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ENGINEERING STUDIES ON POT CALCINATION FOR ULTIMATE DISPOSAL OF NUCLEAR WASTE FROM TBP-25, DAREX, AND PUREX PROCESSES. PART II. COLLECTION OF PERFORMANCE DATA AND ANALYSIS

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NOTICE

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CHEMICAL TECHNOLOGY DIVISION

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ENGINEERING STUDIES ON POT CALCINATION FOR ULTIMATE DISPOSAL OF NUCLEAR WASTE FROM TBP-25, DAREX, AND PUREX PROCESSES. PART II. COLLECTION OF PERFORMANCE DATA AND ANALYSIS

C. W. Hancher L. J. King J. C. Suddath M. E. Whatley

ABSTRACT

Experience with the operation of an experimental engineering-development pot-calcination facility, including two types of evaporators with associated control systems and a calciner pot up to 8 in. in diameter and 90 in. high, formed the basis for the recommendation of equipment and operating procedures for the hot-pilot-plant phase of the waste-calcination program. This report gives the operating data and results from about 20 runs shown in tables and graphs, and significant operating variables are discussed. (Recommended operating procedures are discussed in Part I of this two-part report, ORNL-3277).

A continuous waste evaporator with a 25-liter operating volume, a batch evaporator with a capacity of 500 liters, and waste calciner pot with a 60-liter operating capacity were operated to obtain the necessary data to facilitate the design of the pot-calcination pilot plant. The three types of feed used were Purex, TBP-25, and Darex. The average feed rates varied from a low of 7.0 liters/hr to a maximum of 30.6. The total feed volume calcined varied from 325 to 641 liters. The reduction in volume for the Purex waste was about 10 to 1, and for TBP-25 and Darex the reduction was about 8 to 1. The volume ratio of water added to strip the nitric acid from the evaporator to feed volume varied from 2.0:1.0 to 4.1:1.0.

The resulting calcined solids had bulk densities of about 0.6 g/cc for TBP-25 waste, about 1.2 g/cc for Darex, and about 1.25 g/cc for Purex.

The pot-calcination process is a simple direct approach for preparing high-activity liquid wastes for ultimate disposal, as it requires a small number of processing steps. It is versatile enough to handle a variety of fuel processing wastes, for example, Purex, TBP-25, and Darex, and it produces a small volume of off-gas to be processed for recycle or disposal to the environment.

The report contains approximately 190 figures and 100 tables. In most of these figures and tables operating data are reported hourly or as a continuous graphical function.

CONTENTS

1. INTRODUCTION

1.1 Purpose of Waste Calcination and Essential Steps on the Process

The purpose of the waste calcination process is to find an economic and safe method for reducing radioactive liquid wastes, now in storage or to be produced, to a suitable solid that can be stored with a substantial increase in the safety factor over that of the presently stored liquid waste. Such a process has been developed here and is shown schematically in Fig. 1.

The pot-calcination process consists of evaporating the liquid waste to a maximum consistency, pumping this concentrate to the pot calciner (see Figs. 2 and 3 for these two steps), where it is reduced to a solid by evaporation and thermal decomposition, leaving solids comprised mainly of metal oxides and salts nonvolatile at the storage temperature, which may be about 900 to 1000°C. (The complete account of the process is given in ORNL-3277, which is Part I of this two-part report.)

The resulting off-gas from the pot calciner is condensed and returned to the evaporator for recycle of the volatile and entrained fission products and metal salts. The nitric acid is removed from the evaporator by water stripping. The nitrate ion concentration in the evaporator is maintained below 8 <u>N</u> to reduce the amount of ruthenium volatilized.

The resulting overhead from the waste evaporator, which is the main decontamination device, consists of nitric acid — about 2 <u>M</u>. (The nitric acid would be concentrated by a distillation process in an actual plant. Then, the concentrated acid would be recycled to the fuel-dissolution step,

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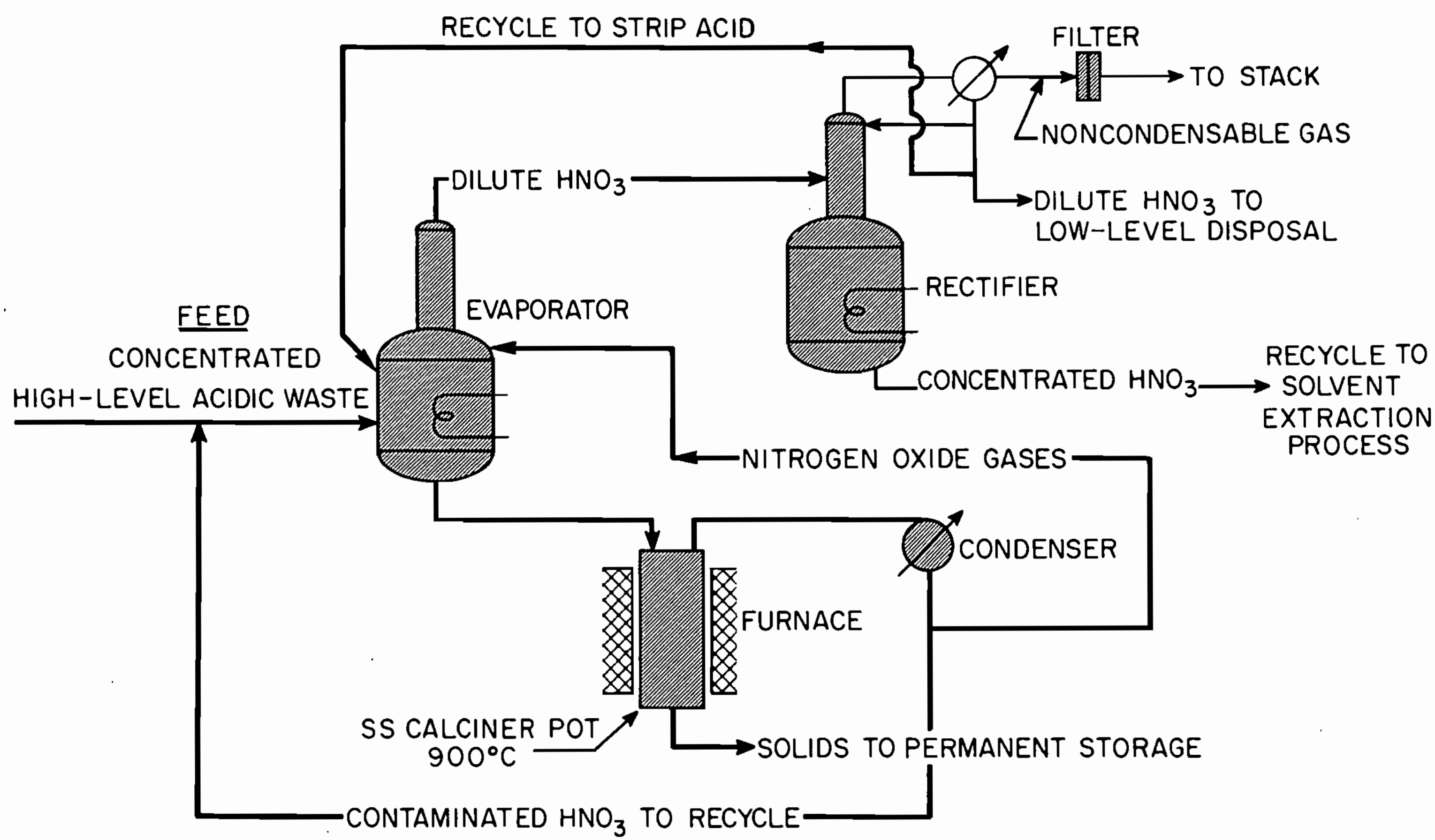

Fig. 1. Flowsheet for Converting High Activity Wastes to Solids by Pot Calcination.

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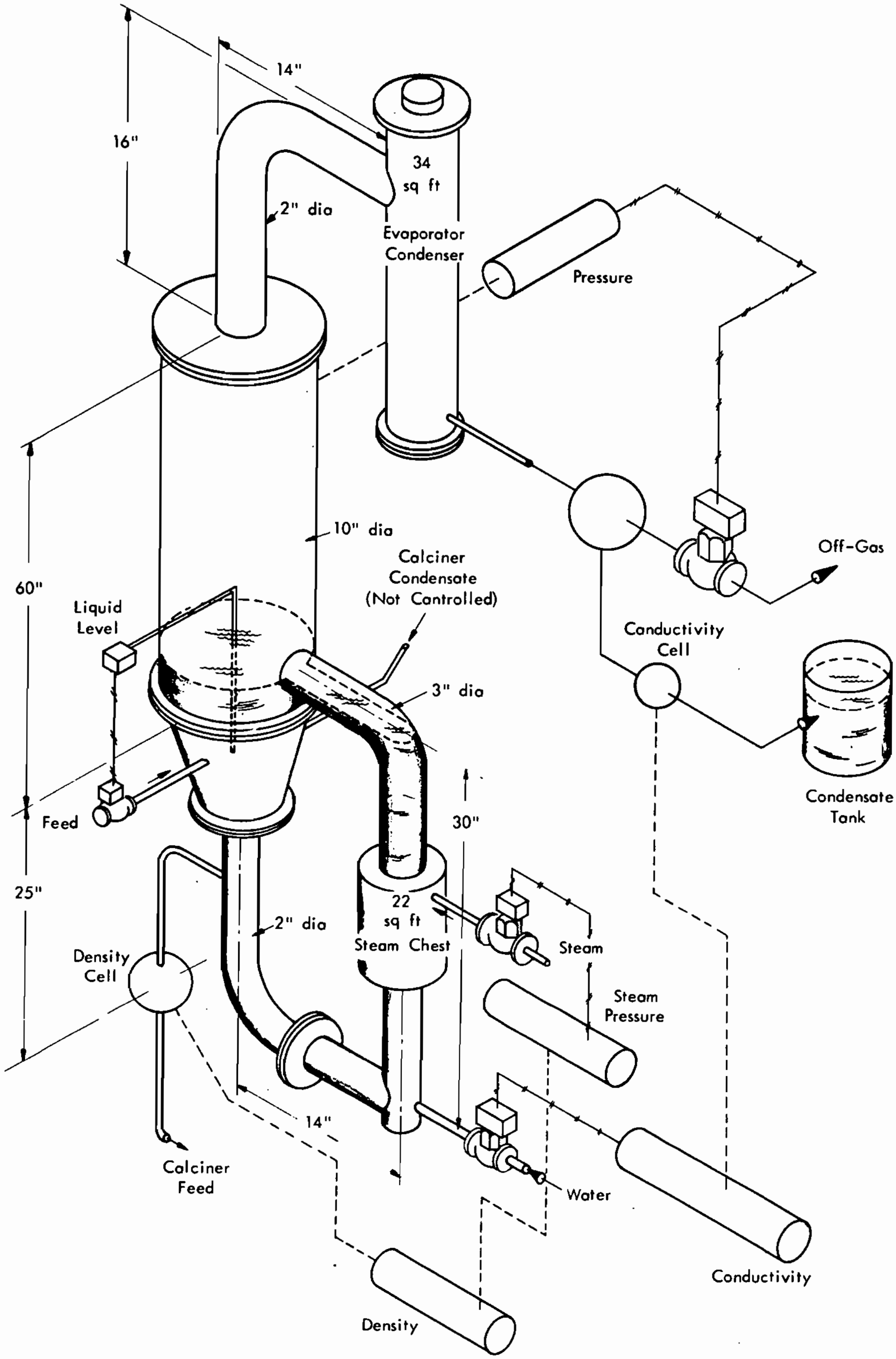

Fig. 2. Equipment Used in the Evaporation Step of the Pot Calcination Process.

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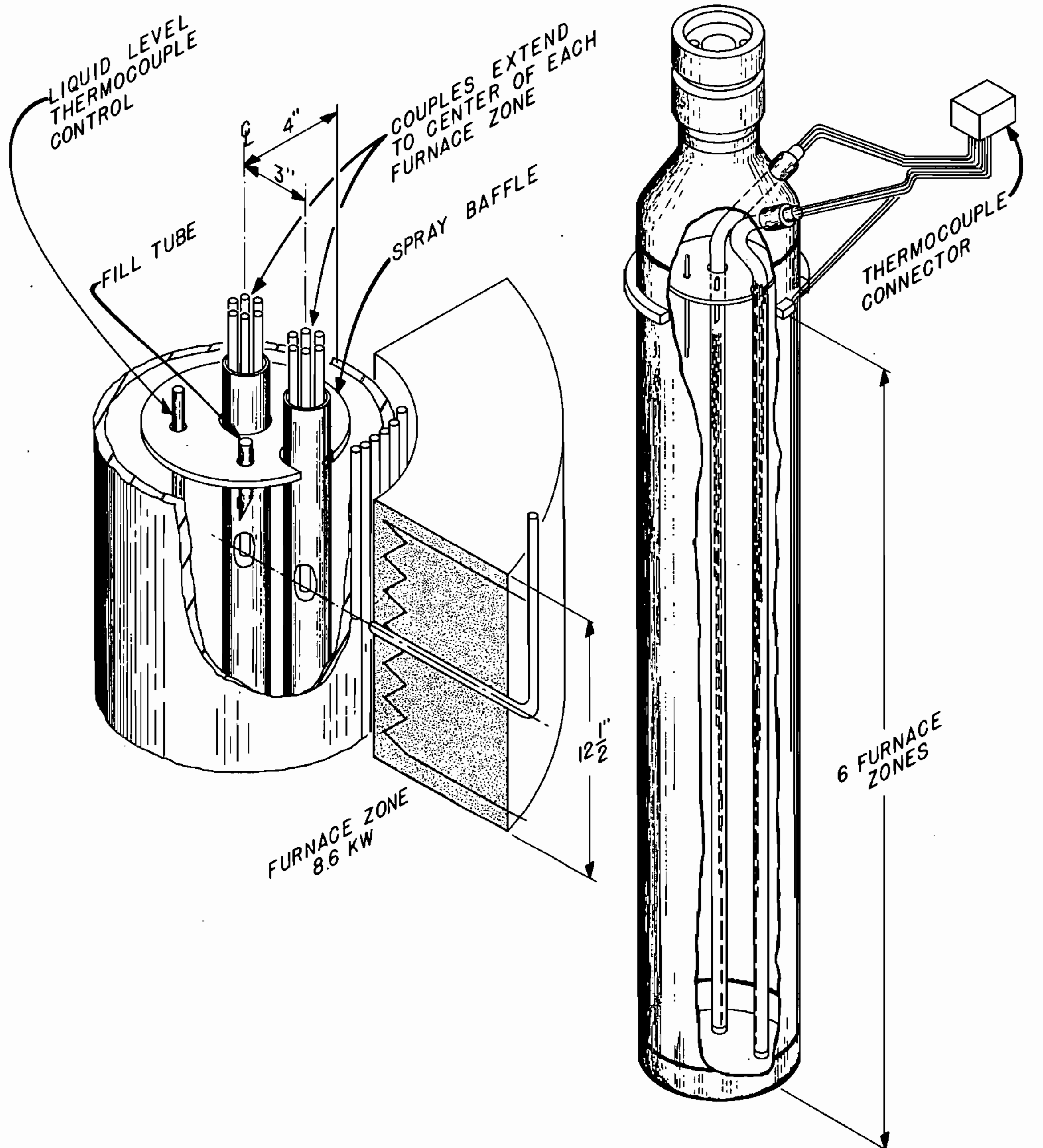

Fig. 3. Waste Calciner Thermocouple Detail.

and the resulting very dilute acid fraction from the top of the distillation column would become a low-activity waste, part of which would be recycled to the evaporator for stripping nitric acid to reduce ruthenium volatility.)

1.2 Brief Discussion of the Two Flowsheets Tested

Two flowsheets were tested: (1) continuous and (2) batch (Figs. 4 and 5). The major difference between the continuous and the batch flowsheets is in the method of feed preparation for the calciner.

When the continuous flowsheet is used, raw, dilute feed is fed and concentrated continuously in the evaporator, while at the same time the acid returned from the calciner is being decontaminated and steam stripped. The continuous evaporator had a 25-liter operating capacity, and processed about 600 liters of raw feed per test.

However, when the batch evaporator is used, a whole, raw-feed batch, 600 liters, is charged to the evaporator and is concentrated while the calciner is fed from a hold tank that contains a batch of prepared calciner feed prepared during the previous batch-evaporation step.

2. SUMMARY OF THE TWO PROCESSES, CONTINUOUS AND BATCH

Both the continuous and batch processes were operated and controlled very satisfactorily. The average system feed rate was about 15 to 25 liters/hr for the three types of waste: Purex, Darex, and TBP-25. The maximum flow rates in each of these cases was about 60 to 70 liters/hr during the starting period of each test, and the rates decreased to 5 to 10 liters/hr at the termination.

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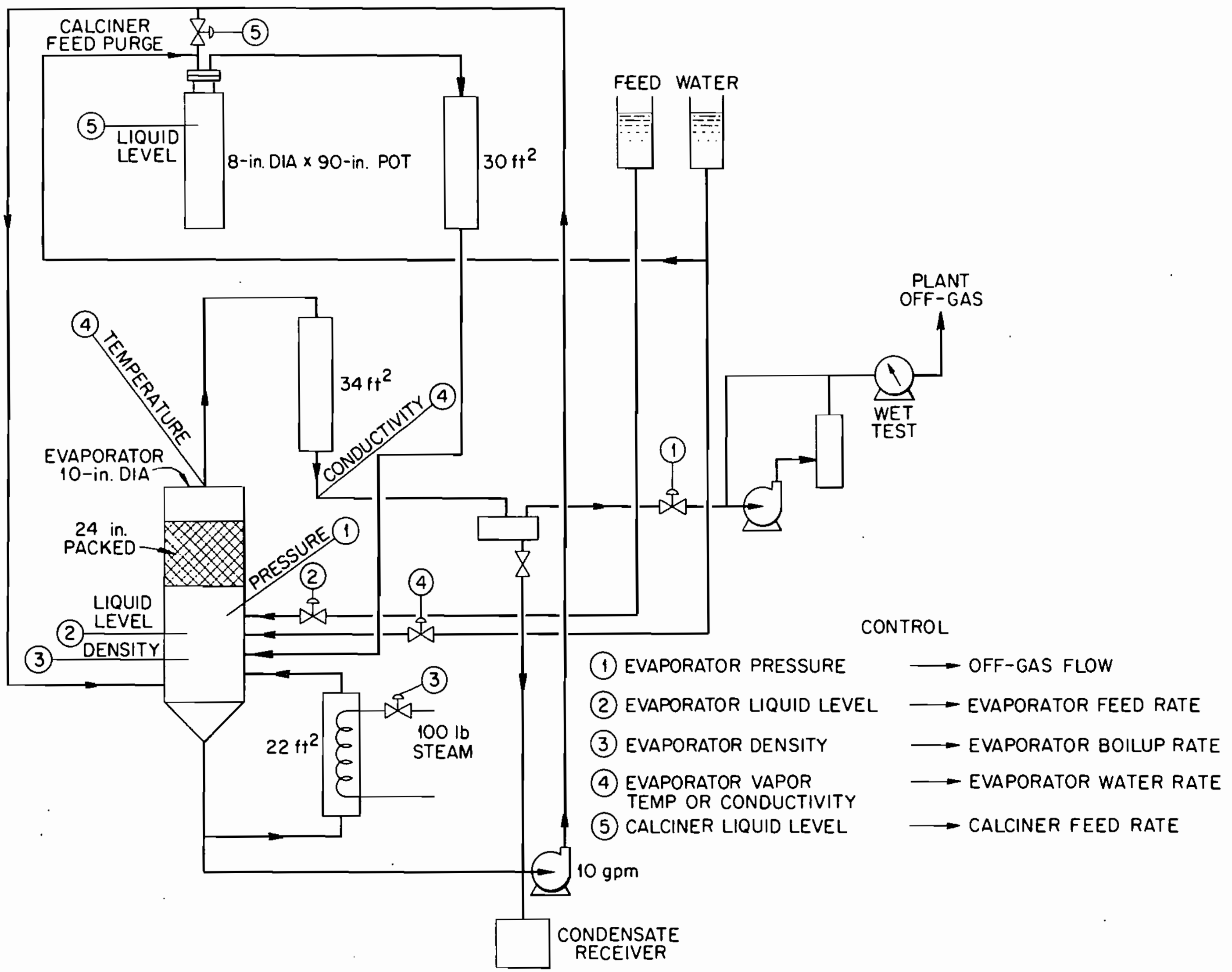

Fig. 4. Calciner-Evaporator Control for Continuous Flowsheet.

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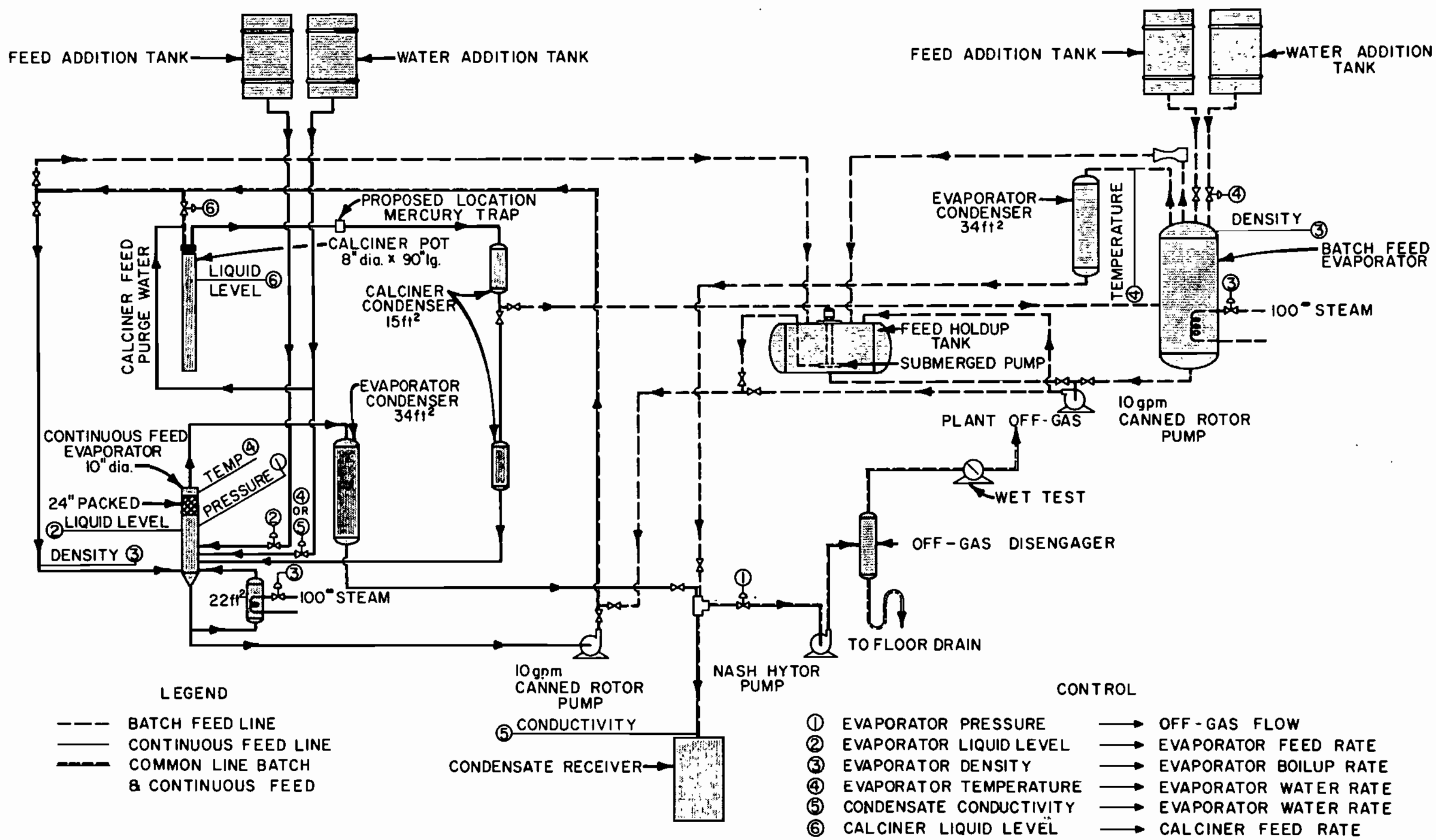

Fig. 5. Waste Calcination: Schematic Process Flowsheet for Batch and Continuous Systems.

The resulting solid from these tests were not completely free of nitrates; however, if the solid is calcined to a temperature exceeding 800°C for 6-8 hours, the residual nitrate should be lower than 300 ppm.

The bulk density of the calcined solids was about 0.6, 1.2, and 1.25 g/cc for TBP, Darex and Purex solids, respectively (Table 1). The volume reductions were 10 to 1, 8 to 1, and 8 to 1 for Purex, TBP-25, and Darex wastes, respectively.

Both processes were technologically feasible, and the continuous process appears to be more adaptable to present engineering practice.

2.1 System Control

The calciner liquid level was satisfactorily controlled using a temperature as an index to liquid-level position. The sensing device was a thermocouple located 13 in. from the tip of a rod suspended down the center line of the calcining vessel. As the operating liquid level increased to cover about 3 in. of the rod, the thermocouple embedded in the rod 10 in. above this point changed about 200°C in a uniform manner, giving a signal usable for proportional control.

The continuous evaporator was easily controlled, one stabilized feature of the system being a density control of the evaporator boilup. The density, which is a slowly changing variable, was used to control the boilup rate (steam pressure), which tended to stabilize the entire evaporator system. There were no difficult problems encountered in control of the batch evaporator.

3. SPECIAL FEATURES OF THE CHEMISTRY OF THE SYSTEM

Three types of feeds were used for the tests reported: Purex with sulfate, Darex, and TBP-25 (see Table 2 for compositions).

Table 1. Results for Waste Calciner Testing

Type of Feed	Mode of Operation	Run No.	Avg System Feed Rate (liters/hr)	Feed Vol (liters)	Water to Feed Vol Ratio	Evaporator[a] Fe or Al Conc (g/liter)	Set Point Conc Fe or Al (g/liter)	Off-gas[b] Vol/Feed (ft^3/liter)	NO_3 in Solids (% by wt)	Solid[c] Density (g/cc)
Purex[d]	Cont	43	System leak	594.5		61-36	45		0.9-0.008	
Purex	Cont	44	40.9	409	7.8	106-36	63	2.02	0.14-0.06	1.14
Purex	Batch	45	25.2	328	3.9	37-27	32	2.2	4.7-0.01	1.17
Purex	Batch	46	25.8	325	4.1	35-27	32	3.5	3.7-0.01	1.55
Darex	Cont	56	13.6	383	4.1	82-47	52	1.4	0.09-0.02	0.86
Darex	Cont	57	8.9	641	3.2	99-53	73	2.2	0.53-0.01	1.4
Darex	Cont	58	16.5	576	3.0	120-98	109	0.84		1.42
Darex	Batch	60	8.6	336	5.5	128-76	110	1.8		1.29
Darex	Batch	61	10.6	307	3.8	112-93	100	out	2-0.1	1.13
TBP-25	Cont	47	30.6	429	3.4	103-54	64	1.9	6.0-0.36	0.57
TBP-25	Cont	48	15.0	468	2.8	72-42	50	3.5	6.0-0.10	0.77
TBP-25	Cont	49	17.6	478	2.6	56-36	54	1.9	6.0-0.36	0.83
TBP-25	Cont	50	11.5	346	2.4	66-35	49	2.4	4.1-0.08	0.52 (Organic)
TBP-25	Cont	54	17.2	428	2.7	52-36	43	1.8	0.85-0.1	0.65
TBP-25	Cont	55	19.4	469	3.5	80-35	42	1.4	0.56-0.1	0.60
TBP-25	Cont	62	16.8	446	4.5	70-36	59	1.0		0.63
TBP-25	Cont	63	16.3	421	2.3	55-39	50	0.9	2.0-0.2	0.61
TBP-25	Cont	64	11.6	560	2.0	54-31	47	1.19	0.2-0.002	0.80
TBP-25	Batch	51	7.0	308	2.5	62-53	57	3.2	6.0-0.08	0.59 (Organic)
TBP-25	Batch	52	9.8	440	2.3	65-49	55	2.4	0.18-0.06	0.44 (Organic)
TBP-25	Batch	59	12.4	397				1.3	1.0-0.07	0.61 (Organic)

[a]Concentration range during calciner feeding, Purex-B batch evaporation.

[b]The off-gas includes about 10 to 20 ft^3/hr system leakage, (ft^2 off-gas/liter of feed).

[c]Bulk density = weight of solid divided by 60 liters.

[d]Purex waste, no $Ca(NO_3)_2$ added.

Table 2. Composition of the Feed Solutions

Type of Feed	Run No.	H^+ M	NO_3^- (g/liter)	Fe^{3+} (g/liter)	Al^{3+} (g/liter)	SO_4^{2-} (g/liter)	Hg^{2+} (g/liter)	Ru^{3+} (g/liter)	Na^+ (g/liter)
Purex	42	5.33	387	29.4		97.8		0.170	12.9
Purex	43	5.15	380	26.7		93.1		0.142	13.0
Purex	44	5.40	358	26.5		90.5		0.123	11.9
Purex	45	6.42	443	36.7		127.4			16.9
Purex	46	6.08	411	33.2		132			19.4
TBP-25	47	1.50	412	0.159	48.4		4.33		
TBP-25	48	1.77	431	0.182	47.8		4.37		
TBP-25	49	1.76	434	0.247	51.1		4.8		
TBP-25	50	1.83	448	0.190	49.0		4.89	0.216	
TBP-25	51	1.57	402	0.211	45.5		3.77	0.205	
TBP-25	52	1.56	426	0.323	49.7		5.98	0.226	
TBP-25	53								
TBP-25	54	1.82	406	0.200	42.2		4.82	0.203	
TBP-25	55	1.86	419	0.198	41.97		5.75	0.206	
TBP-25	59	1.80	446	0.232	49.2		4.50	0.200	
TBP-25	62	1.77	451	0.185	49		4.28		
TBP-25	63	1.67	434	0.290	45.4		4.57		
TBP-25	64	1.65	434	0.525	46.1		4.88		
Darex	56	0.78	349	66.0					
Darex	57	1.33	362	67.2					
Darex	58	1.47	376	71.3					
Darex	60	1.55	579	113.8					
Darex	61	1.94	570	103.6				0.233	

3.1 Purex Wastes

If the sulfate in Purex wastes is not fixed in the calciner but is allowed to volatilize, it builds up in the evaporator. Calcium proved to be the best fixing agent. If the calcium is added directly to the feed, the resulting calcium sulfate slurry is difficult to pump and to handle in the evaporator. Calcium addition directly to the pot proved to be better, and a soluble calcium salt is preferred because it is easier to handle and meter into the calciner vessel. Three molar calcium nitrate was satisfactory. The calcium nitrate was added to the calcining pot through the secondary feed line and was mixed by the boiling of the liquid in the calcining vessel. The sulfate volatility from the calcining vessel was less than 1.0% when a stoichiometric excess of calcium was added. Eight percent of the ruthenium volatilized from the Purex calciner, and 0.2% from the evaporator when the nitrate ion concentration was about 8.0 N.

3.2 Darex Waste

Darex waste caused very few problems in feeding or evaporation. It could be evaporated to an iron concentration of 90 to 100 g/liter before any precipitation occurred. Less than 0.2% of the ruthenium was volatilized from the calciner, and 0.2% from the evaporator.

3.3 TBP-25 Wastes

TBP-25 wastes can be easily evaporated to an aluminum concentration of 60 to 70 g/liter. Mercury, present in TBP-25 wastes to about 4 g/liter, volatilized from the calciner and caused the off-gas lines to plug with a yellow mercury-oxide-nitrate compound which was found to be volatile at a temperature greater than 300°C. This will be discussed in detail in a later section of the report. The extent of ruthenium volatility with the TBP calciner condensate was about 20%, and about 0.2% from the evaporator, with about 80% remaining in the cake.

3.4 Physical and Chemical Properties

3.4.1 Density-Concentration Relationships in the Evaporator

The density of the liquid in the evaporator is a strong function of only the nitric acid concentration and of the metal ion concentration. Figures 6, 7, and 8 show the relationship between density vs nitrate concentration at given concentrations of iron or aluminum for the three waste types. These densities are from measurements and samples taken during a large number of evaporator tests, and the lines give only an approximation to show the magnitude of the trends.

3.4.2 Appearance and Density of the Calcined Solids

The calcined solids from the three feed types varied greatly in physical appearances and density. The Purex cake with calcium added was a very dense solid, with a bulk density of about 1.25 g/cc — bulk density being defined as the total weight of solid divided by 60 liters, which is the total void volume to the operating liquid level (see Table 3 and Fig. 9). The Darex solid was a very dark-brown rusty-appearing solid, with little or no mechanical strength, and it had a bulk density of about 1.2 g/cc (see Table 3 and Fig. 10). The TBP-25 solid, which was practically pure aluminum oxide, was very soft, although it was not dusty and was white grey in color, depending on the residual ruthenium and nitrate. It had an approximate density of 0.6 g/cc (see Table 3 and Fig. 11).

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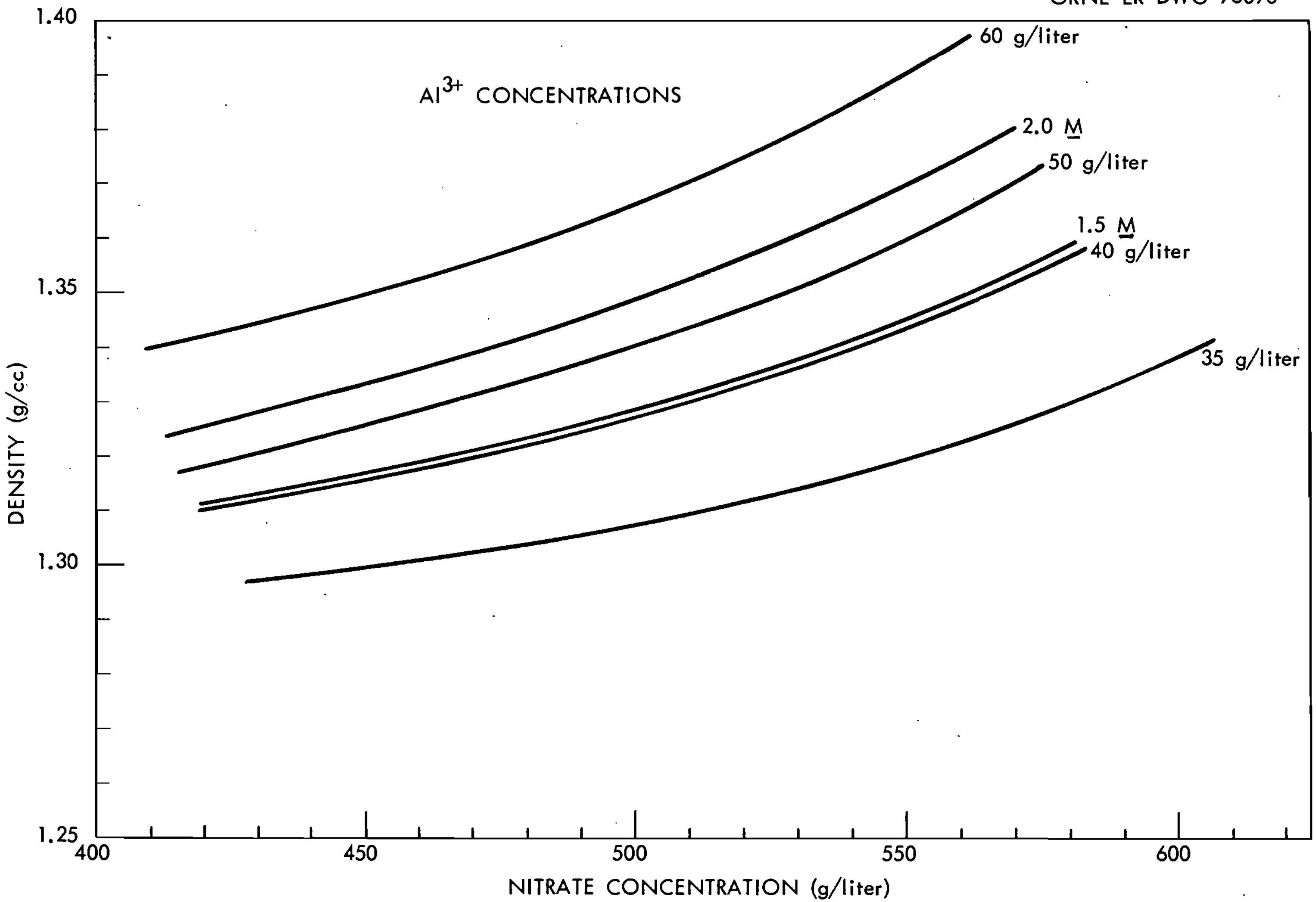

Fig. 6. TBP-25 Waste Solution Evaporator Density vs Nitrate Concentration as a Function of Al^{3+} Concentration.

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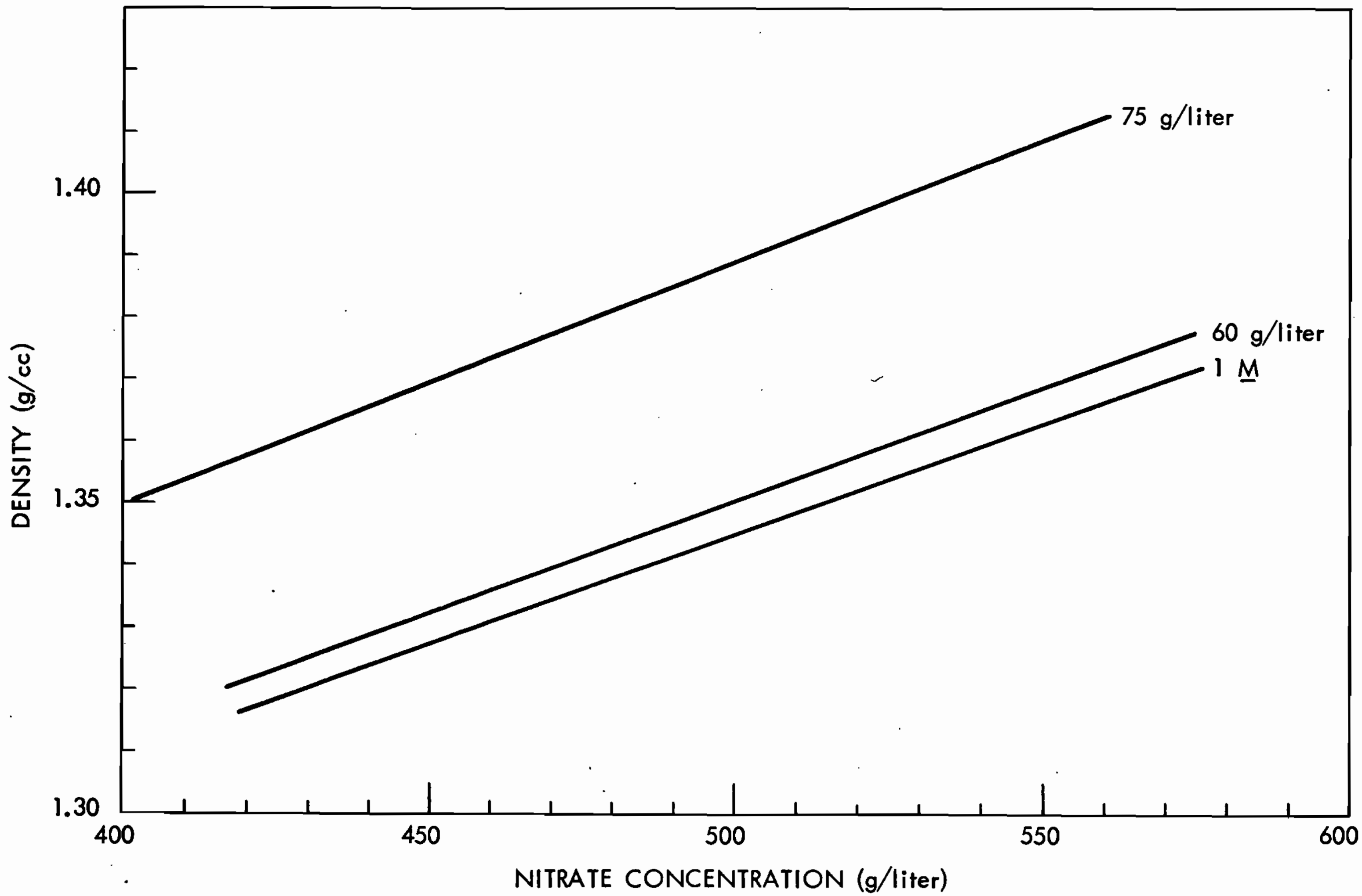

F Fig. 7. Density vs Nitrate Concentration as a Function of Fe^{3+} in Darex Waste Solutions.

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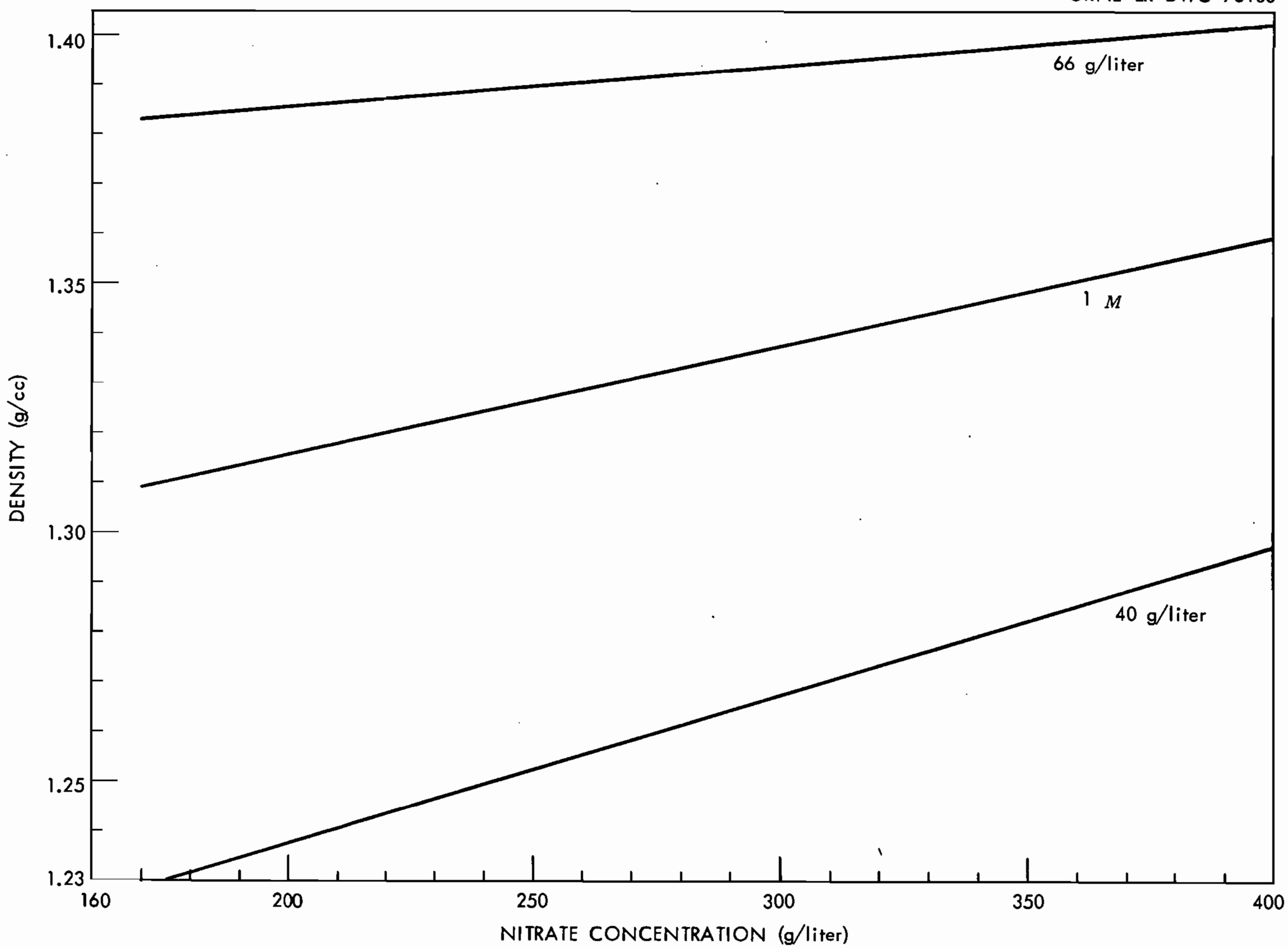

Fig. 8. Density vs Nitrate Concentration as a Function of Fe in Purex Waste Solution.

Table 3. Ionic Material Balance of the Calcined Solids

Run No.	Input to System (g)	Found in Solids (g)	% of Solids	% of Input	Solid Density (g/cc)
		Iron			
42	14,270	12,807	14.23	89.7	1.14
43	15,503	9,949	13.20	64.0	1.17
44	10,838	8,983	13.02	83.0	1.14
45	11,283	6,433	13.00	57.0	1.17
46	11,180	11,386	12.00	102	1.55
47	68.21	212.68	0.57	312	0.57
48	76.75	292	0.625	380	0.77
49	124.3	150	0.30	120.7	0.83
50	69.2	77.5	0.25	120.0	0.52
51	60.9	106.2	0.31	174.2	0.59
52	136.4	158.4	0.60	116.1	0.44
53					
54	77.04	187.2	0.48	243	0.65
55	178.2	148.2	0.39	83.15	0.60
56	25,278	24,768	4.8	97.9	0.86
57	63,971	39,480	47	61.7	1.40
58	40,896	40,071	47.2	98.0	1.42
59	59.5				0.61
60	39,313	31,173	47.03	79.3	1.29
61	34,691	30,572	45.5	88.13	1.13
62	82.51	472.16	1.253	572	0.63
63	125.50	232.44	0.640	185.3	0.61
64	364	76.27	0.160	21	0.80
		Mercury			
42					
43					
44					
45					
46					
47	1,857	356	1.05	19	
48	2,049	756	9.55	37	
49	2,772	310	0.62	11.2	
50	1,591	2,154	6.95	135.4	
51	1,232	531	1.50	43.1	
52	3,190	211.2	0.8	6.6	
54	1,510	278.85	0.715	18.45	
55	2,875	95	0.25	3.3	
56					
57					
58					
59	1,627.7	720.38	1.990	44.26	

Table 3 (Cont'd.)

Run No.	Input to System (g)	Found in Solids (g)	% of Solids	% of Input	Solid Density (g/cc)
		Mercury			
60					
61					
62	1,908.8	1,086.37	2.883	56.9	
63	1,957.65	693.71	1.910	35.4	
64	2,565	276.4	0.58	10.7	
		Nitrate			
42	195,732	685.8	0.762	0.289	
43	218,592	210.1	0.275	0.10	
44	146,422	64.17	0.093	0.044	
45	114,472	3,959	8	2.77	
46	133,575	948.86	1.45	0.512	
47	176,748	134.33	0.36	0.076	
48	203,112	46.72	0.10	0.023	
49	209,364	1,740	3.48	0.83	
50	158,122	647.9	2.09	0.41	
51	122,584	1,062	3.04	0.866	
52	218,840	23.76	0.12	0.01	
54	168,632	167.70	0.43	0.099	
55	196,980	108.3	0.285	0.055	
56	133,667	25.8	0.05	0.020	
57	298,706	168	0.20	0.056	
58	216,576	145.18	0.171	0.067	
59	166,740	202.72	0.560	0.122	
60	190,176	4.64	0.0076	0.002	
61	173,762	215	0.32	0.124	
62	201,146	644.36	1.710	0.32	
63	183,556	351.21	0.967	0.19	
64	242,280	30.985	0.065	0.013	
		Aluminum			
42					
43					
44					
45					
46					
47	20,763	17,947	48.1	86	
48	22,089	18,711	40.05	84.7	
49	24,712	28,750	57.5	116.0	
50	17,576	13,020	42.0	74.1	
51	14,137	15,222	45.5	107.7	
52	23,188	12,408	47.5	53.5	

Table 3 (Cont'd.)

