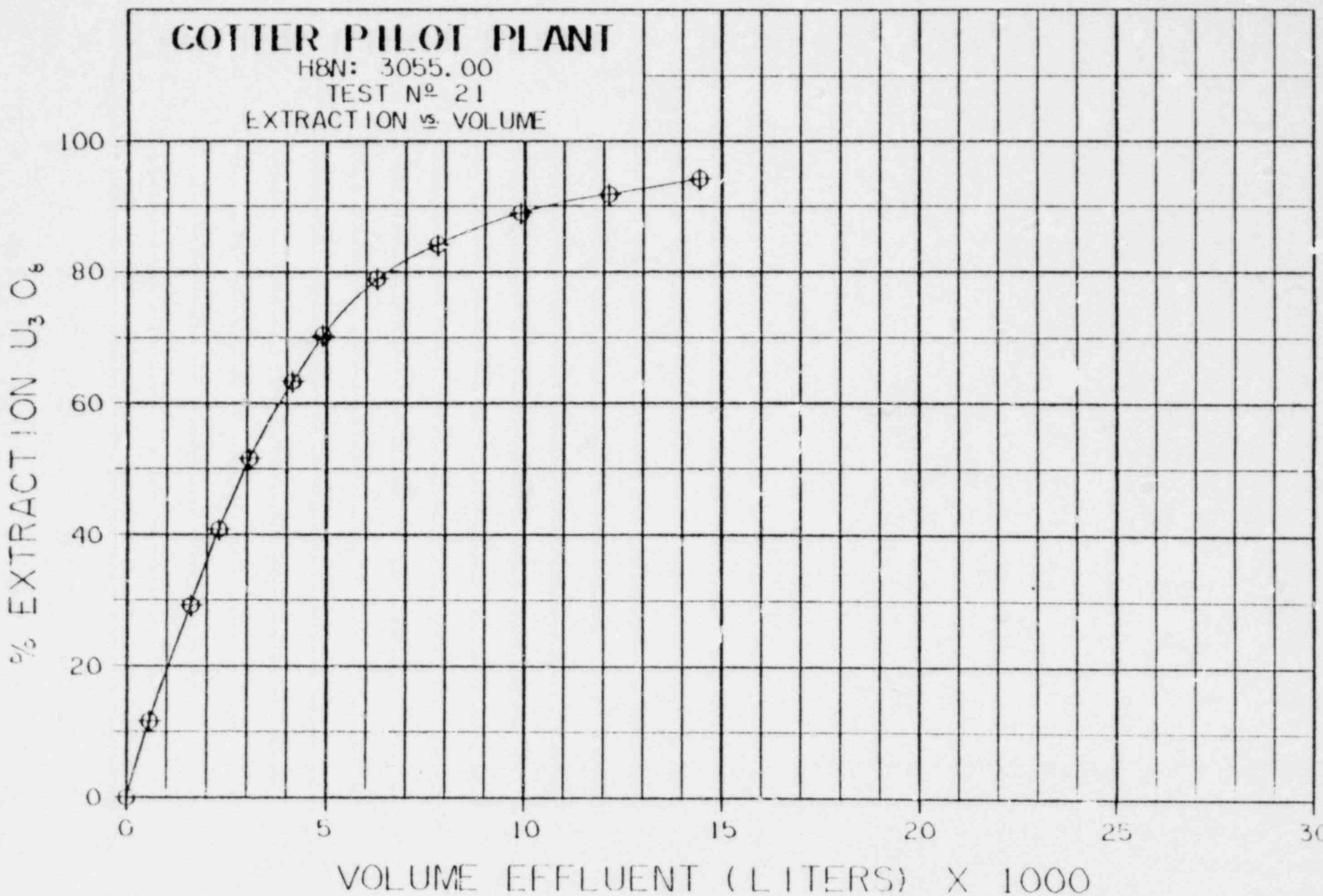
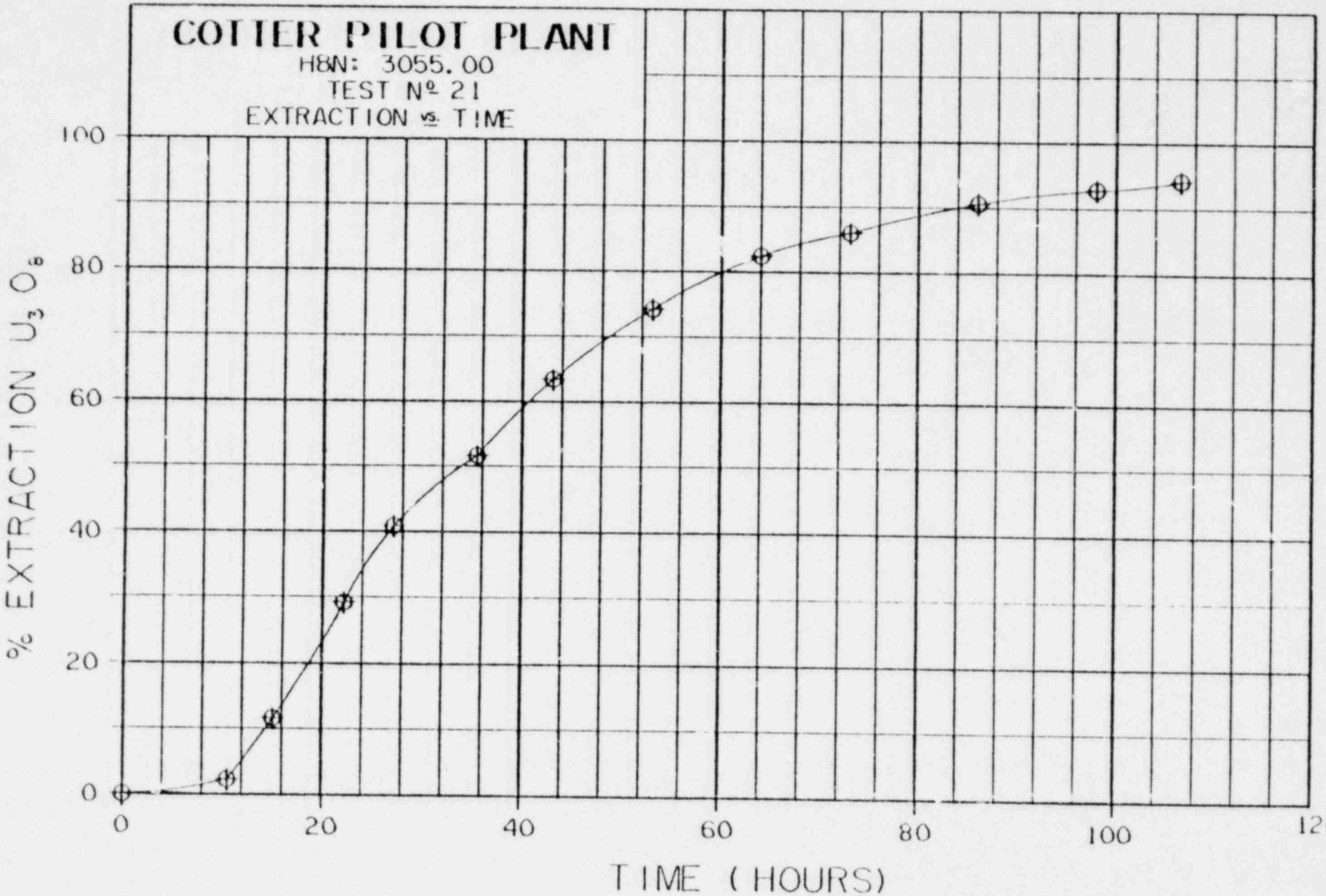
H&N: 3055.00
TEST № 19
EFFLUENT CONCENTRATION vs VOLUME
CONCENTRATION U_3O_8 (G/L)
6.0
5.0
4.0
3.0
2.0
1.0
0
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000