Run No.	Input to System (g)	Found in Solids (g)	% of Solids	% of Input	Solid Density (g/cc)
		Aluminum			
54	16,264	18,135	46.5	111.5	
55	18,901	17,917	47.15	94.8	
56					
57					
58		862.56	1.016		
59	19,572	17,792	49.15	91	
60		366.5	0.553		
61		188.13	0.280		
62	21,854	17,371	46.13	79.5	
63	18,945	17,796	49.0	94.0	
64	27,440	23,659	49.63	86.2	
		Ruthenium			
42	79.28	38.7	0.043	48.8	
43	74.84	31.36	0.041	42.0	
44	50.31	22.77	0.033	45.3	
45		6.43	0.013		
46		12.335	0.013		
47					
48					
49					
50	83.04	41.85	0.135	50.4	
51	64.68	60.18	0.175	93.0	
52	114.4	58.08	0.22	50.77	
54	81.32	68.25	0.175	84.0	
55	89.1	45.6	0.120	51.2	
56					
57					
58		8.5	0.01		
59	79.4				
60		6.63	0.01		
61	81.35	44.35	0.066	54.5	
		Sulfate			
42	48,311	44,280	4.4	91.49	
43	54,826	43,528	1.0	80.3	
44					
45					
46	31,200	44,217	10.7	141	
		Calcium			
42	12,397	13,500		108.9	
43	12,608				
44	13,629	13,800	4.7	101.3	
45	9,450	9,252		97.9	
46	11,400	20,874	0.35	183	

Fig. 9. Purex Calcined Solids.

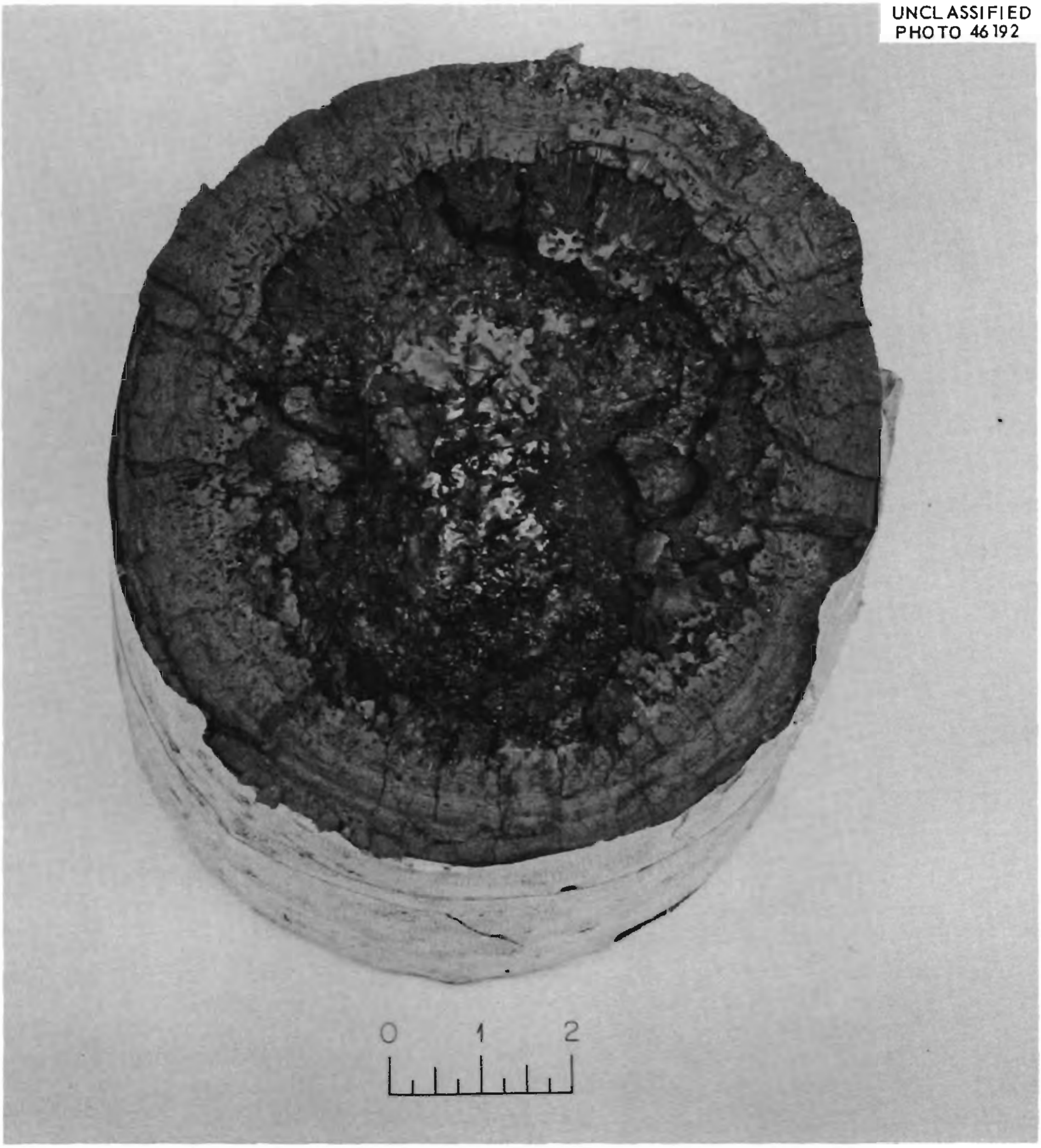

Fig. 10. Calcined Darex Solids.

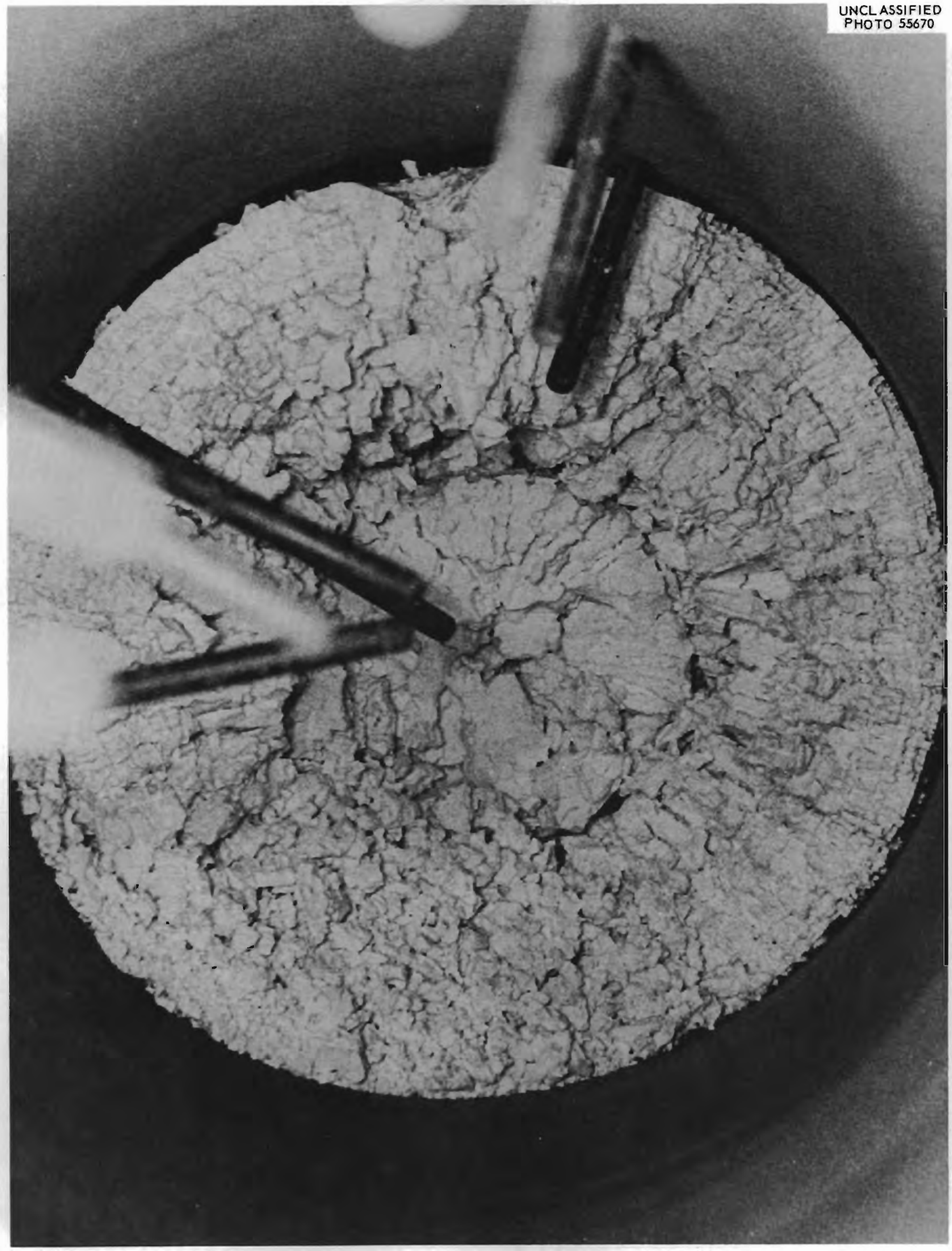

Fig. 11. TBP-Calcined Solids.

3.4.3 Thermal Conductivities of the Calcined Solids

The thermal conductivities of the cakes after calcination were not determined, but they were calculated for the cakes during operation. The following formulas were used:

$$k = \frac{Q \ln\left(1 - \frac{V_o}{60}\right)}{4\pi L \, \Delta T},$$

where k = Btu-hr-ft-$^{\circ}$F,

Q = Btu/hr,

$\ln\left(1 - \frac{V_o}{60}\right)$ = logarithm of the mean radius squared,

V_o = volume of cake (liters),

L = cake length (ft),

ΔT = $^{\circ}$F,

Q = heat removed by calciner condenser,

θ = time (hours).

V_o is determined accordingly:

$$V_o = \left[\frac{\text{Volume of cake}}{\text{Btu of heat to liquid}}\right] \times \int_0^{\theta} Q\,d\theta$$

3.4.4 Liquid-to-Solid Volume Reduction

The volume reduction from Purex solvent extraction raffinates to calcined solids is 240-fold (1200 to 5 gal/ton of uranium processed) (Fig. 12). For TBP-25 waste, in which the salt concentration is much higher, the volume reduction is 6- to 8-fold. Maximum volume reduction is important because one of the major costs of the process is the calciner vessel.

The deposition of the three types of feed was nearly radial and did not grow very much from the bottom up. (The radial-deposition equation is shown in Sec 3.4.3.) The deposition rates for the various types of

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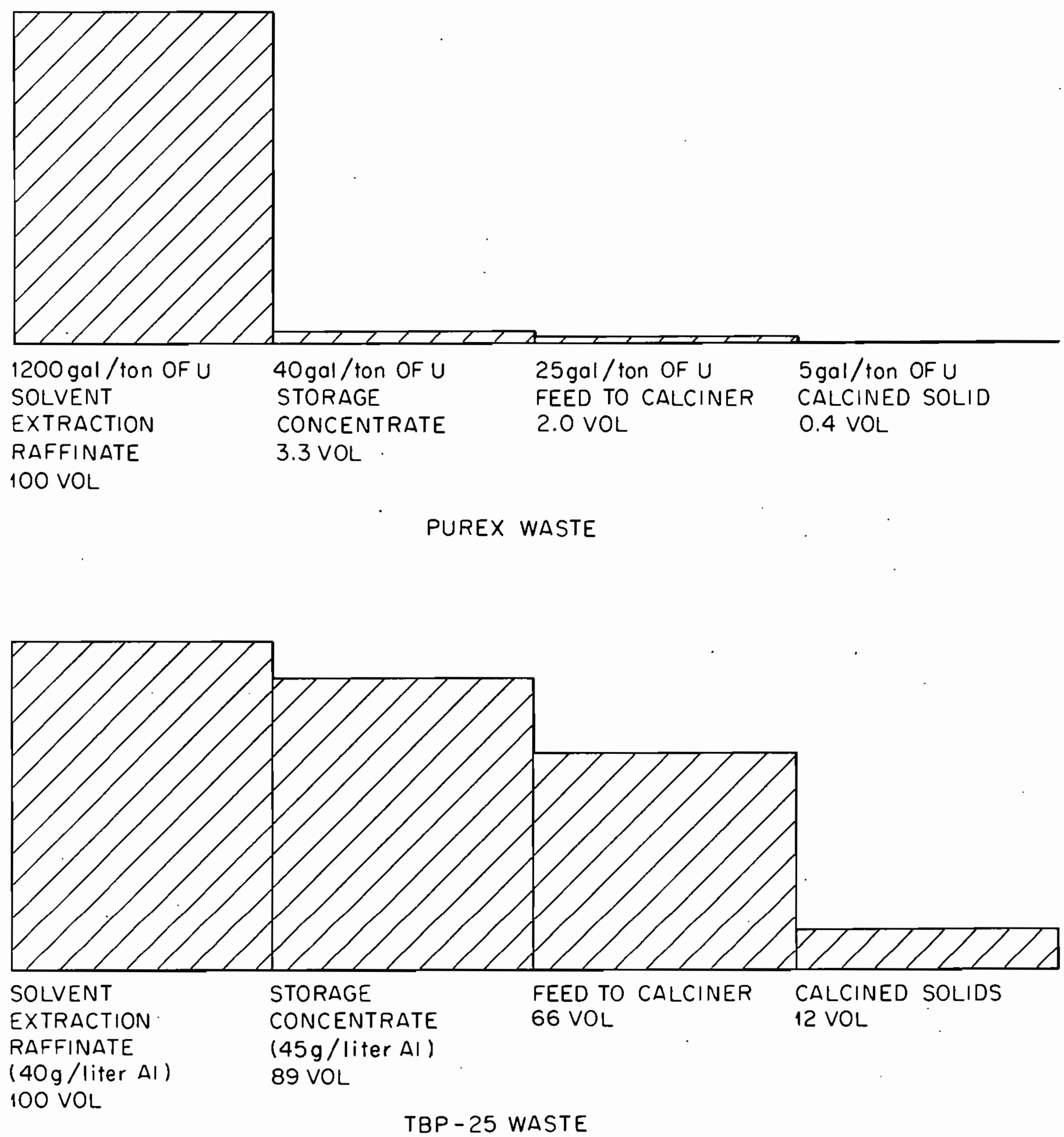

Fig. 12. Volume Reduction (from Liquids to Solids) in the Pot Calciner.

feed are given in Table 5, and the resulting average densities of the solids from the three types of feed are as follows: Purex, 1.25 g/cc; Darex, 1.20 g/cc; TBP, 0.6 g/cc (Table 3).

The theoretical thermal conductivity (Btu $hr^{-1}ft^{-1}{}^{o}F^{-1}$) of the radial deposition solids during deposition was calculated, and the average thermal conductivity during deposition of the various feed types are shown in Tables 4, 5, and 6.

The simulated feed composition used in the various tests matched actual wastes (Table 2).

Both batch and continuous evaporation steps were tested during this operation. The batch evaporation is slower than the continuous because the feed must be transferred from the batch evaporator to the batch-evaporator hold tank between tests so that another batch of raw feed can be charged to the evaporator. The batch-evaporator instrumentation problems are equally as difficult as those of the continuous-evaporator, although they are somewhat different in nature. The control of the batch evaporator is simplier because of the large hold-up and slowly changing control parameters. The authors feed that the continuous-evaporator control problems have been adequately solved, and, because we have had more operating experience with the continuous evaporator, we feel that it is superior in its operating capabilities to the batch evaporator.

3.5 Material Balances

Material balances for all the tests (R-42 to R-64) are given in Table 7, and the feed composition for the tests is given in Table 8. A number of the components either fail to complete a balance or are more than 100% in balance. This can be attributed to errors in measurements taken during operation and/or to the degree of errors of the analytical results.

Table 4. **Calculated Thermal Conductivities of Cakes Formed During Calcination**

Run	Thermal Conductivities ($Btu\text{-}hr\text{-}ft\text{-}^{o}F$) Average (Skin to Center)[b]	Average (Skin to Edge)[c]	Cake Volume at End of Calcination (liters)	Time for[a] Cake to Cover Edge Thermocouple (hr)
42	0.686	0.824	49.137	8
43	1.231	1.177	51.836	4
44	1.105	0.903	57.962	4
45	1.597	3.016	54.303	12
46	0.597	0.886	56.755	16
47	0.230	0.273	35.635	24[d]
48	0.342	0.458	52.446	14
49	0.552	0.566	52.698	9
50	0.320	0.439	46.732	15
51	2.371	3.002	49.630	26
52	1.841	2.690	54.928	30
53				
54	0.456	0.549	50.941	10
55	0.809	0.713	40.939	10
56	1.089	0.965	39.937	13
57	1.020	1.396	32.041	44[d]
58	1.327	2.175	30.135	25[d]
59	0.429	0.770	51.606	11
60	0.296	0.257	52.831	17
61	0.413	0.485	42.150	8
62	0.530	0.899	31.738	20[d]
63	1.486	1.697	58.627	10
64	0.945	1.367	52.642	17
65	0.84	0.92	54.98	9
66	1.54	1.09	50.9	12
67	0.999	1.066	41.123	13

[a]Volume of edge couple = 36.6 liters.

[b]Skin of calciner vessel to center line.

[c]Skin of calciner vessel to approximately half way to center line.

[d]Incomplete filling.

Table 5. Times for Calcined Solids to attain Temperatures

Test No.	Feed Type	Time (hr) Required For: Calciner Skin Temp. to Exceed 800°C	Calciner Solid 1 in. from Wall to Exceed 200°C	Calciner Solid at the Center to Exceed 200°C
R-42	Purex	6.2	6.1	10.8
R-43	Purex	12.1	7.8	11.0
R-44	Purex	5.7	6.3	10.6
R-45	Purex	10.1	6.5	14.6
R-46	Purex	7.0	9.7	16.3
R-47	TBP-25	23.2[a]	13.0	17.6
R-48	TBP-25	9.8	8.4	29.0
R-49	TBP-25	14.3	11.8	25.5
R-50	TBP-25	12.0	6.4	24.0
R-51	TBP-25	30.0	8.1	16.7
R-52	TBP-25	12.1	5.4	11.1
R-54	TBP-25	6.8	8.5	24.3
R-55	TBP-25	13.8	10.3	18.2
R-56	Darex	26.0[a]	11.9	28.2
R-57	Darex	16.6	11.0	26.8
R-58	Darex	6.4	5.5	12.8
R-59	TBP-25	16.2	7.0	25.1
R-60	Darex	21.1	8.7	20.2
R-61	Darex	11.3	7.4	7.7
R-62	TBP-25	23.0	10.3	23.0
R-63	TBP-25	17.3	9.3	27.2
R-64	TBP-25[b]	18.0-36.1	10.8	20.3-40.8

[a]Set point 700°C for first 22 hr.

[b]Pot refilled after first calcination.

Table 6. Temperatures (°C) at Beginning and End of the Calcination

Run	Center of Pot (Top → Bottom) 1[b]	2	3	4	5	6	1 in. from Wall (Top → Bottom) 7	8	9	10	11	12
						Beginning						
42	125	125	125	125	125	195	135	145	155	145	300	505
43	265	155	135	220	455	440	320	170	240	620	795	795
44	170	130	130	195	790	455	455	175	270	515	805	640
45	280	125	125	245	855	765	490	240	295	650	855	820
46	215	155	155	155	155	750	640	570	300	180	275	820
47	130	135	135	135	135	150	225	165	175	195	210	360
48	235	135	140	160	200	495	690	440	500	495	590	730
49	160	145	145	145	205	415	600	305	530	280	570	710
50	125	140	140	145	455	905	185	285	270	350	770	905
51	680	515	200	305	935	935	680	670	555	650	925	635
52	145	135	135	135	135	145	660	415	390	500	510	605
53[a]												
54	150	145	145	160	190	720	210	475	405	500	590	780
55	230	145	155	230	250	780	780	465	155	395	505	830
56	575	555	450	400	135	155	630	720	665	590	355	560
57	205	250	255	180	675	865	450	540	635	525	790	880
58	335	155	130	130	175	535	680	620	285	445	635	700
59	680	665	345	350	900	890	720	815	800	700	910	890
60	215	250	200	170	140	230	465	475	520	615	565	690
61	505	135	150	145	810	875	730	540	460	555	880	880
62	140	140	135	150	235	665	660	315	395	525	635	220
63	390	220	135	140	170	340	685	465	500	430	560	690
64	540	180	135	140	150	200	745	475	375	365	390	590
64	615	135	150	505	910	880	835	525	555	815	900	880

[a] Pot began to leak after 2 hr of operation.

[b] Thermocouple locations:

1 Centerline	72 in. from bottom	7 one-inch from wall	72 in. from bottom
2	59	8	59
3	45	9	45
4	32	10	32
5	19	11	19
6	6	12	6

Table 6. (Cont'd.)

	Center of Pot						1 in. from Wall					
	(Top				Bottom)		(Top				Bottom)	
Run	1	2	3	4	5	6	7	8	9	10	11	12
						End						
42	570	670	675	880	870	840	600	830	845	900	880	875
43	620	755	500	855	855	860	660	790	800	870	870	875
44	545	705	750	790	830	785	655	765	785	815	835	790
45	550	495	615	895	895	845	765	610	725	900	900	865
46	560	540	225	555	565	870	715	730	600	730	735	880
47	685	850	895	905	320	475	725	860	900	910	630	755
48	700	445	870	915	930	890	795	765	885	910	925	895
49	160	145	145	205	415	415	600	305	530	280	550	710
50	795	860	890	890	890	895	805	870	895	895	895	895
51	750	815	560	465	915	895	745	840	750	755	915	900
52	145	135	135	135	135	145	665	410	390	500	510	605
53[a]												
54	605	855	830	815	910	920	605	855	830	815	910	920
55	240	150	200	345	450	865	415	255	510	680	750	885
56	615	795	850	860	855	520	685	840	870	875	880	820
57	555	780	830	780	870	880	690	835	880	825	875	885
58	170	155	135	145	315	710	690	625	320	520	715	775
59	720	870	895	915	895	890	745	875	895	895	910	890
60												
61	505	135	150	145	810	875	730	540	460	555	880	880
62	640	750	350	340	870	900	645	830	760	670	870	900
63	805	915	840	300	850	920	910	925	840	715	890	915
64	820	1000	905	465	265	375	845	985	905	810	600	635
64	810	585	790	900	915	875	880	800	840	900	900	895

[a]Pot began to leak after 2 hr of operation.

Table 7. Material Balances for Waste Calciner Tests R-42 through R-64.

	HNO_3		Al		Fe		Hg		SO_4		Ru		P		Ca	
	g	%	g	%	g	%	g	%	g	%	g	%	g	%	g	%
Purex Run R-42																
IN																
Feed	195,722				14,270				48,311		79.28				12,397	
Added	41,131															
Total	236,853															
OUT																
Evap.	3,500	1.48			655	4.6			2,157	4.4	5.9	7.44				
Cond.	248,372	104.8			89.3	0.6			483	1.0						
Solid	685.8	0.29			12,807	89.7			44,280	91.49	38.7	48.8			13,500	108.9
Total		106.5				94.9				96.9		56.24				108.9
Purex Run R-43																
IN																
Feed	218,592				15,503				54,826		74.84				12,608	
Added	3,392															
Total	221,984															
OUT																
Evap.	117	0.1			51.6	0.33					2.55	3.41				
Cond.	181,474	81.7			128.4	0.83			548	1.0						
Solid	210	0.1			9,949	64.0			43,548	80.3	31.36	42				
Total		81.9				65.2				81.3		45.41				

Table 7. (Cont'd.)

	NO_3		Al		Fe		Hg		SO_4		Ru		P		Ca	
	g	%	g	%	g	%	g	%	g	%	g	%	g	%	g	%
Purex Run R-44																
IN																
Feed	146,422	100			10,838	100					50.31	100			13,629	100
Added																
Total	146,422															
OUT																
Evap.	1,482	1.01			1,360	12.5					7.73	15.35			650	4.7
Cond.	175,698	120			42.8	0.39					8.72	17.33			80	0.6
Solid	64.2	0.04			8,983	83.0					22.77	45.3			13,800	101.3
Total		121.05				95.89						78				106.6
Run R-45																
IN																
Feed	114,472				11,283										9,450	
Added	28,272															
Total	142,744															
OUT																
Evap.	-25,630	-18.0			1,825	16.2										
Cond.	172,125	121.0			22.4	0.2										
Solid	3,959	2.77			6,433	57.0									9,252	97.9
Total		105.7				73.4										97.9

Table 7. (Cont'd.)

	NO_3		Al		Fe		Hg		SO_4		Ru		P		Ca	
	g	%	g	%	g	%	g	%	g	%	g	%	g	%	g	%
Purex-Batch Run R-46																
IN																
Feed	133,575				11,180										11,400	
Added	51,875	100														
Total	185,450															
OUT																
Evap.	-25,176	-13.57			498	4.5										
Cond.	179,631	97.0			5.6	0.05									40	0.35
Solid	948.8	0.512			11,386	102									20,874	183
Total		83.9				106.5										183.35
TBP-25 Run 47																
IN																
Feed	176,748	100	20,763		68.21		1,857									
Added																
Total	176,748															
OUT																
Evap.	10,550	5.9	211.3	0.17	6.7	9.8	192	10								
Cond.	135,503	77.0	1,242	5.9	13.2	19.3	197	10.6								
Solid	134.33	0.076	17,947	86.0	212.6	312	356	19								
Total		82.9		92.1		341.2		40.0								

Table 7. (Cont'd.)

	HNO_3		Al		Fe		Hg		SO_4		Ru		P		Ca	
	g	%	g	%	g	%	g	%	g	%	g	%	g	%	g	%
TBP-25 Run R-48																
IN																
Feed	203,112	100	22,089	100	76.75	100	2,049	100								
Added																
Total	203,112	100														
OUT																
Evap.	12,900	6.35	1,015	4.6	7.13	9.2	270	13								
Cond.	203,112	100					164	8								
Solid	46.72	0.023	18,711	84.7	292.0	380	756	37								
Total		106.37		89.3		389.3		58								
TBP-25 Run R-49																
IN																
Feed	209,364	100	24,712		124.3		2,772									
Added																
Total	209,364															
OUT																
Evap.	10,350	4.0	1,370	5	8.6	7.0	162	6								
Cond.	149,274	71.3	26.9	0.1	7.8	6.3	56	2								
Solid	1,740	0.83	28,750	116	150	121	310	11								
Total		76.13		121.1		134.1		19								

Table 7. (Cont'd.)

	HNO_3 g	HNO_3 %	Al g	Al %	Fe g	Fe %	Hg g	Hg %	SO_4 g	SO_4 %	Ru g	Ru %	P g	P %	Ca g	Ca %
TBP-25 Organic Run R-50																
IN																
Feed	158,122	100	17,576		69.2		1,591				83.04		114			
Added																
Total	158,122															
OUT																
Evap.	12,075	7.64	1,415	8.1	13.2	19.2	206	13			6.675	8.04				
Cond.	123,052	77.8	14.2	0.08	2.84	4.1	60	3.7			1.58	1.9	1.4	1		
Solid	647.9	0.41	13,020	74.1	77.5	120	2,154	134			41.85	50.4	62	54.3		
Total		85.85		82.3		143.3		150.7				60.34		55.3		
TBP-25 Batch Organic Run R-51																
IN																
Feed	122,584	100	14,137		60.9		1,232				64.68		77			
Added																
Total	122,584															
OUT																
Evap.	44,400	36.22	5,655	40	104.1	170.6	1,889.6	153.3			55.8	86.3				
Cond.	120,169	98.03	17.2	0.12	2.1	0.03	83.65	6.79			2.87	4.44	0.08	1		
Solid	1,062	0.866	15,222	107.7	106.2	174.2	531	43.1			60.18	93	77	100		
Total		135.12		147.4		344.8		203.1				183.74		101		

Table 7. (Cont'd.)

	HNO$_3$		Al		Fe		Hg		SO$_4$		Ru		P		Ca	
	g	%	g	%	g	%	g	%	g	%	g	%	g	%	g	%
TBP-25 Batch Organic Run R-52																
IN																
Feed	213,840	100	23,188		136.4		3,190				114.4		127			
Added																
Total	213,840															
OUT																
Evap.	43,266	20.23	8,923	38.5	126	92.5	951	29.8			37.5	32.78				
Cond.	26,812	17.66														
Solid	23.76	0.01	12,408	53.5	158.4	116.1	211.2	6.6			58.08	50.77	52.8	41.5		
Total		38.0		92.0		208.5		36.4				83.55		41.5		
TBP-25 Run R-54																
IN																
Feed	168,632	100	16,264		77.04		1,510.8				81.32					
Added																
Total	168,632															
OUT																
Evap.	12,400	7.35	1,187	7.3	42.0	54.2	522.5	34.6			5.05	6.21				
Cond.	181,792	107.8	2.9	0.02	0.1	0.13	41.9	2.77			1.51	1.86				
Solid	167.7	0.099	18,135	112	187.2	243.0	278.85	18.46			68.25	84				
Total		115.25		118.8		297.6		55.83				92.1				

Table 7. (Cont'd.)

	HNO_3 g	HNO_3 %	Al g	Al %	Fe g	Fe %	Hg g	Hg %	SO_4 g	SO_4 %	Ru g	Ru %	P g	P %	Ca g	Ca %
TBP-25 Run R-55																
IN																
Feed	196,980		18,901		178.2		2,875				89.1					
Added																
Total	196,980															
OUT																
Evap.	12,875	6.54	1,395	7.4	26	14.6	442.5	15.4			6.73	7.55				
Cond.	133,842	66.9	72.7	0.38	1.92	1.1	81.87	2.85			1.79	2.01				
Solid	108.3	0.055	17,917	94.8	148.2	83.1	95	3.3			45.6	51.2				
Total		74.5		102.5		98.8		21.55				60.76				
Darex Run R-56																
IN																
Feed	133,667	100			25,278											
Added																
Total	133,667															
OUT																
Evap.	12,450	9.3			1,212	4.8										
Cond.	87,845	65.7			2.29	0.01										
Solid	25.8	0.02			25,768	97.9										
Total		75.02				102.7										

Table 7. (Cont'd.)

	HNO_3		Al		Fe		Hg		SO_4		Ru		P		Ca	
	g	%	g	%	g	%	g	%	g	%	g	%	g	%	g	%
Darex Run R-57																
IN																
Feed	298,706	100			63,971											
Added																
Total	298,706															
OUT																
Evap.	12,550	4.2			1,945	3.04										
Cond.	195,298	65.3			9.68	0.02										
Solid	168.0	0.056			39,480	61.7										
Total		69.60				64.75										
Darex Run R-58																
IN																
Feed	216,576	100			40,896											
Added																
Total	216,576															
OUT																
Evap.	14,575	6.73			2,650	6.4										
Cond.	170,168	78.57			3.43	0.01										
Solid	145.18	0.067			40,071	98.0										
Total		85.40				104.5										

Table 7. (Cont'd.)

	HNO_3		Al		Fe		Hg		SO_4		Ru		P		Ca	
	g	%	g	%	g	%	g	%	g	%	g	%	g	%	g	%
TBP-25 Batch Organic Run R-59																
IN																
Feed	166,740	100	19,572		59.4		1,627.7				79.4					
Added																
Total	166,740															
OUT																
Evap.	161,579	97	1,320	6.7	6.65	11.2	1,273	78.21			6.65	8.38				
Cond.																
Solid	202.72	0.122	17,792	91			720.4	44.3								
Total		97.122		97.75		11.2		122.51				8.38				
Darex Batch Run R-60																
IN																
Feed	190,176	100			39,313	100										
Added																
Total	190,176															
OUT																
Evap.	42,250	22.2			12,186	30.1										
Cond.	147,633	77.63			2,218	5.64										
Solid	4.64	0.002			31,173	79.3										
Total		99.83				115.04										

Table 7. (Cont'd.)

	HNO_3 g	HNO_3 %	Al g	Al %	Fe g	Fe %	Hg g	Hg %	SO_4 g	SO_4 %	Ru g	Ru %	P g	P %	Ca g	Ca %
Darex Batch Run R-61																
IN																
Feed	173,762	100			34,691	100					81.355	100				
Added																
Total	173,762															
OUT																
Evap.	104,372	60.1			65.78	0.19					1.628	2.0				
Cond.	85,855	41.41			13.99	0.04					1.53	1.88				
Solid	215	0.12			30,572	88.13					44.35	54.50				
Total		104.63				88.33						58.38				
TBP-25 Run R-62																
IN																
Feed	201,146	100	21,854	100	82.51	100	1,908.8	100								
Added																
Total	201,146															
OUT																
Evap.	13,000	6.46	967.5	4.43	54.75	66.36	440	23.1								
Cond.	129,812	64.53	4.61	0.02			39.14	2.05								
Solid	644	0.32	17,371	79.5	47.3	57.2	1,086	56.9								
Total		71.31		85.95		123.56		82.05								

Table 7. (Cont'd.)

	HNO_3		Al		Fe		Hg		SO_4		Ru		P		Ca	
	g	%	g	%	g	%	g	%	g	%	g	%	g	%	g	%
TBP-25 Run R-63																
IN																
Feed	183,556	100	18,945	100	125.5	100	1,957	100								
Added																
Total	183,556															
OUT																
Evap.	12,025	6.55	920	4.85	23.75	18.9	127	6.5								
Cond.	152,339	83	3.41	0.012			46.9	2.4								
Solid	351.2	0.19	17,796	94.0	232.44	185.3	693.7	35.4								
Total		89.74		98.85		204		44.3								
TBP-25 Run R-64																
IN																
Feed	242,280	100	27,440	100	364	100	2,565	100								
Added																
Total	242,280															
OUT																
Evap.	8,550	3.53	817.5	2.97	9.25	2.54	211.25	8.2								
Cond.	176,908	73	3.41	0.02	41.5	11.40	142.89	5.57								
Solid	30.9	0.013	23,659	86.2	76.3	20.96	276.48	10.7								
Total		76.51		89.19		34.90		24.47								
Cond.	185,397	71	174	0.59	3.3	0.08	2,637	103								

Table 8. Summary of Material Balances

Material Balance for Ruthenium

Test No.	Input to System, g	Inventory to Evaporator, g	Output via Condensate, g	Calcined Solid, g	Balance, %
R-42	79.28	5.9	-	38.7	56.24
R-43	74.84	2.55	-	31.36	45.41
R-44	50.31	7.73	8.72	22.77	78
R-50	83.04	6.675	1.58	41.85	60.34
R-51	64.68	55.8	2.87	60.18	183.74
R-52	114.4	37.5	-	58.08	83.55
R-54	81.32	5.05	1.51	68.25	92.1
R-55	89.1	6.73	1.79	45.6	60.76
R-59	79.4	6.65	-	-	8.38
R-61	81.355	1.628	1.53	44.35	58.38

Material Balance for Mercury

Test No.	Input to System, g	Inventory to Evaporator, g	Output via Condensate, g	Calcined Solid, g	Balance, %
R-47	1,857	192	197	356	40.0
R-48	2,049	270	164	756	58
R-49	2,772	162	56	310	19
R-50	1,591	206	60	2,154	150.7
R-51	1,232	1,889.6	83.65	531	203.1
R-52	3,190	951	-	211.2	36.4
R-54	1,510.8	522.5	41.9	278.85	55.83
R-55	2,875	442.5	81.87	95	21.55
R-59	1,627.7	1,273	-	720.4	122.47
R-62	1,908.8	440	39.14	1,086	82.05
R-63	1,957	127	46.9	693.7	44.3
R-64	2,565	211.25	142.89	276.48	24.47

Table 8 (Cont'd.)

Material Balance for Nitrate

Test No.	Input to System, g	Inventory to Evaporator, g	Output via Condensate, g	Calcined Solid, g	Balance, %
R-42	236,853	3,500	248,372	685.8	106.5
R-43	211,984	117	181,474	210	81.9
R-44	146,422	1,482	175,698	64.2	121.05
R-45	142,744	-25,630	172,125	3,959	105.7
R-46	185,450	-25,176	179,631	948.8	83.9
R-47	176,748	10,550	135,503	134.33	82.9
R-48	203,112	12,900	203,112	46.72	106.37
R-49	209,364	10,350	149,274	1,740	76.13
R-50	158,122	12,075	123,052	647.9	85.85
R-51	122,584	44,400	120,169	1,062	135.12
R-52	213,840	43,266	26,812	23.76	38.00
R-54	168,632	12,400	181,792	167.7	115.25
R-55	196,980	12,875	133,842	108.3	74.5
R-56	133,667	12,450	87,845	25.8	75.02
R-57	298,706	12,550	195,298	168.0	69.60
R-58	216,576	14,575	170,168	145.18	85.40
R-59	166,740	161,579	-	202.72	97.122
R-60	190,176	42,250	147,633	4.64	99.83
R-61	173,762	104,372	85,855	215	104.63
R-62	201,146	13,000	129,812	644	71.31
R-63	183,556	12,025	152,339	351.2	89.74
R-64	242,280	8,550	176,908	30.9	76.51

Table 8 (Cont'd.)

Material Balance of Major Salt Component

Test No.	Major Cation for Control Balance	Input to System, g	Inventory to Evaporator, g	Output via Condensate, g	Calcined Solid, g	Balance, %
R-42	Fe	14,270	655	89.3	12,807	94.9
R-43	Fe	15,503	51.6	128.4	9,949	65.2
R-44	Fe	10,838	1,360	42.8	8,983	95.89
R-45	Fe	11,283	1,825	22.4	6,433	73.4
R-46	Fe	11,180	498	5.6	11,386	106.5
R-47	Al	20,763	211.3	1,242	17,947	92.1
R-48	Al	22,089	1,015	-	18,711	89.3
R-49	Al	24,712	1,370	26.9	28,750	121.1
R-50	Al	17,576	1,415	14.2	13,020	82.3
R-51	Al	14,137	5,655	17.2	15,222	147.4
R-52	Al	23,188	8,923	-	12,408	92.0
R-54	Al	16,264	1,187	2.9	18,133	118.8
R-55	Al	18,901	1,395	72.7	17,917	102.5
R-56	Fe	25,278	1,212	2.29	24,768	102.7
R-57	Fe	63,971	1,945	9.68	39,480	64.75
R-58	Fe	40,896	2,650	3.43	40,071	104.5
R-59	Al	19,572	1,320	-	17,792	97.75
R-60	Fe	39,313	12,186	2,218	31,173	115.04
R-61	Fe	34,691	65.78	13.99	30,572	88.33
R-62	Al	21,854	967.5	4.61	17,371	85.95
R-63	Al	18,945	920	3.41	17,796	98.85
R-64	Al	27,440	817.5	4.09	23,659	89.19

The ruthenium and mercury deficiency can be traced to the large amount of deposited solids on the off-gas lines after TBP-25 tests were completed. These deposits could not be sampled or weighed accurately enough to be added to the balance total. The discrepancy in the nitrate ion can be attributed to inaccurate metering of the evaporator condensate volume.

4. TEMPERATURE EFFECTS

The temperatures of the calciner furnace and of the calciner pot were recorded continuously on Brown Recorder strip charts and were also recorded at hourly intervals. The furnace had six control zones, and there were four radial temperatures recorded at each zone: the calciner-furnace temperature, the calcination-vessel surface temperature, a temperature 1 in. from the wall on the inside of the calciner vessel, and the temperature at the center line of the calciner vessel. From observation of these furnace and pot temperatures, the zones of liquid and solid in the calcination pot could be followed through the tests, and the time at which the solid formed at a certain point could be determined by the time at which that point reached a temperature in excess of 200°C (Figs. 13 and 14).

The assumption that deposition of solids was radial was proved approximately correct except for the top and bottom zones, because the time at which the center four zones reached 200°C was approximately the same. These values are given in Tables 4 and 5. A comparison of these solid-deposition times with the calculated deposit times from the thermal conductivity during operation agree very well.

The temperature history for tests R-42 to R-64 are given in Table 6, which lists the temperature of the calcining pot at the start and finish

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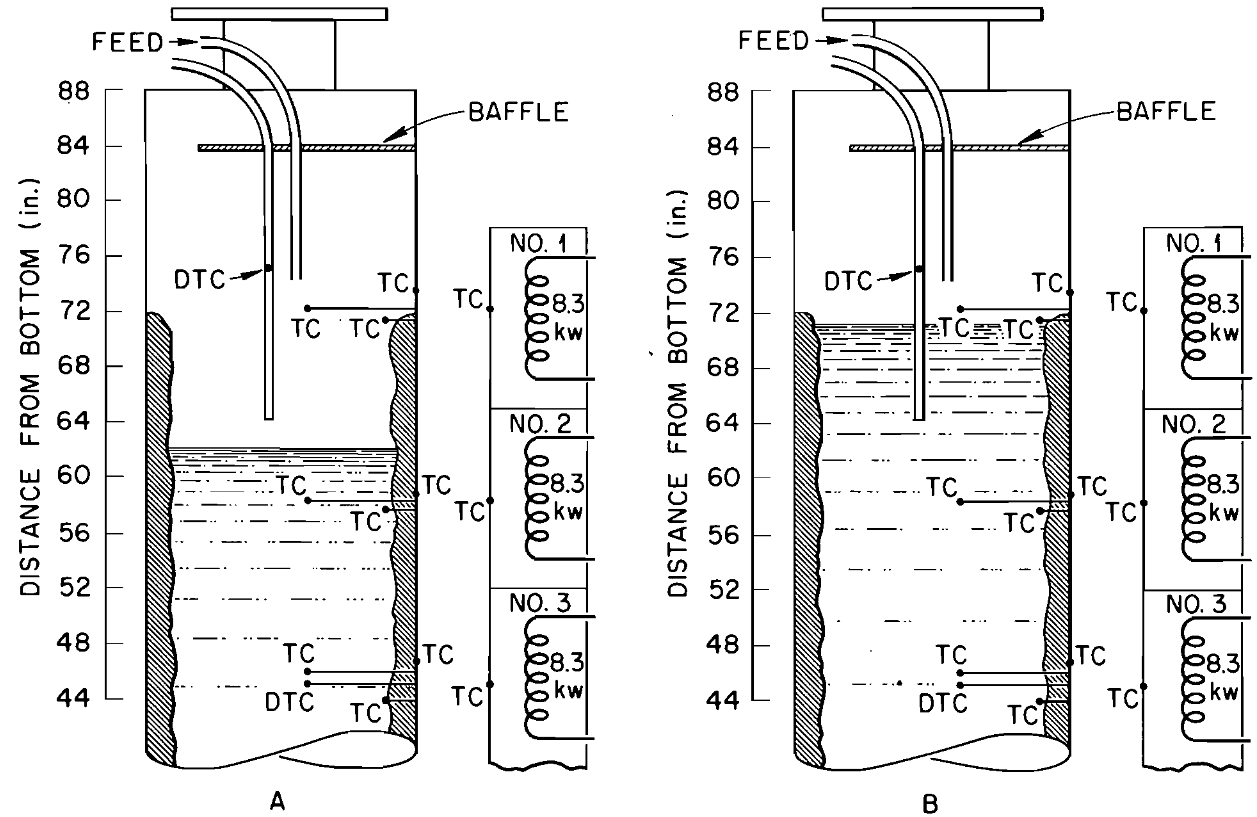

DCT $\Delta T = 600°C - 120°C = 480°C$
TOP BOTTOM

DCT $\Delta T = 220°C - 120°C = 100°C$
TOP BOTTOM

CONTROL RANGE = 50–150°C FOR 0–100% CONTROL OUTPUT

Fig. 13. Temperature Control of Calciner Liquid Level.

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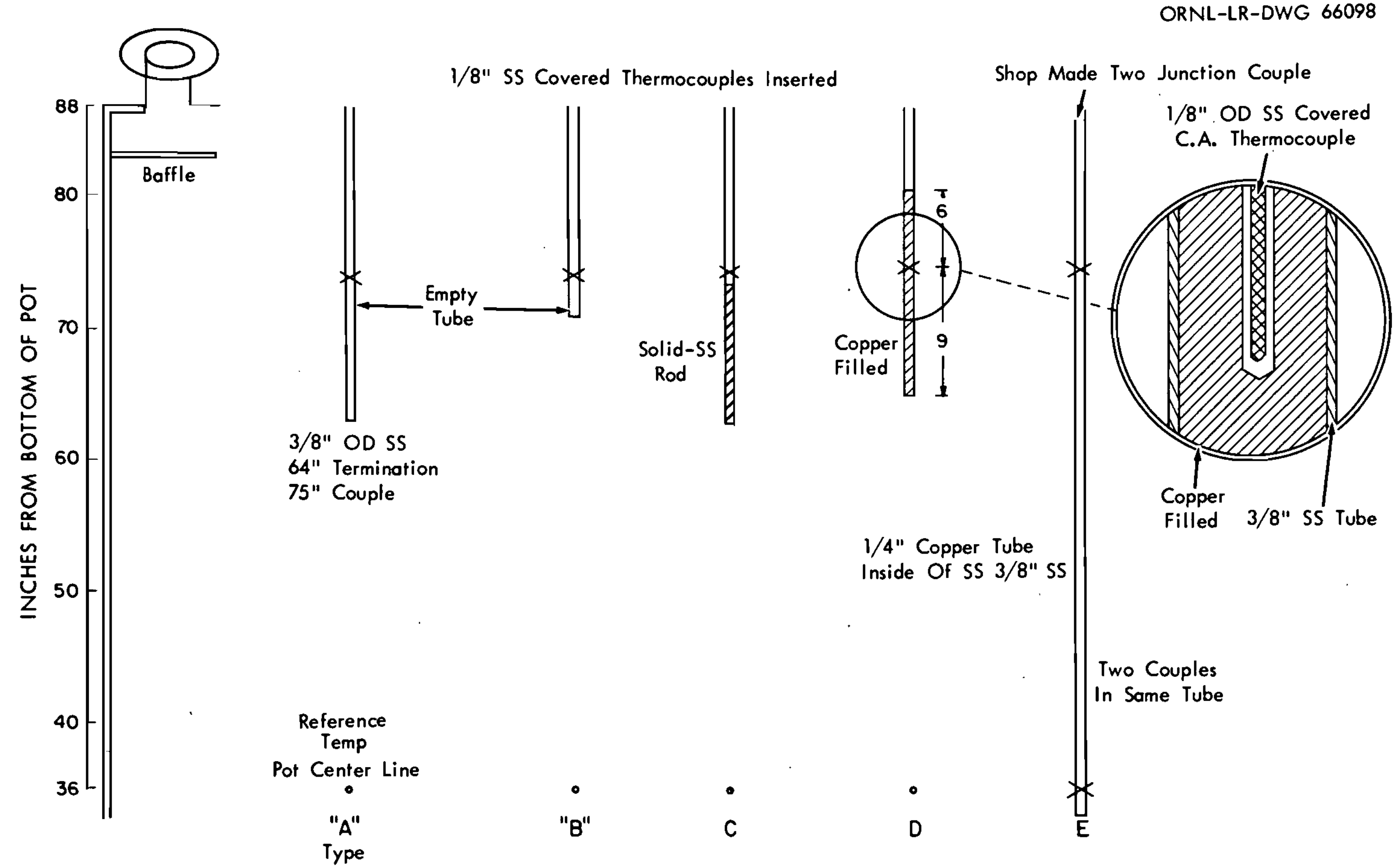

Fig. 14. Different Types of Couples Used for Controlling the Liquid Level in the Calciner Pot.

of calcination. The operating temperatures of calciner and furnace for tests R-59, -61, -63, and -64 are plotted at 5-min intervals in Fig. 15a, b, c, and d. (Fig. 15a consists of eight curves showing data on test R-59, b is for R-61, etc.)

The evaporator temperature was determined for the various nitric acid concentrations and salt concentrations in the evaporator. The boiling point of the mixture for the various tests was about 113 to 116°C at the operating pressure of -1 psig.

5. CONTROL OF THE PROCESS

5.1 Control of the Complete Continuous Process

The variables that must be controlled in the process are listed below:

1. Acidity in the evaporator. The evaporator is operated with a nitrate ion concentration of 8 N or less in order to reduce ruthenium volatility. This concentration is maintained by recycling water or weak nitric acid from the distillation column to the evaporator, the amount recycled being controlled by the nitric acid concentration of the liquid when metal ions are present in varying concentrations. The vapor temperature and liquid density are related (Fig. 16), and the preferred operating range is between 0.5 and 0.7 M iron and between 4 and 6 M hydrogen ion for Purex waste. Increasing the rate of water addition increased the vapor volume and therefore the required capacities of the evaporator and distillation column.