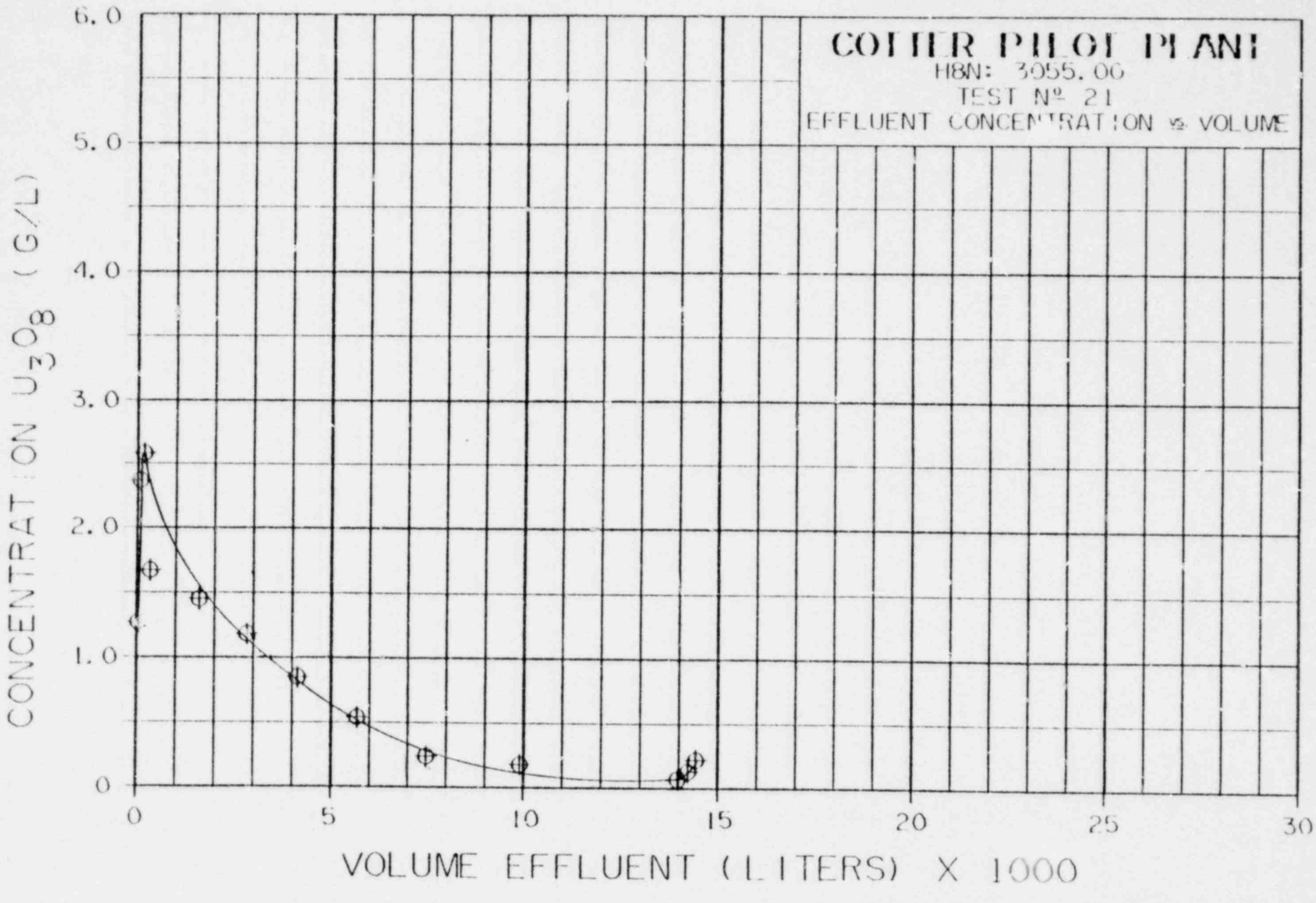

COTTER PILOT PLANT
H8N: 3055.00
TEST № 20
EXTRACTION vs VOLUME
% EXTRACTION U_3O_8
VOLUME EFFLUENT (LITERS) X 1000
0
20
40
60
80
100
0
5
10
15
20
25
30


COTTER PILOT PLANT
H8N: 3055.00
TEST № 20
EXTRACTION vs. TIME
% EXTRACTION U_3O_8
100
80
60
40
20
0
0
20
40
60
80
100
120
TIME (HOURS)


COTTER PILOT PLANT
H8N: 3055.00
TEST № 20
EFFLUENT CONCENTRATION vs VOLUME
6.0
5.0
4.0
3.0
2.0
1.0
0
CONCENTRATION U3O8 (G/L)
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000


COTTER PILOT PLANT
H8N: 3055.00
TEST № 21
EXTRACTION vs. VOLUME
% EXTRACTION U_3O_8
100
80
60
40
20
0
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000


COTTER PILOT PLANT
H&N: 3055.00
TEST № 21
EXTRACTION vs. TIME
% EXTRACTION U_3O_8
TIME (HOURS)
0
20
40
60
80
100
120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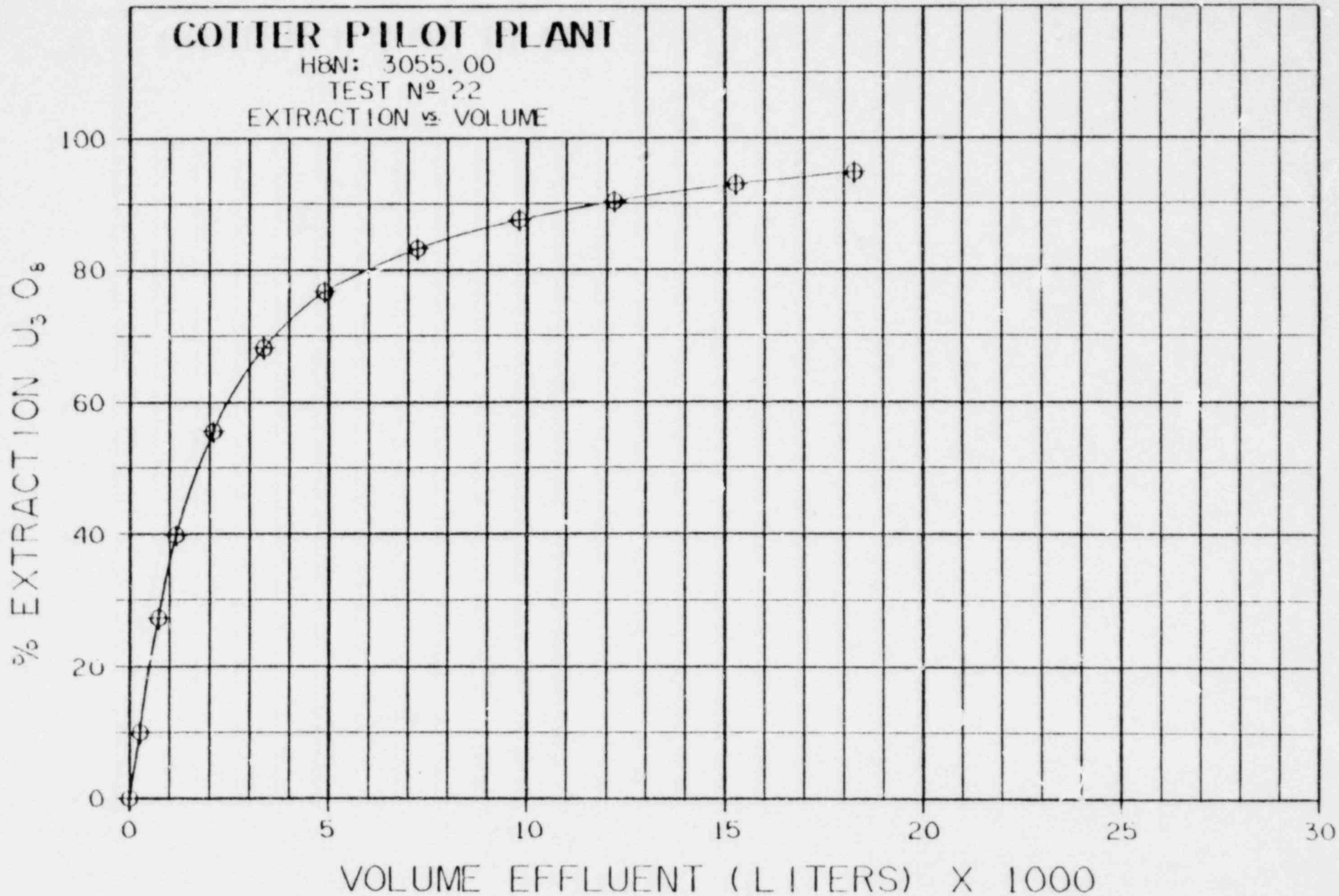
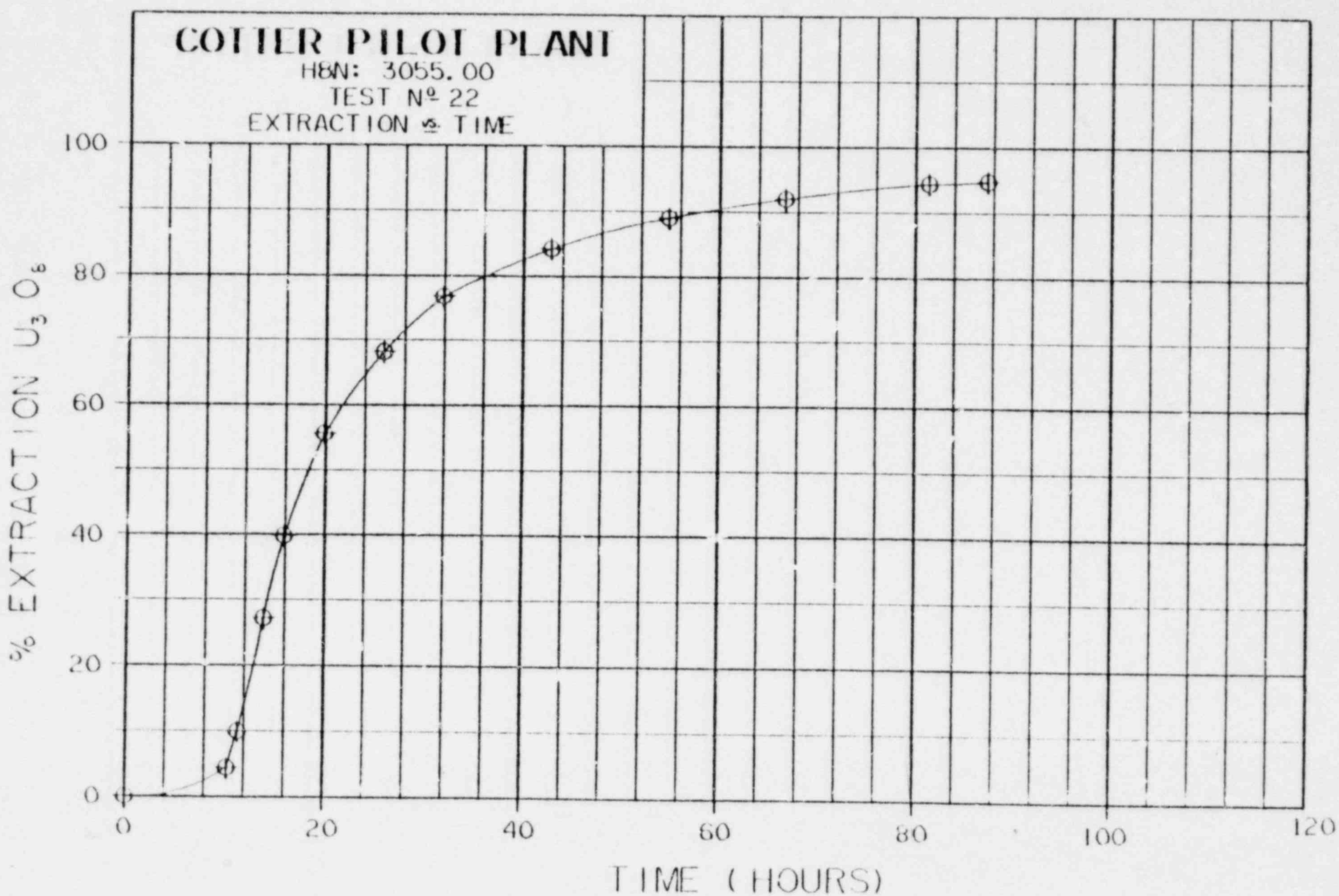
HBN: 3055.06
TEST Nº 21
EFFLUENT CONCENTRATION vs VOLUME
6.0
5.0
4.0
3.0
2.0
1.0
0
CONCENTRATION U_3O_8 (G/L)
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000


COTTER PILOT PLANT
HBN: 3055.00
TEST № 22
EXTRACTION vs VOLUME
% EXTRACTION U_3O_8
VOLUME EFFLUENT (LITERS) X 1000


COTTER PILOT PLANT
H8N: 3055.00
TEST № 22
EXTRACTION vs TIME
% EXTRACTION U3 O8
TIME (HOURS)
0
20
40
60
80
100
120

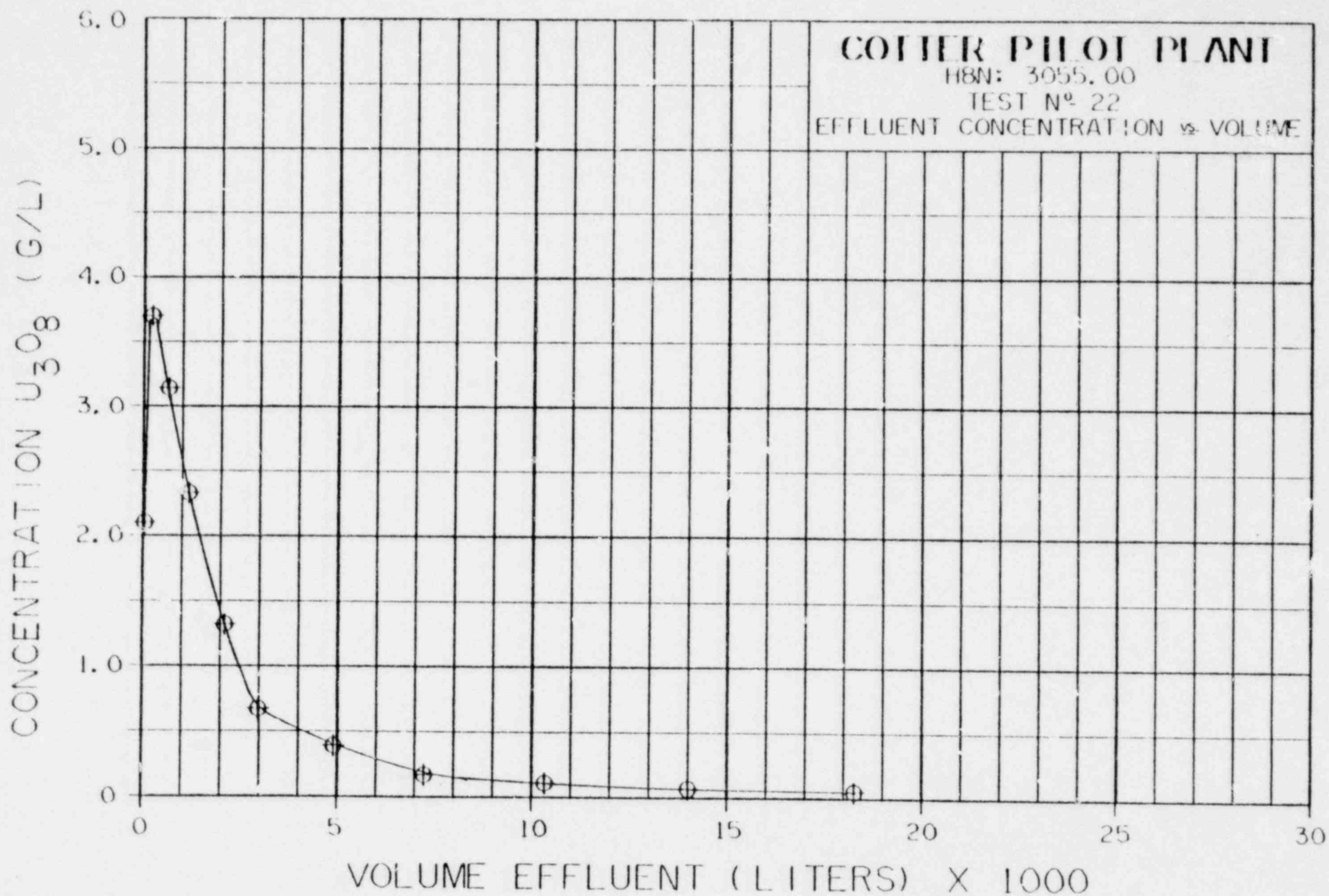
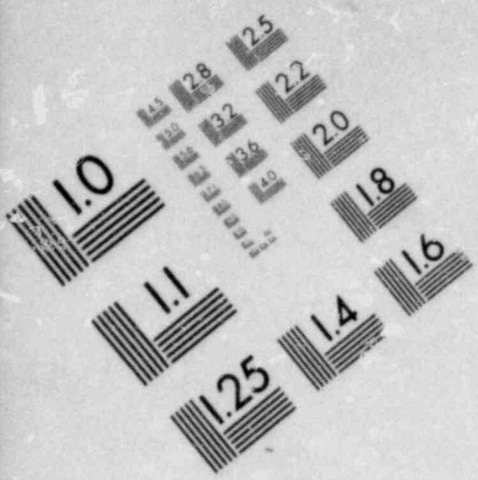