2. Metal ion concentration in the evaporator. The metal ion concentration in the evaporator is kept at a maximum, limited by solution stability, by controlling the liquid density, which is done by controlling the amount of steam used to vaporize the liquid.

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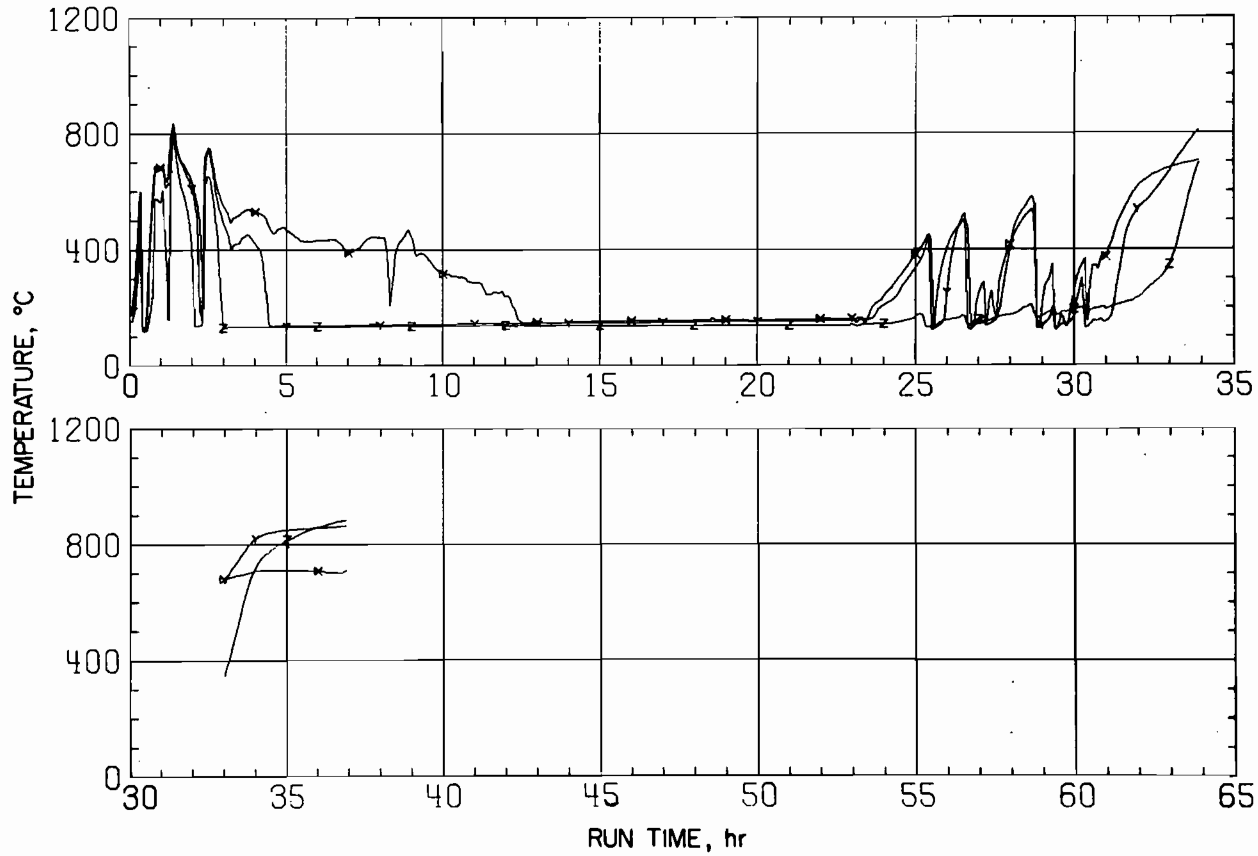

Elevation	Distance from Bottom of Calciner, in.
X	72
Y	58
Z	45

Fig. 15a. Calciner center line zone temperatures R-59.

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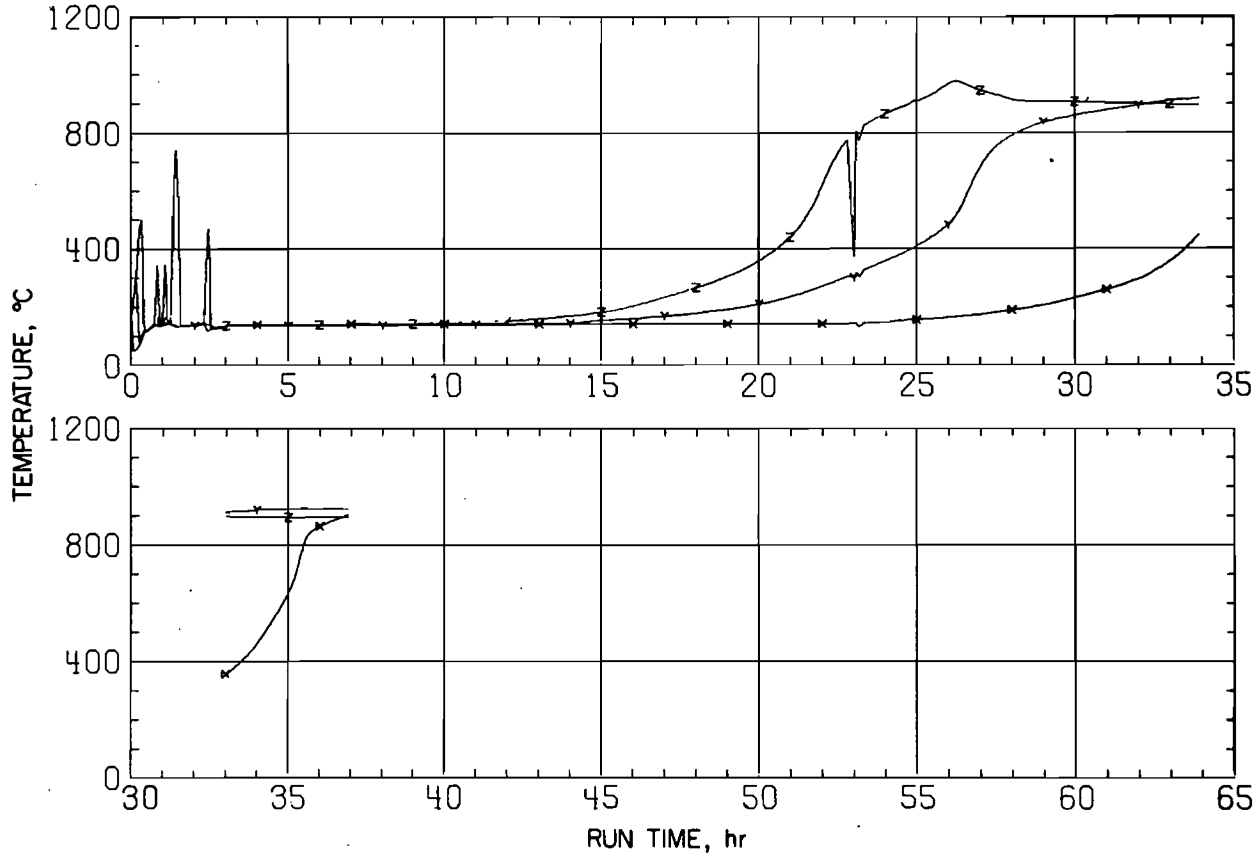
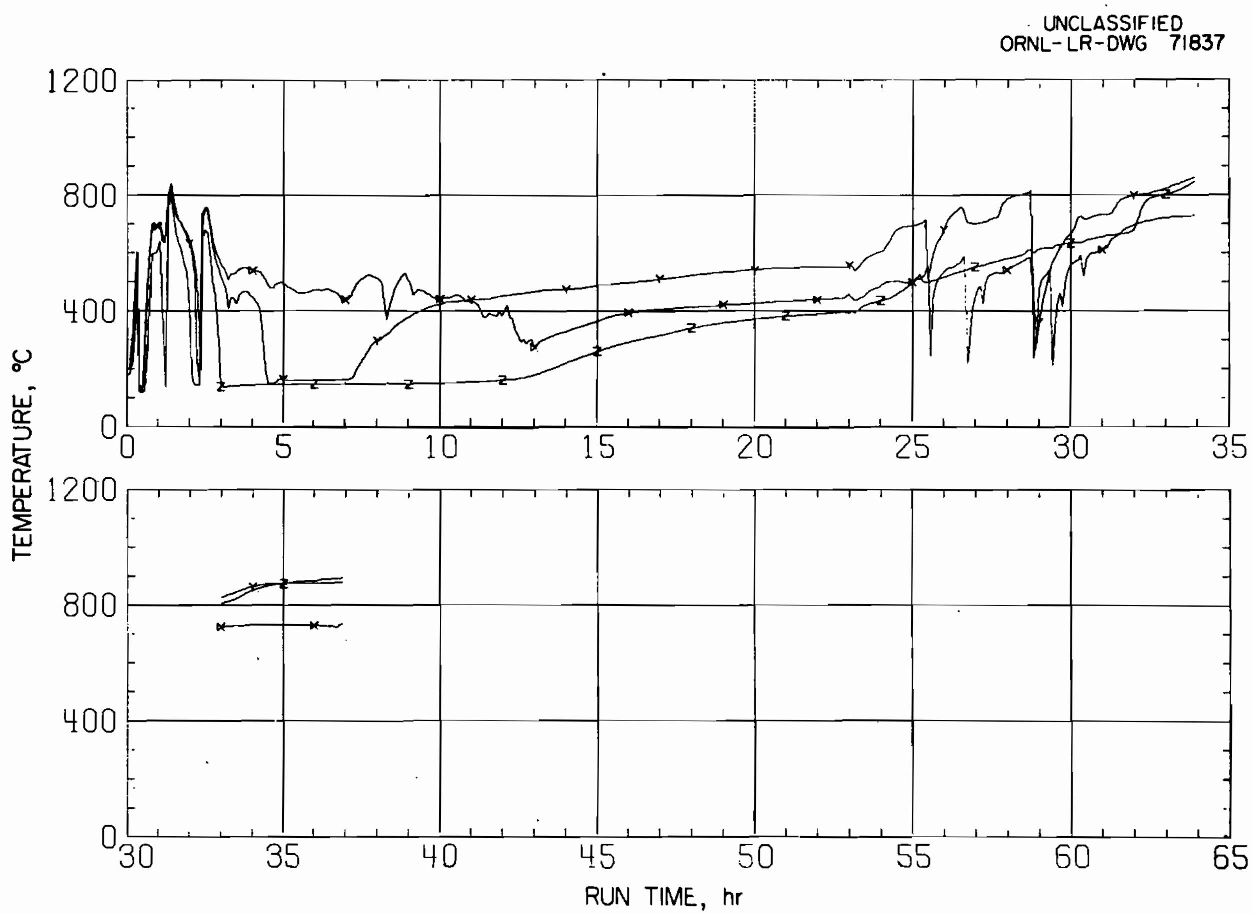


Elevation	Distance from Bottom of Calciner, in.
X	32
Y	19
Z	6

Fig. 15a. Calciner center line zone temperatures R-59.



Elevation	Distance from Bottom of Calciner, in.
X	72
Y	58
Z	45

Fig. 15a. Calciner Inside near wall zone temperatures R-59.

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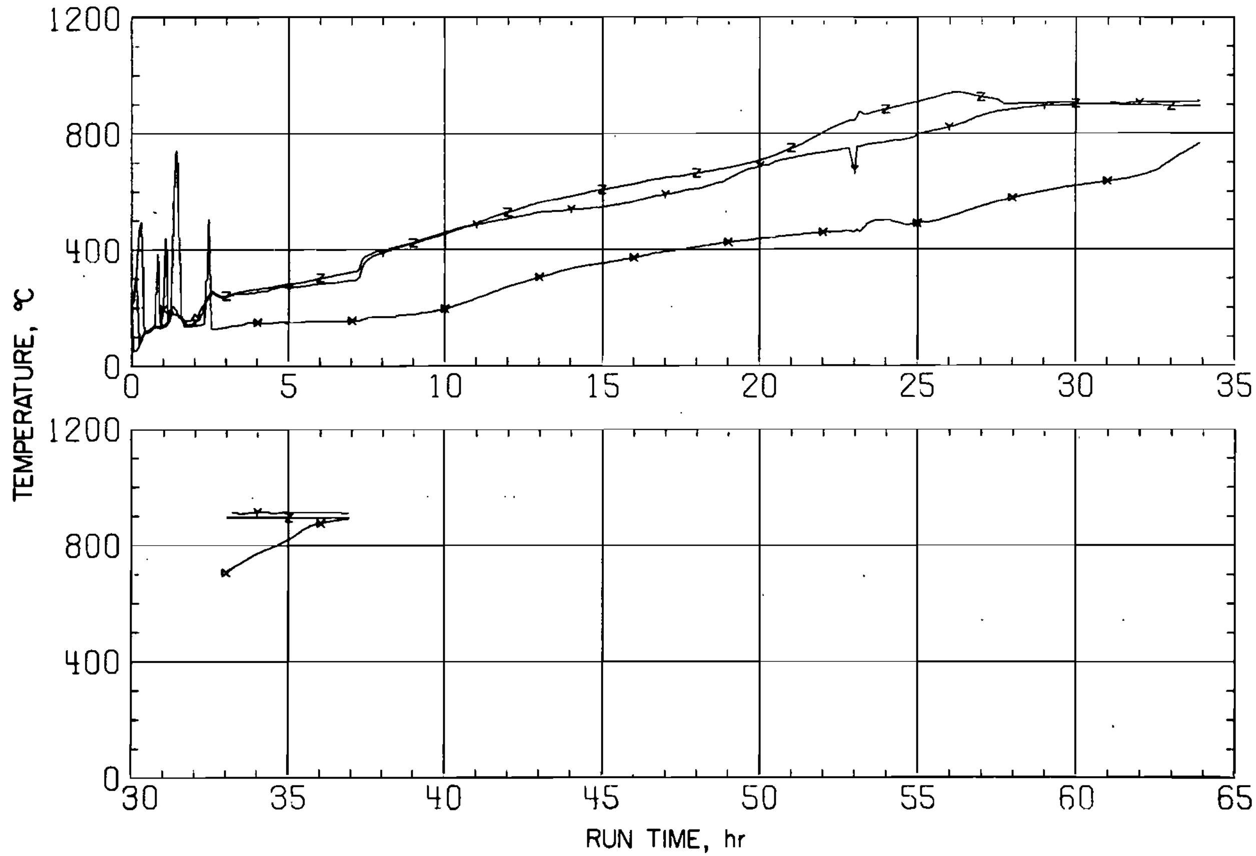
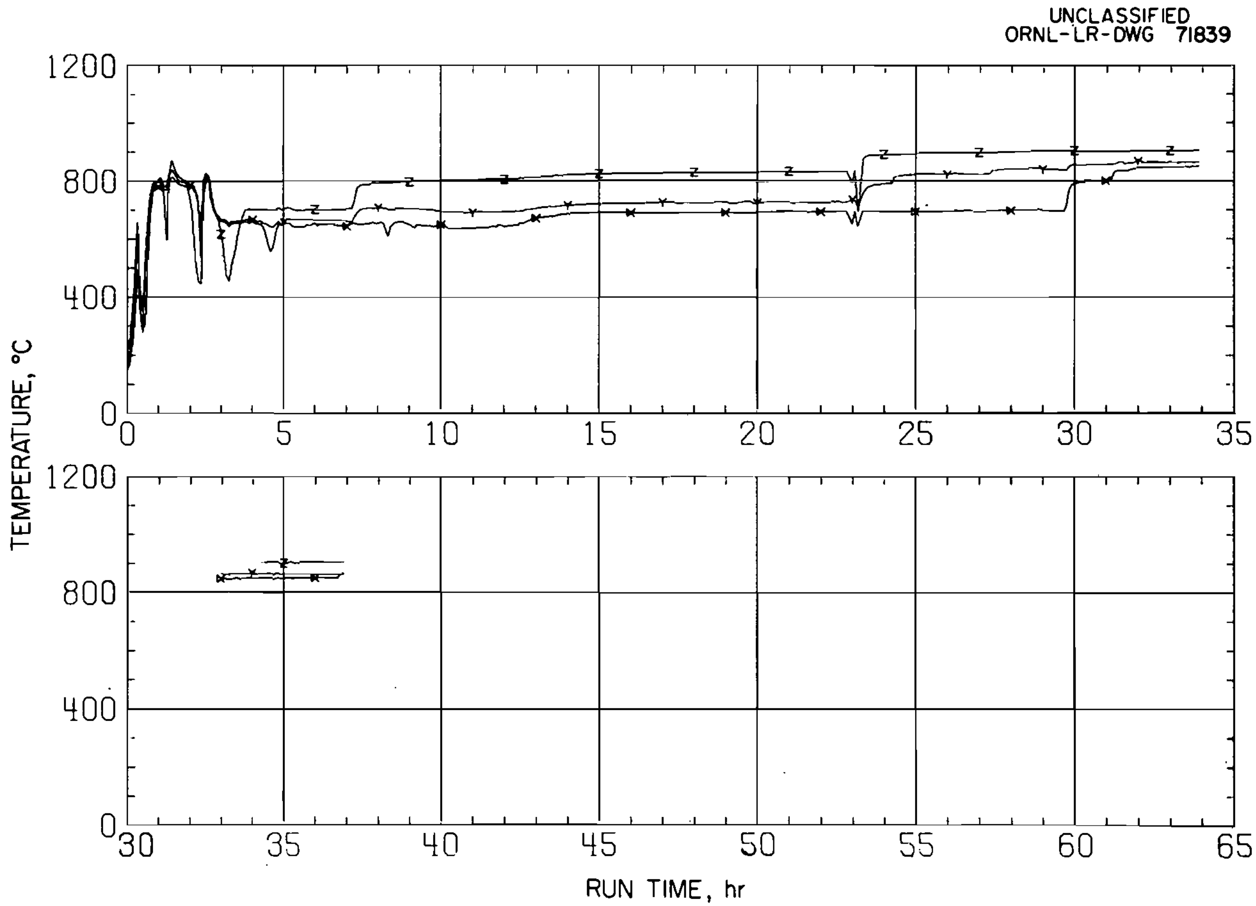


Elevation	Distance from Bottom of Calciner, in.
X	32
Y	19
Z	6

Fig. 15a. Calciner Inside near wall zone temperatures R-59.



Elevation	Distance from Bottom of Calciner, in.
X	72
Y	58
Z	45

Fig. 15a. Calciner surface zone temperatures R-59.

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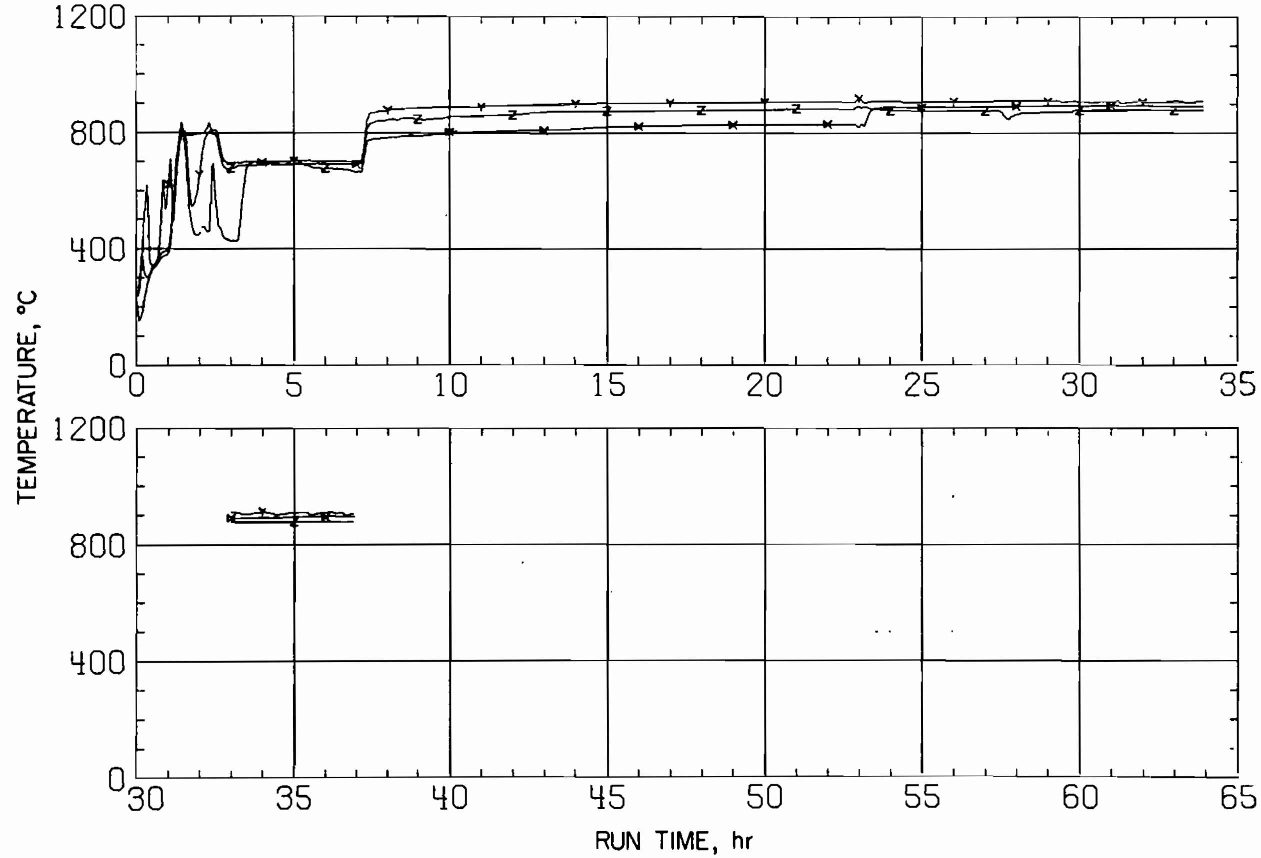

Elevation	Distance from Bottom of Calciner, in.
X	32
Y	19
Z	6

Fig. 15a. Calciner surface zone temperatures R-59.

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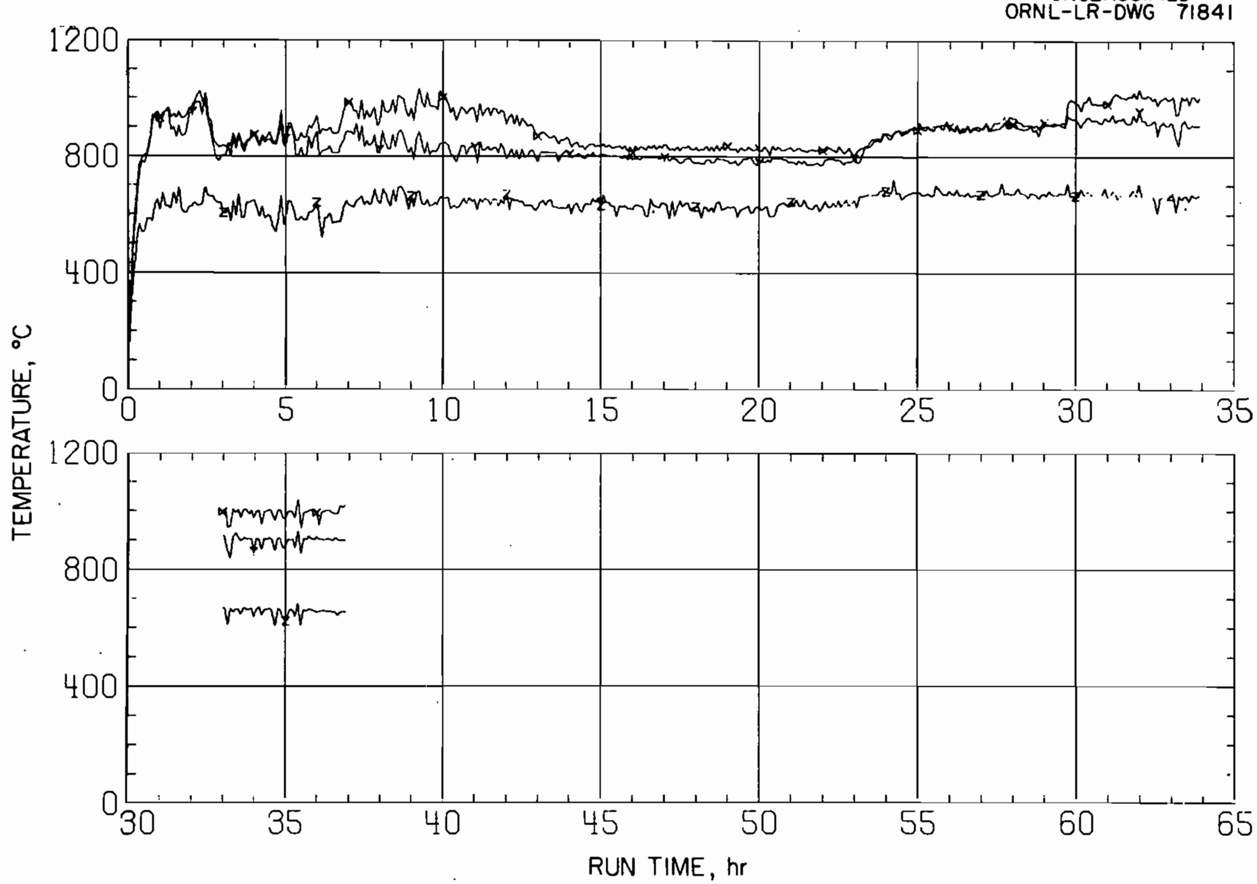
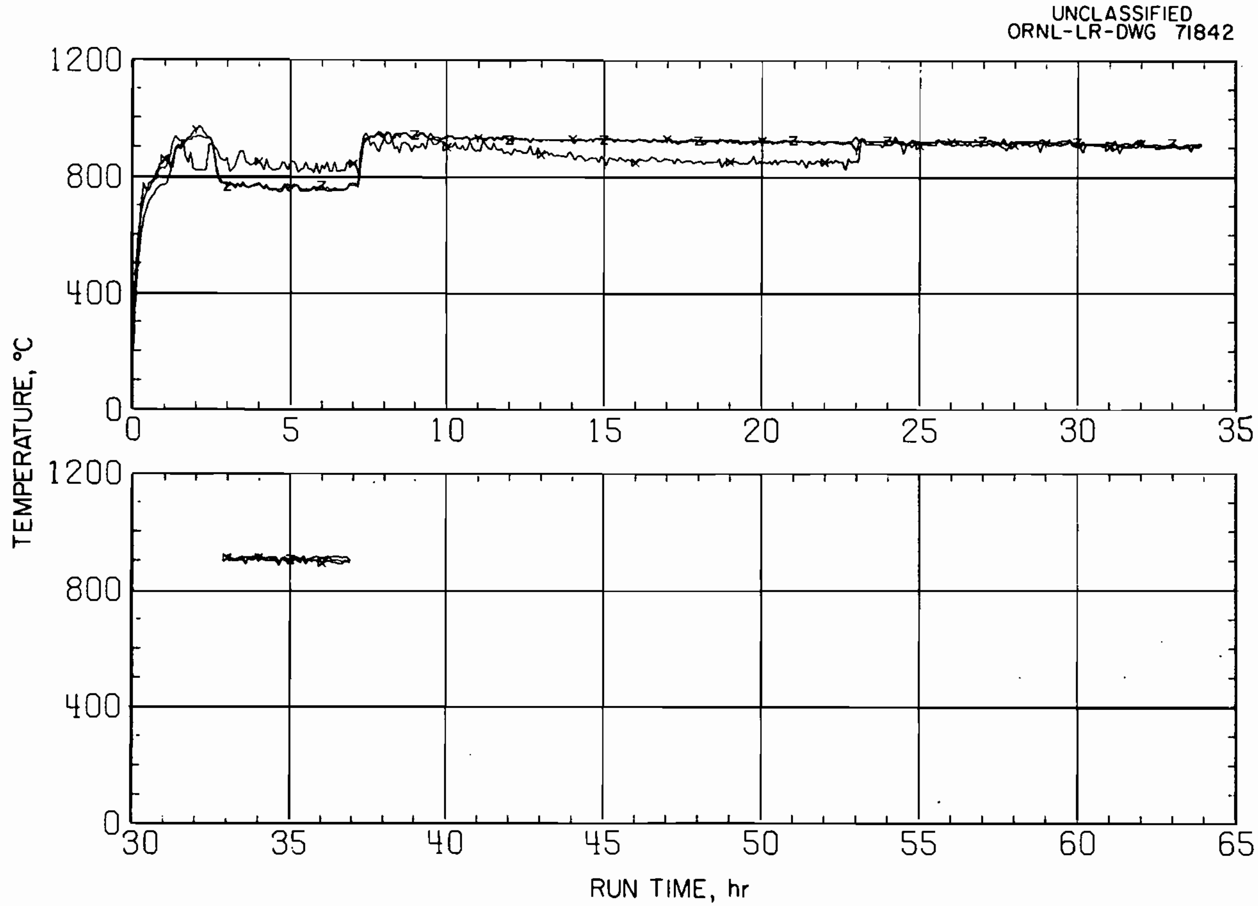


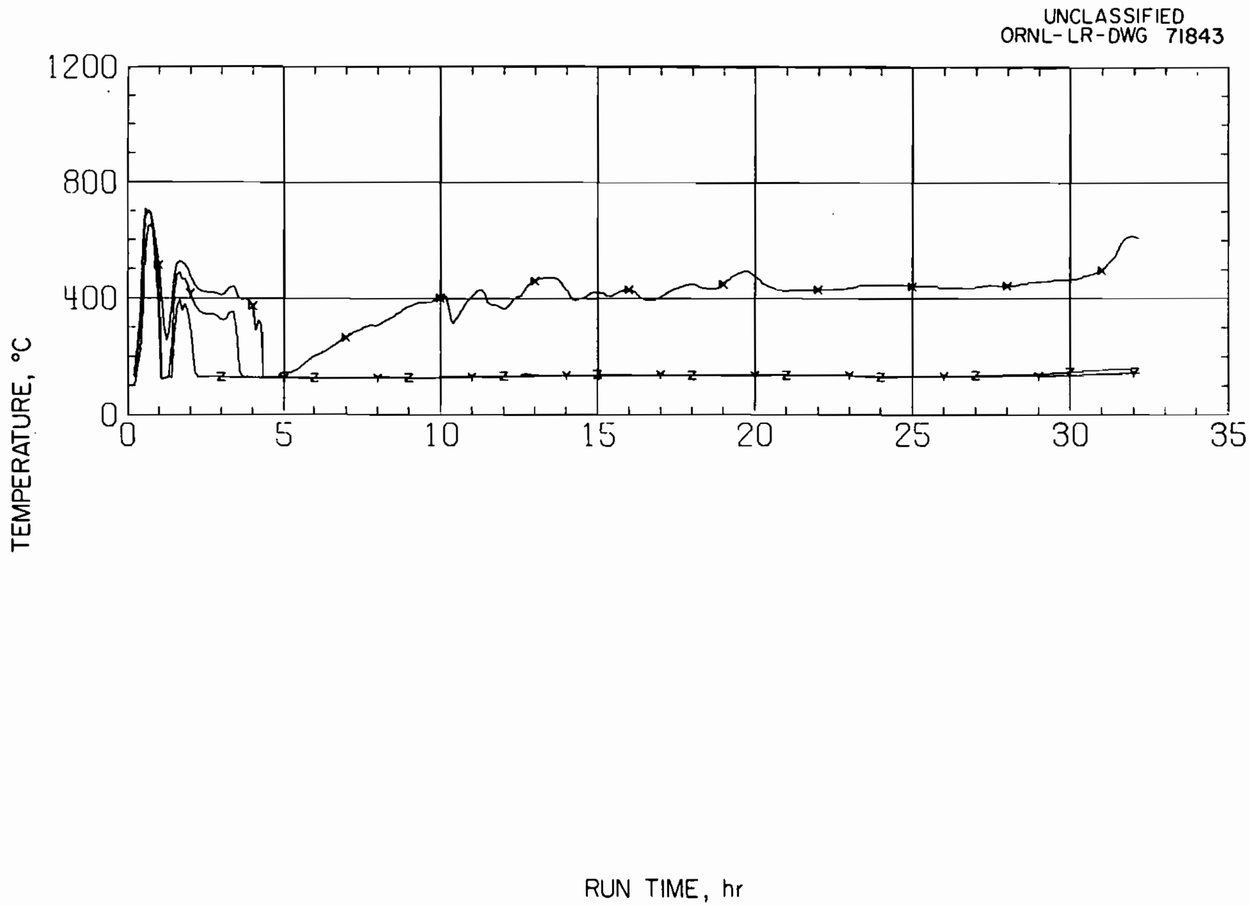
Elevation	Distance from Bottom of Calciner, in.
X	72
Y	58
Z	45

Fig. 15a. Calciner furnace zone temperatures R-59



Elevation	Distance from Bottom of Calciner, in.
X	32
Y	19
Z	6

Fig. 15a. Calciner furnace zone temperatures R-59.



Elevation	Distance from Bottom of Calciner, in.
X	72
Y	58
Z	45

Fig. 15b. Calciner center line zone temperatures R-61.

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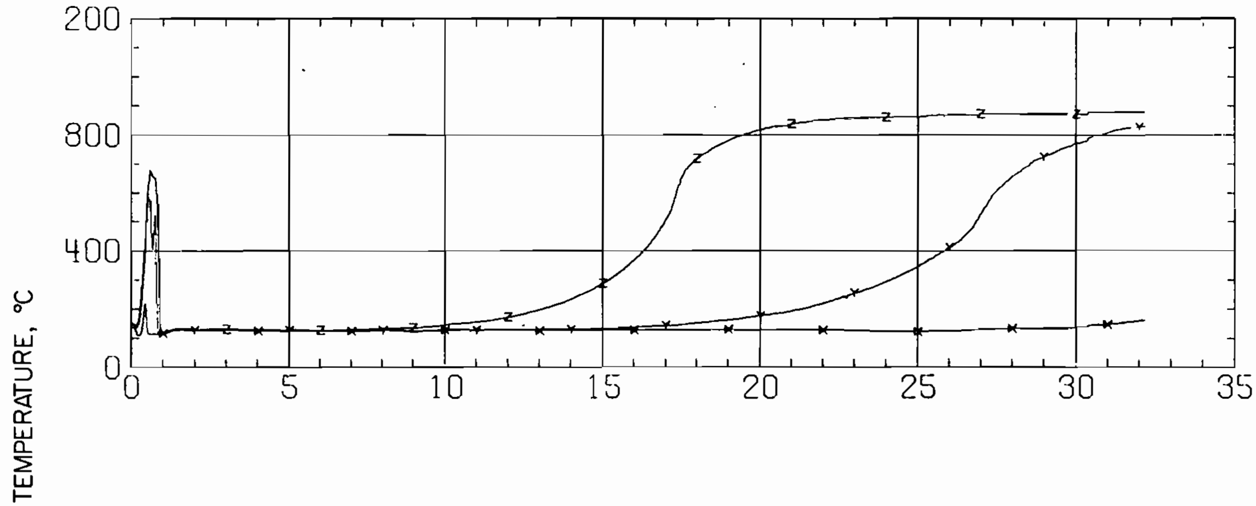

RUN TIME, hr

Elevation	Distance from Bottom of Calciner, in.
X	32
Y	19
Z	6

Fig. 15b. Calciner center line zone temperatures R-61.

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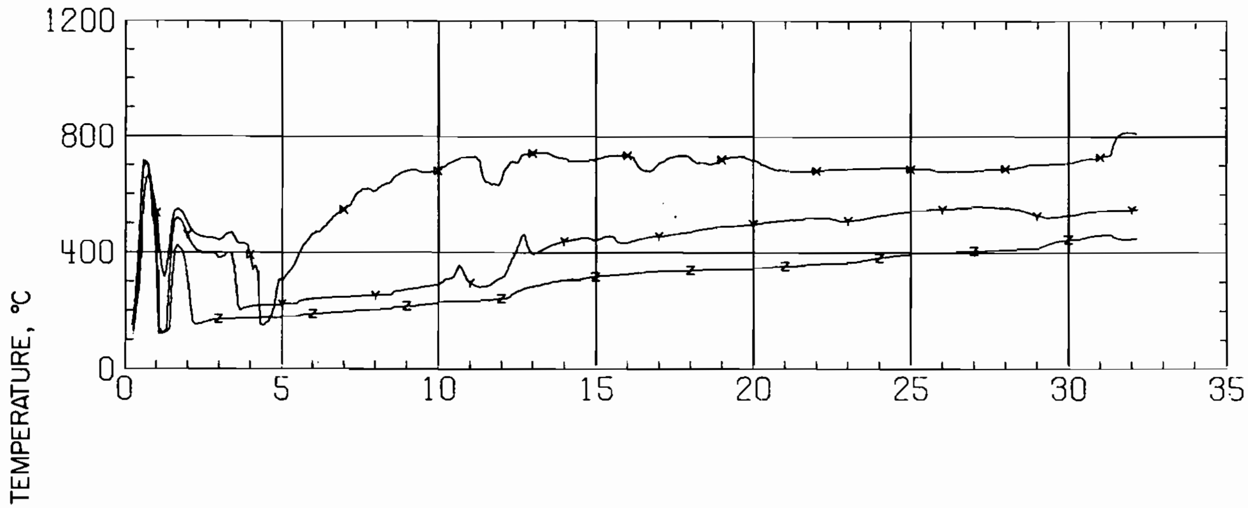

Elevation	Distance from Bottom of Calciner, in.
X	72
Y	58
Z	45

Fig. 15b. Calciner Inside near wall zone temperatures R-61.

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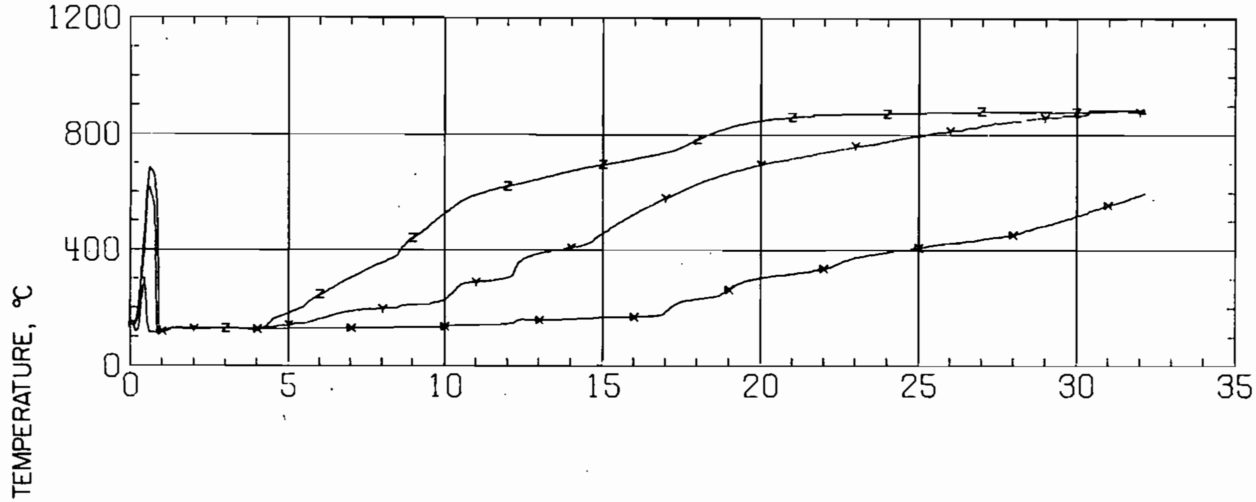
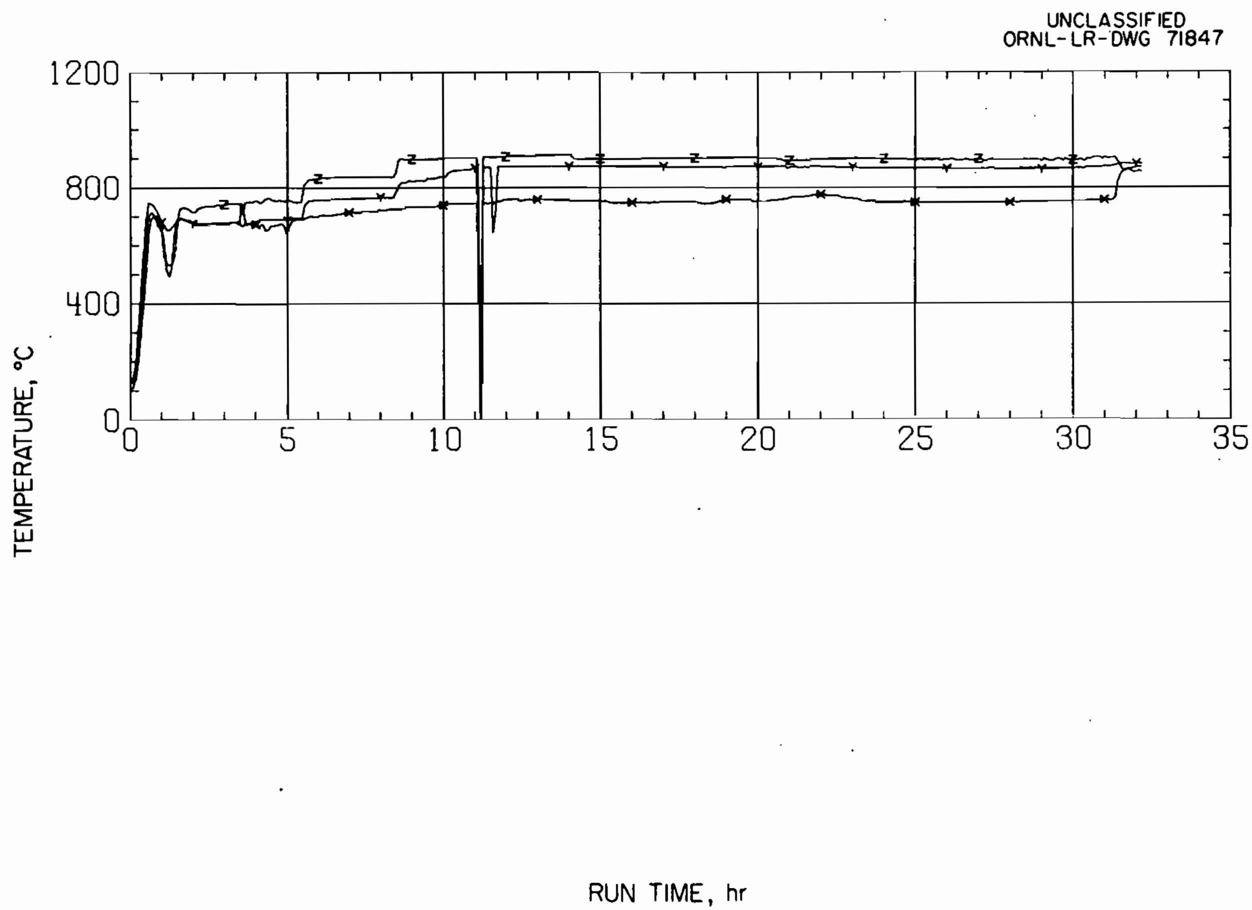


RUN TIME, hr

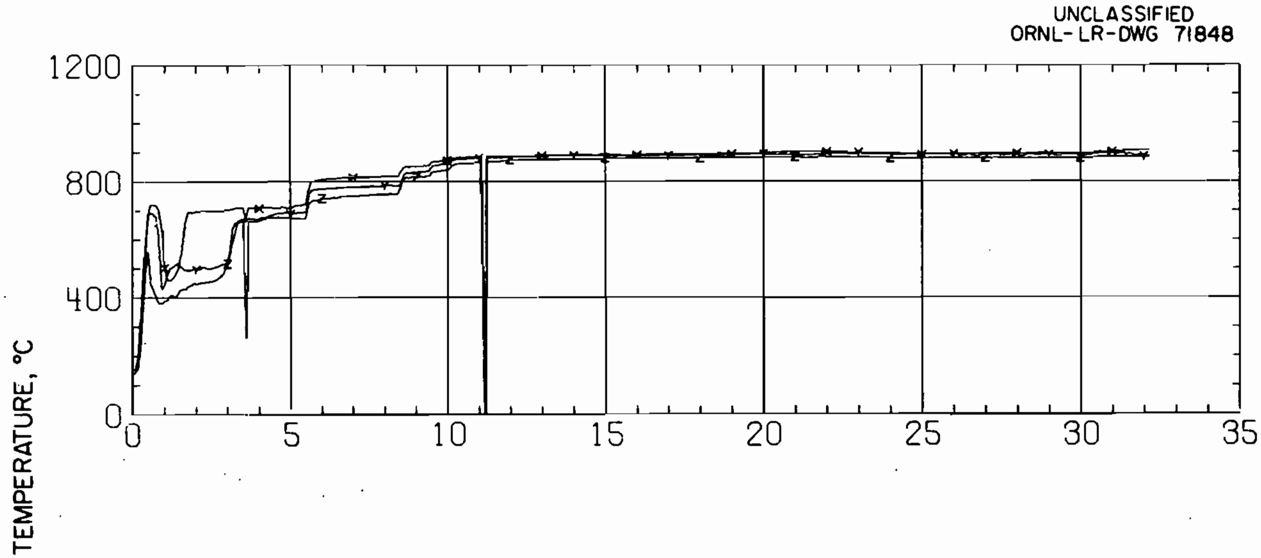
Elevation	Distance from Bottom of Calciner, in.
X	32
Y	19
Z	6

Fig. 15b. Calciner Inside near wall zone temperatures R-61.



Elevation	Distance from Bottom of Calciner, in.
X	72
Y	58
Z	45

Fig. 15b. Calciner surface zone temperatures R-61.



RUN TIME, hr

Elevation	Distance from Bottom of Calciner, in.
X	32
Y	19
Z	6

Fig. 15b. Calciner surface zone temperatures R-61.

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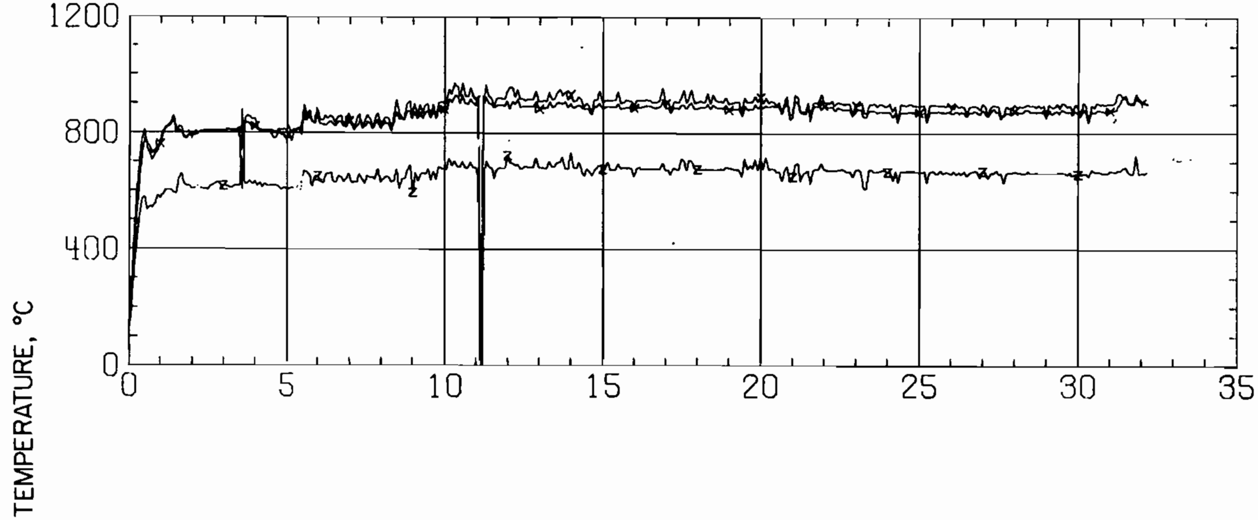
ORNL-LR-DWG 71849



RUN TIME, hr

Elevation	Distance from Bottom of Calciner, in.
X	72
Y	58
Z	45

Fig. 15b. Calciner furnace zone temperatures R-61.