COTTER PILOT PLANT
H8N: 3055.00
TEST Nº 22
EFFLUENT CONCENTRATION vs VOLUME
6.0
5.0
4.0
3.0
2.0
1.0
0
CONCENTRATION U_3O_8 (G/L)
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000

IMAGE EVALUATION TEST TARGET (MT-3)

6"



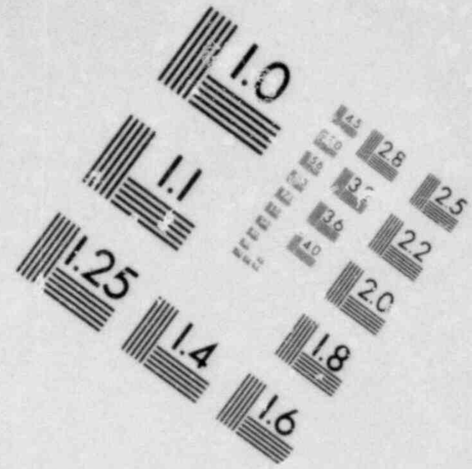
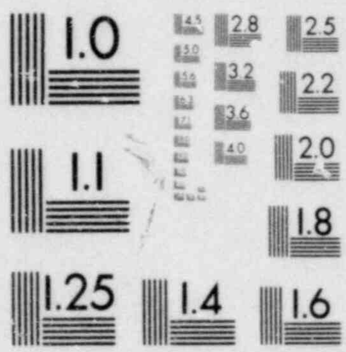
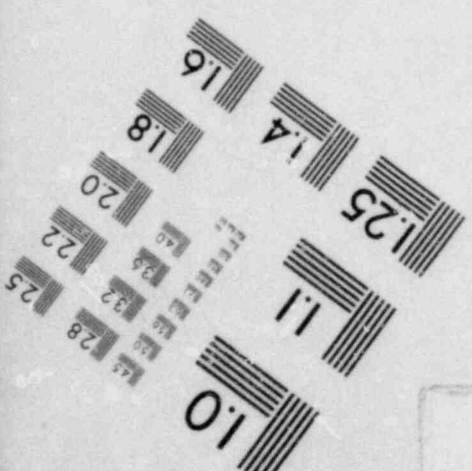
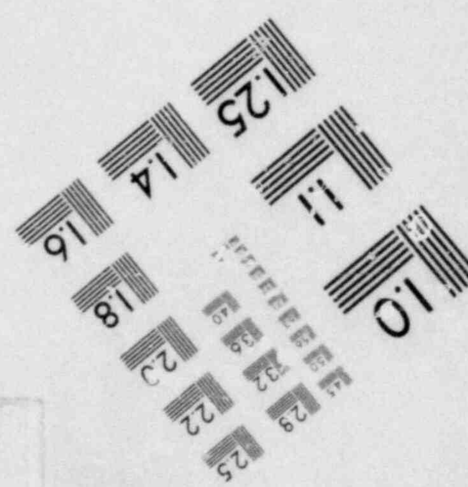


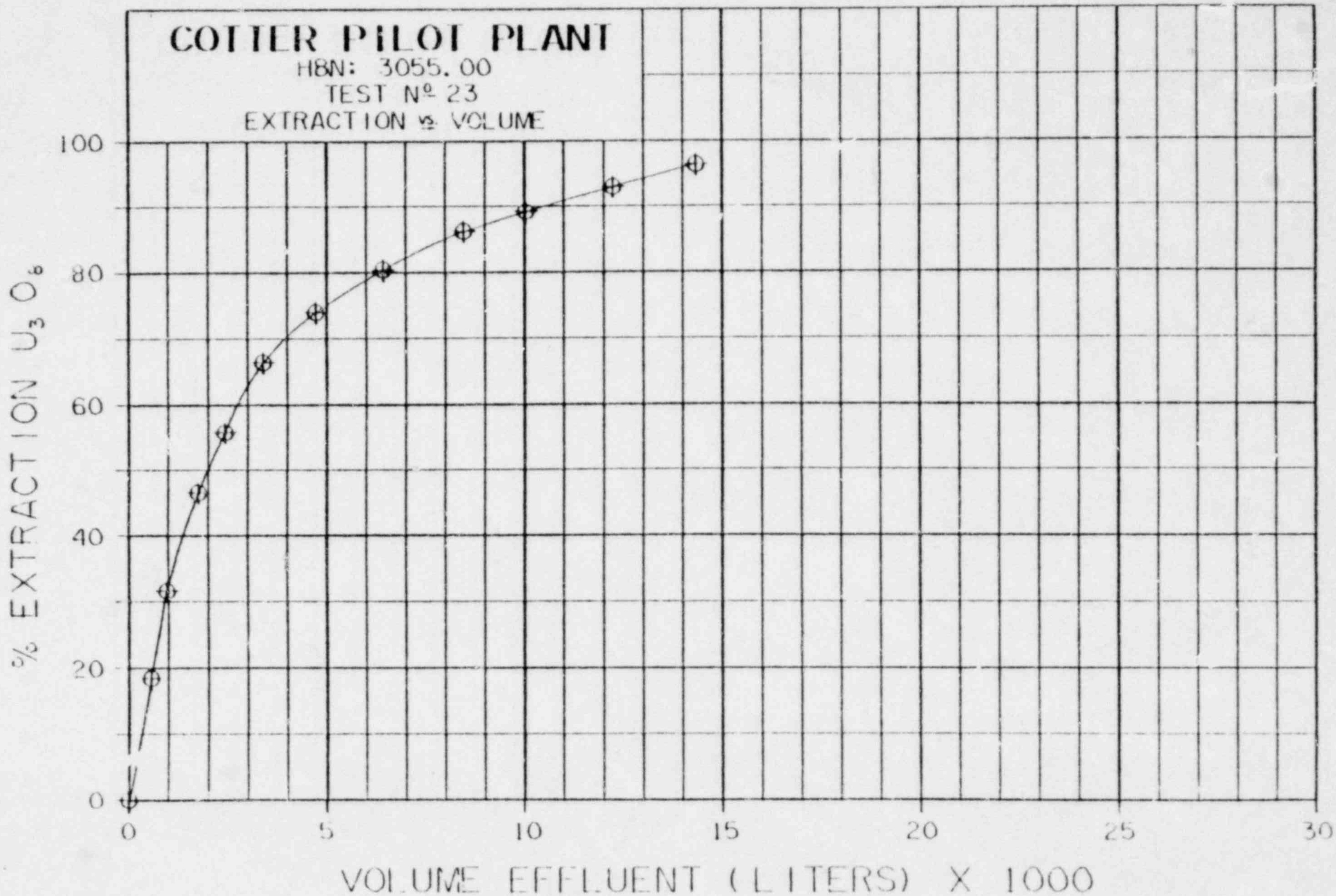
IMAGE EVALUATION TEST TARGET (MT-3)

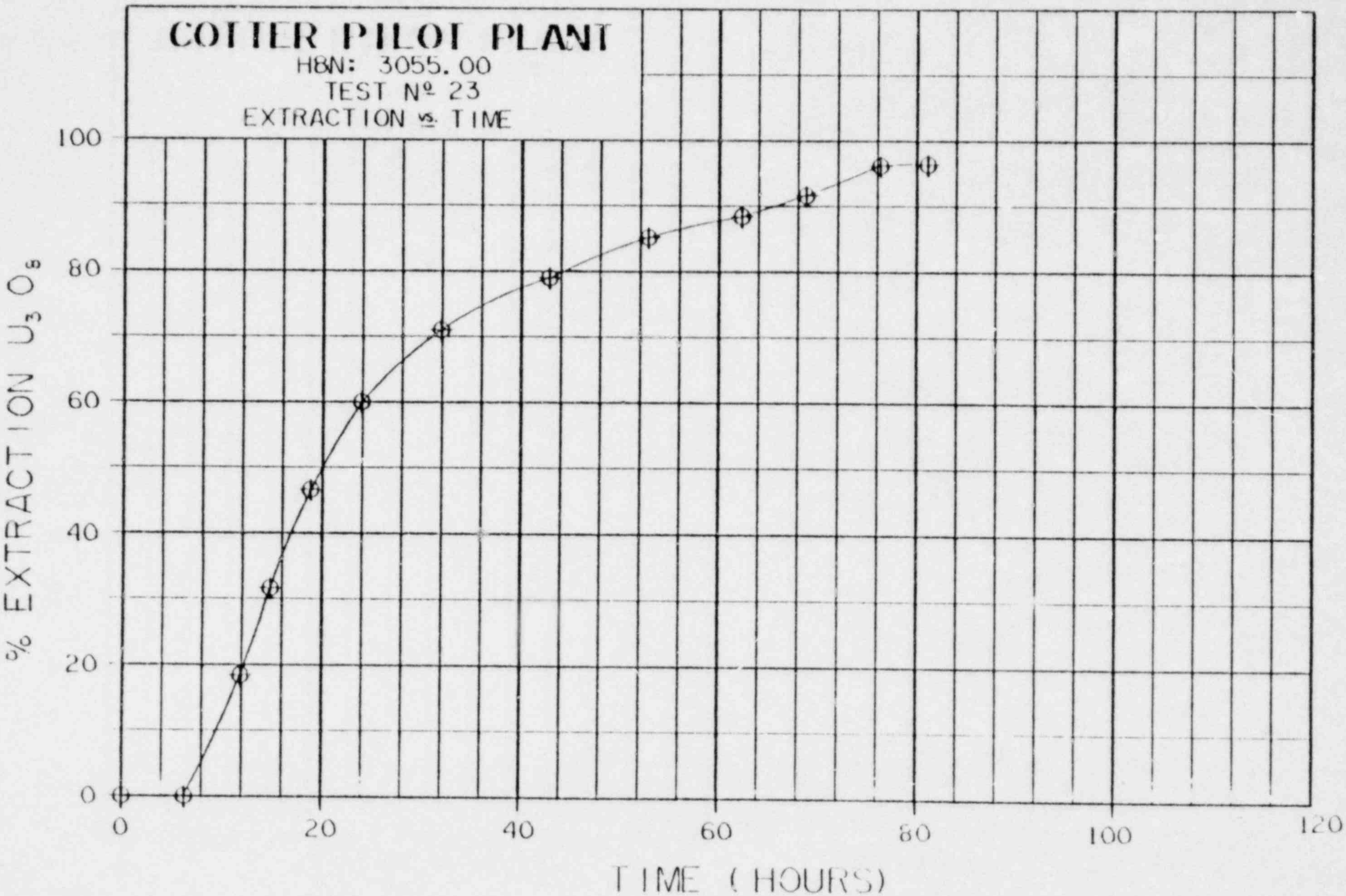


6"