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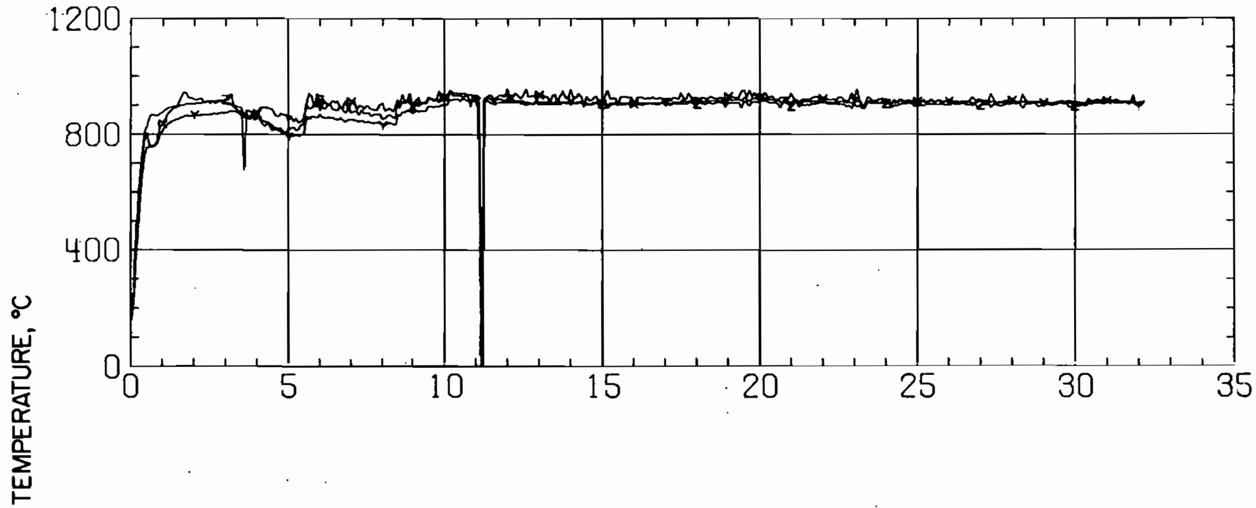

RUN TIME, hr

Elevation	Distance from Bottom of Calciner, in.
X	32
Y	19
Z	6

Fig. 15b. Calciner furnace zone temperatures R-61.

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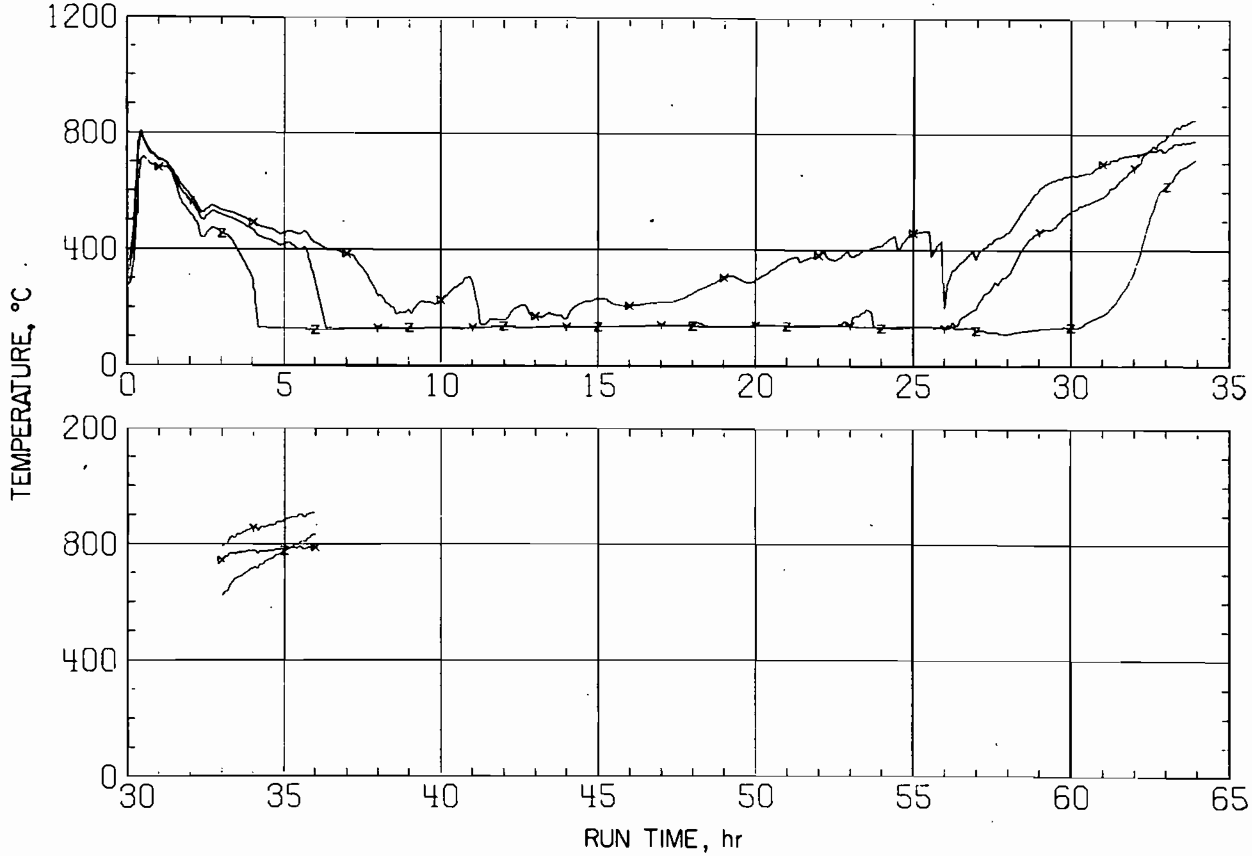
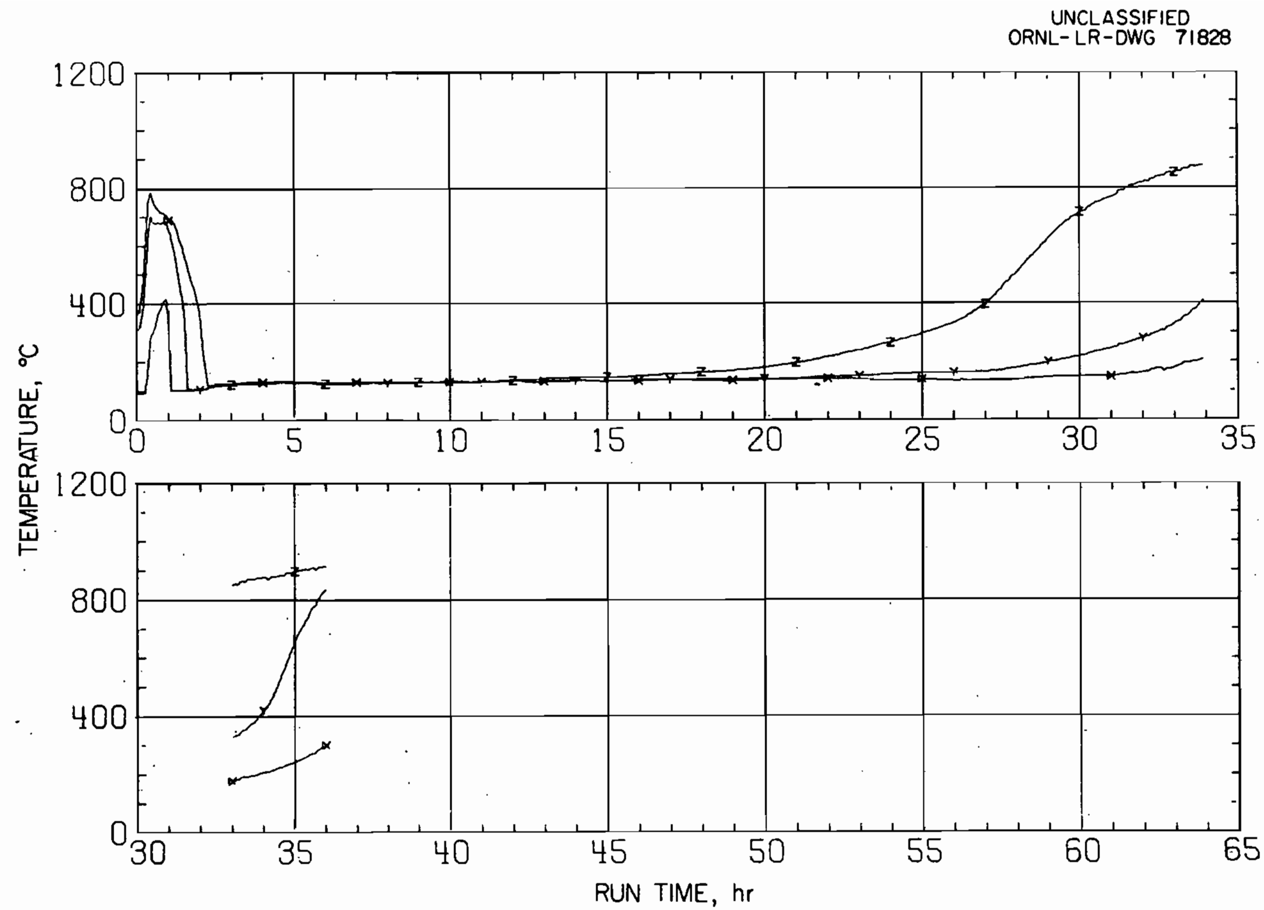


Elevation	Distance from Bottom of Calciner, in.
X	72
Y	58
Z	45

Fig. 15c. Calciner center line zone temperatures R-63.



Elevation	Distance from Bottom of Calciner, in.
X	32
Y	19
Z	6

Fig. 15c. Calciner center line zone temperatures R-63.

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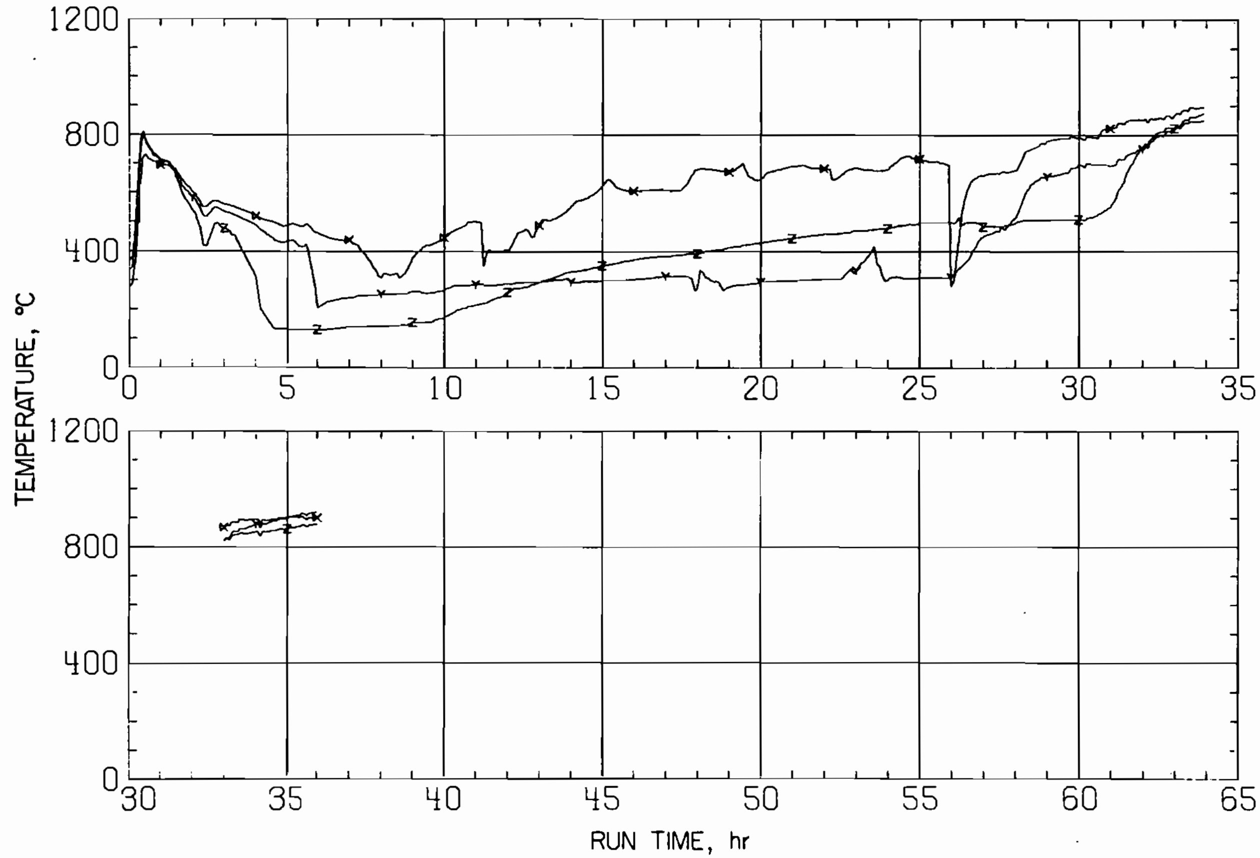

Elevation	Distance from Bottom of Calciner, in.
X	72
Y	58
Z	45

Fig. 15c. Calciner Inside near wall zone temperatures R-63.

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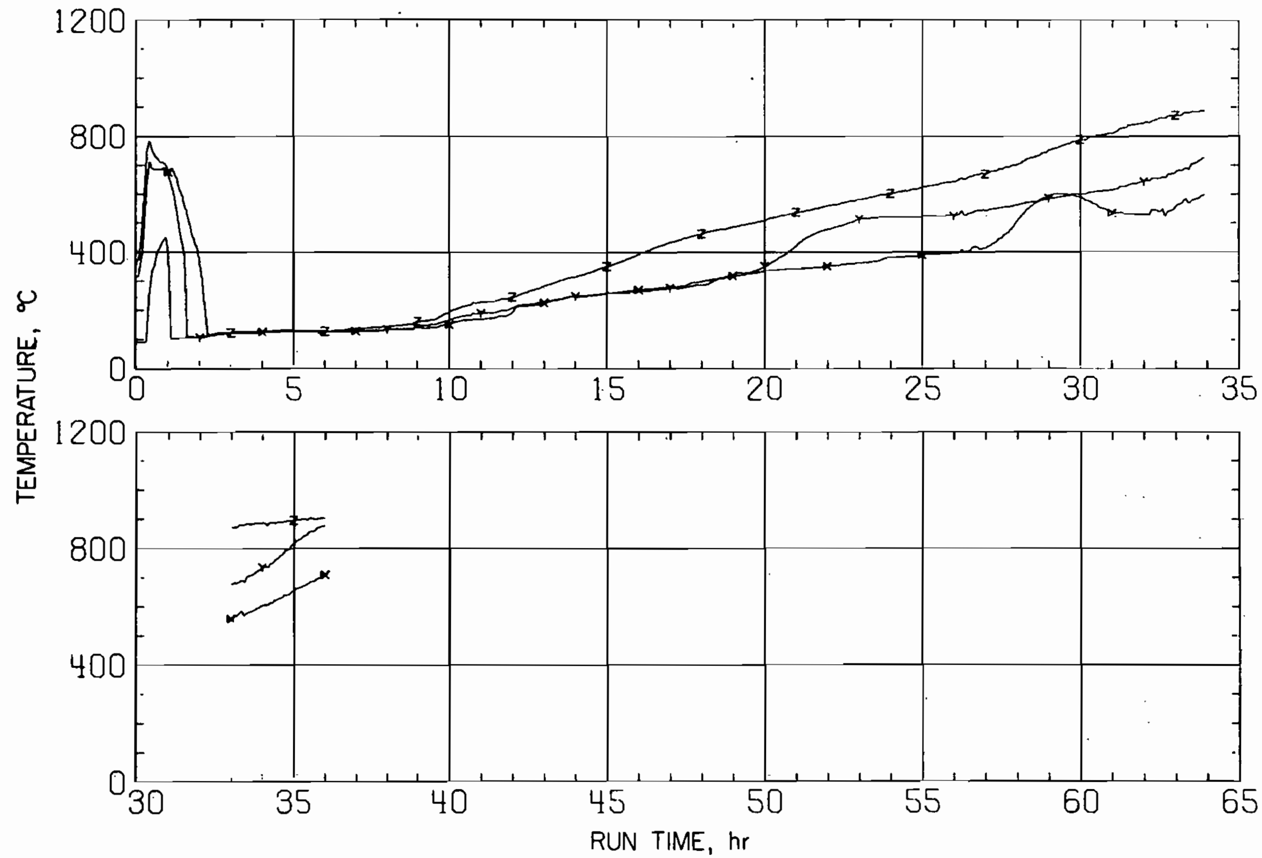
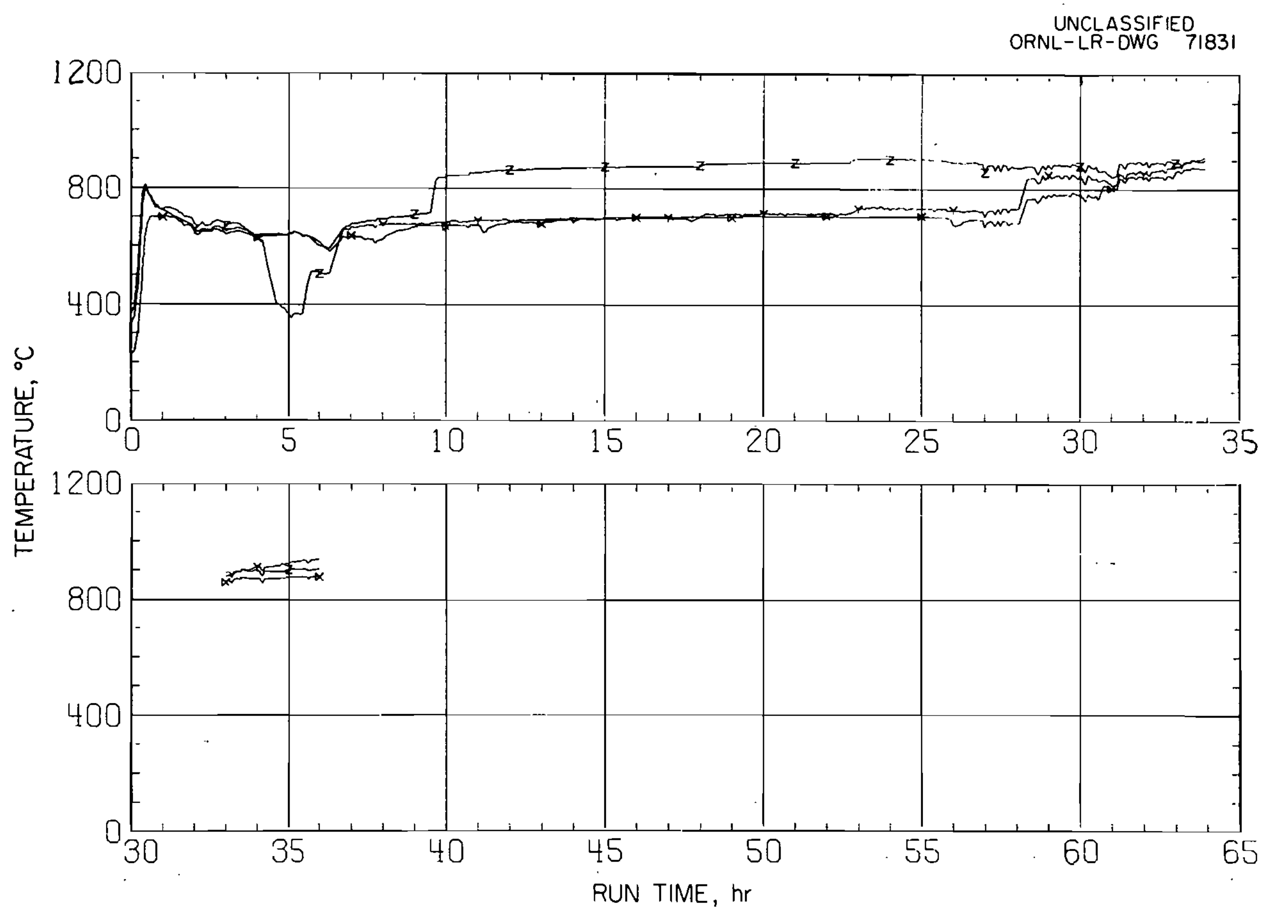


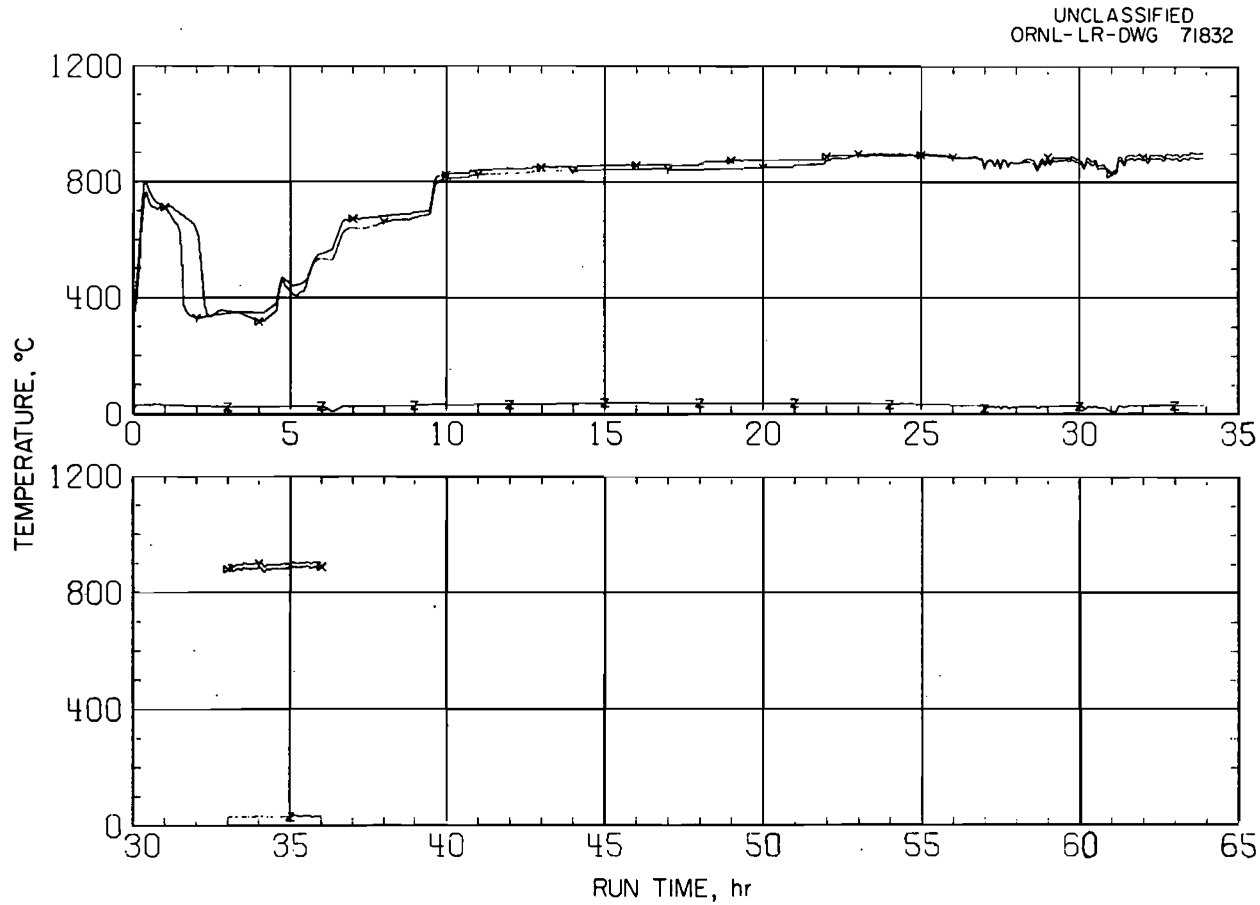
Elevation	Distance from Bottom of Calciner, in.
X	32
Y	19
Z	6

Fig. 15c. Calciner Inside near wall zone temperatures R-63.



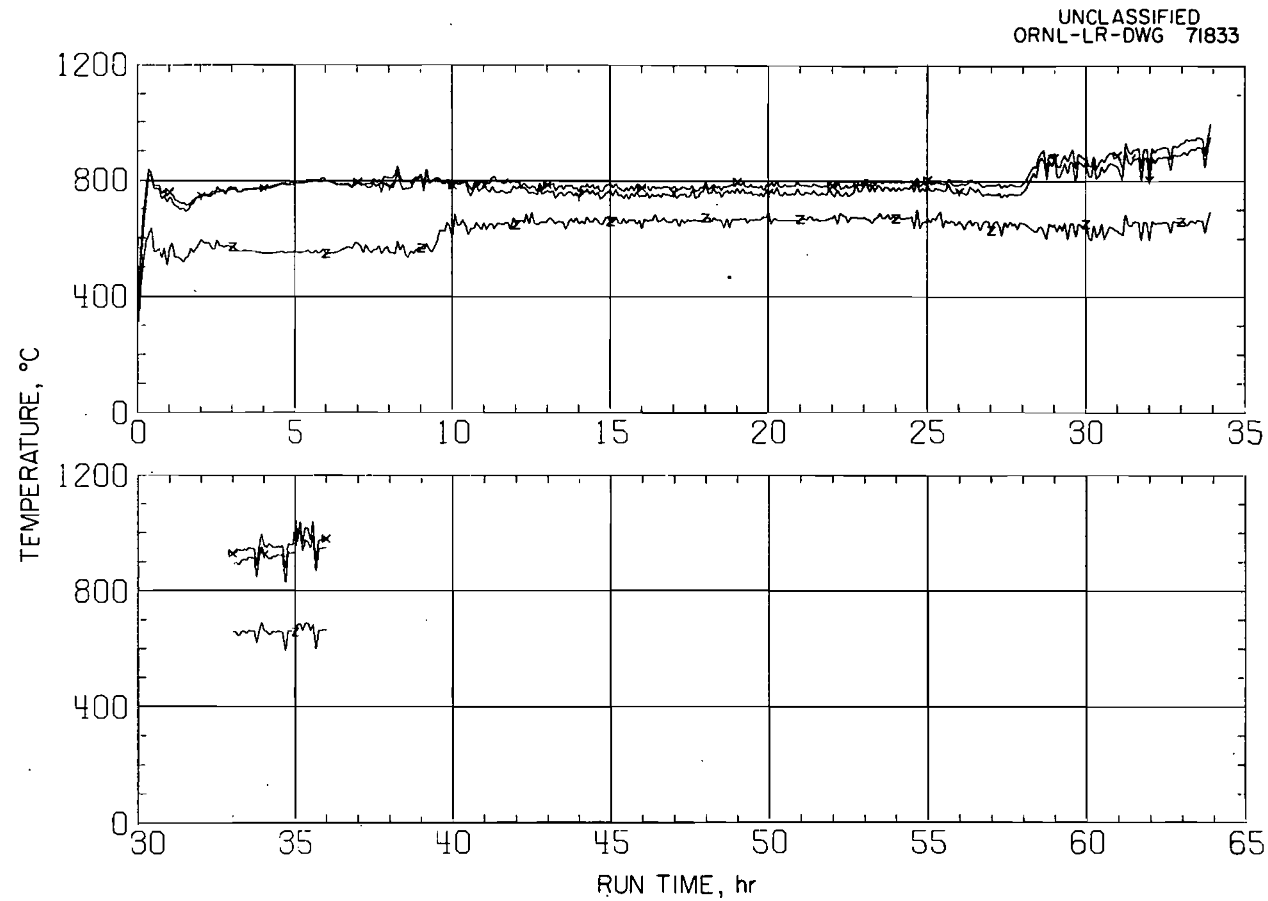
Elevation	Distance from Bottom of Calciner, in.
X	72
Y	58
Z	45

Fig. 15c. Calciner surface zone temperatures R-63.



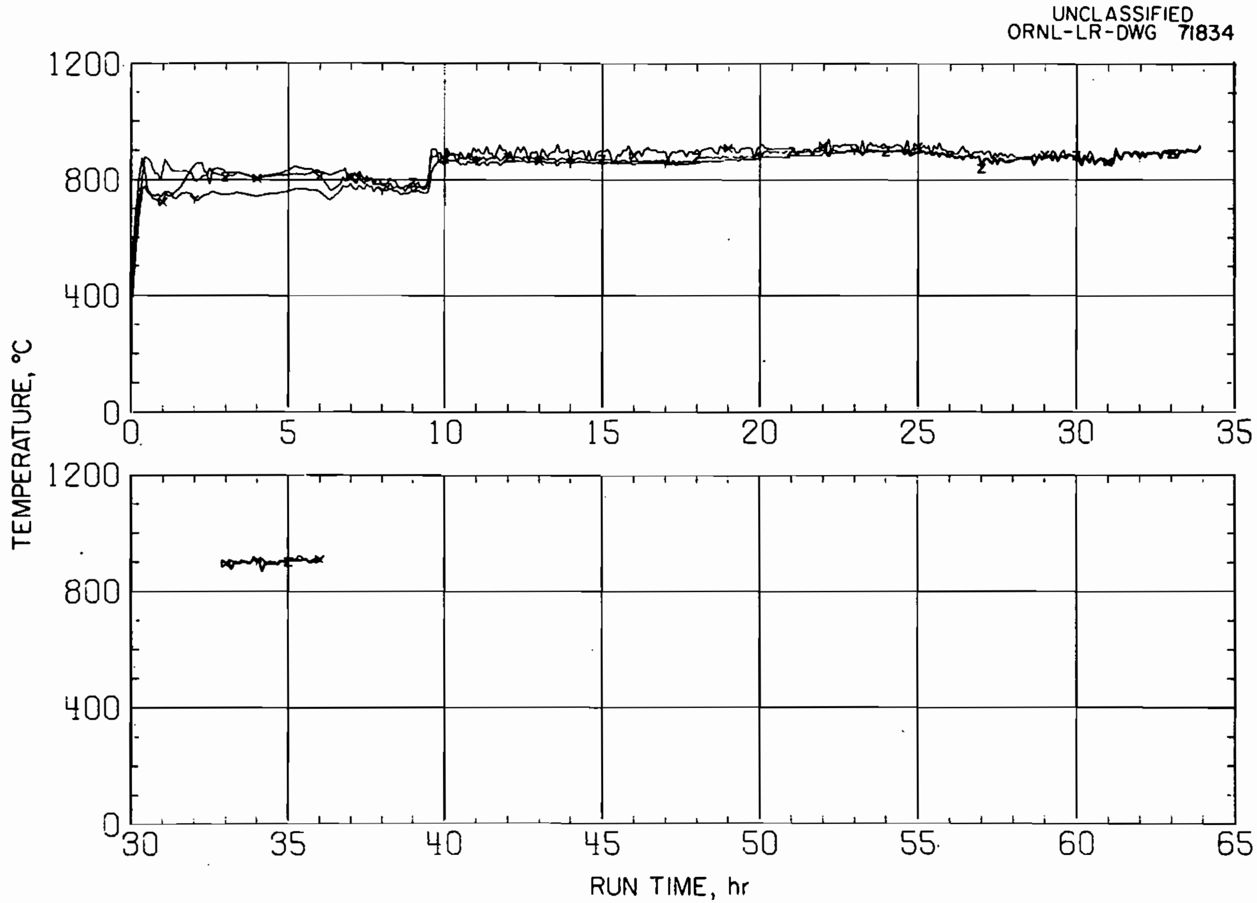
Elevation	Distance from Bottom of Calciner, in.
X	32
Y	19
Z	6

Fig. 15c. Calciner surface zone temperatures R-63.



Elevation	Distance from Bottom of Calciner, in.
X	72
Y	58
Z	45

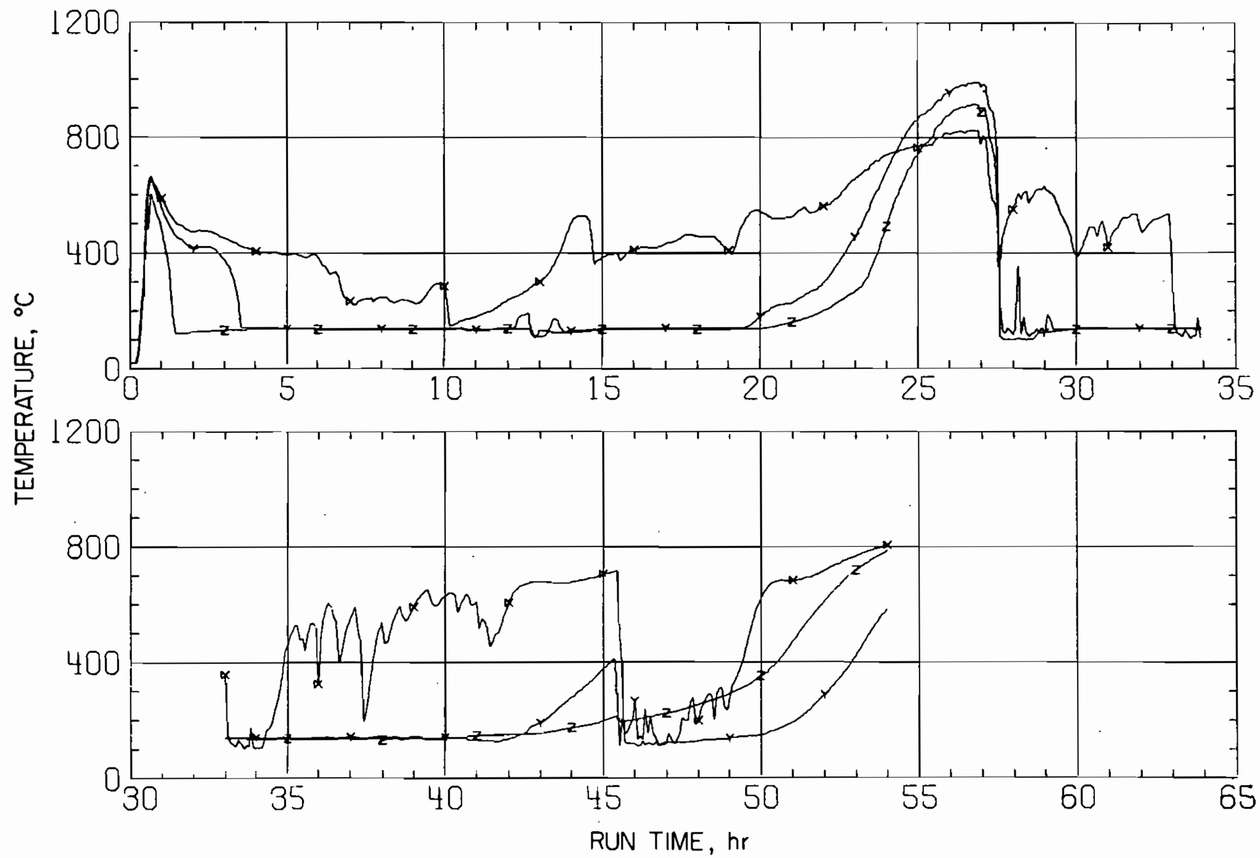
Fig. 15c. Calciner furnace zone temperatures R-63.



Elevation	Distance from Bottom of Calciner, in.
X	32
Y	19
Z	6

Fig. 15c. Calciner furnace zone temperatures R-63.

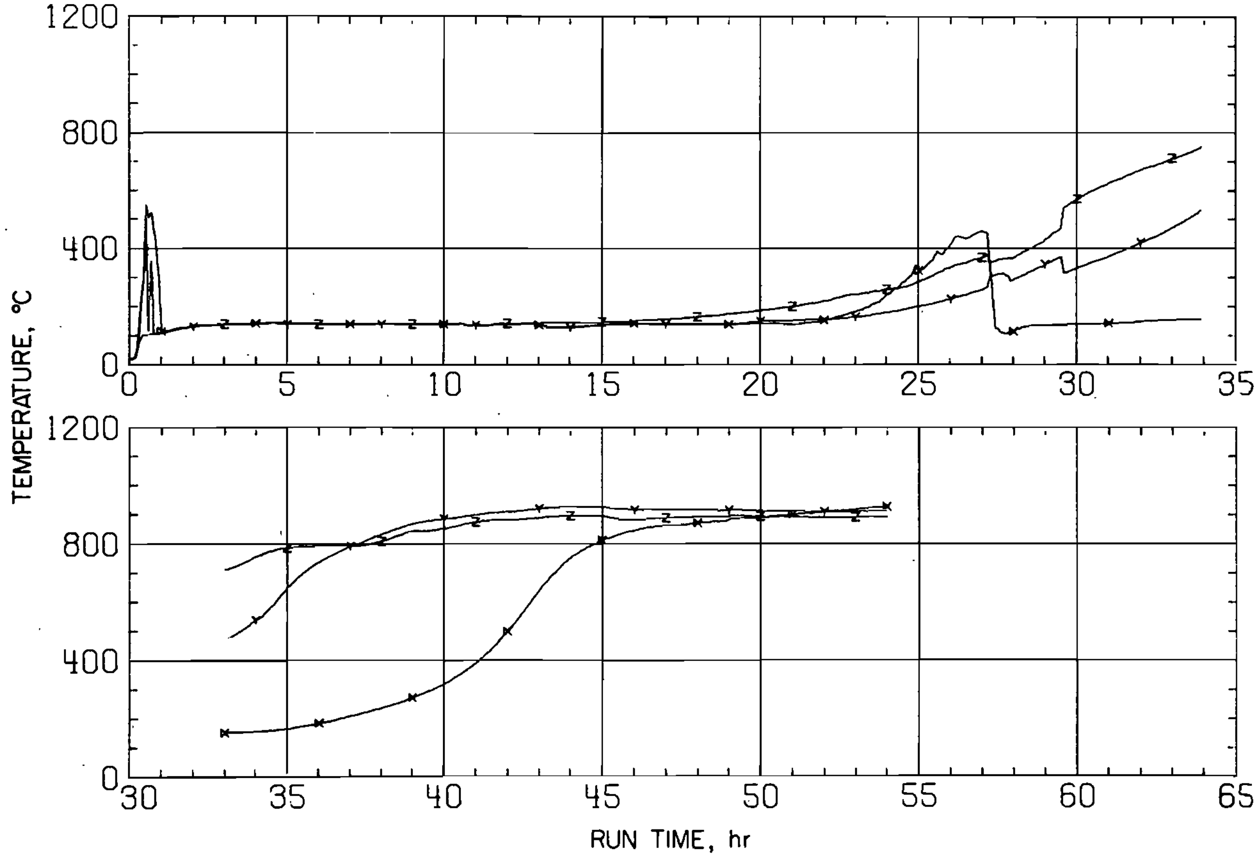
UNCLASSIFIED
ORNL-LR-DWG 71851



Elevation	Distance from Bottom of Calciner, in.
X	72
Y	58
Z	45

Fig. 15d. Calciner center line zone temperatures R-64.

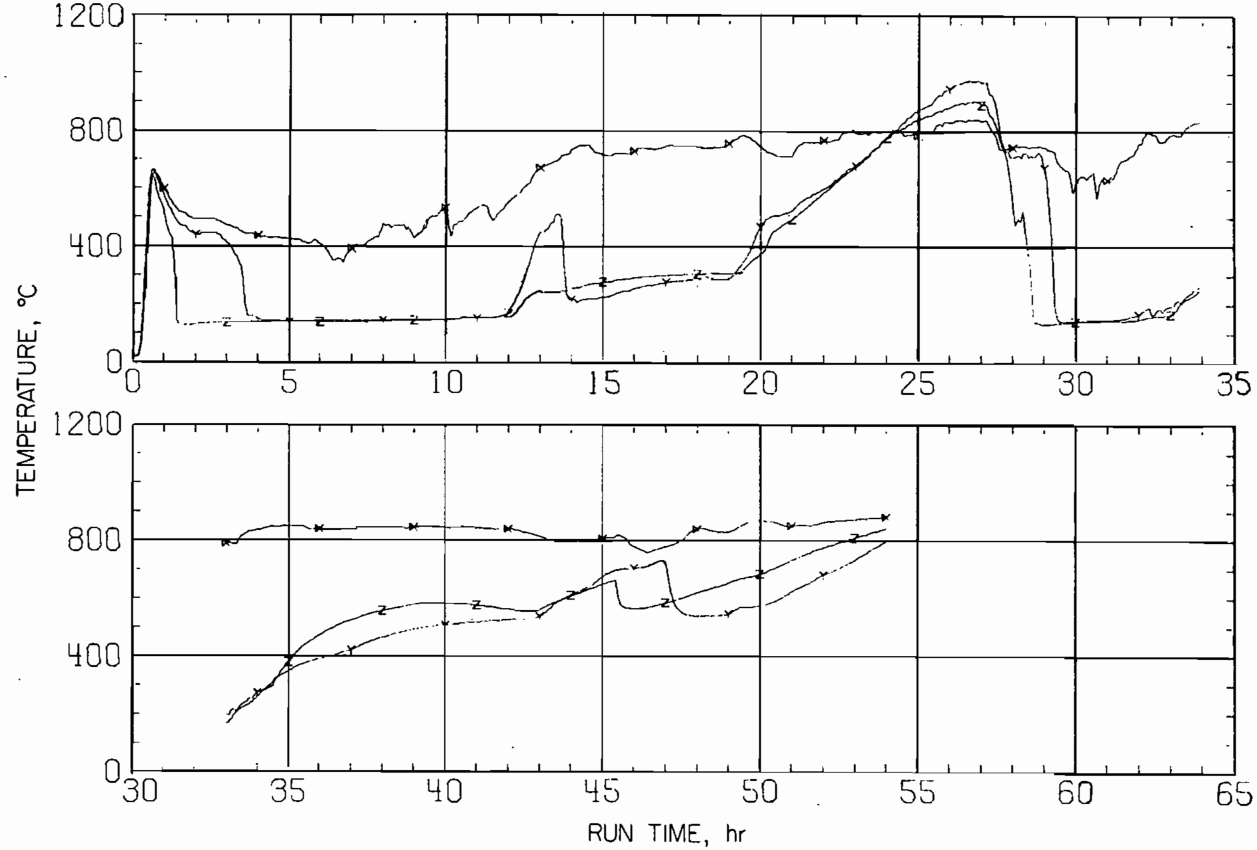
UNCLASSIFIED
ORNL-LR-DWG 71852



Elevation	Distance from Bottom of Calciner, in.
X	32
Y	19
Z	6

Fig. 15d. Calciner center line zone temperatures R-64.

UNCLASSIFIED
ORNL-LR-DWG 71853



Elevation	Distance from Bottom of Calciner, in.
X	72
Y	58
Z	45

Fig. 15d. Calciner Inside near wall zone temperatures R-64.

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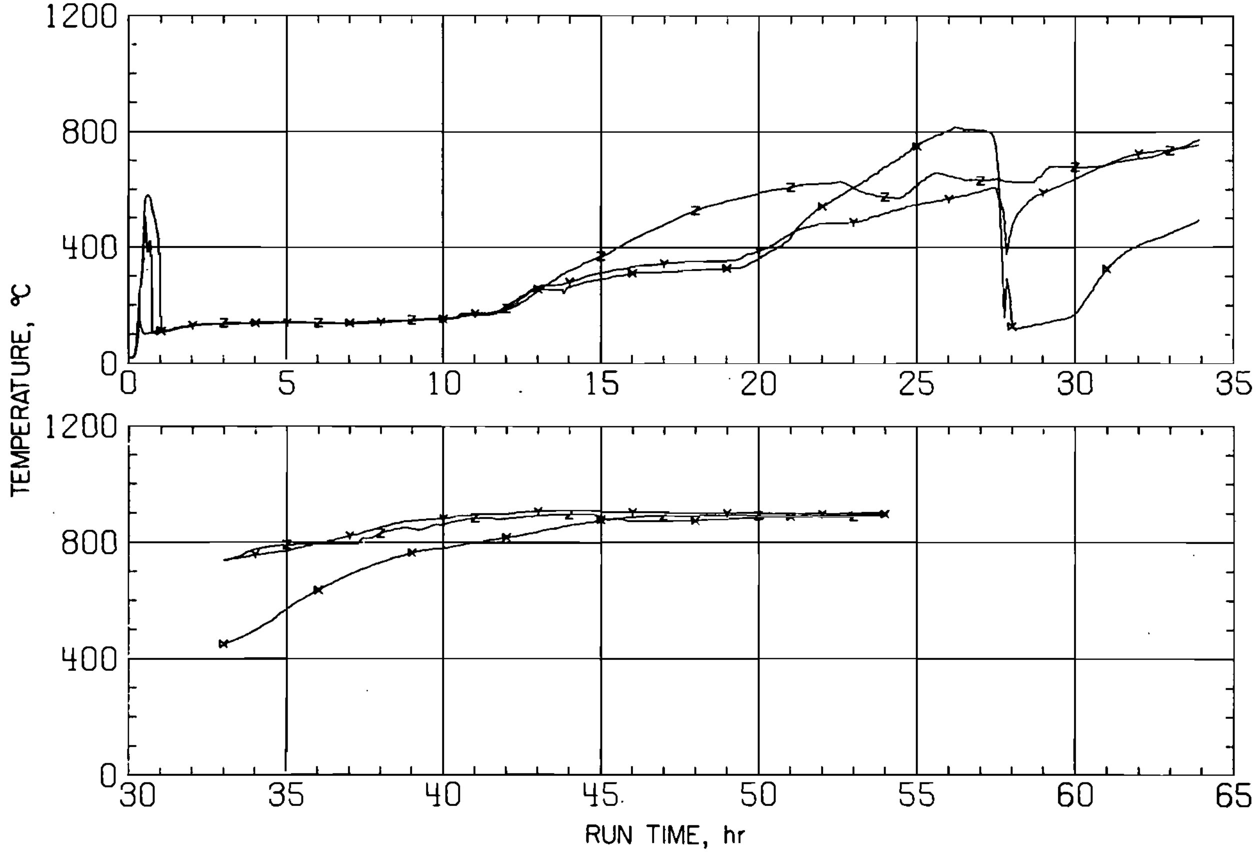
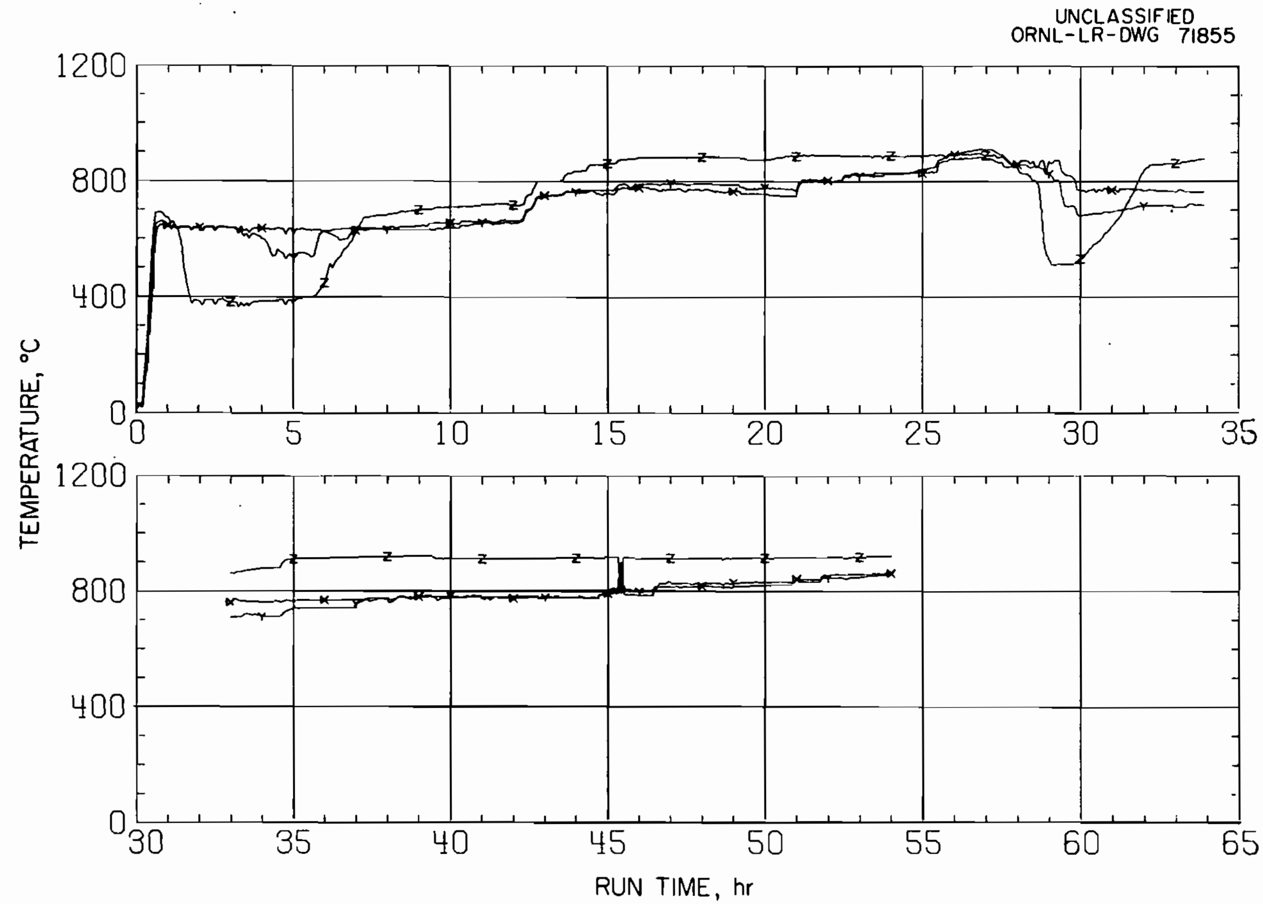


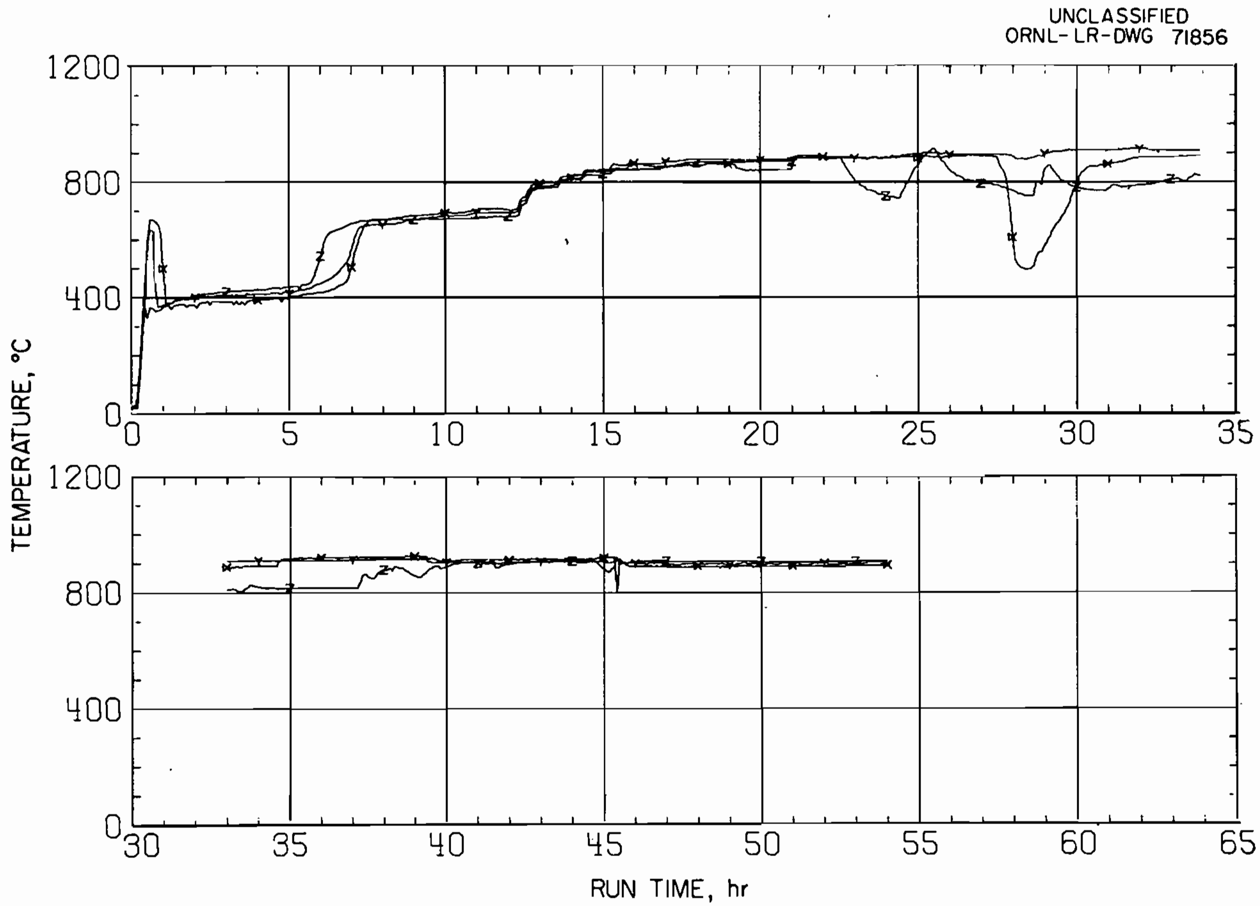
Elevation	Distance from Bottom of Calciner, in.
X	32
Y	19
Z	6

Fig. 15d. Calciner Inside near wall zone temperatures R-64.



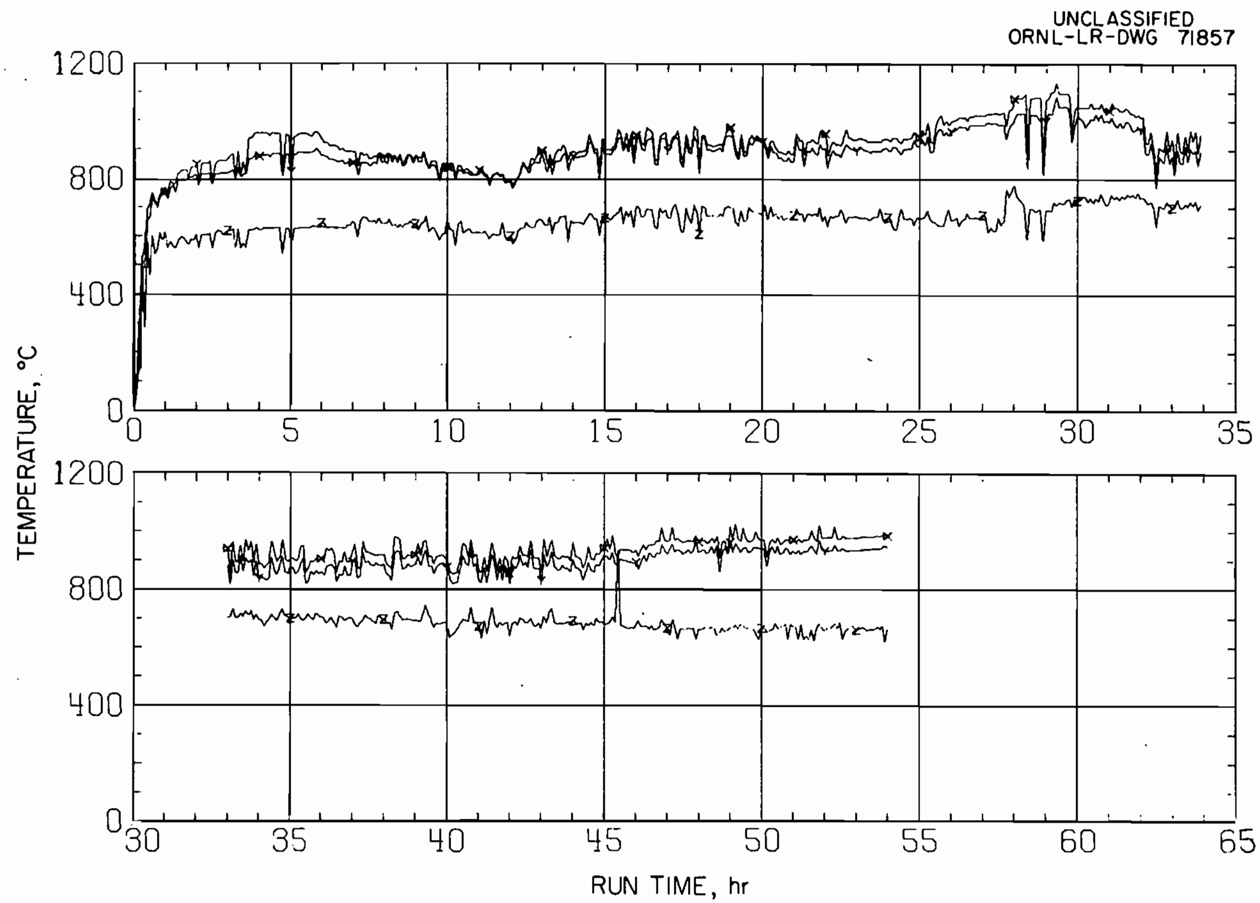
Elevation	Distance from Bottom of Calciner, in.
X	72
Y	58
Z	45

Fig. 15d. Calciner surface zone temperatures R-64.



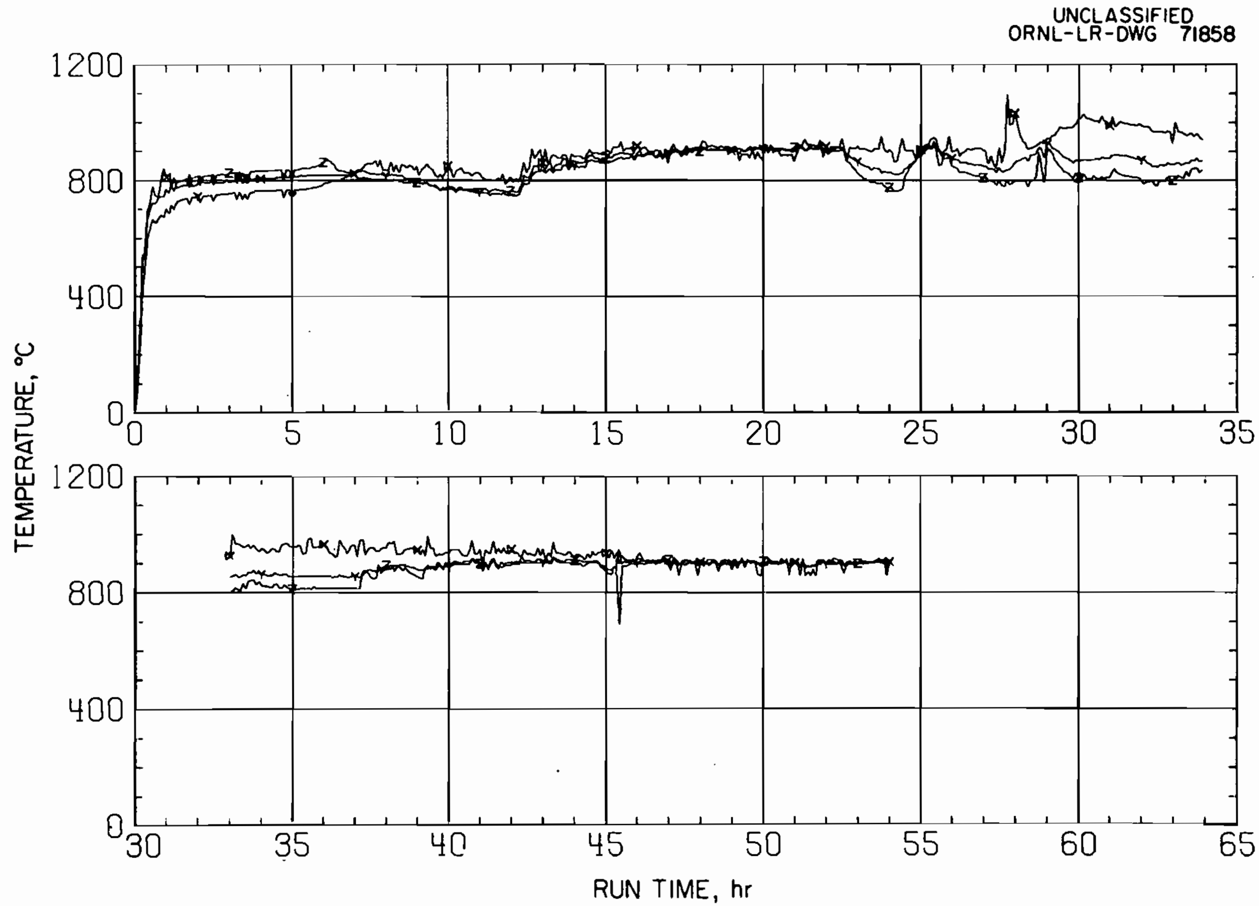
Elevation	Distance from Bottom of Calciner, in.
X	32
Y	19
Z	6

Fig. 15d. Calciner surface zone temperatures R-64.



Elevation	Distance from Bottom of Calciner, in.
X	72
Y	58
Z	45

Fig. 15d. Calciner furnace zone temperatures R-64.



Elevation	Distance from Bottom of Calciner, in.
X	32
Y	19
Z	6

Fig. 15d. Calciner furnace zone temperatures R-64.

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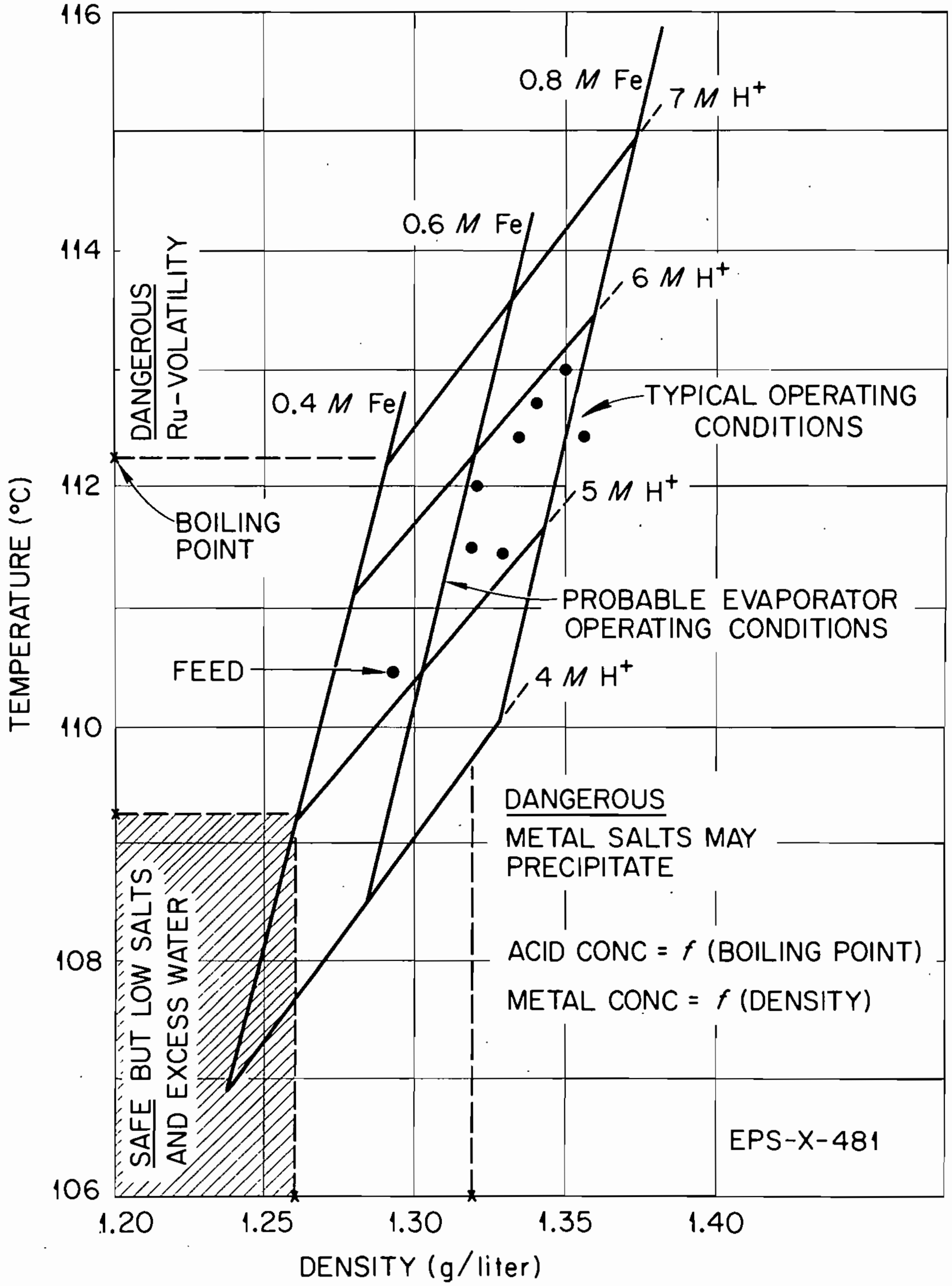


Fig. 16. Boiling Point vs Density as Function of Acid and Salts at Atmospheric Pressure for Purex Waste.

3. Liquid level in the evaporator. The liquid level in the evaporator is controlled by the amount of evaporator feed added to the system.

4. Pressure in the evaporator. The pressure in the evaporator is kept below atmospheric in order to prevent the outleakage of radioactive off-gas, by regulating the off-gas vacuum pump capacity.

5. Liquid level in the calciner pot. A differential pressure bubbler satisfactorily indicated liquid level in the calciner until the latter part of the test, when the bubbler tubes plugged and gave a high-liquid-level signal, which cut off the feed. A completely satisfactory differential temperature device consisted of a rod down the center of the calciner pot, extending 9 to 12 in. below the liquid level (Figs. 13 and 14). When the level is above the lower thermocouple but has not reached the control rod itself, the rod is heated by radiation from the walls of the pot. When liquid reaches the end of the rod, the rod begins to transfer its heat to the liquid. The temperature at the thermocouple point is a function of the height of the liquid on the thermocouple rod, and, by maintaining a temperature difference of 100^{o}C between the two thermocouples, it is possible to maintain a liquid level 4 in. lower than the thermocouple in the rod. The control results for tests R-42 to R-64 were analyzed according to the following control limits, which are suitable for good control of the system.

Variable	% of Scale		Corresponding Quantity
Calciner liquid level	95-20	$\cong$	57 to 63 liters
Evaproator density	± 5	$\cong$	±0.05 g/cc
Evaporator liquid level	±20	$\cong$	±4 liters
Evaporator temperature or conductivity	± 5	$\cong$	±0.30 $\underline{M}$ (HNO_3)
Evaporator pressure	± 2	$\cong$	±0.2 psig

In some of the first tests of this series the control was very poor (see Tables 9 to 13), and a number of reasons are responsible: equipment failure, poor signal pickup, incorrect control action (proportional band and reset (Tables 14 and 15), and misjudged operating variables. However, during later tests the control was much improved.

The graphs of the control variables show the limits in relationship to set point and to the variables (Fig. 17).

5.2 Control of the Batch Evaporator

In the Unit Operations studies, the control system for the batch evaporator that was used and which is recommended consists of using the density signal to control the boilup rate and the acid concentration of the vapor to control the water addition rate. Since an entire batch was added to the evaporator at the start of the run, it was not necessary to control the liquid level. The batch was initially concentrated to the desired density, and as the condensate from the calciner pot being run at the same time was introduced to the evaporator, sufficient water to effect proper dilution was automatically added, and the boilup rate automatically increased. The settings for proportional band and reset rate were the same as used in the continuous runs. Because of the large capacity of the system and the fewer number of variables, this is a much simpler system to control and elaboration of the subject was not warranted.

5.3 General Comments

The control system presented here was selected after considering all the attractive alternatives. Some were discarded because they involved the measurement of flow rates of difficult-to-handle streams. The

Table 9. Calciner Liquid Level Control

	Run	Over Limits		Under Limits		Outside	Total	Control
		% of	No. of	% of	No. of	Limits	Control	Limits
	No.	time	times	time	times	% time	Time, hrs	% of Range
	R-42	3.7	6	25.6	6	29.3	19	95-20
	R-43	14.2	3	12.7	3	26.9	7.5	95-20
	R-44	41.5	9	29.1	9	70.6	15	95-20
Batch	R-45	5.9	6	63.5	12	69.4	11	95-20
Batch	R-46	57.1	2	32.6	3	89.7	15	95-20
	R-47	5.1	3	17.7	6	22.8	14	95-20
	R-48	11.4	4	15.7	10	27.1	16	95-20
	R-49	4.0	2	41.0	5	45.0	12	95-20
	R-50	5.6	27	40.8	37	46.4	21	95-20
Batch	R-51	26.7	61	53.8	70	80.5	39	95-20
Batch	R-52	8.1	8	18.0	10	26.1	39	95-20
	R-54	17.8	15	61.8	25	79.6	30	95-20
	R-55	26.4	22	46.4	59	72.8	28	95-20
	R-56	23.5	21	56.4	19	79.9	37	95-20
	R-57	0	0	8.8	12	8.8	72	95-20
	R-58	3.4	8	52.0	10	55.4	30	95-20
Batch	R-59	0	0	57.3	6	57.3	27	95-20
Batch	R-60	0.6	4	28.4	22	29.0	39	100-20
Batch	R-61	2.3	2	14.1	6	16.4	22	95-20
	R-62	8.6	3	10.6	7	19.2	23	95-20
	R-63	0	0	16.7	4	16.7	23	95-20
	R-64	13.5	1	2.8	3	16.3	32	95-20
	Ave.	12.7	9.4	32.1	15.6	44.8	30	-

Table 10. Evaporator Density Control

	Run No.	Over Limits % of time	Over Limits No. of times	Under Limits % of time	Under Limits No. of times	Outside Limits % time	Total Control Time, hrs	Control Limits % of Set Point
	R-42	96.4	4	3.3	4	99.7	11	± 5
	R-43	0	0	85.4	3	85.4	8	± 5
	R-44	16.4	1	66.4	3	82.8	6	± 5
Batch	R-45	40.8	5	0	0	40.8	2	± 5
Batch	R-46	Manual						
	R-47	8.7	2	63.7	6	72.4	16	± 5
	R-48	51.2	7	10.5	5	61.7	16	± 5
	R-49	11.1	6	27.8	8	38.9	27	± 2
	R-50	21.4	7	17.9	7	39.3	23	± 5
Batch	R-51	0.13	1	8.5	5	8.6	39	± 5
Batch	R-52	0	0	69.7	2	69.7	7	± 5
	R-54	79.2	2	17.5	2	96.7	38	± 2
	R-55	18.6	3	25.0	6	43.6	25	± 2
	R-56	43.0	20	12.6	9	55.6	31	± 2
	R-57	0.42	3	3.0	5	3.4	72	± 5
	R-58	0	0	4.2	5	4.2	30	± 5
Batch	R-59	Manual						
Batch	R-60	14.1	1	3.2	2	17.3	39	± 5
Batch	R-61	Manual						
	R-62	0.04	1	29.0	4	29.1	8	± 5
	R-63	3.2	3	13.3	7	16.5	28	± 5
	R-64	0	0	1.5	3	1.5	46	± 5
	Ave.	21.3	3.5	24.3	4.5	45.6	24.8	-

Table 11. Evaporator Liquid Level Control

	Run No.	Over Limits % of time	Over Limits No. of times	Under Limits % of time	Under Limits No. of times	Outside Limit % time	Total Control Time	Control Limits + and - % of set point
	R-42	4.1	4	21.9	5	26.0	22	± 20
	R-43	0	0	1.2	3	1.2	15	± 20
	R-44	14.7	10	7.1	8	21.8	15	± 20
Batch	R-45	19.9	1	0	0	19.9	15	± 20
Batch	R-46	0	0	0.11	1	0.11	15	± 20
	R-47	6.2	4	0.4	1	6.6	20	± 20
	R-48	11.1	3	1.8	6	12.9	16	± 20
	R-49	0.4	1	1.2	3	1.6	27	± 20
	R-50	18.8	14	9.6	12	28.4	24	± 20
Batch	R-51	Manual						
Batch	R-52	Manual						
	R-54	12.2	10	2.8	4	15	38	± 20
	R-55	6.8	7	2.1	2	8.9	25	± 20
	R-56	32.8	17	0	0	32.8	27	± 20
	R-57	9.7	6	0	0	9.7	72	± 20
	R-58	3.7	3	0.2	1	3.9	39	± 20
Batch	R-59	Manual						
Batch	R-60	Manual						
Batch	R-61	Manual						
	R-62	8.6	3	5.6	5	14.2	16	± 20
	R-63	8.1	13	0.4	1	8.5	29	± 20
	R-64	5.4	5	3.6	3	9.0	38	± 20
	Ave.	9.6	5.9	3.4	3.2	13	26.7	-

Table 12. Evaporator Temperature or Conductivity

	Run No.	Over Limit % of time	Over Limit No. of times	Under Limit % of time	Under Limit No. of times	Outside Limit % time	Total Control Time	Control Limits + and - % of set point
	R-42	2.3	4	56.3	5	58.6	22	± 5
	R-43	16.5	7	12.5	4	29	8	± 5
	R-44	3.8	7	48.7	11	52.5	15	± 5
Batch	R-45	2.4	1	32.1	3	34.5	15	± 5
Batch	R-46	0	0	7.5	1	7.5	15	± 5
	R-47	23.2	5	45.7	5	68.9	20	± 5
	R-48	2.8	2	46.1	8	4.8	16	± 5
	R-49	0	0	50.0	5	50.0	12	± 5
	R-50	0	0	68.0	8	68.0	23	± 5
Batch	R-51	0	0	1.3	1	1.3	18.42	± 5
Batch	R-52	10.8	3	47.2	11	58.0	38	± 5
	R-54	0.3	2	99.3	5	99.6	38	± 5
	R-55	6.7	7	34.0	14	40.7	25	± 5
	R-56	1.9	3	27.4	9	29.3	31	± 5
	R-57	0.2	5	7.1	7	7.3	72	± 4
	R-58	1.0	1	22.1	13	22.2	30	± 4
Batch	R-59	Manual						
Batch	R-60	3.4	1	23.7	3	27.1	39	± 4
Batch	R-61	Manual						
	R-62	3.8	6	16.2	8	20.0	25	± 5
Cond.	R-63	16.4	29	28.2	24	44.6	29	± 15
Cond.	R-64	18.0	12	16.0	8	34.0	45	± 15
	Ave.	56.8	4.8	34.5	7.6	37.9	26.8	-

Table 13. Evaporator Vapor Pressure Control

	Run No.	Over Limits % of time	Over Limits No. of times	Under Limits % of time	Under Limits No. of times	Outside Limit % time	Total Control Time	Control Limits + and - % of set point
	R-42	0.68	2	0.3	3	1.0	22	± 2
	R-43	15.1	6	0.14	1	15.2	24	± 2
	R-44	2.8	16	6.4	15	9.2	23	± 2
Batch	R-45	14.2	6	0.06	1	14.3	27	± 2
Batch	R-46	72.7	8	0.56	2	73.4	15	± 2
	R-47	7.3	3	11.1	6	18.4	20	± 2
	R-48	6.3	2	46.7	6	53.0	16	± 2
	R-49	0.77	2	0.77	3	1.5	13	± 2
	R-50	6.3	2	46.7	6	53.0	16	± 2
Batch	R-51	0.3	3	0.81	3	1.1	39	± 2
Batch	R-52	3.1	4	0.17	2	3.3	39	± 2
	R-54	9.5	8	4.2	7	13.7	28	± 2
	R-55	21.4	8	1.8	9	23.2	28	± 2
	R-56	1.1	9	1.1	9	2.2	31	± 2
	R-57	0	0	0	0	0	72	± 2
	R-58	0	0	0	0	0	30	± 2
Batch	R-59	0	0	0	0	0	31	± 2
Batch	R-60	0	0	0	0	0	39	± 2
Batch	R-61	0	0	0	0	0	31	± 2
	R-62	0.33	1	0	0	0.33	30	± 2
	R-63	4.3	15	12.4	4	16.7	39	± 2
	R-64	0.6	3	0	0	0.6	49	± 2
	Ave.	7.6	4.5	6.1	3.5	13.6	30	-

Table 14. Proportional Bands and Reset Times

	Test No.	Calciner Liquid Level		Evaporator Density		Evaporator Liquid Level		Evaporator Temp.		Evaporator Pressure	
		PB %	RS min	PB %	RS min	PB %	RS min	PB %	RS min	PB %	RS min
	R-42	100	5	200	5	20	5	200	5	25	0.3
	R-43	300	50	100	3	25	3	100	3	25	0.3
	R-44	300	44	200	3	25	1	60	5	20	0.3
Batch	R-45	300	24	200	3	25	4	75	5	20	0.3
Batch	R-46	300	60	M	M	50	10	60	9	20	3
	R-47	200	40	40	9	25	10	60	8	20	0.3
	R-48	200	50	200	5	25	10	60	9	20	0.3
	R-49	300	0	200	5	25	10	25	9	50	0.3
	R-50	200	0	200	9	25	10	25	10	50	0.3
Batch	R-51	200	0	200	9	M	M	25	10	50	0.3
Batch	R-52	200	0	200	10	M	M	25	10	20	0.3
	R-54	150	0	100	2	25	10	25	8	10	1
	R-55	150	0	100	2	25	10	25	8	10	0.3
	R-56	150	0	100	2	25	10	25	9	10	1
	R-57	150	0	200	10	25	10	25	10	15	1
	R-58	200	0	100	10	25	10	25	8	10	0.1
Batch	R-59	200	0	M	M	M	M	M	M	10	0.1
Batch	R-60	100	0	100	10	M	M	25	8	25	1
Batch	R-61	220	0	M	M	M	M	M	M	25	1
	R-62	200	240	100	10	25	10	100	10	25	1
	R-63	200	240	100	10	40	10	200	8	25	1
	R-64	200	240	100	10	40	10	200	10	25	1
	Limits	95-20%		SP ± 5%		SP ± 20%		SP ± 5%		SP ± 2%	

Table 15. Control Settings and Range of Variables

Variable	Range	Signal	Scale	Proportional Band	Reset Time, min	Set Point
Evaporator liquid level	10-30 liters	0-20 in. H_2O	0-100%	35%	10	50%
Density	1-2 g/cm^3	25-52 in. H_2O	0-100%	100%	10	30%
Vapor composition	0-16 normal	100-125°C	0-100%	100%	10	40%
Vapor composition	1-3 normal	0.3-0.67 mhos	0-100%	200%	9	40%
Steam pressure	0-100 psi	0-100 psi	0-100%	50%	8	-
Calciner liquid level	56-60 liters	150-450°C	0-100%	200%	240	60%
Evaporator pressure	-5 to +5 psi	-5 to +5 psi	0-100%	25%	1	40%

Range of Flows

	Normal	Maximum
Water	0-2 liters/min	0-10 liters/min
Feed	0-1 liters/min	0-4 liters/min
Condensate (calciner)	0-0.8 liters/min	0-1 liters/min
Calciner feed	0-1.2 liters/min	0-2 liters/min
Evaporator boilup	0-3 liters/min	0-6 liters/min

Evaporator Boilup

$q = 84{,}000\ (p-9)^{1/2}$ (Btu/hr)

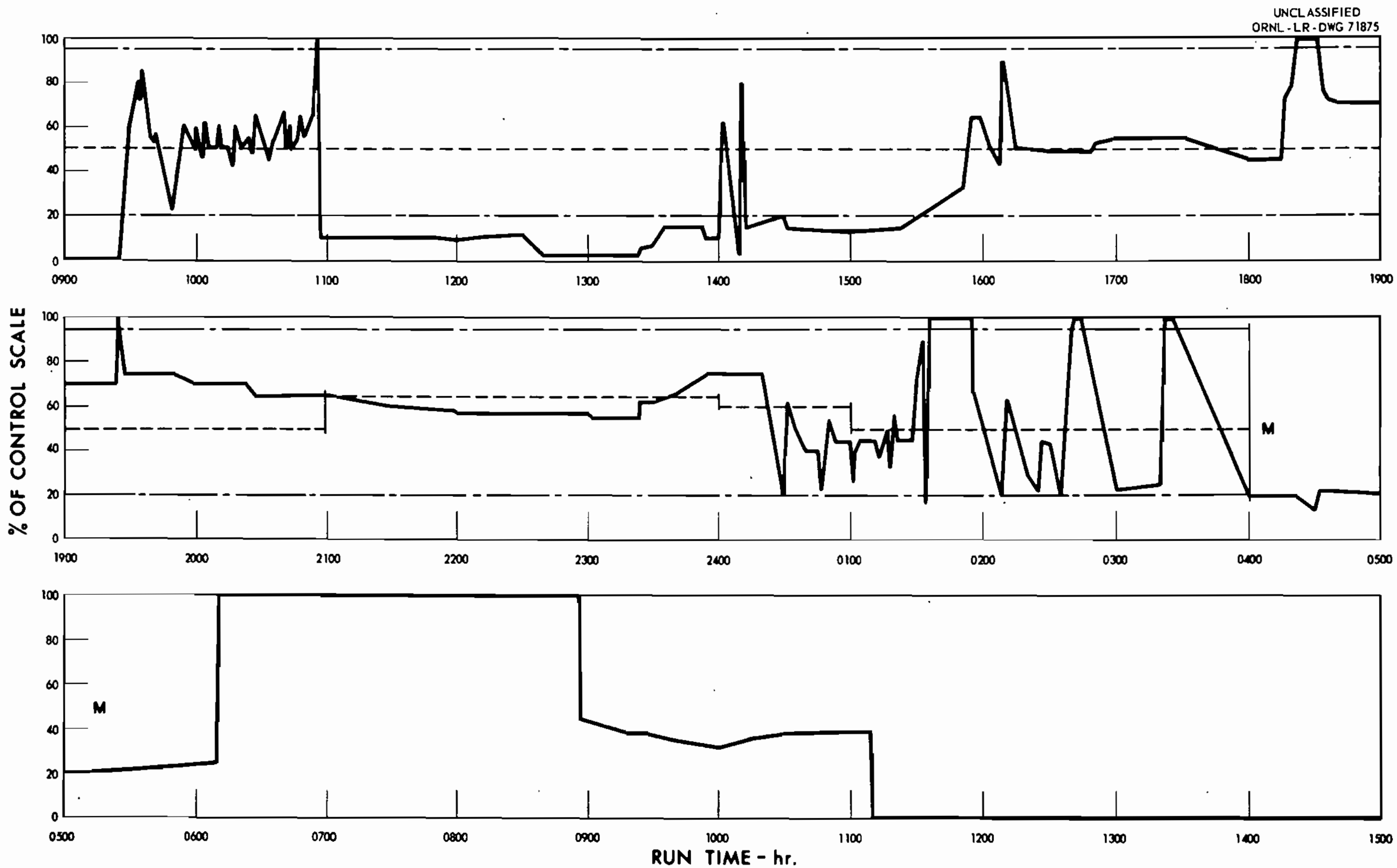
$x = 0.7\ (p-9)^{1/2}$ (liters/min)

p = steam pressure, psig

Valve Characteristics
where F is flow in liters/min and v is fraction open

Water	$F = 10(v)^2$
Feed	$F = 4.0(v)^2$
Calciner feed	$F = 2.0(v)^2$
Steam[a]	$p = 100(v)$ p is pressure in chest

[a]Effected by cascade controller.



Calciner Liquid Level - Continuous - Purex

Limits 95-20% Controller Action Prob. 100 %
Reset 5 min

Fig. 17. Waste calcination & evaporation control - Test 42 - Calciner Liquid Level.

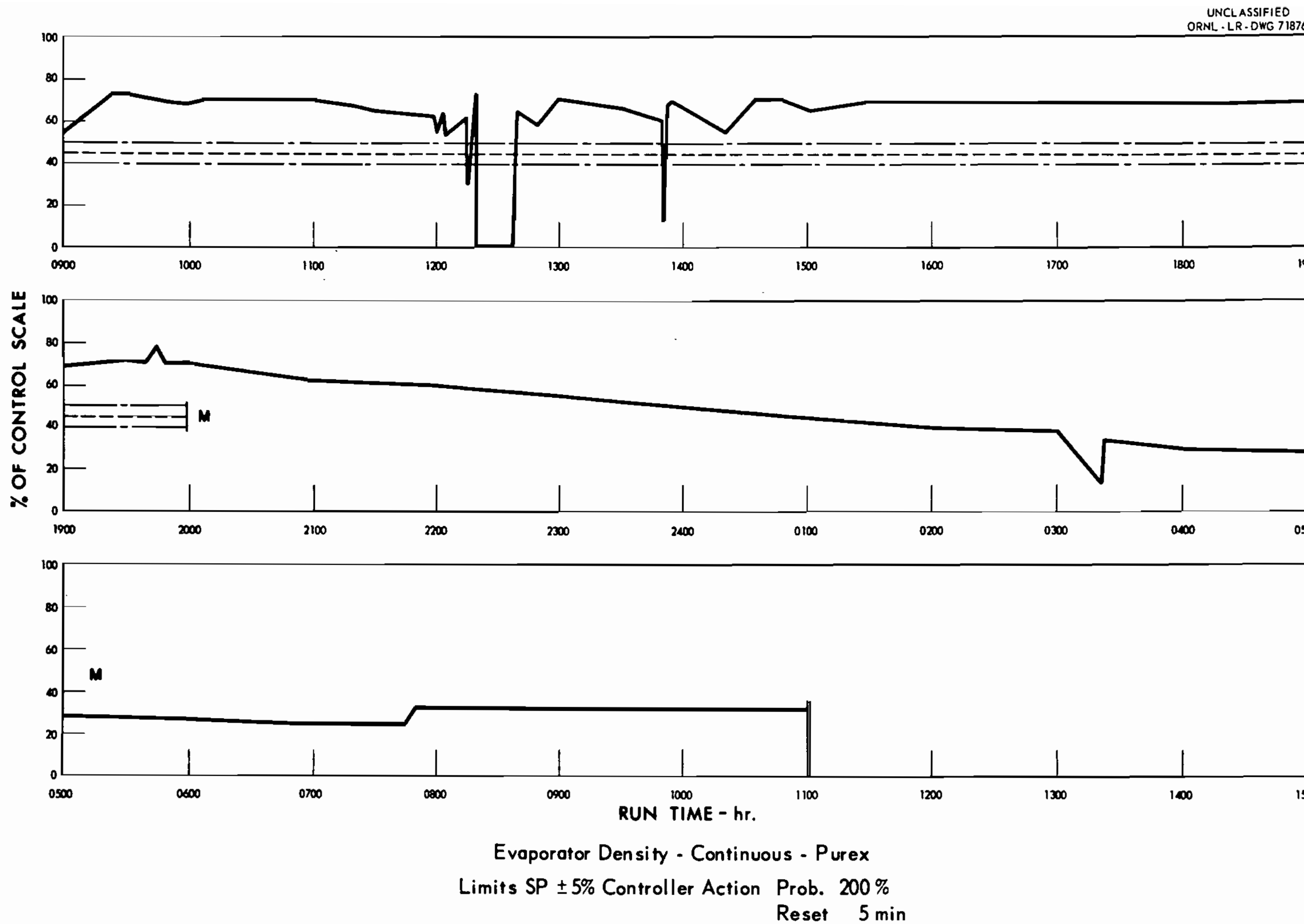
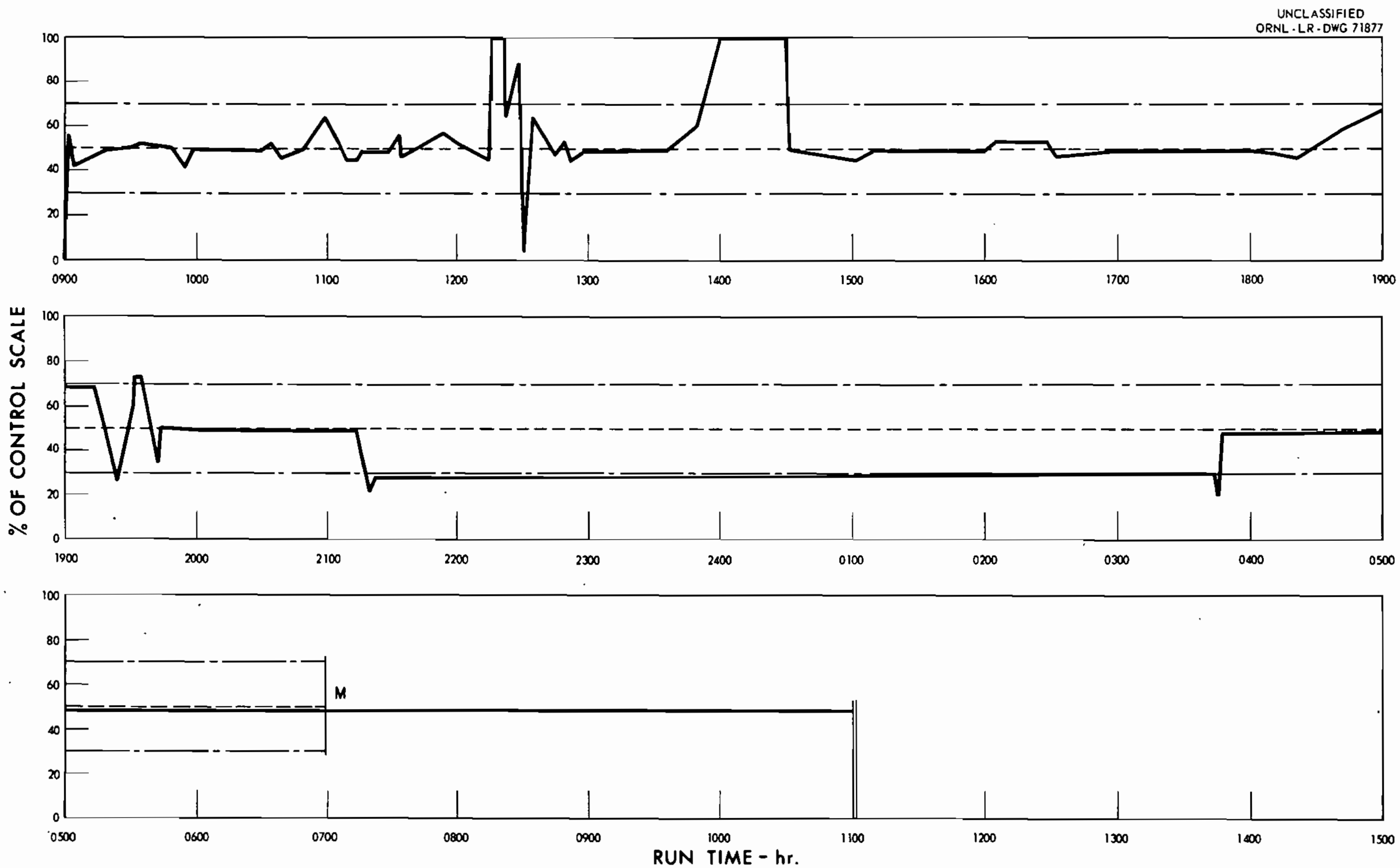


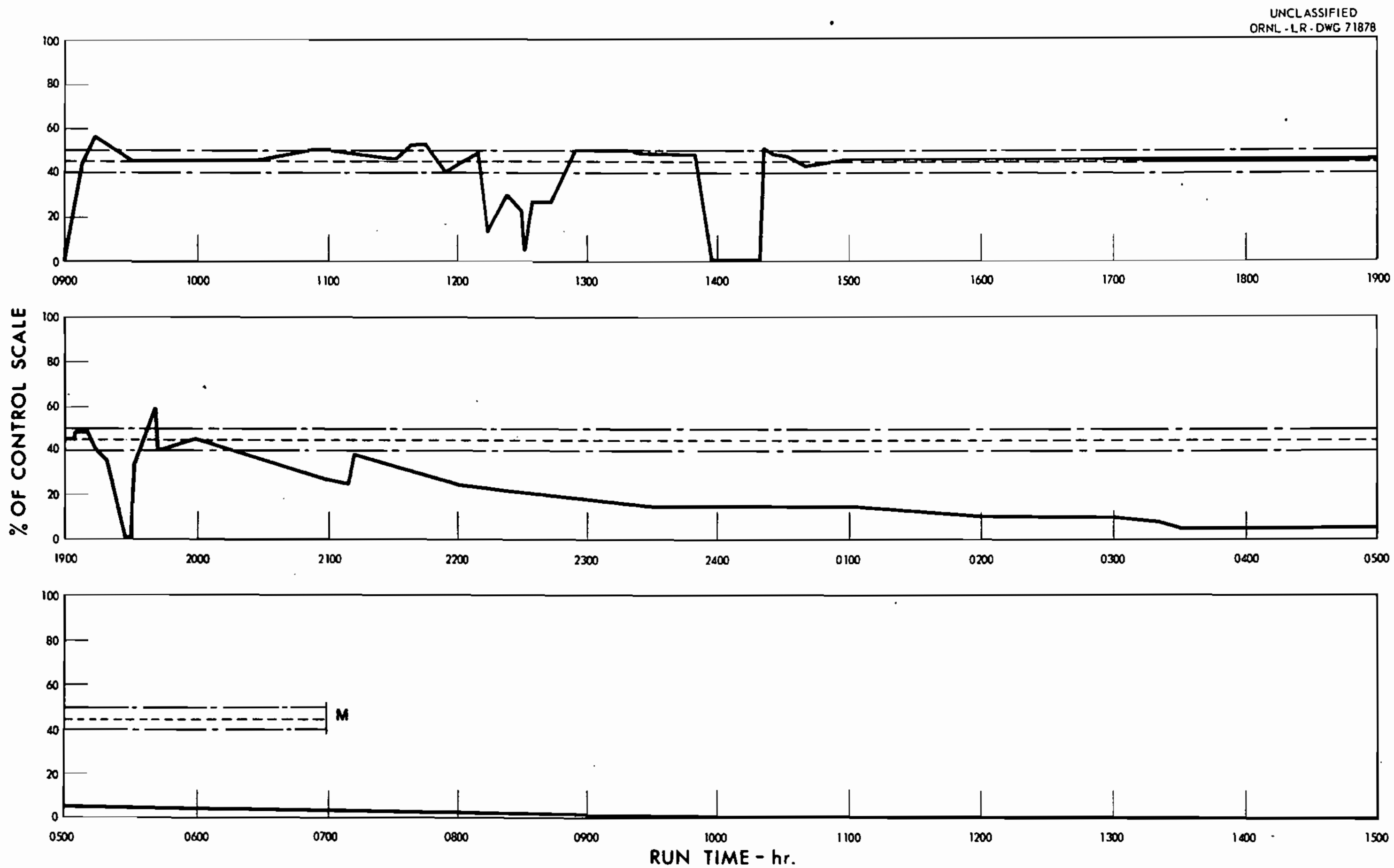
Fig. 17. Waste calcination & evaporation control - Test 42 - Evaporator Density.



Evaporator Liquid Level - Continuous - Purex

Limits SP ±20% Controller Action Prob. 20 %
Reset 5 min

Fig. 17. Waste calcination & evaporation control - Test 42 - Evaporator Liquid Level.