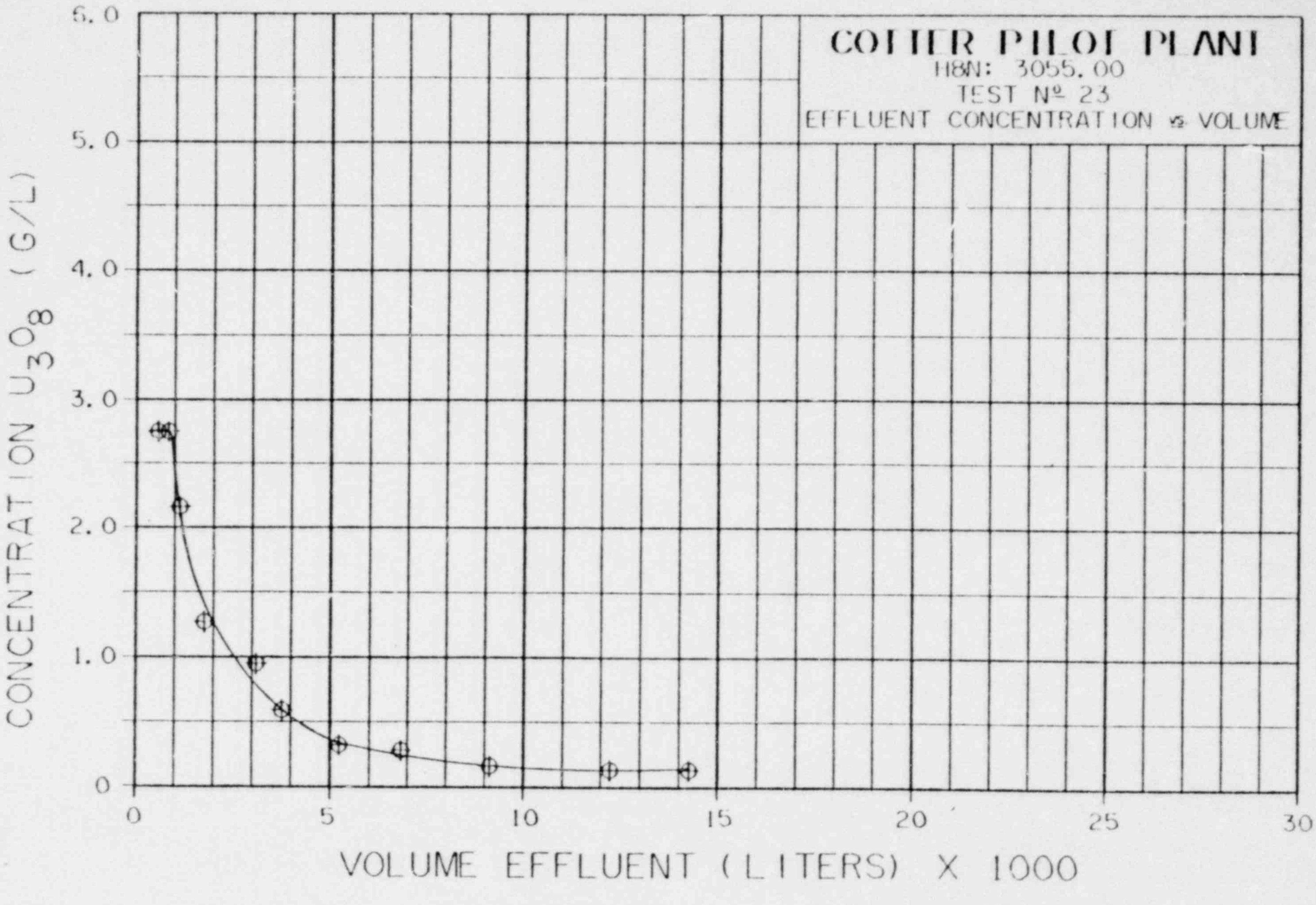




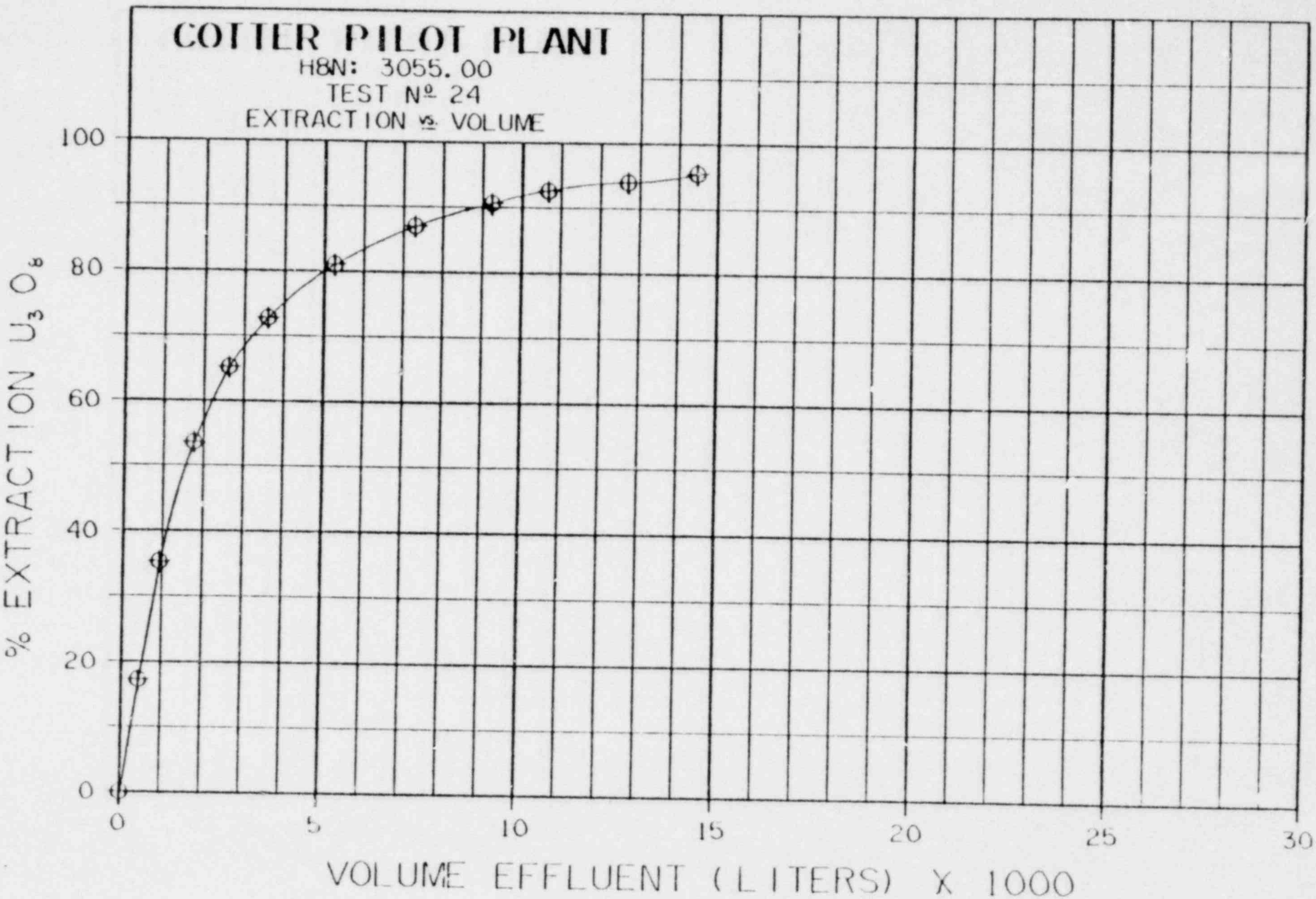

COTTER PILOT PLANT
HBN: 3055.00
TEST Nº 23
EXTRACTION vs VOLUME
% EXTRACTION U3 O8
0
20
40
60
80
100
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000



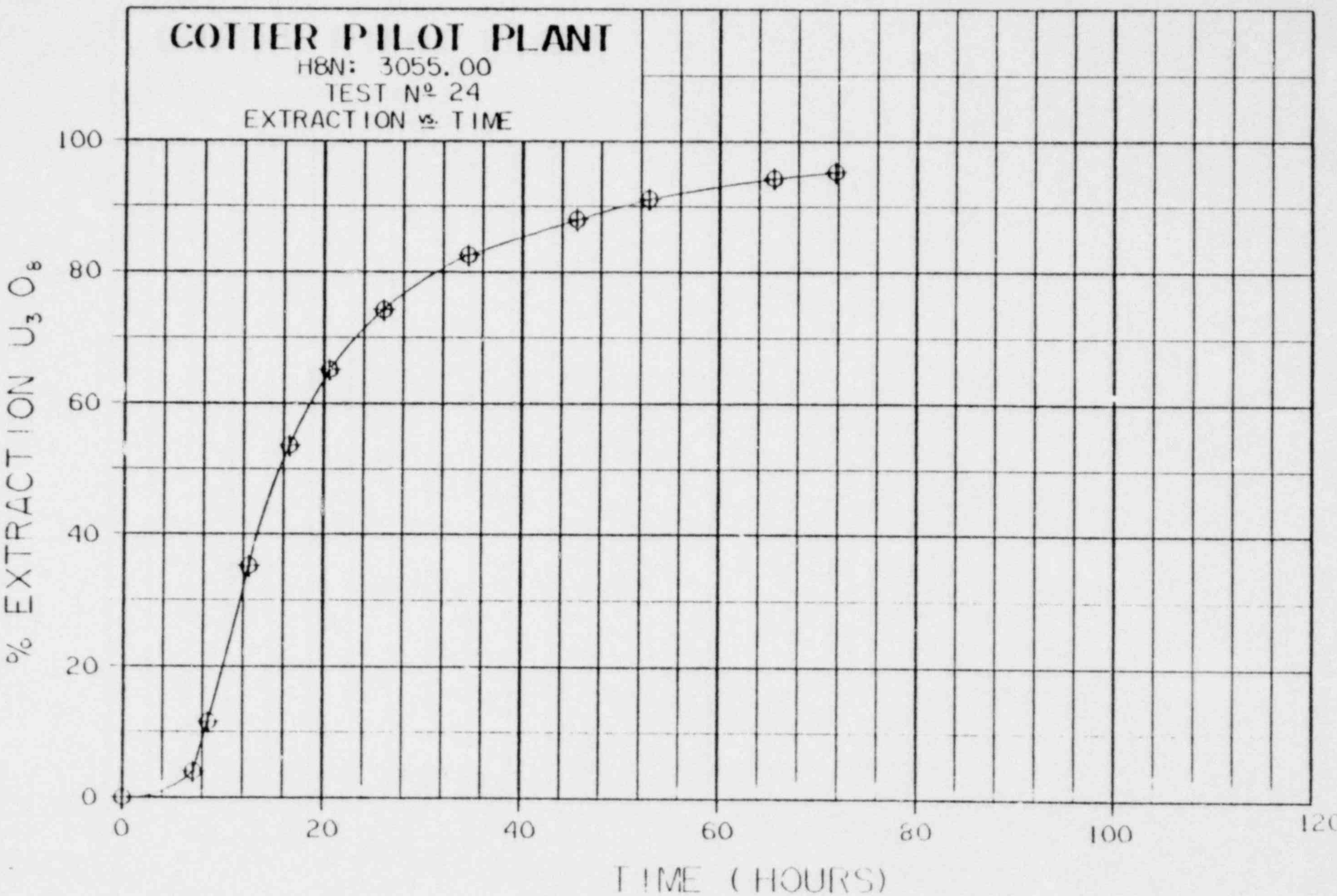
COTTER PILOT PLANT
H8N: 3055.00
TEST № 23
EXTRACTION vs TIME
% EXTRACTION U3 O8
0
20
40
60
80
100
0
20
40
60
80
100
120
TIME (HOURS)



COTTER PILOT PLANT
HBN: 3055.00
TEST Nº 23
EFFLUENT CONCENTRATION vs VOLUME
6.0
5.0
4.0
3.0
2.0
1.0
0
0
5
10
15
20
25
30
CONCENTRATION U_3O_8 (G/L)
VOLUME EFFLUENT (LITERS) X 1000


COTTER PILOT PLANT
H8N: 3055.00
TEST № 24
EXTRACTION vs VOLUME
% EXTRACTION U_3O_8
0
20
40
60
80
100
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000