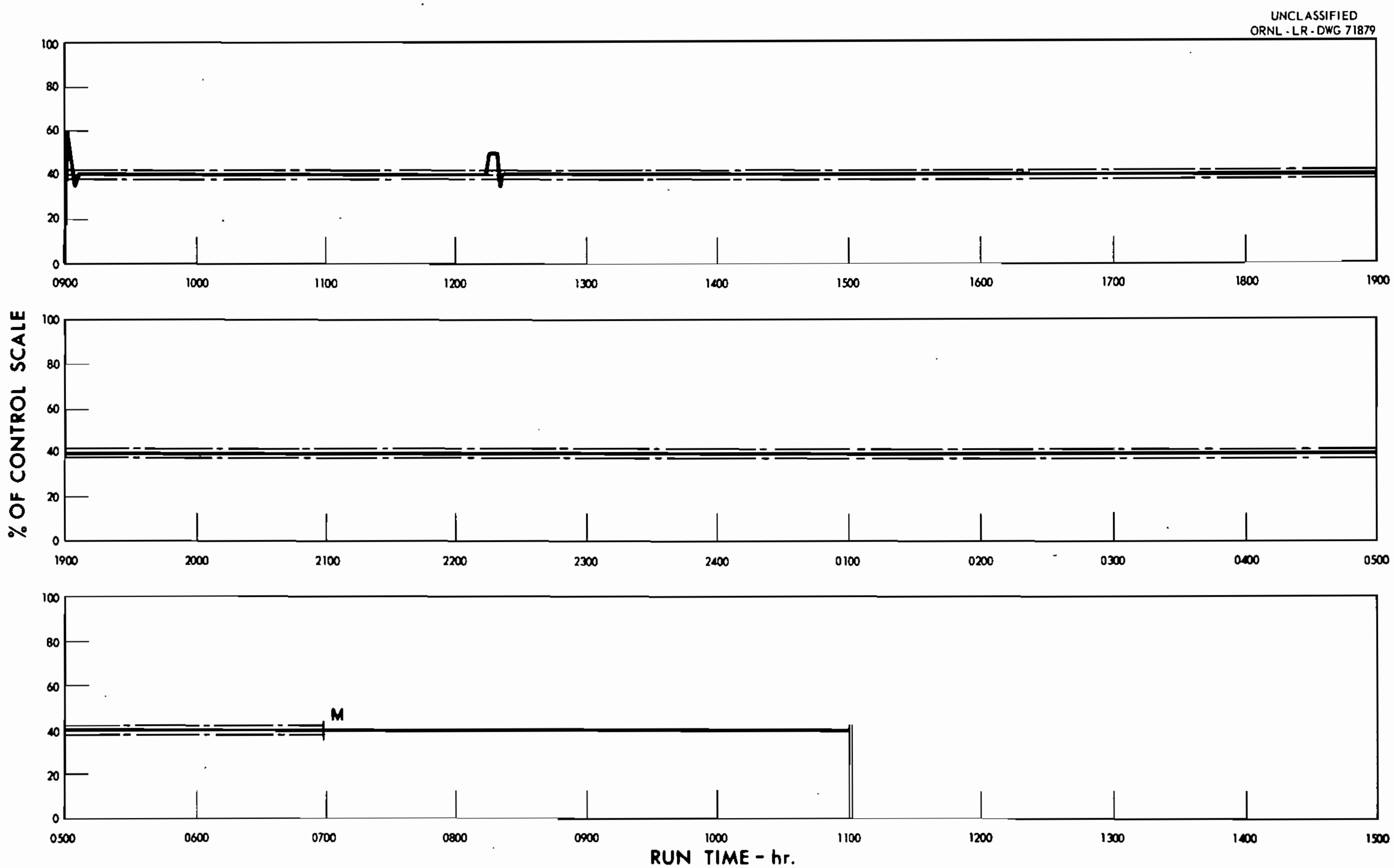


Evaporator Temperature - Continuous - Purex

Limits SP ±5% Controller Action Prob. 200 %

Reset 5 min

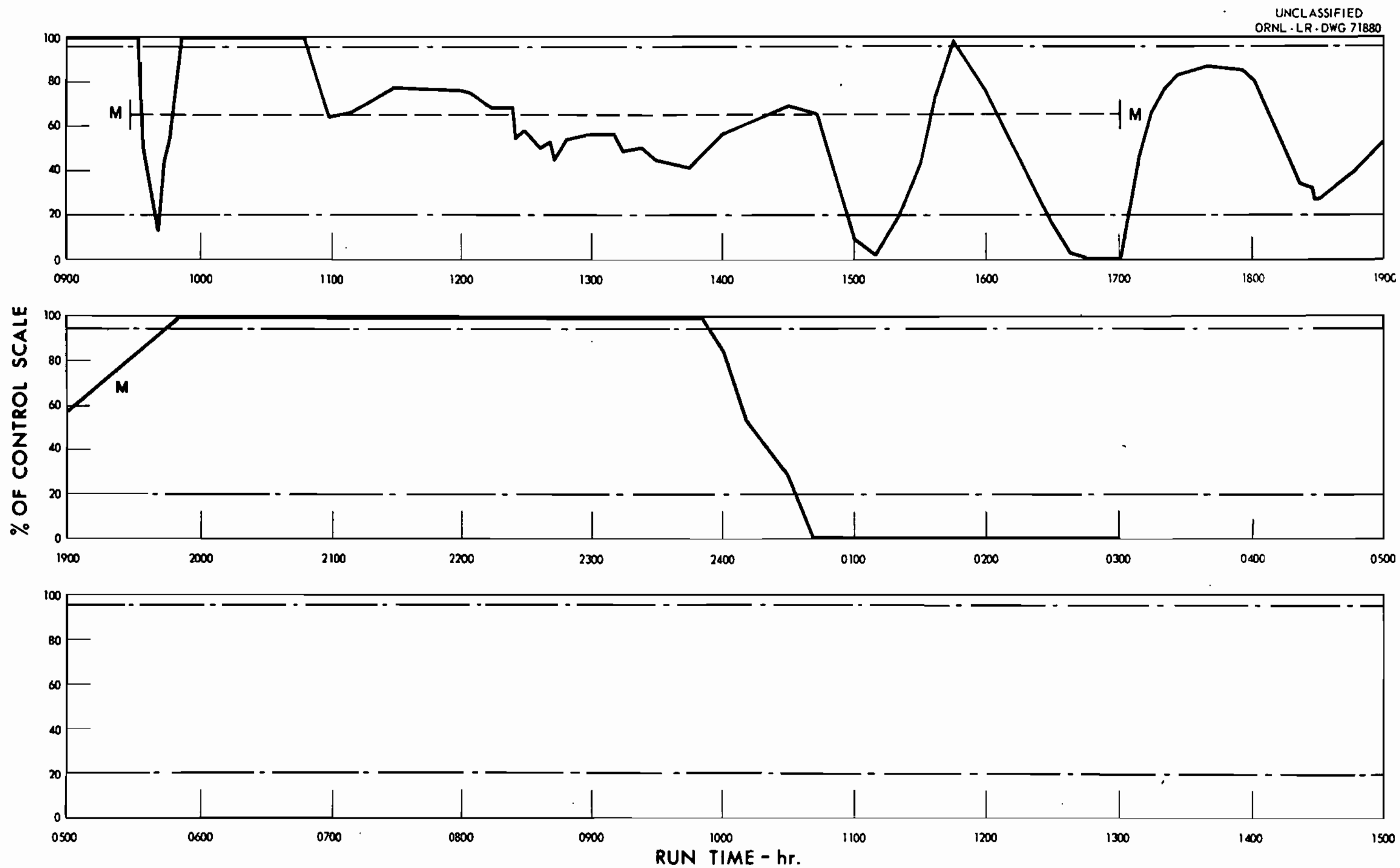
Fig. 17. Waste calcination & evaporation control - Test 42 - Evaporator Temperature.



Evaporator Pressure - Continuous - Purex

Limits SP ±5% Controller Action Prob. 25%
Reset 0.3 min

Fig. 17. Waste calcination & evaporation control - Test 42 - Evaporator Temperature.

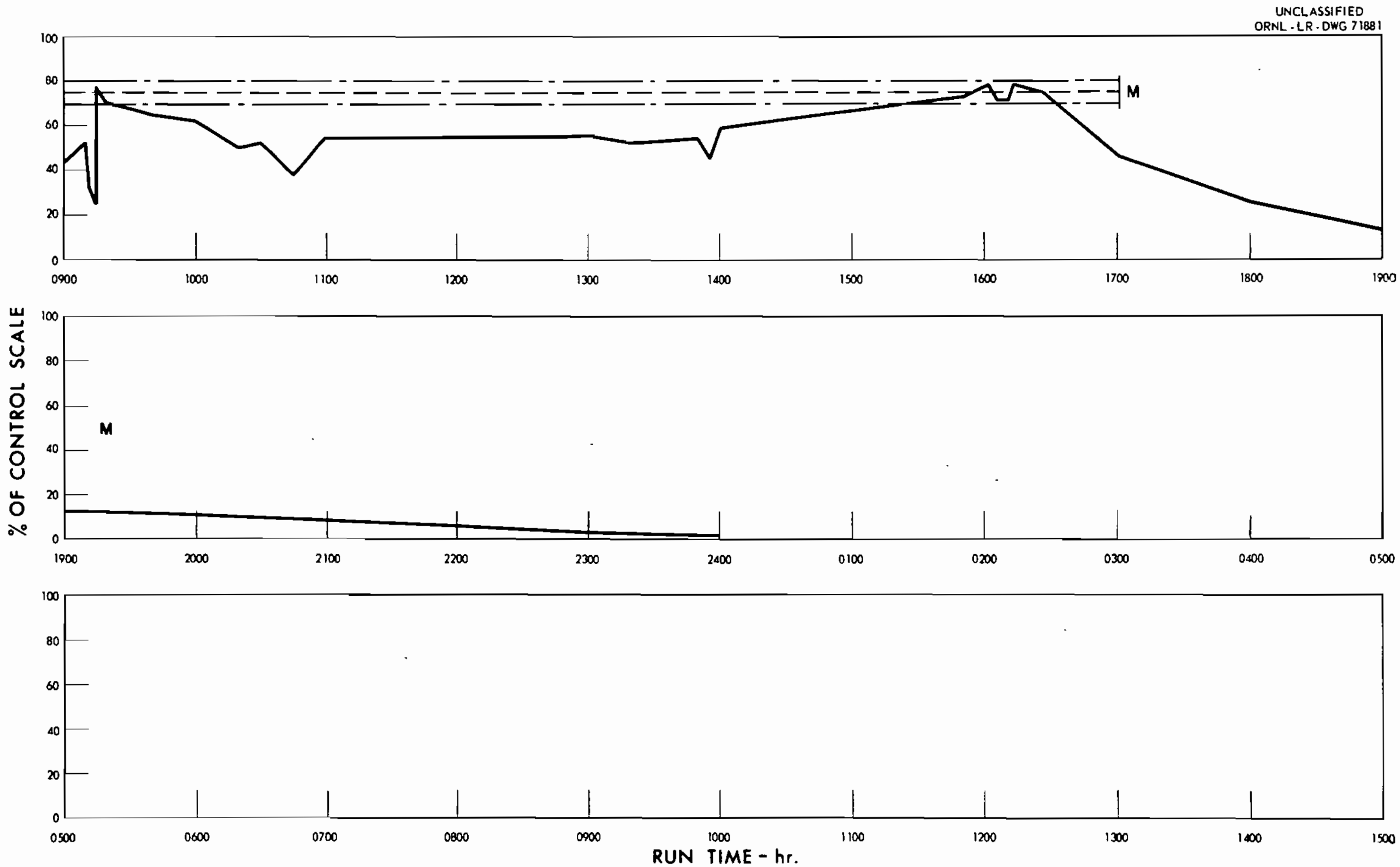


Calciner Liquid Level - Continuous - Purex

Limits 95-20% Controller Action Prob. 300 %

Reset—50-min

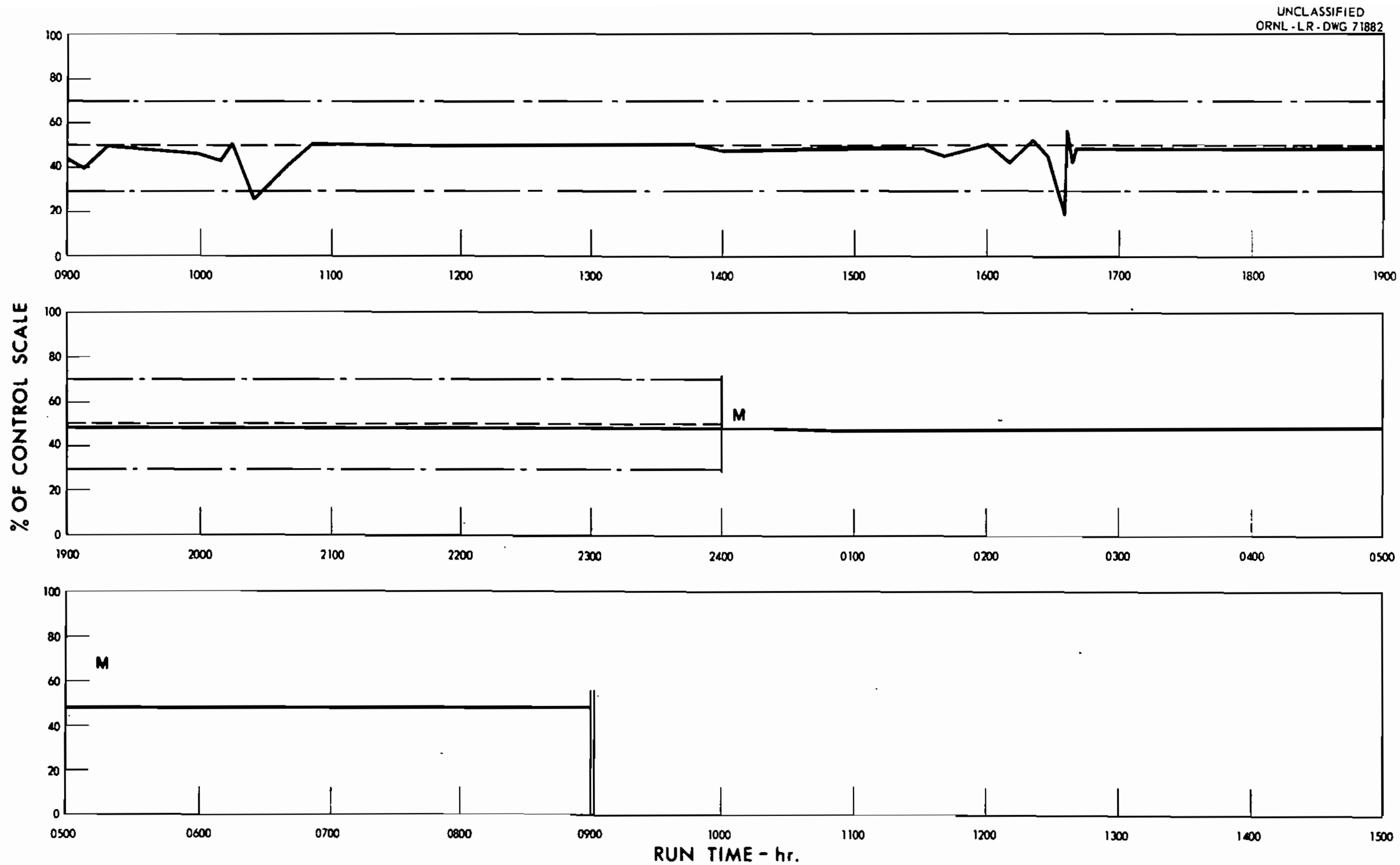
Fig. 17. Waste calcination & evaporation control - Test 43 - Calciner Liquid Level.



Evaporator Density - Continuous - Purex

Limits SP ± 5% Controller Action Prob. 100 %
Reset 3 min

Fig. 17. Waste calcination & evaporation control - Test 43 - Evaporator Density.



Evaporator Liquid Level - Continuous - Purex

Limits SP ±20% Controller Action Prob. 25 %

Reset 3 min

Fig. 17. Waste calcination & evaporation control - Test 43 - Evaporator Liquid Level.

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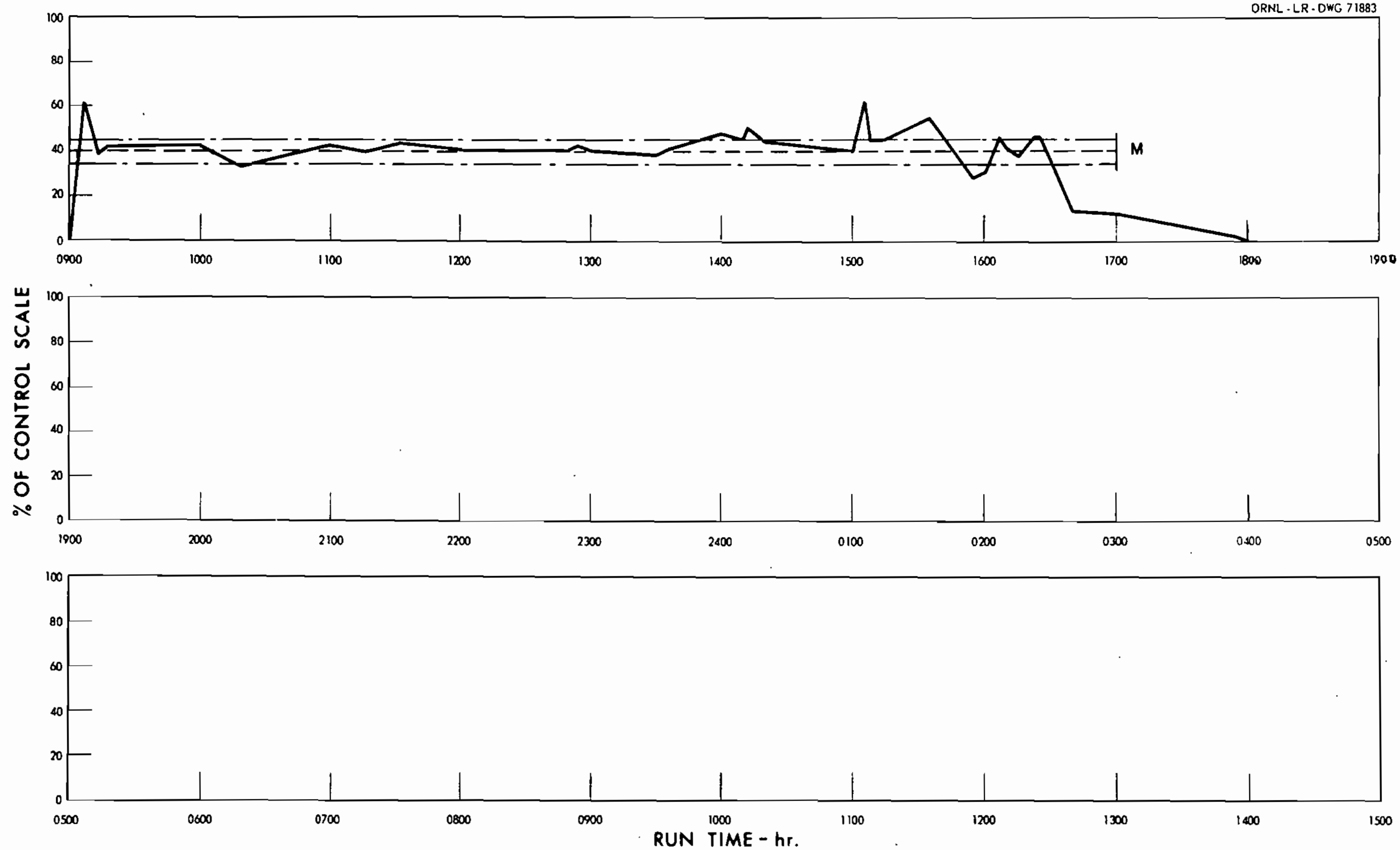
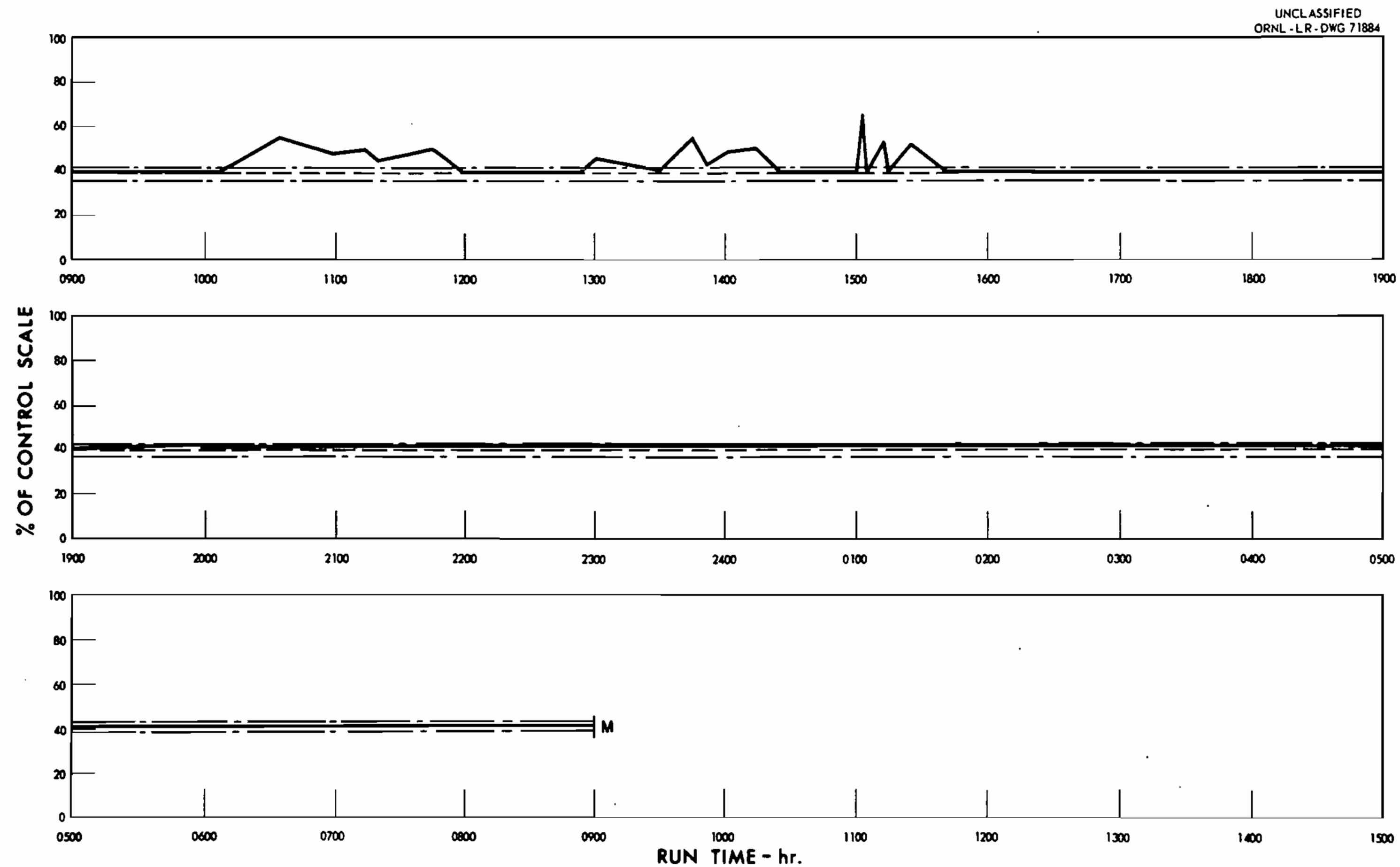


Evaporator Temperature - Continuous - Purex

Limits SP ±5% Controller Action Prob. 100 %
Reset 3 min

Fig. 17. Waste calcination & evaporation control - Test 43 - Evaporator Temperature.



Evaporator Pressure - Continuous - Purex

Limits SP ± 2% Controller Action Prob. 25 %

Reset 0.3 min

Fig. 17. Waste calcination & evaporation control - Test 43 - Evaporator Pressure.

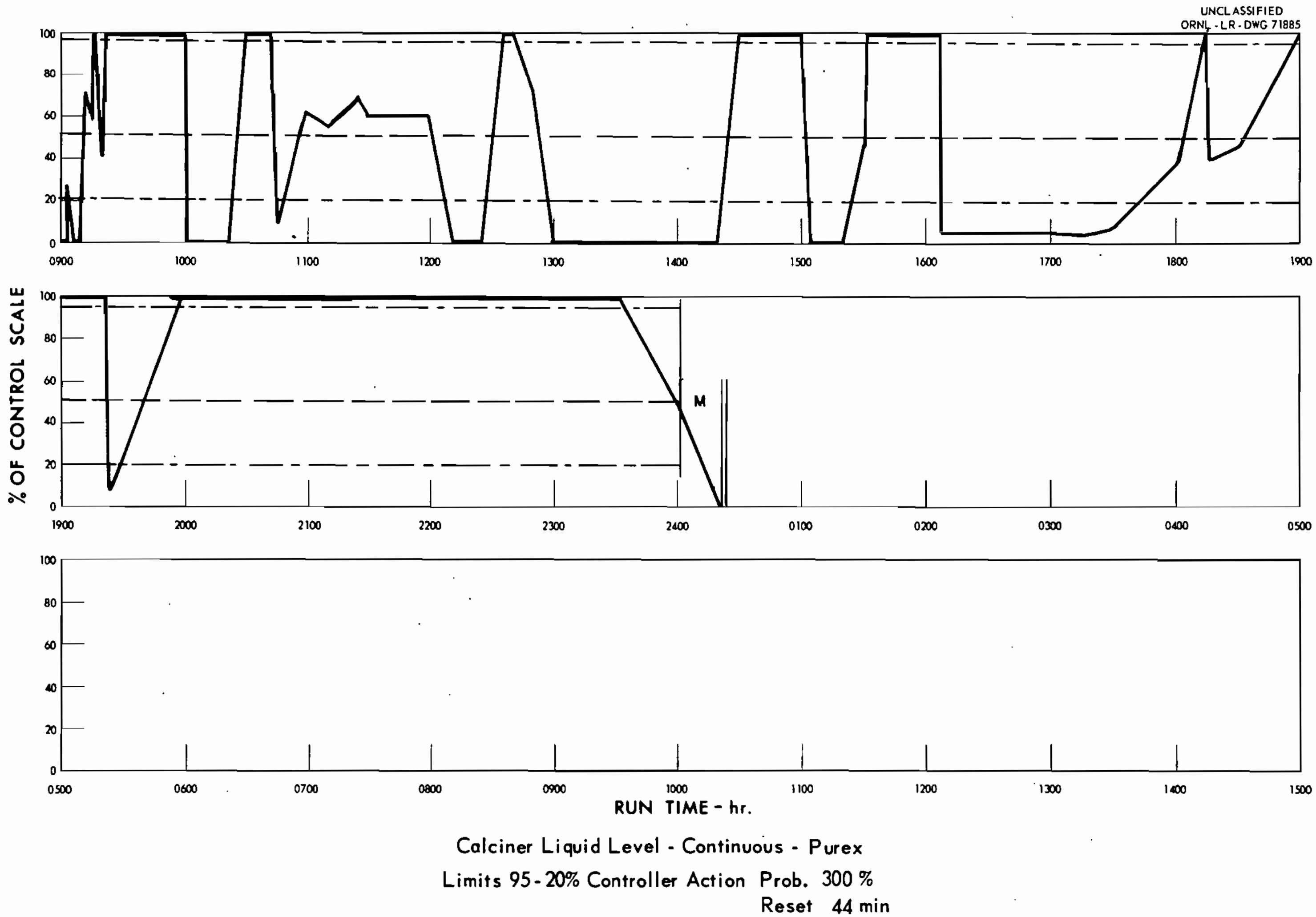
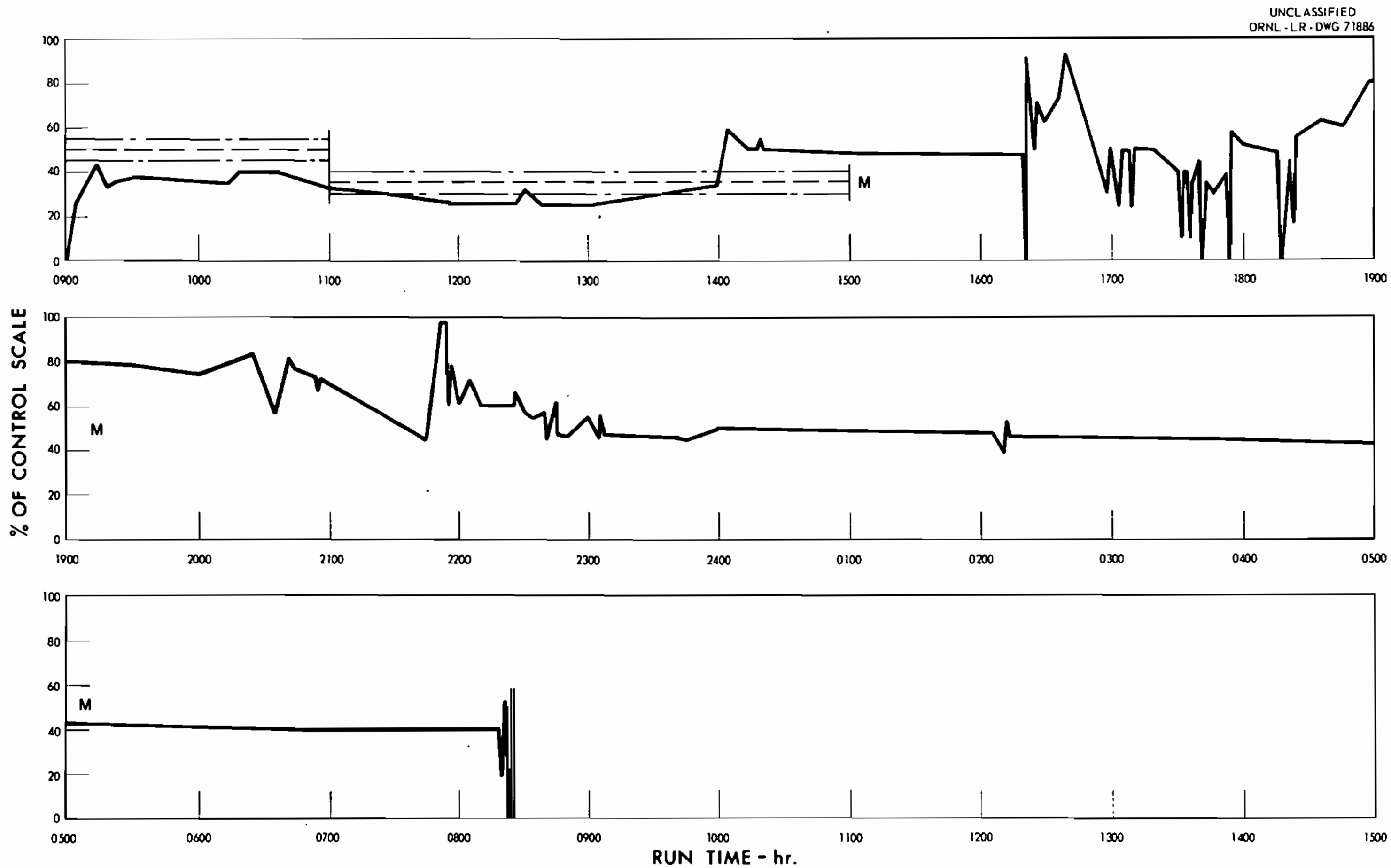


Fig. 17. Waste calcination & evaporation control - Test 44 - Calciner Liquid Level.

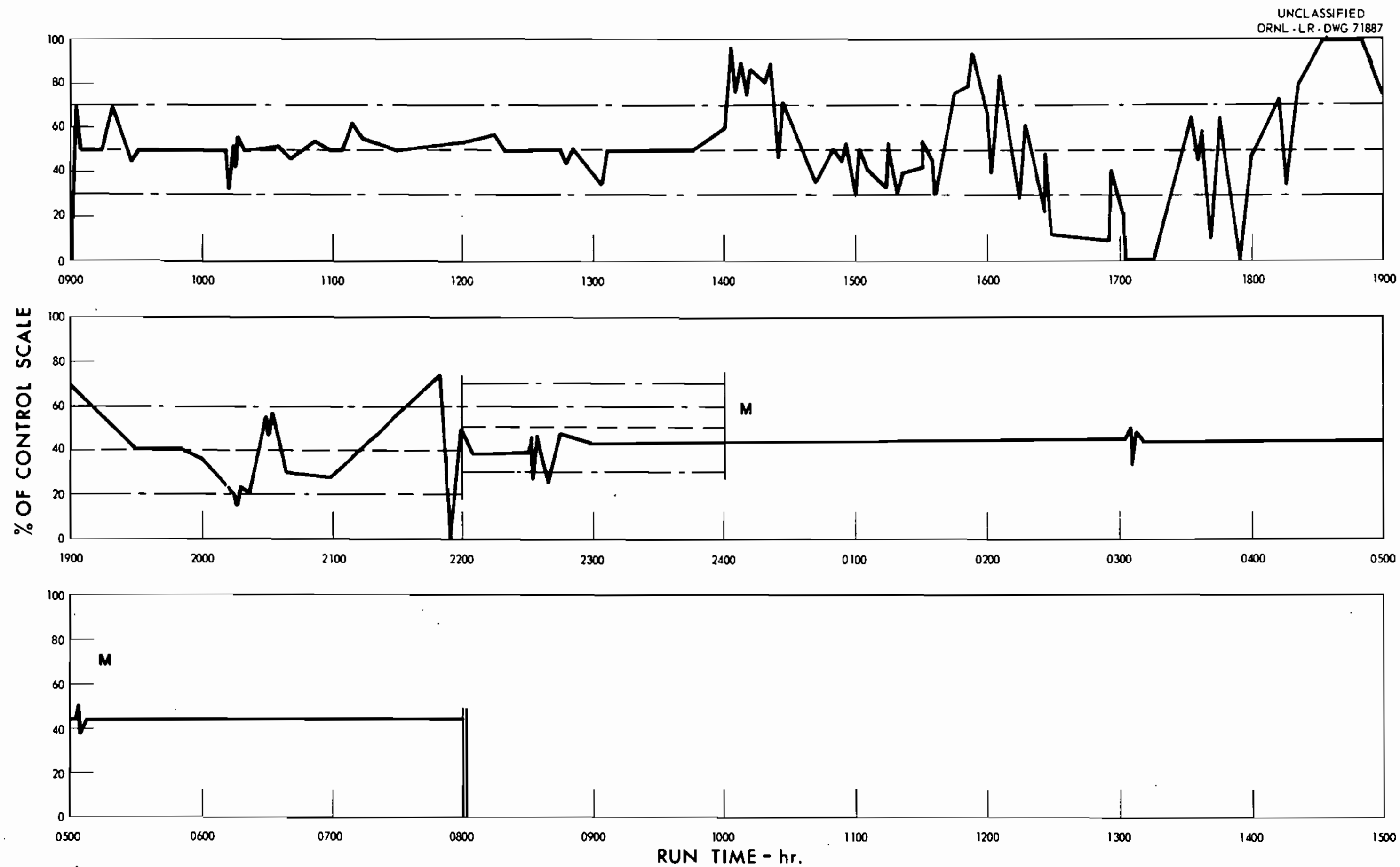


Evaporator Density - Continuous - Purex

Limits SP ±5% Controller Action Prob. 200 %

Reset 3 min

Fig. 17. Waste calcination & evaporation control - Test 44 - Evaporator Density.

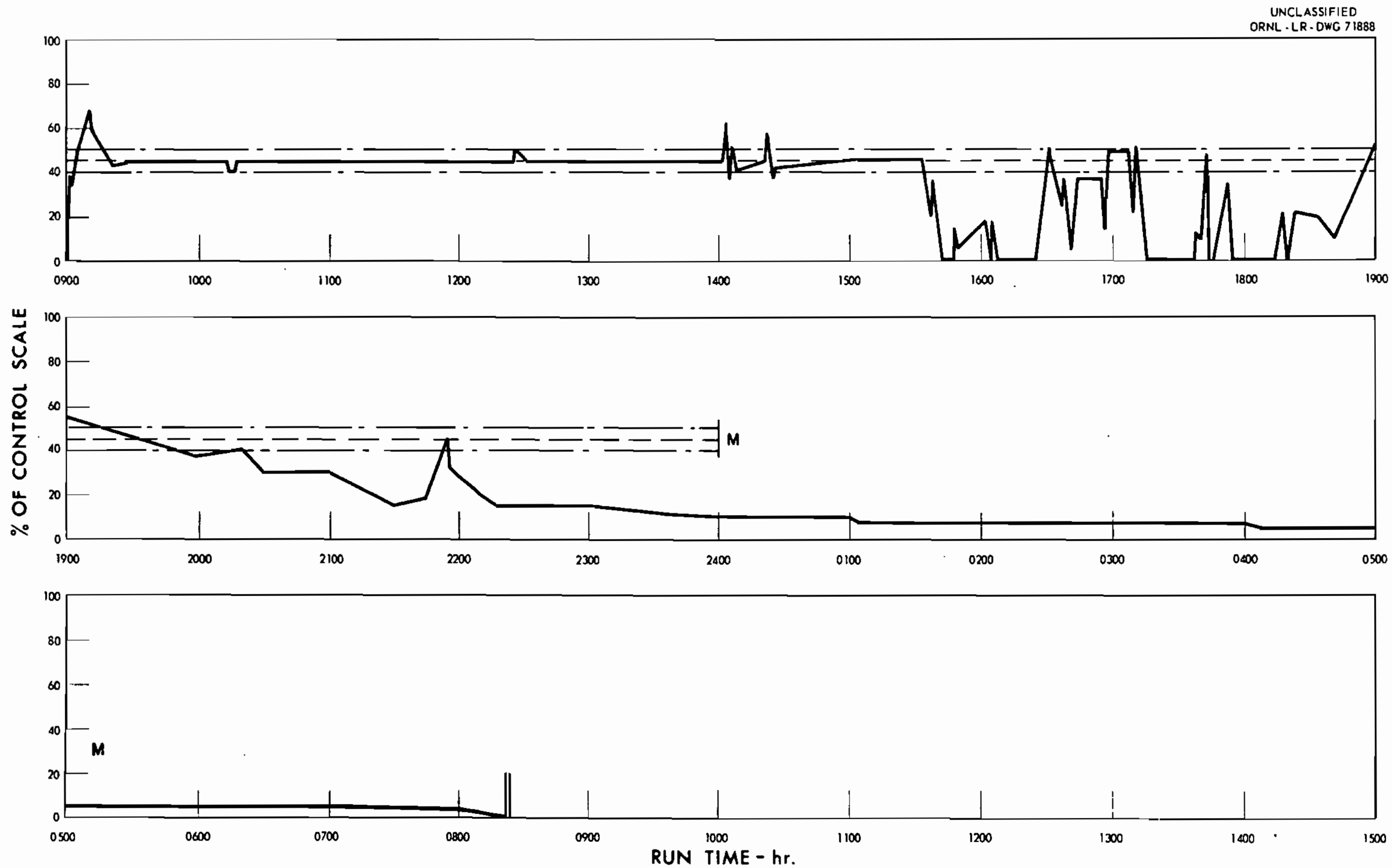


Evaporator Liquid Level - Continuous - Purex

Limits SP ±20% Controller Action Prob. 25 %

Reset 1 min

Fig. 17. Waste calcination & evaporation control - Test 44 - Evaporator Liquid Level.



Evaporator Temperature - Continuous - Purex

Limits SP ±5% Controller Action Prob. 60 %

Reset 5-min

Fig. 17. Waste calcination & evaporation control - Test 44 - Evaporator Temperature.

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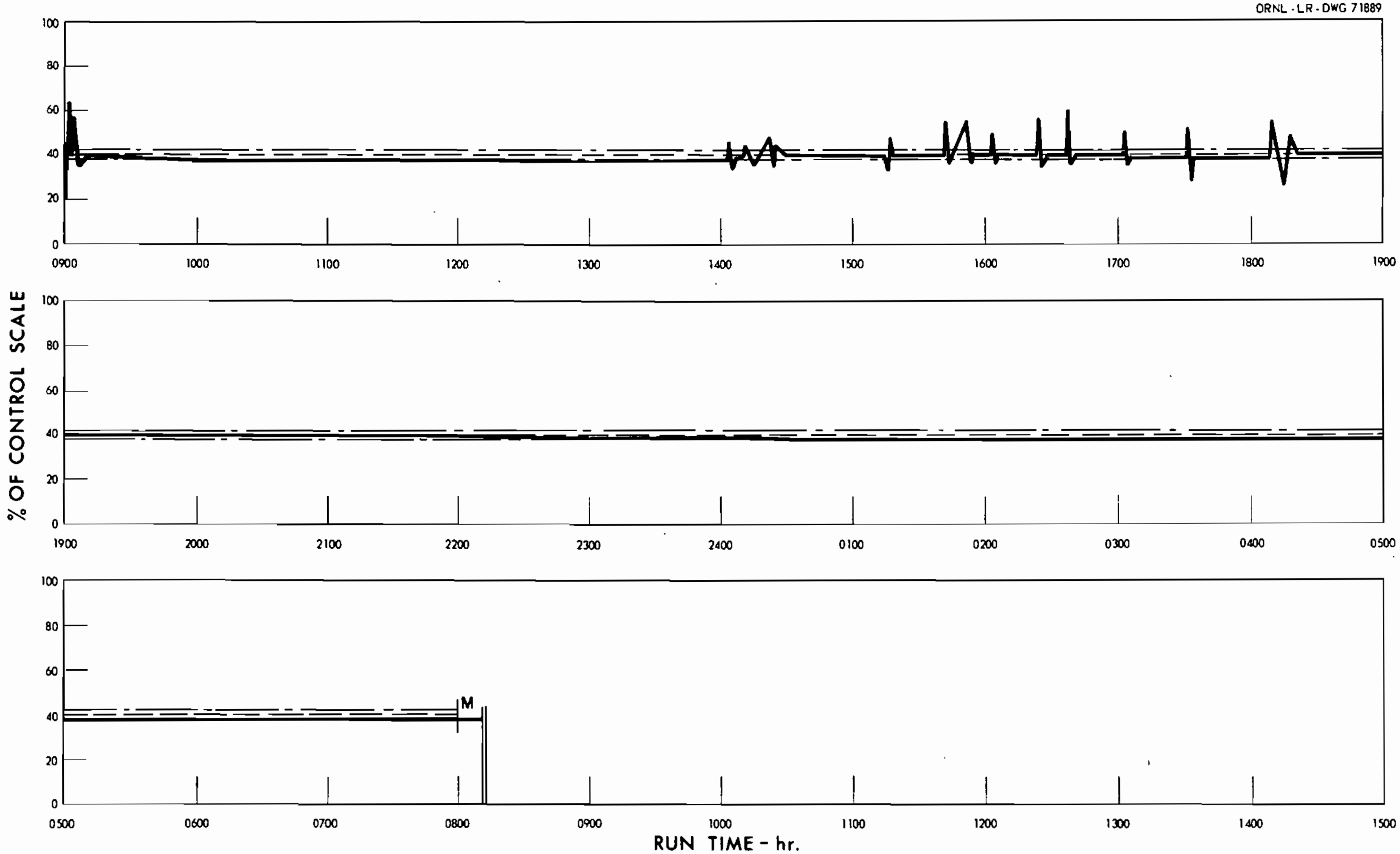
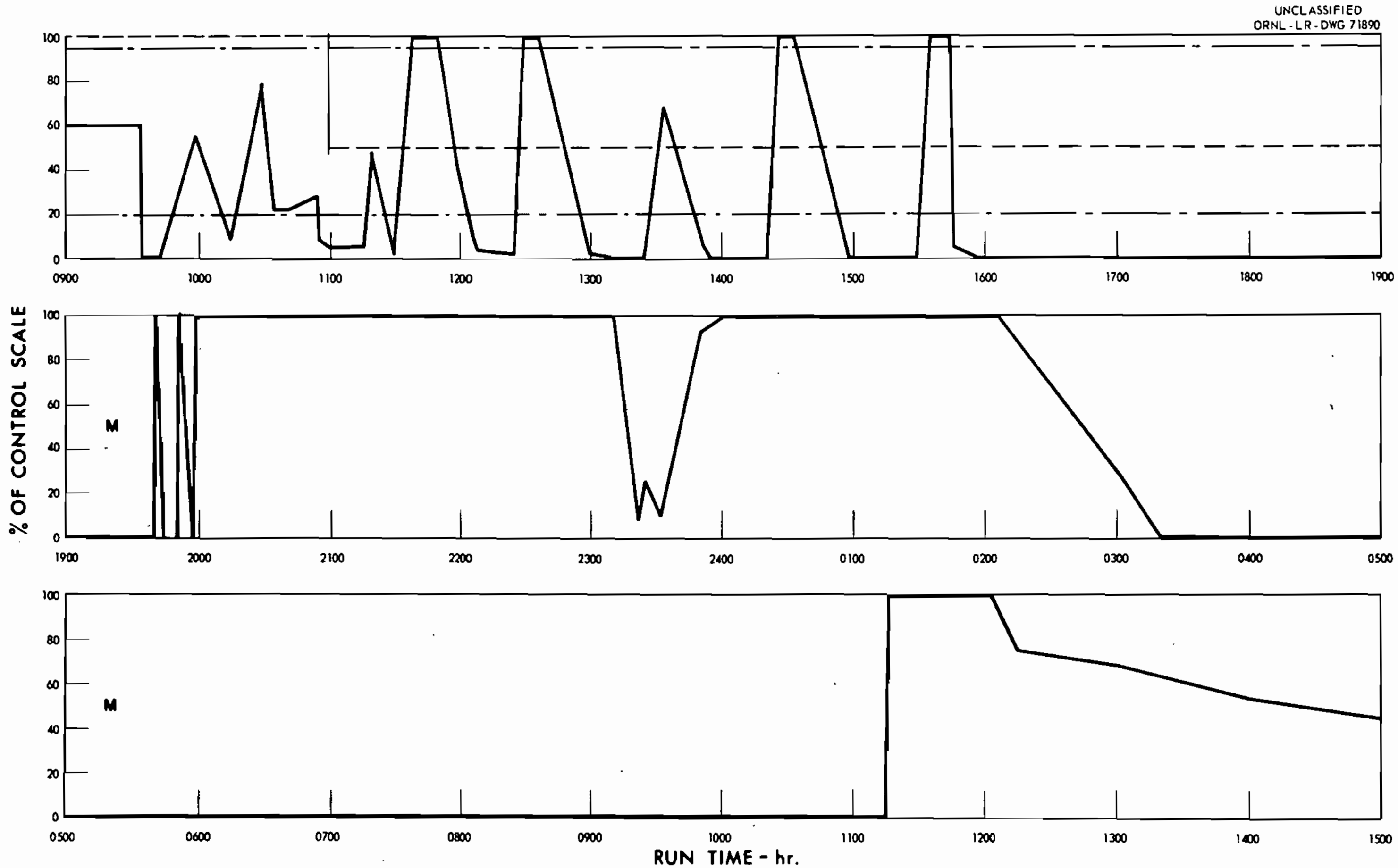


Evaporator Pressure - Continuous - Purex

Limits SP ± 2% Controller Action Prob. 20 %

Reset 0.3 min

Fig. 17. Waste calcination & evaporation control - Test 44 - Evaporator Pressure.



Calciner Liquid Level - Batch - Purex

Limits 95-20% Controller Action Prob. 300 %

Reset 24 min

Fig. 17. Waste calcination & evaporation control - Test 45 - Calciner Liquid Level.

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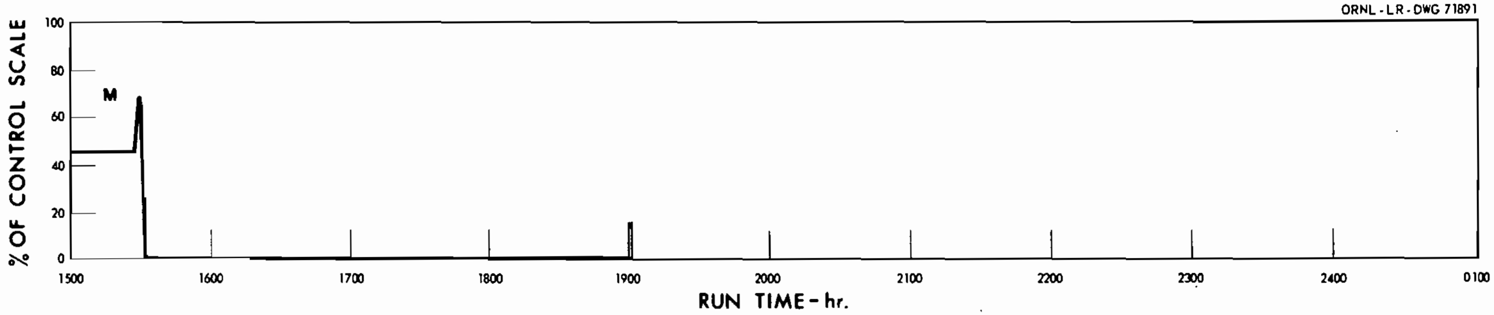

Calciner Liquid Level - Batch - Purex

Limits 95-20% Controller Action Prob. 300 %

Reset 24 min

Fig. 17. Waste calcination & evaporation control - Test 45 - Calciner Liquid Level. (Cont'd.)

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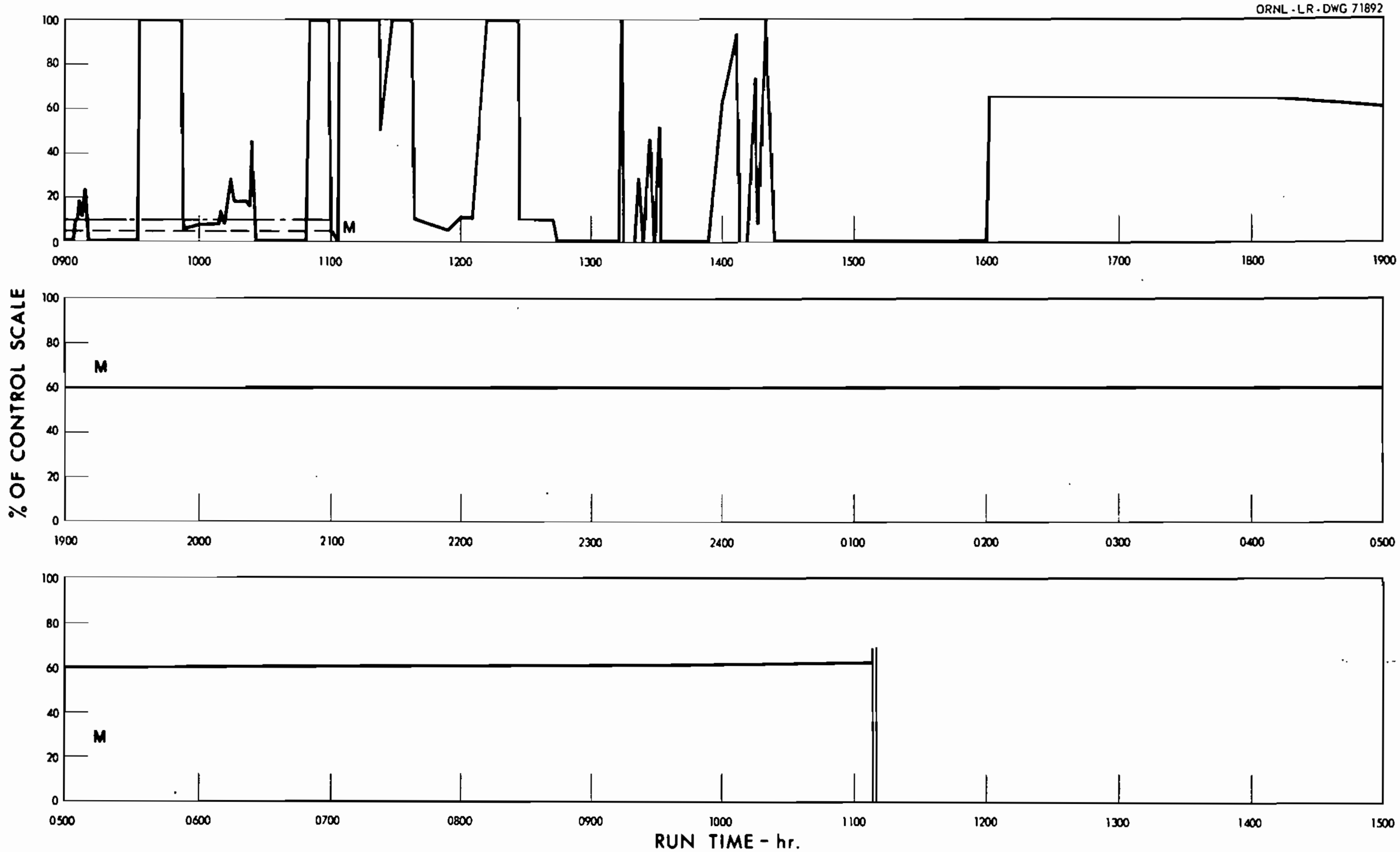
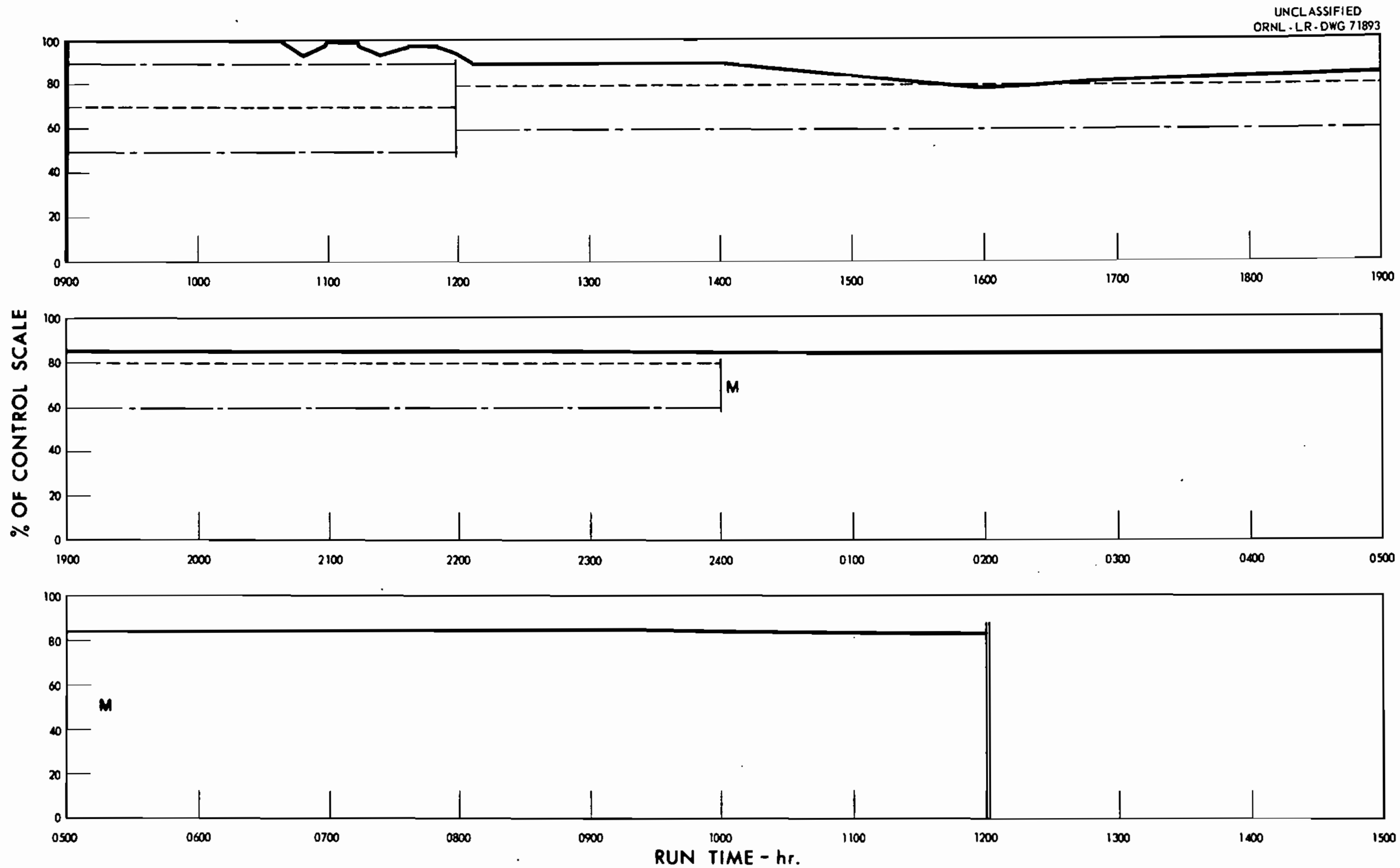


Evaporator Density - Batch - Purex

Limits SP ± 5% Controller Action Prob. 200 %

Reset 3 min

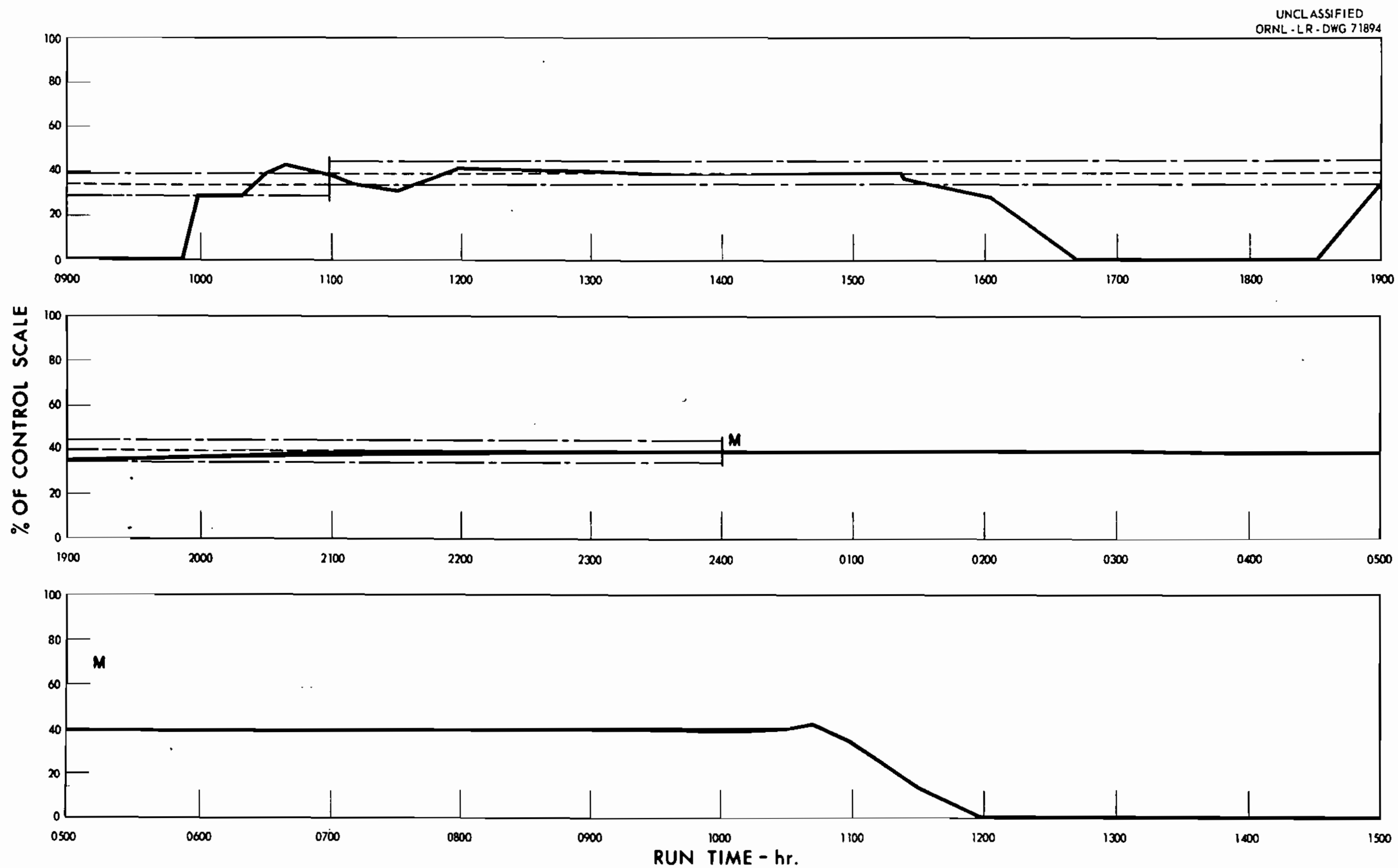
Fig. 17. Waste calcination & evaporation control - Test 45 - Evaporator Density.



Evaporator Liquid Level - Batch - Purex

Limits SP ±20% Controller Action Prob. 25 %
Reset 4 min

Fig. 17. Waste calcination & evaporation control - Test 45 - Evaporator Liquid Level.

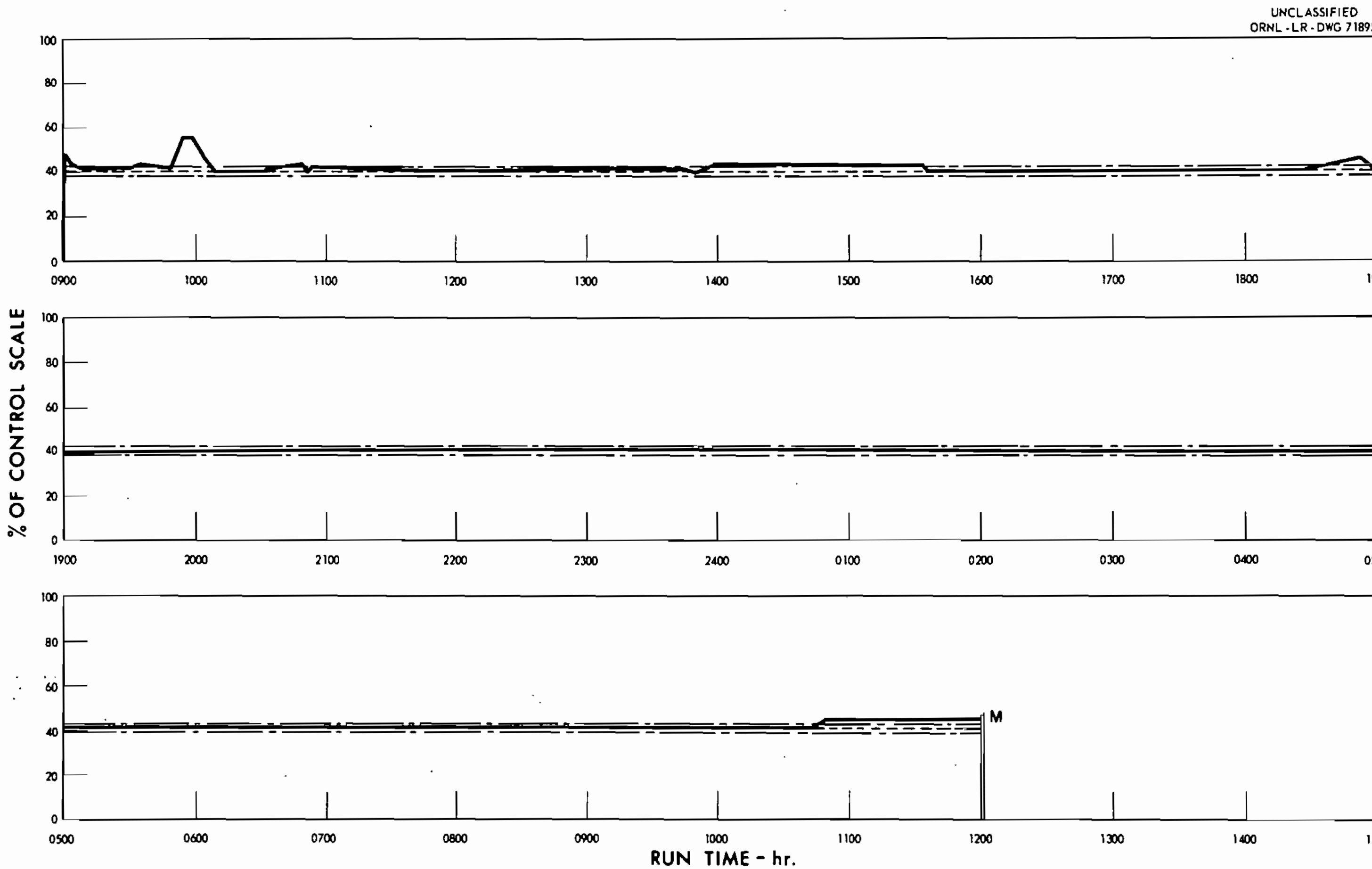


Evaporator Temperature - Batch - Purex

Limits SP ±5% Controller Action Prob. 75 %

Reset 5 min

Fig. 17. Waste calcination & evaporation control - Test 45 - Evaporator Temperature.

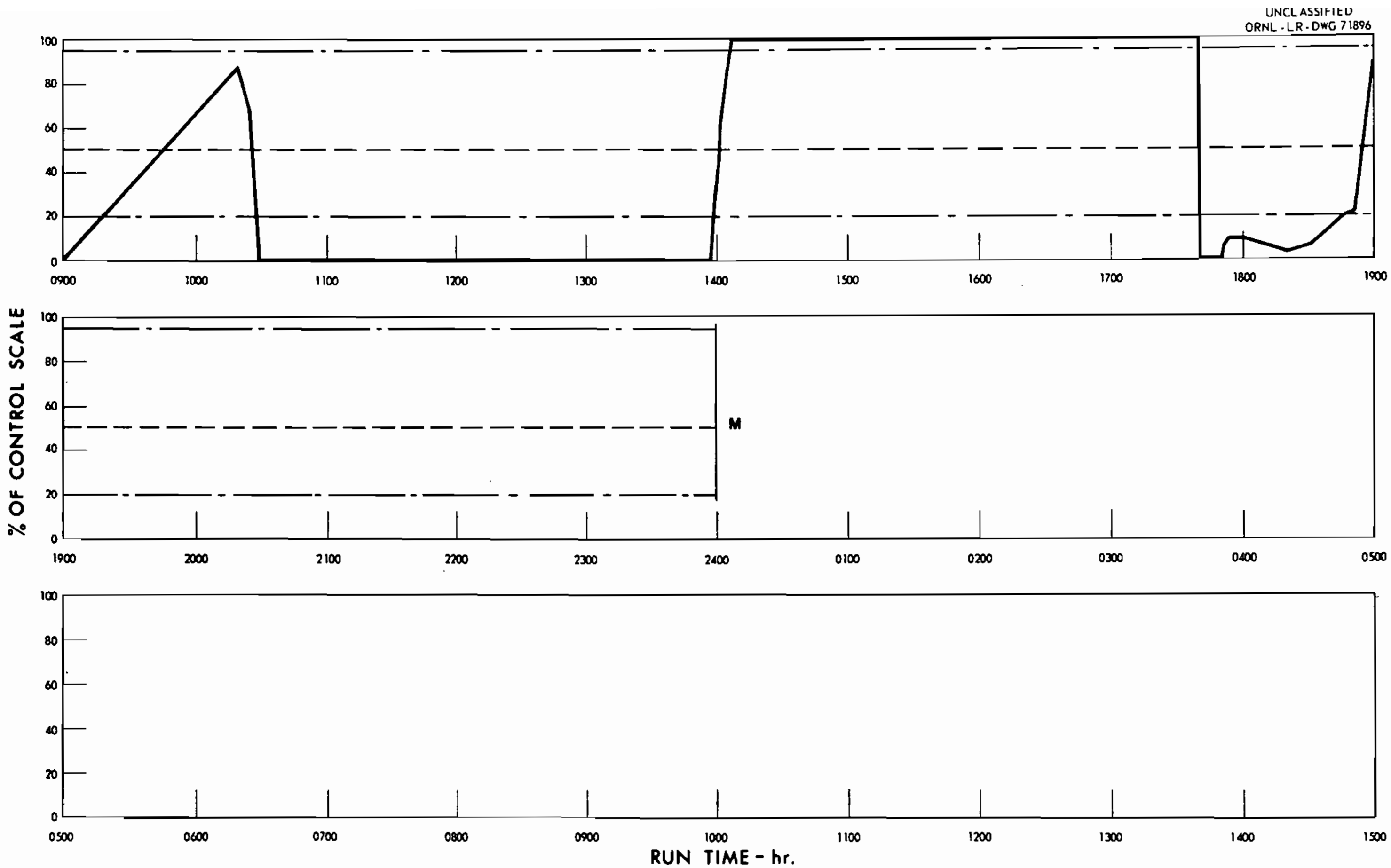


Evaporator Pressure - Batch - Purex

Limits SP ± 2% Controller Action Prob. 20 %

Reset 0.3 min

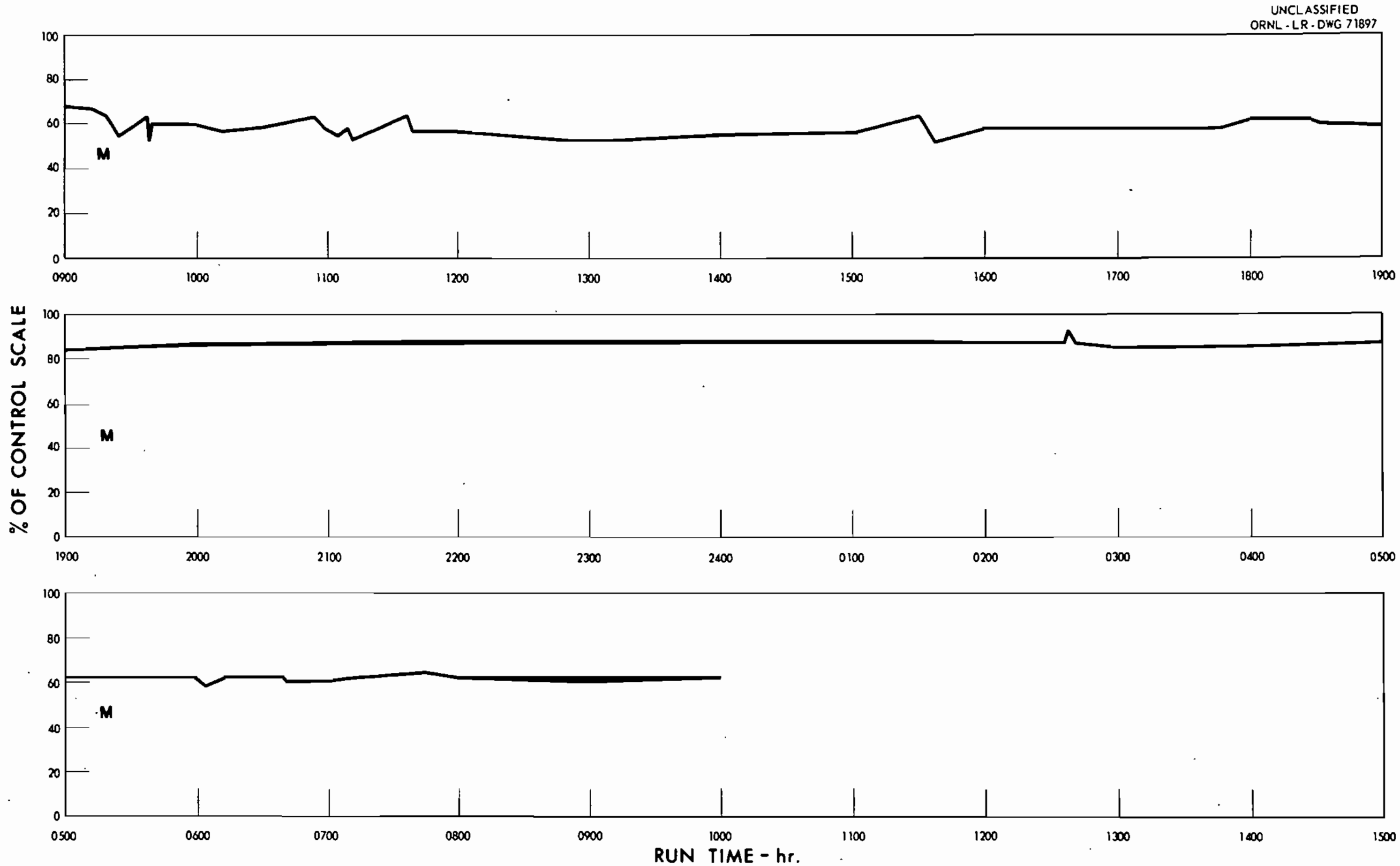
Fig. 17. Waste calcination & evaporation control - Test 45 - Evaporator Pressure.



Calciner Liquid Level - Batch - Purex

Limits 95-20% Controller Action Prob. 300 %
Reset 60 min

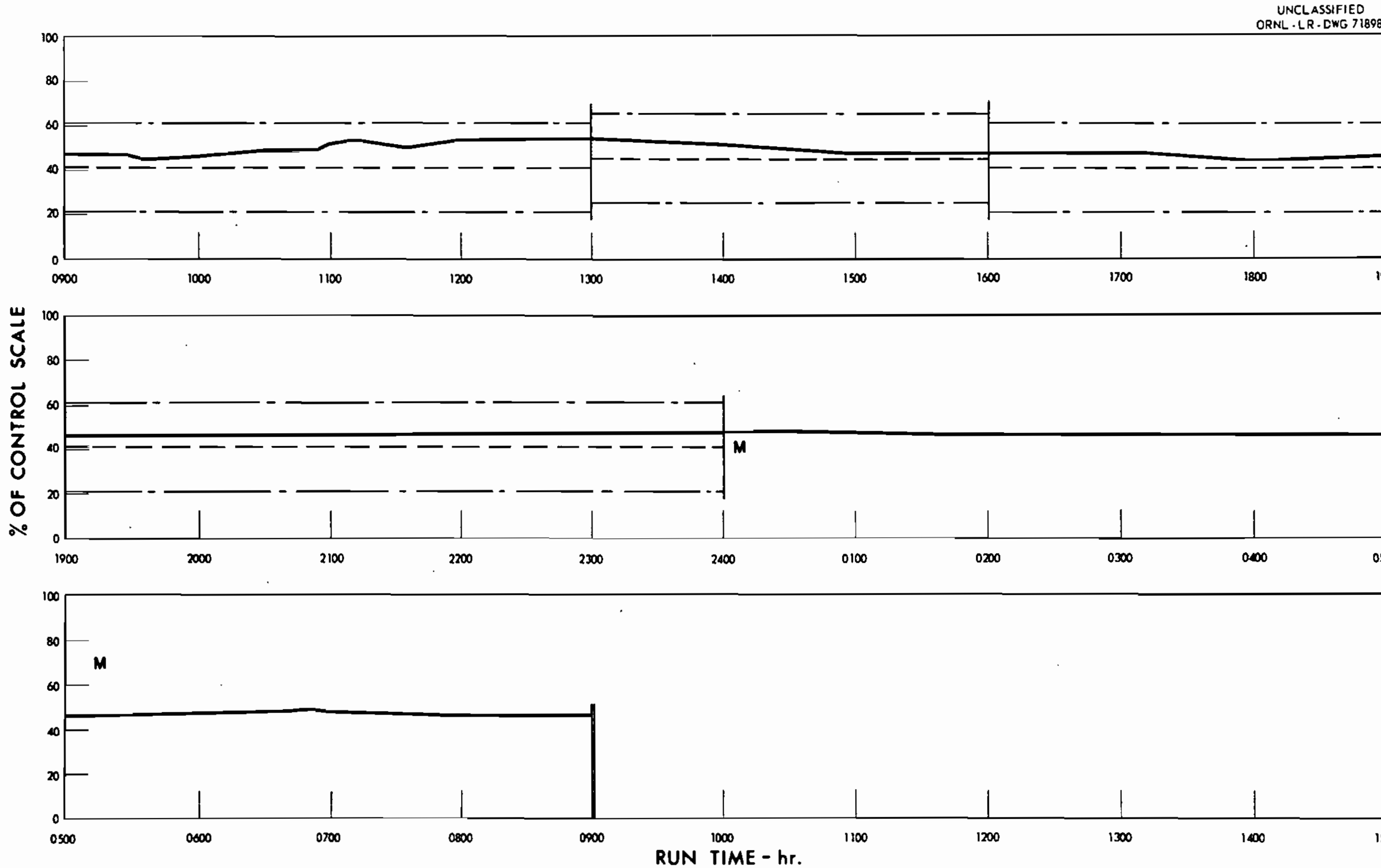
Fig. 17. Waste calcination & evaporation control - Test 46- Calciner Liquid Level.



Evaporator Density - Batch - Purex

Limits SP ± 5% Controller Action Prob. 25 %
Reset 5 min

Fig. 17. Waste calcination & evaporation control - Test 46 - Evaporator Density.

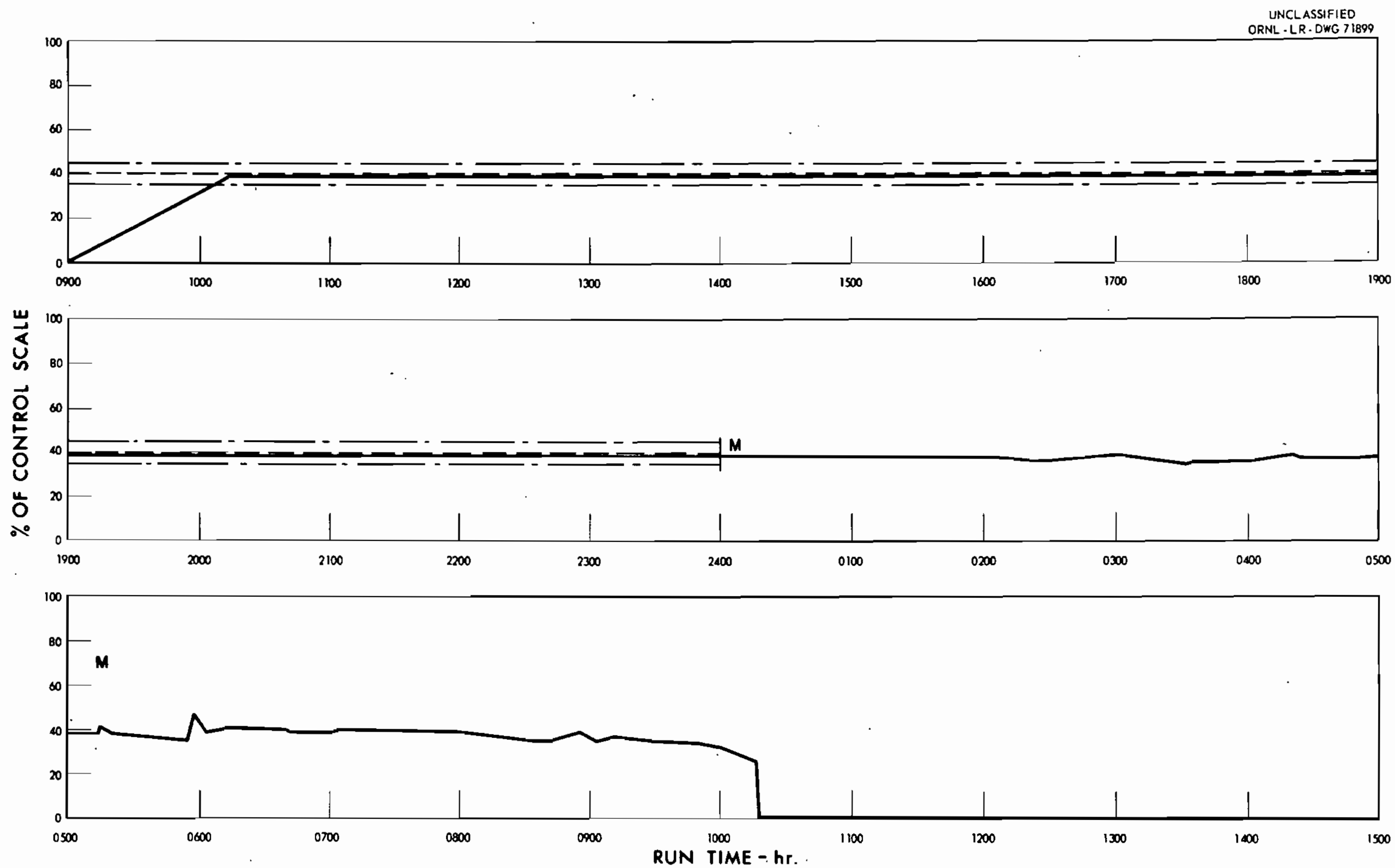


Evaporator Liquid Level - Batch - Purex

Limits SP ±20% Contraller Action Prob. 50 %

Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 46- Evaporator Liquid Level.

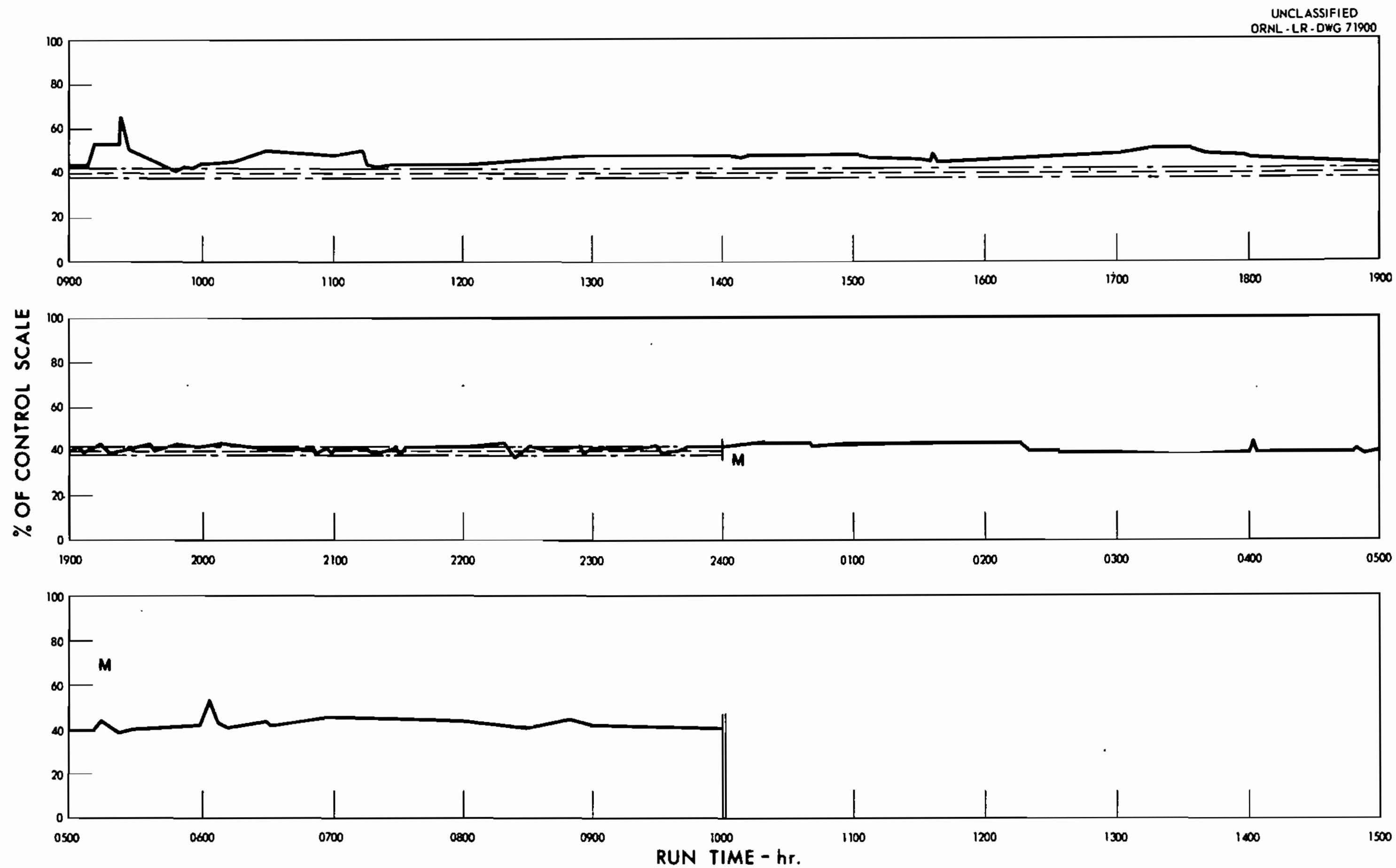


Evaporator Temperature - Batch - Purex

Limits SP ± 5% Controller Action Prob. 60 %

Reset 9 min

Fig. 17. Waste calcination & evaporation control - Test 46 - Evaporator Temperature.

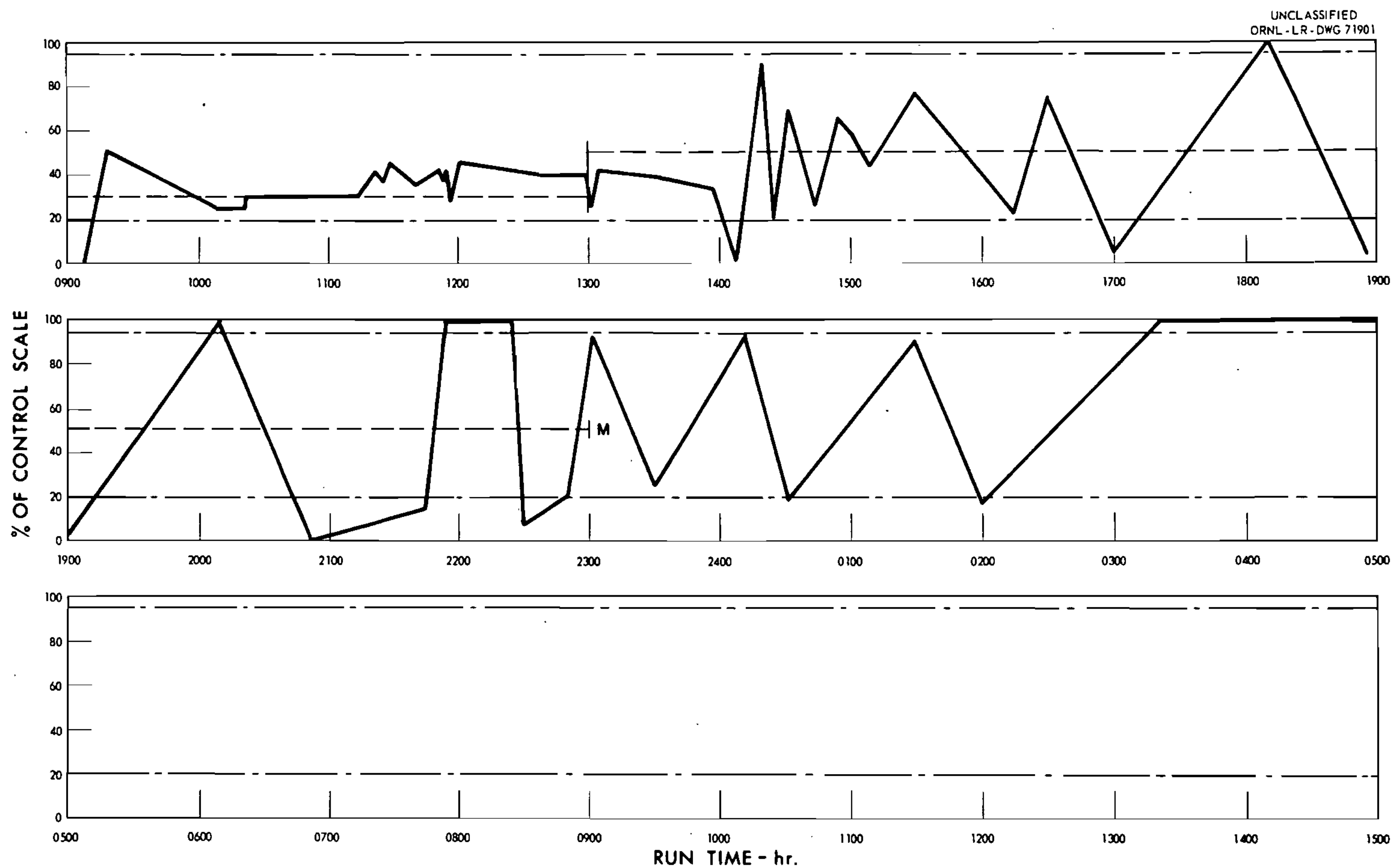


Evaporator Pressure - Batch - Purex

Limits SP ± 2% Controller Action Prob. 20 %

Reset 3 min

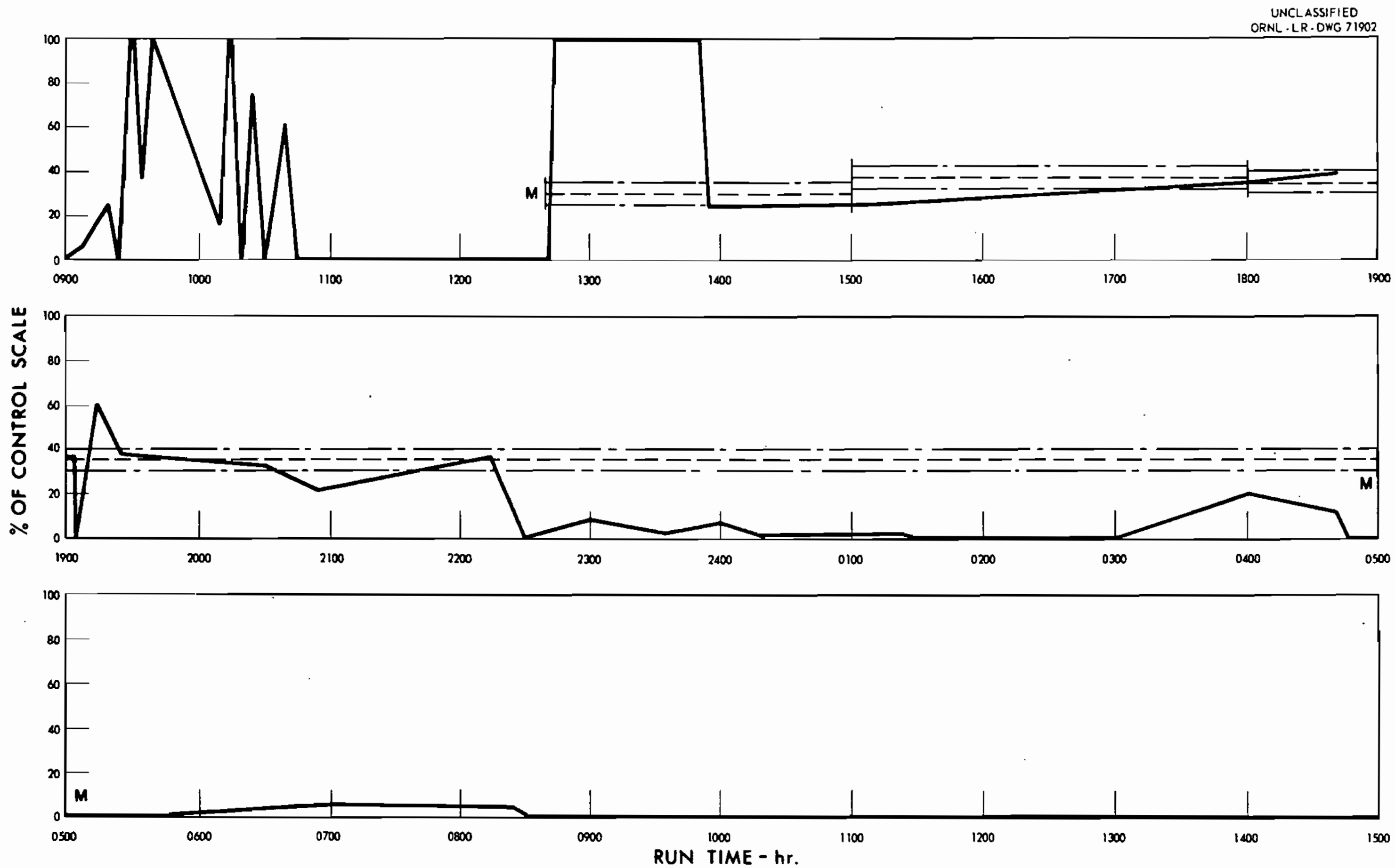
Fig. 17. Waste calcination & evaporation control - Test 46 - Evaporator Pressure.



Calciner Liquid Level - Continuous - TBP-25

Limits 95-20% Controller Action Prob. 200 %
Reset 40 min

Fig. 17. Waste calcination & evaporation control - Test 47 - Calciner Liquid Level.

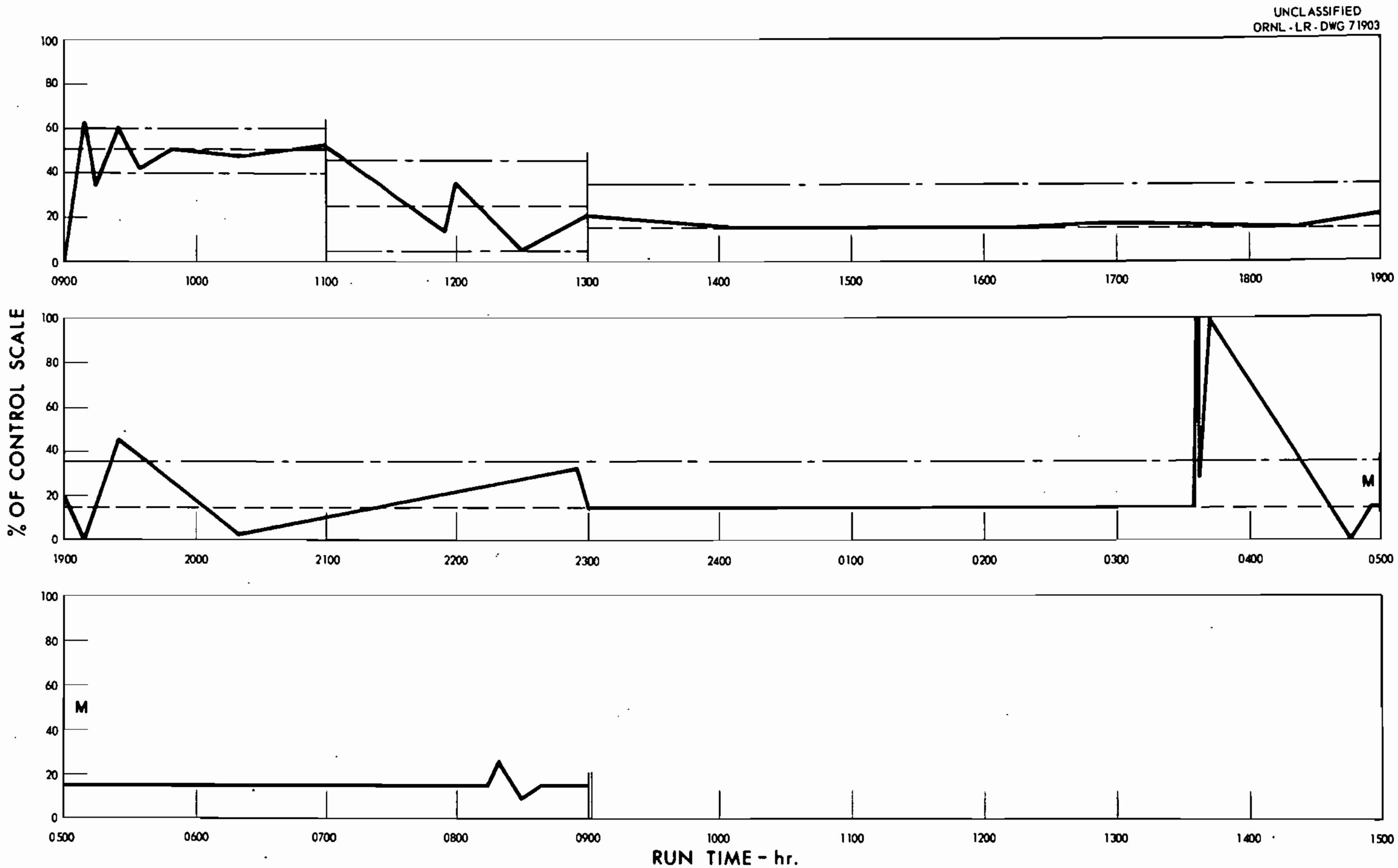


Evaporator Density - Continuous - TBP-25

Limits SP ±5% Controller Action Prob. 40%

Reset 9 min

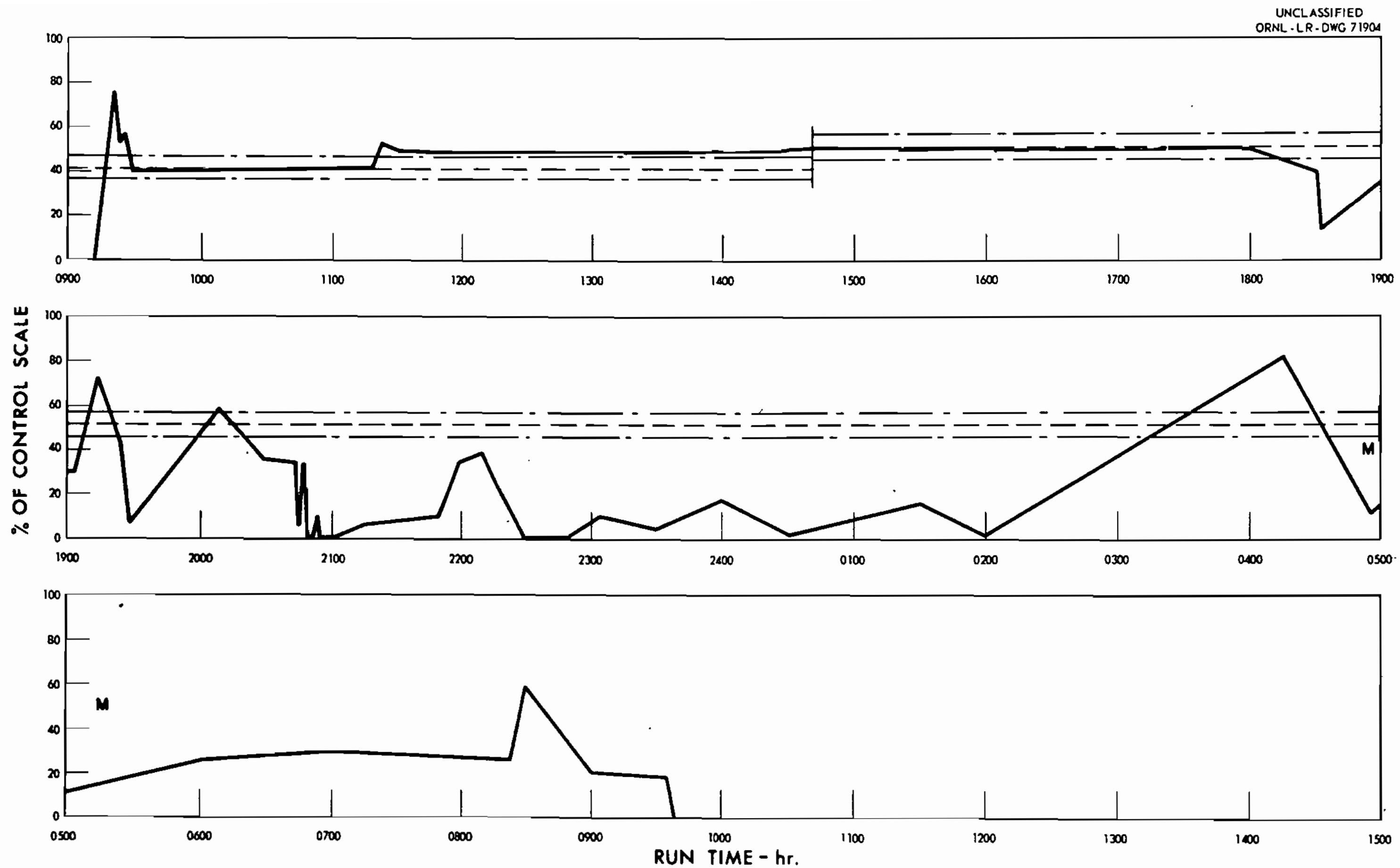
Fig. 17. Waste calcination & evaporation control - Test 47 - Evaporator Density.