9-70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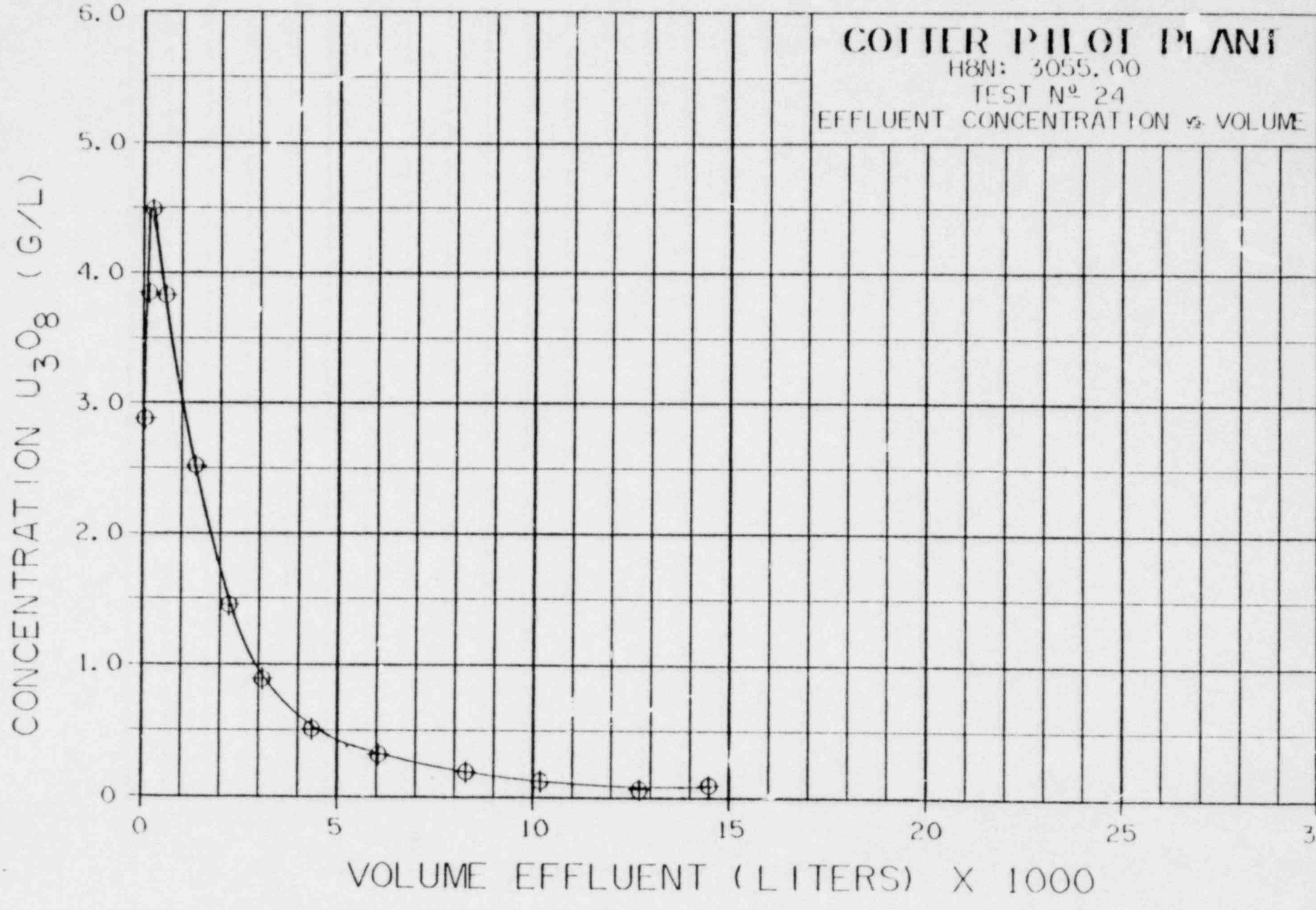
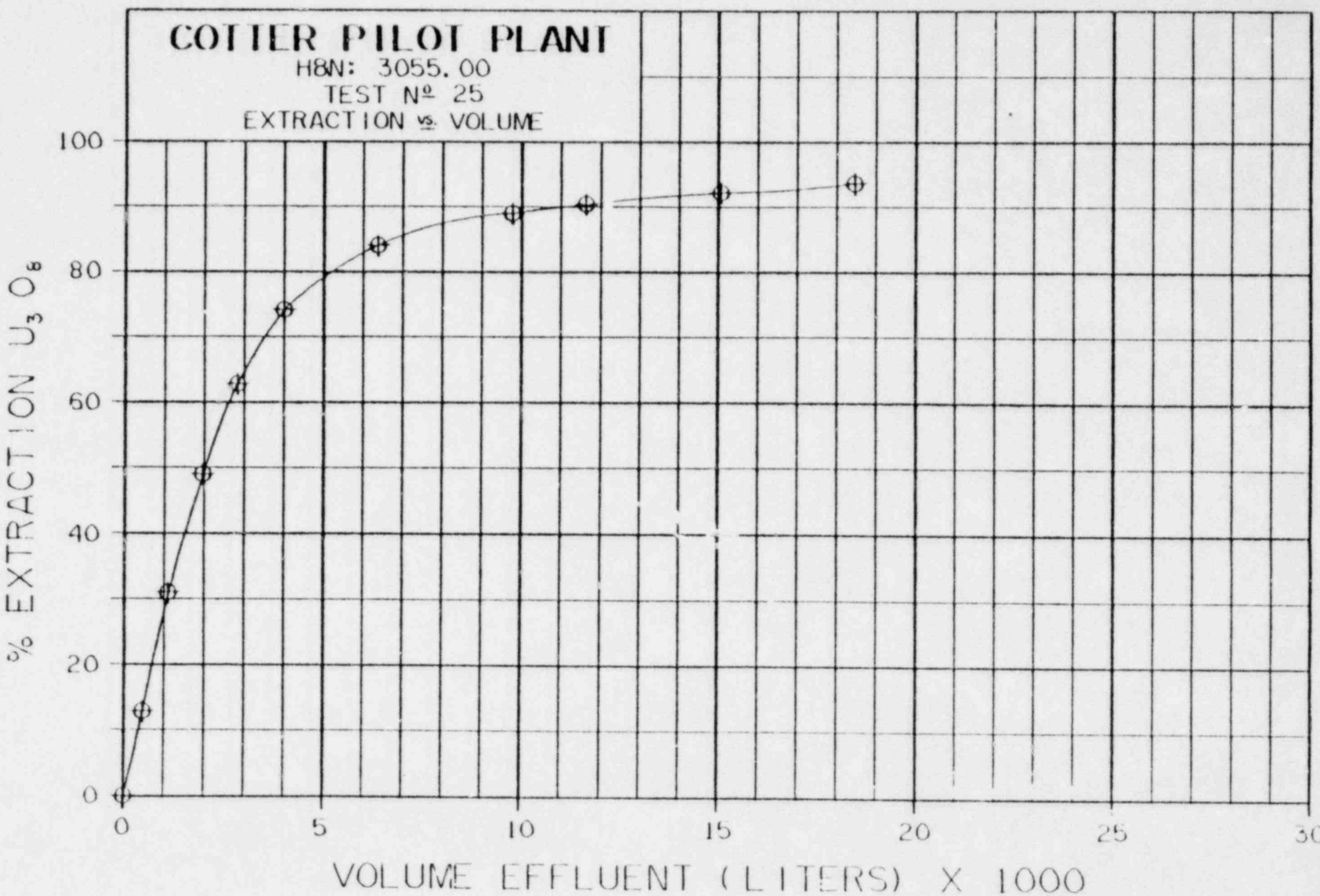
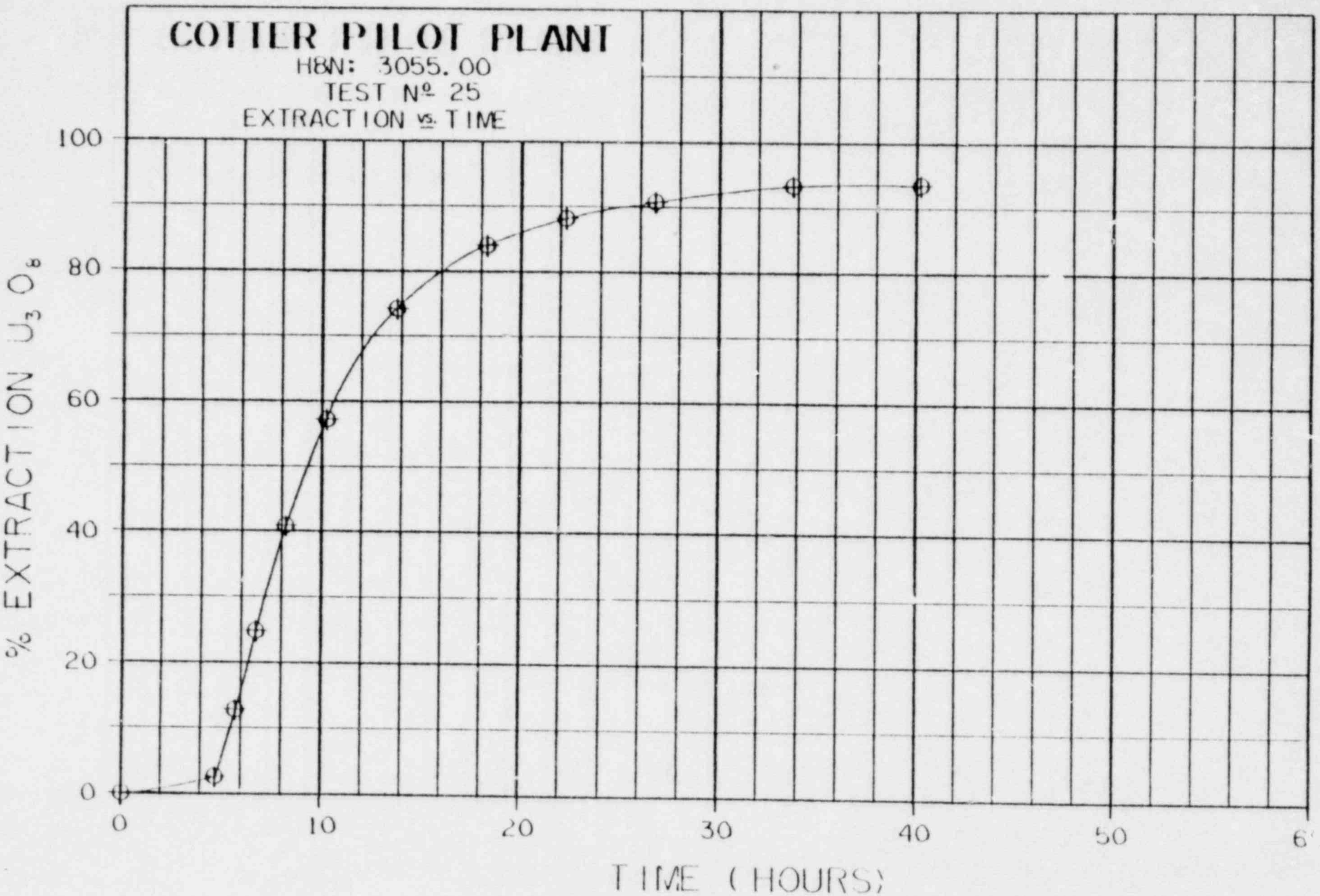
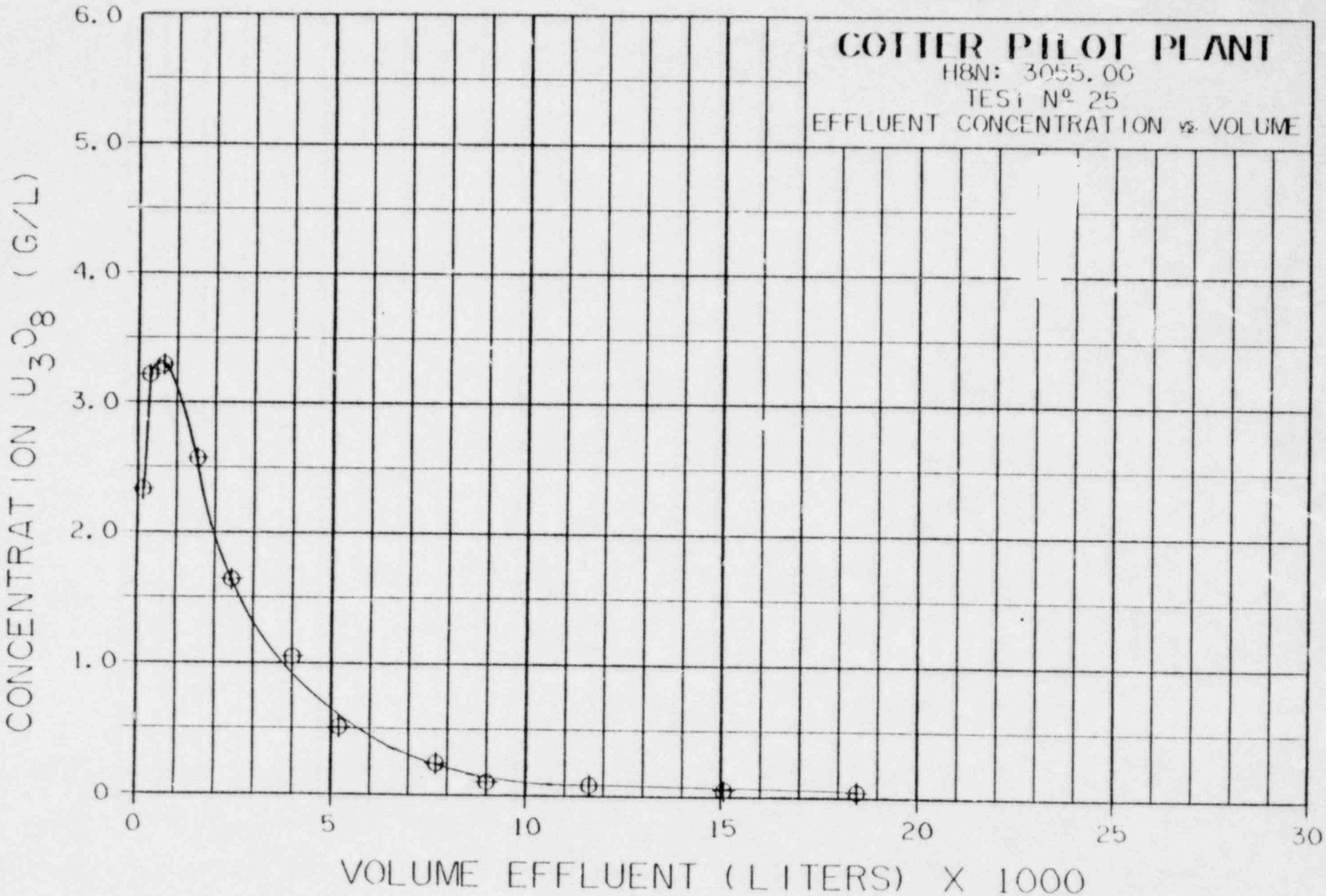
TEST Nº 24
EXTRACTION vs. TIME
% EXTRACTION U3 O8
TIME (HOURS)
0
20
40
60
80
100
120


COTTER PILOT PLANT
H8N: 3055.00
TEST Nº 24
EFFLUENT CONCENTRATION vs VOLUME
CONCENTRATION U3O8 (G/L)
6.0
5.0
4.0
3.0
2.0
1.0
0
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000


COTTER PILOT PLANT
H8N: 3055.00
TEST № 25
EXTRACTION vs. VOLUME
% EXTRACTION U_3O_8
0
20
40
60
80
100
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000


COTTER PILOT PLANT
H&N: 3055.00
TEST № 25
EXTRACTION vs TIME
% EXTRACTION U_3O_8
0
20
40
60
80
100
0
10
20
30
40
50
6
TIME (HOURS)



COTTER PILOT PLANT
H8N: 3055.00
TEST Nº 25
EFFLUENT CONCENTRATION vs VOLUME
6.0
5.0
4.0
3.0
2.0
1.0
0
CONCENTRATION U_3O_8 (G/L)
0
5
10
15
20
25
30
VOLUME EFFLUENT (LITERS) X 1000

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ANO. 8106170175

NO. OF PAGES 1

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Cotter Corporation
General Office

DIAL 303 232 8218
9305 WEST ALAMEDA PARKWAY SUITE 201
LAKEWOOD COLORADO 80226

August 25, 1980

Mr. Jack Rothfleisch
Division of Waste Management
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Re: Radioactive Materials License No. SUA-1370

Dear Mr. Rothfleisch:

In response to our telephone conversation of Monday, July 28, 1980, license conditions 21 and 22 of RML No. 1370, and Amendment No. 1 to the above-captioned license, Cotter Corporation submits the enclosed information.

License Condition 21 - The short duration of the pilot plant operation (seventeen, 25 ton, batches over a 46 day period) during November and December, 1979, the relative lack of definitive metallurgical results, and the subsequent decision by Cotter to evaluate further the efficacy of the TL Leach process delayed the submittal of a quarterly report according to the terms of license condition 21. Additionally, a project completion report was not submitted because the company concluded, following the 1979 operations, that additional work with the process would be needed in view of the inconclusive results derived from the first 17 batches.

In accordance with the NRC's letter, dated July 31, 1980, which approved an amendment to RML SUA-1370, Cotter submits herewith the radiological safety and environmental sampling data collected in 1979. (See Tables 1 through 3.) It should be noted that ambient air particulate data are not enclosed herewith. These data will be forwarded to NRC along with the environmental and safety data collected during the 1980 pilot plant operations.

License Condition 22 - Column leach tests were conducted at Cotter's Canon City lab facilities using tailings generated during the November-December, 1979, operation of the TL Leach pilot plant.

These tailings represented a composite sample obtained by combining the tails collected from ten randomly selected sites within a leach bay at the pilot plant following completion of leaching and draining. Tailings collected from the ten random sites were obtained from different depths and different areal locations within the leach bay.

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