Evaporator Liquid Level - Continuous - TBP-25

Limits SP ±20% Controller Action Prob. 25 %
Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 47 - Evaporator Liquid Level.

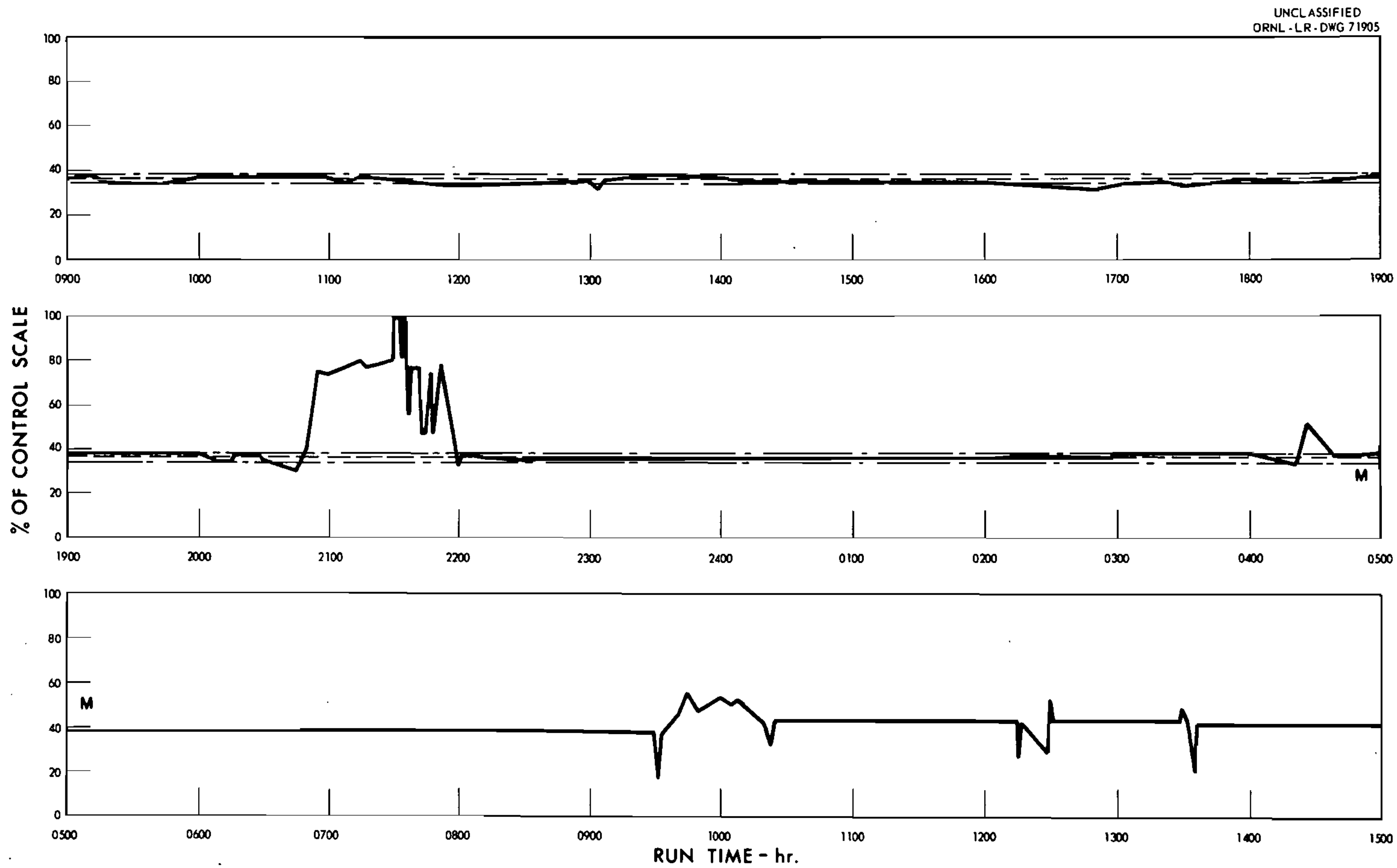


Evaporator Temperature - Continuous - TBP-25

Limits SP ±5% Controller Action Prob. 60 %

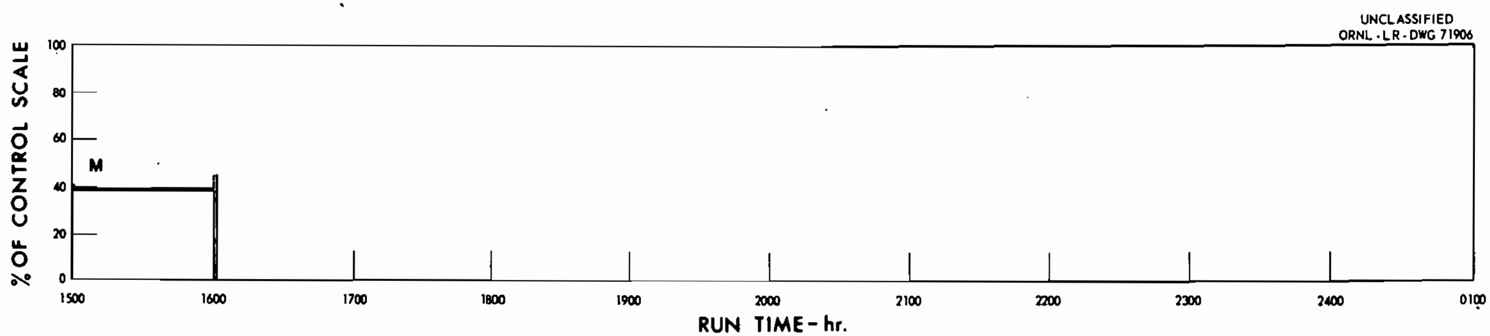
Reset 8 min

Fig. 17. Waste calcination & evaporation control - Test 47 - Evaporator Temperature.



Evaporator Pressure - Continuous - TBP - 25
Limits SP ± 2% Controller Action Prob. 20 %
Reset 0.3 min

Fig. 17. Waste calcination & evaporation control - Test 47 - Evaporator Pressure.

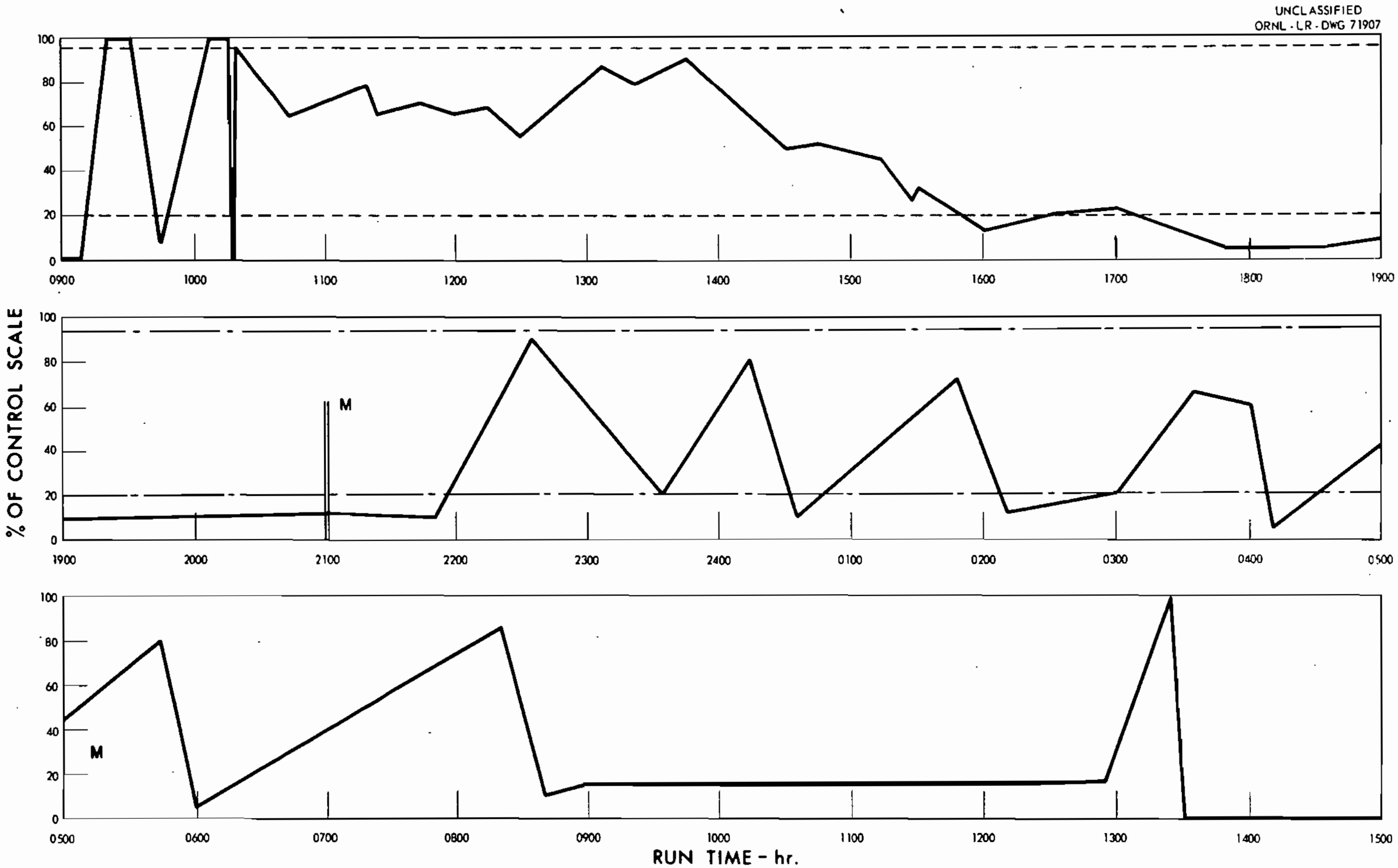


Evaporator Pressure - Continuous - TBP-25

Limits SP ± 2% Controller Action Prob. 20 %

Reset 0.3 min

Fig. 17. Waste calcination & evaporation control - Test 47 - Evaporator Pressure. (Cont'd.)

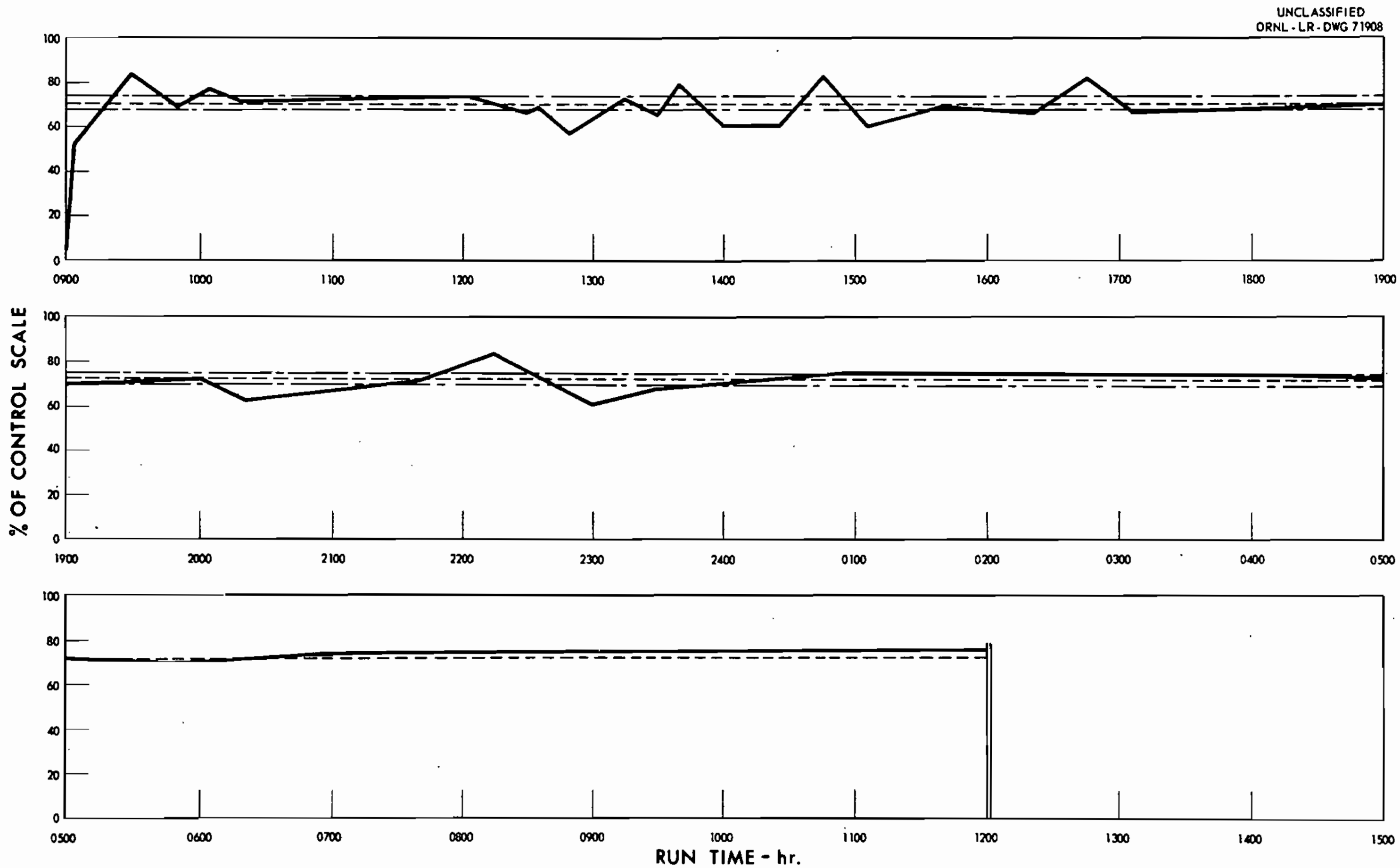


Calciner Liquid Level - Continuous - TBP - 25

Limits 95-20% Controller Action Prob. 300 %

Reset 0 min

Fig. 17. Waste calcination & evaporation control - Test 49- Calciner Liquid Level.

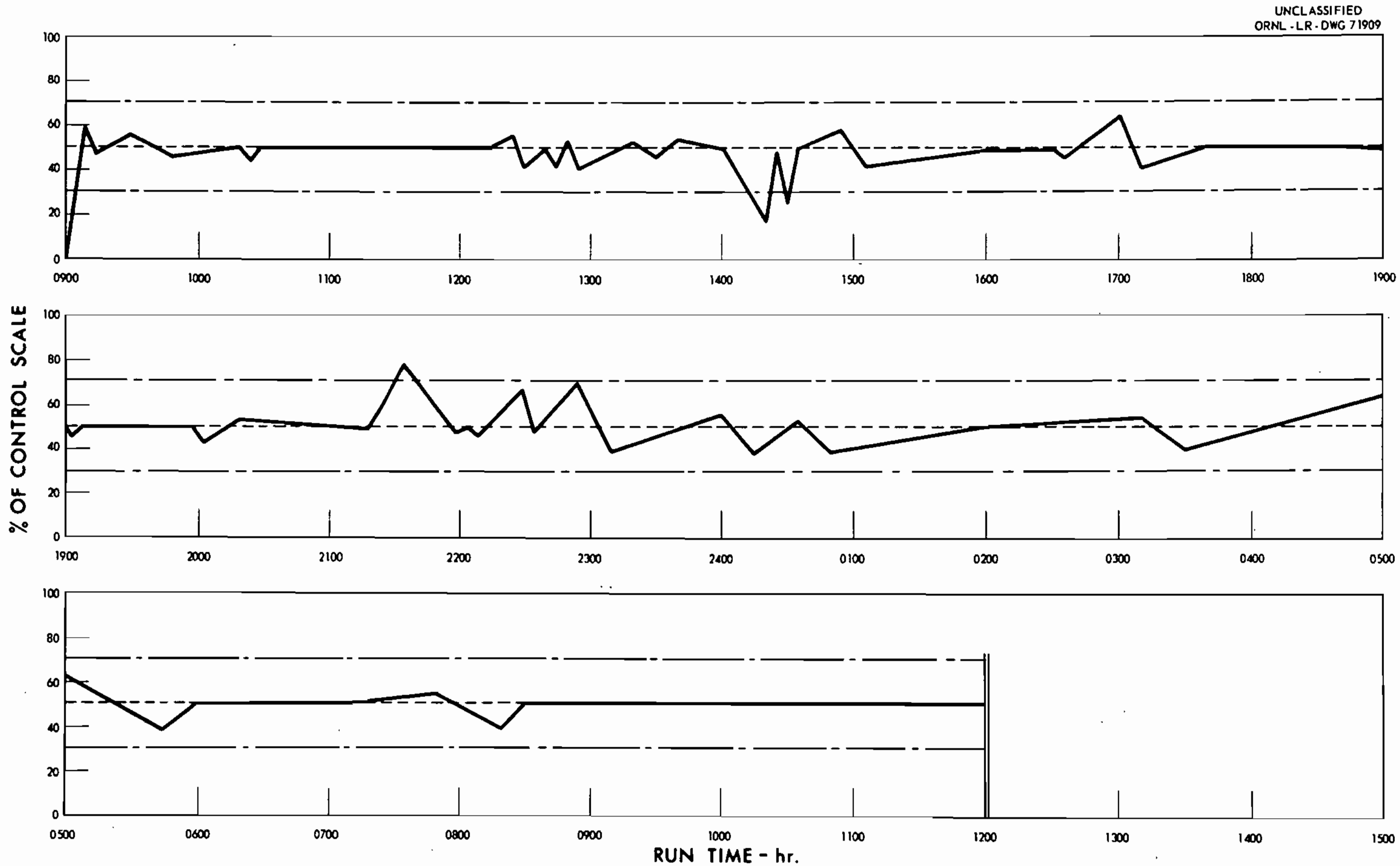


Evaporator Density - Continuous - TBP - 25

Limits SP ±5% Controller Action Prob. 200 %

Reset 5 min

Fig. 17. Waste calcination & evaporation control - Test 49 - Evaporator Density.

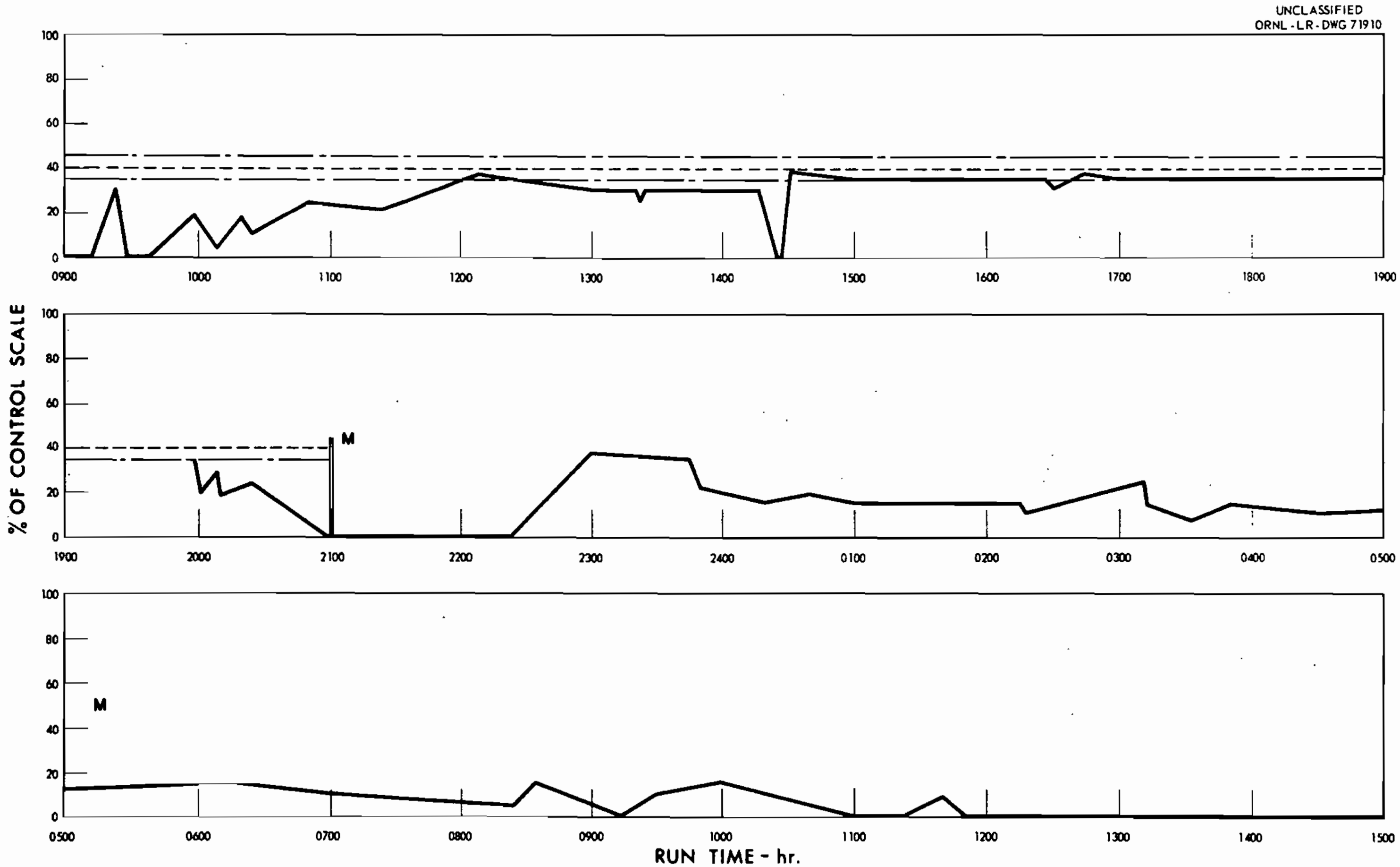


Evaporator Liquid Level - Continuous - TBP - 25

Limits SP ±20% Controller Action Prob. 25 %

Reset 10 min

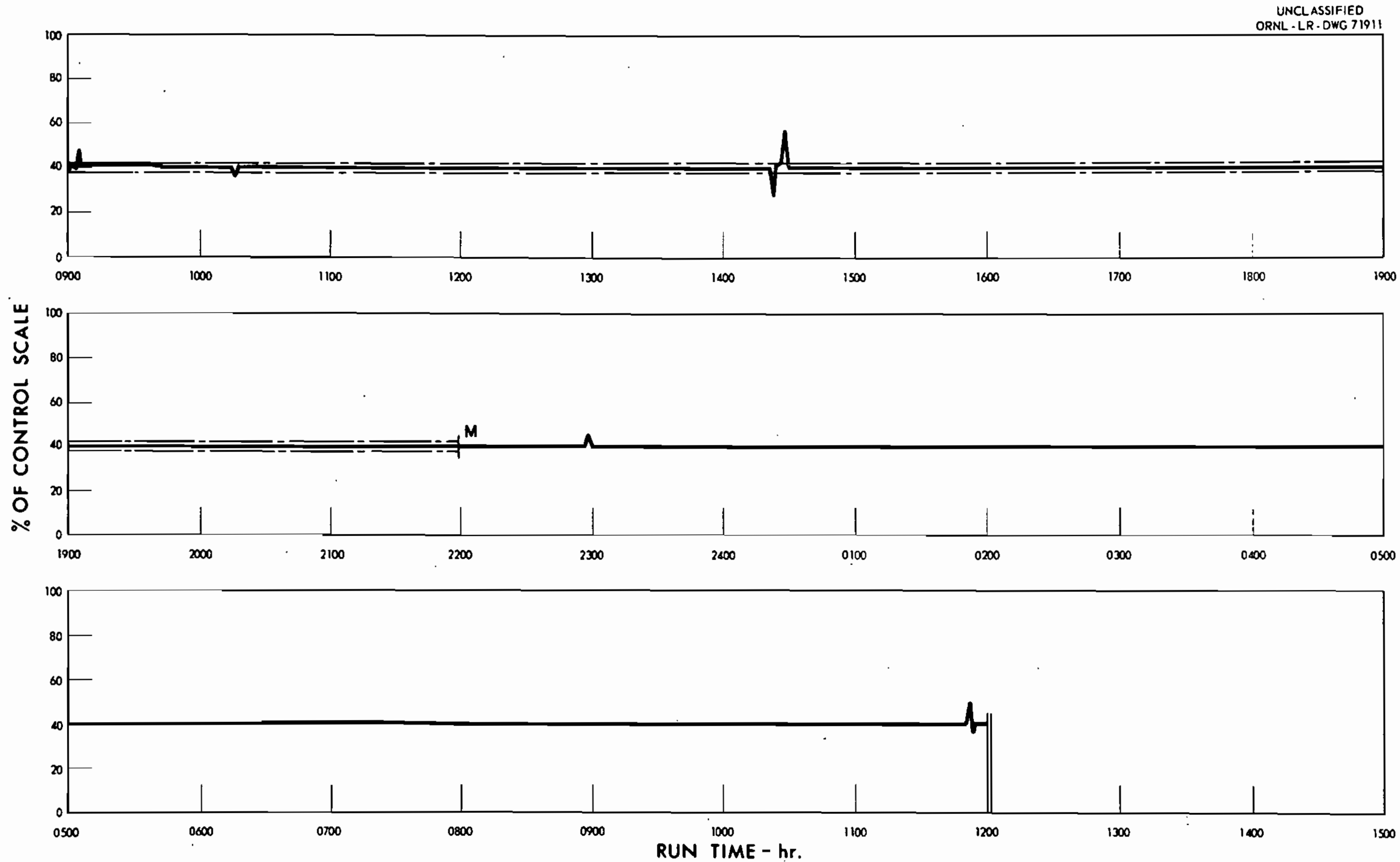
Fig. 17. Waste calcination & evaporation control - Test 49 - Evaporator Liquid Level.



Evaporator Temperature - Continuous - TBP - 25

Limits SP ±5% Controller Action Prob. 25 %
Reset 9 min

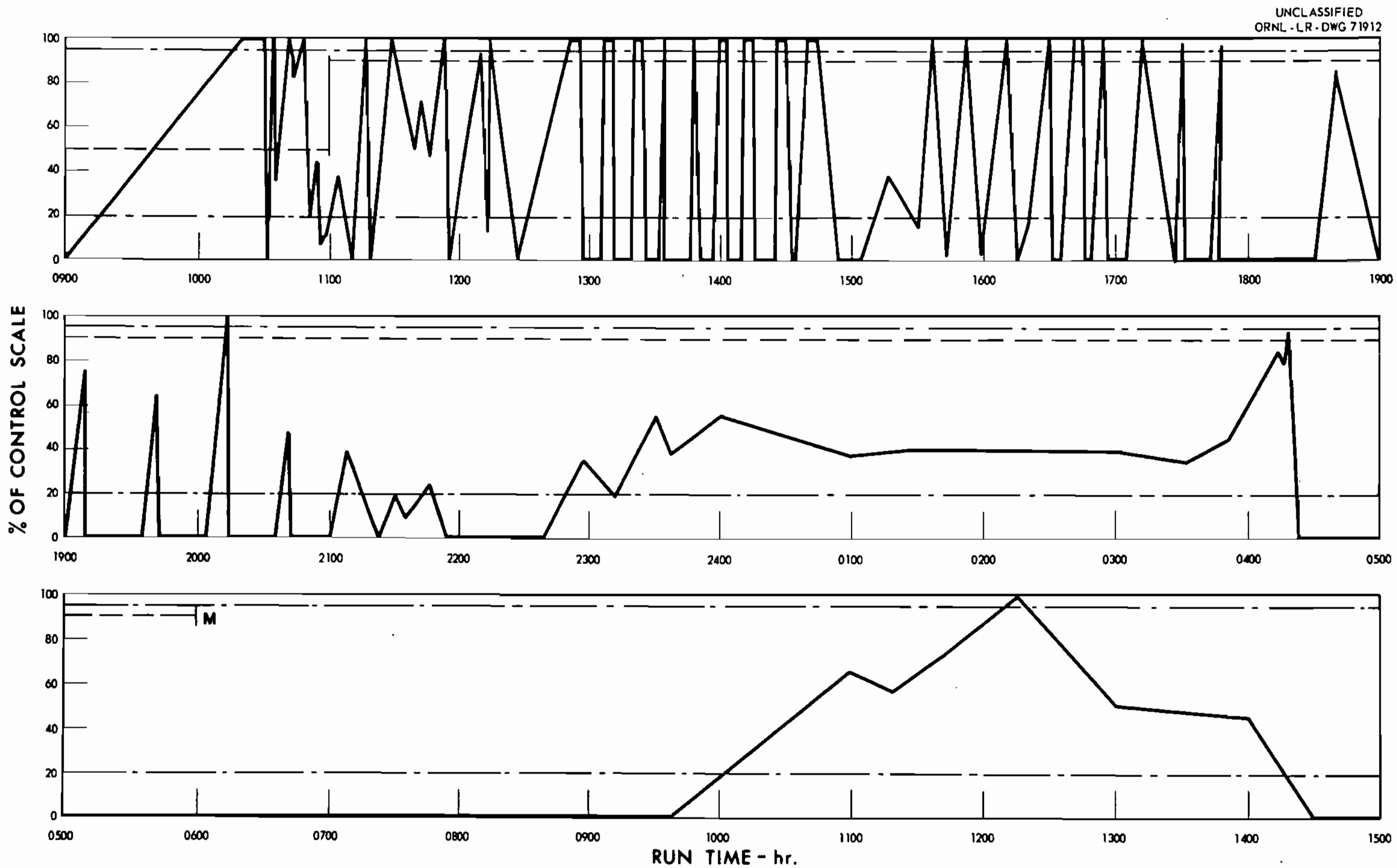
Fig. 17. Waste calcination & evaporation control - Test 49 - Evaporator Temperature.



Evaporator Pressure - Continuous - TBP-25

Limits SP ± 2% Controller Action Prob. 50 %
Reset 0.3 min

Fig. 17. Waste calcination & evaporation control - Test 49 - Evaporator Pressure.

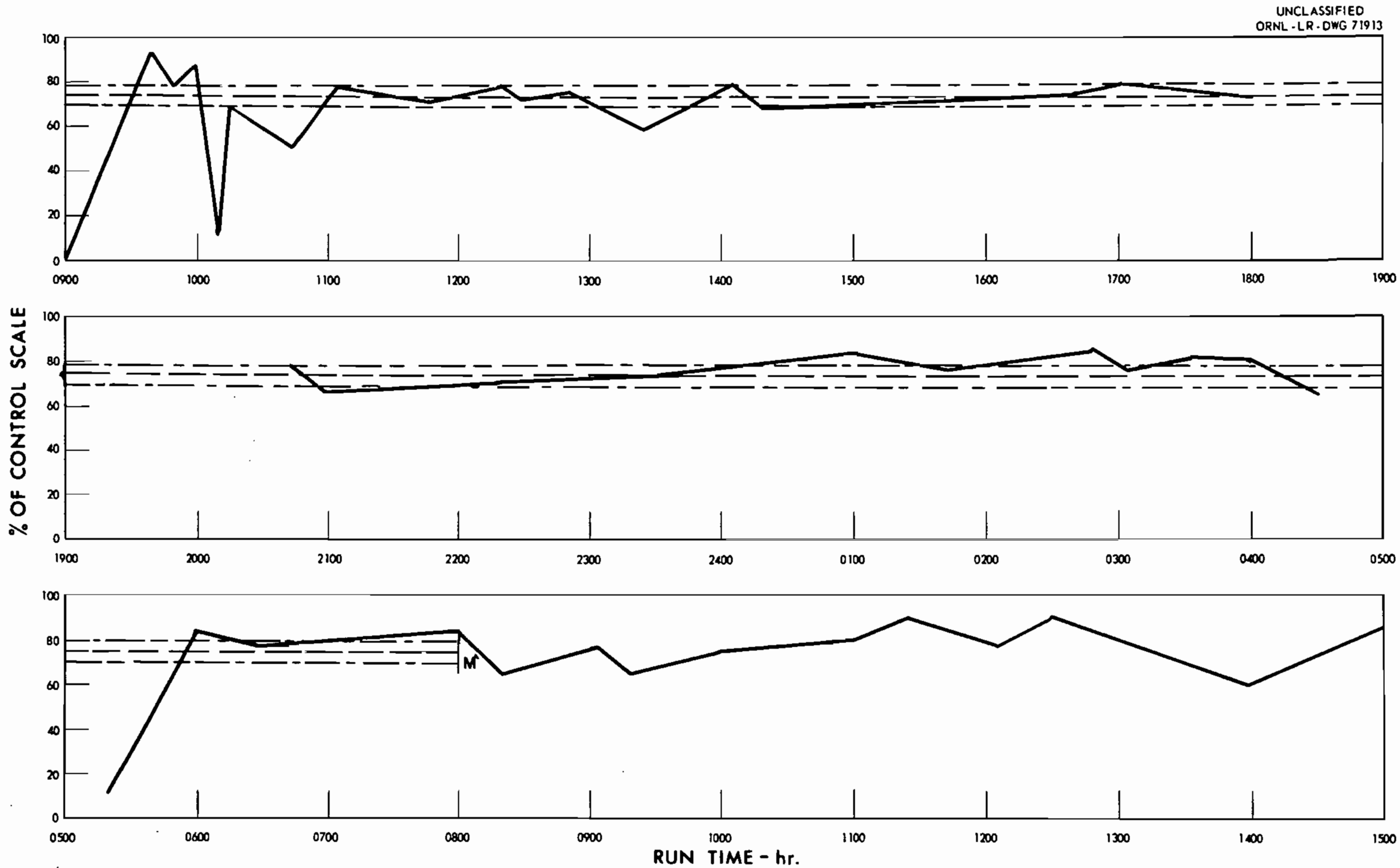


Calciner Liquid Level - Continuous - TBP-25

Limits 95-20% Controller Action Prob. 200 %

Reset 0 min

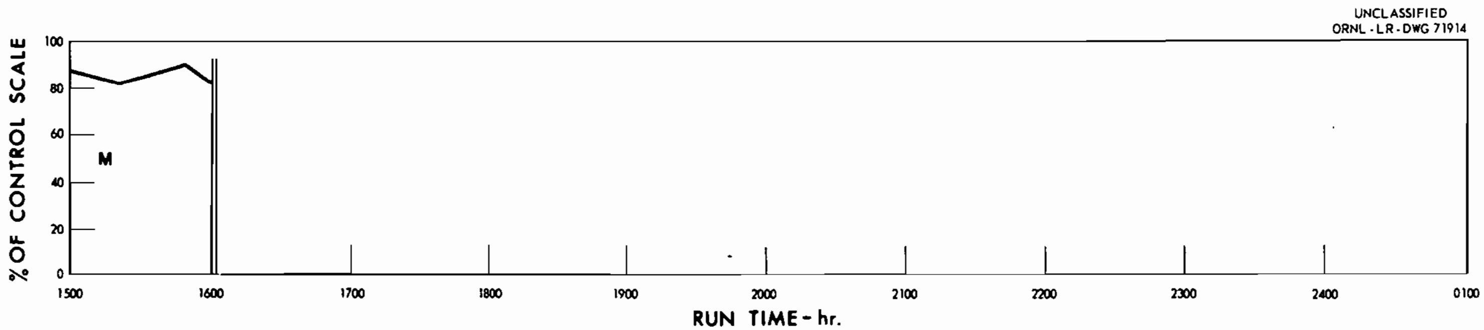
Fig. 17. Waste calcination & evaporation control - Test 50 - Calciner Liquid Level.



Evaporator Density - Continuous - TBP - 25

Limits SP ± 5% Controller Action Prob. 200 %
Reset 9 min

Fig. 17. Waste calcination & evaporation control - Test 50 - Evaporator Density.

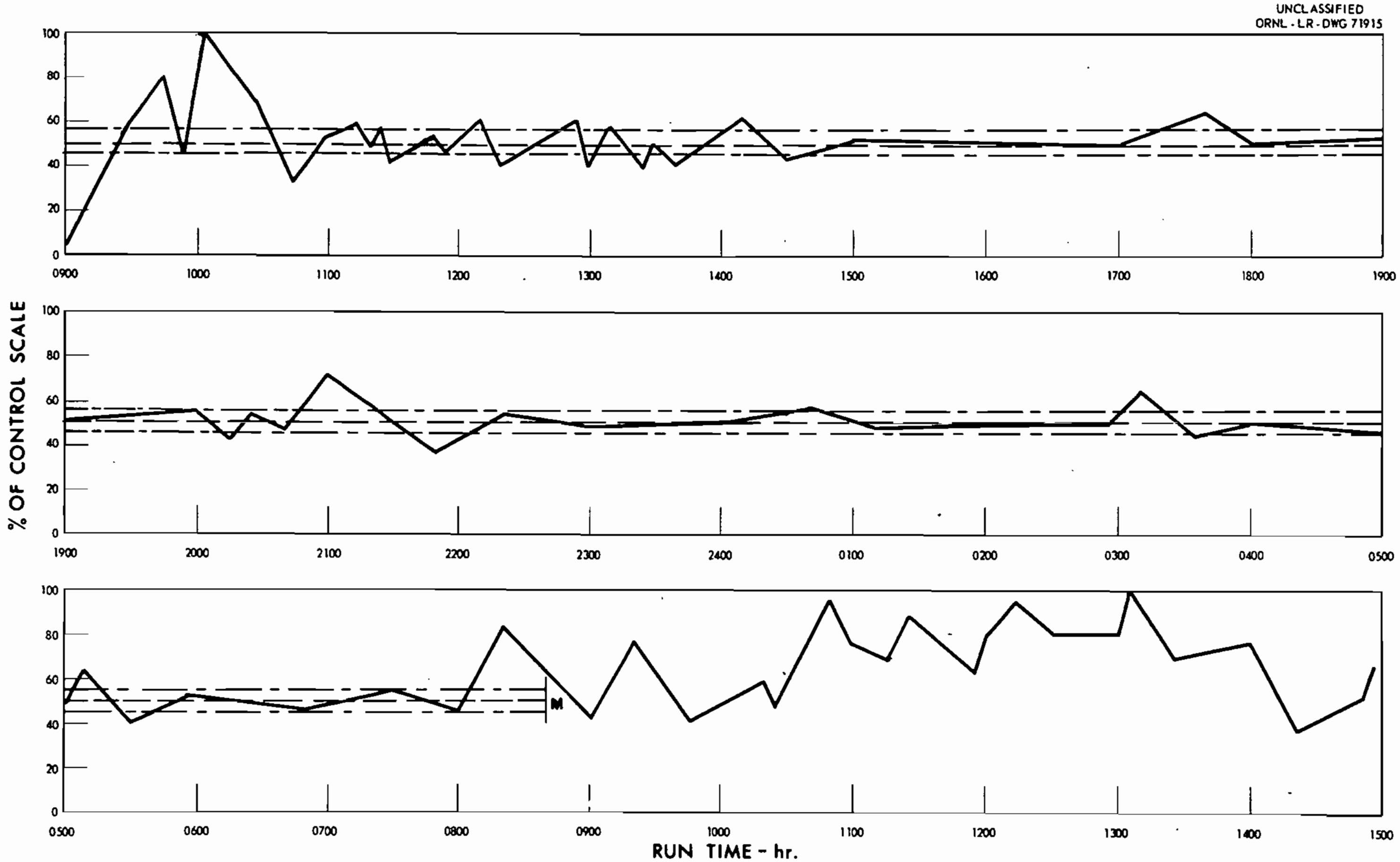


Evaporator Density - Continuous - TBP-25

Limits SP ±5% Controller Action Prob. 200 %

Reset 9 min

Fig. 17. Waste calcination & evaporation control - Test 50 - Evaporator Density. (Cont'd.)

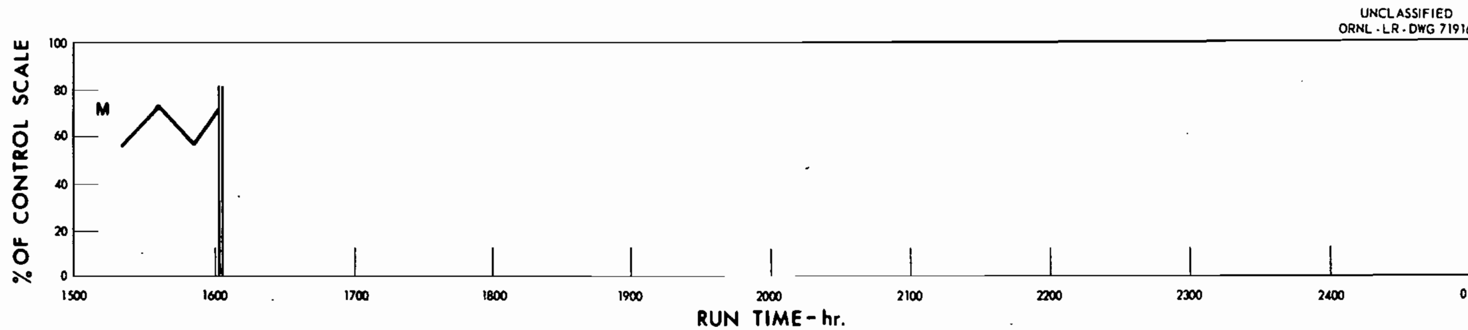


Evaporator Liquid Level - Continuous - TBP-25

Limits SP ±20% Controller Action Prob. 25 %

Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 50 - Evaporator Liquid Level.



Evaporator Liquid Level - Continuous - TBP - 25

Limits SP ±20% Controller Action Prob. 25 %
Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 50 - Evaporator Liquid Level. (Cont'd.)

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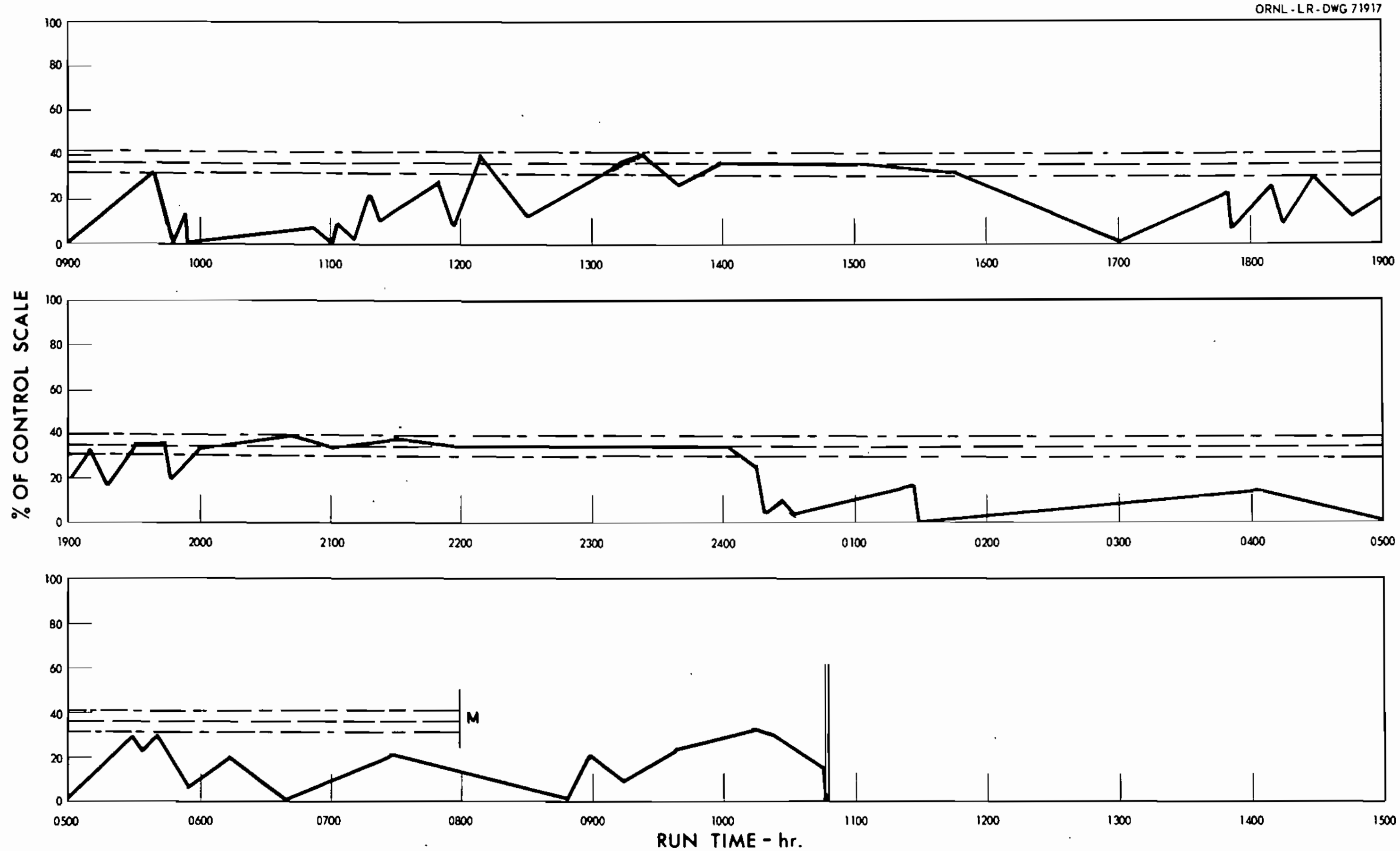
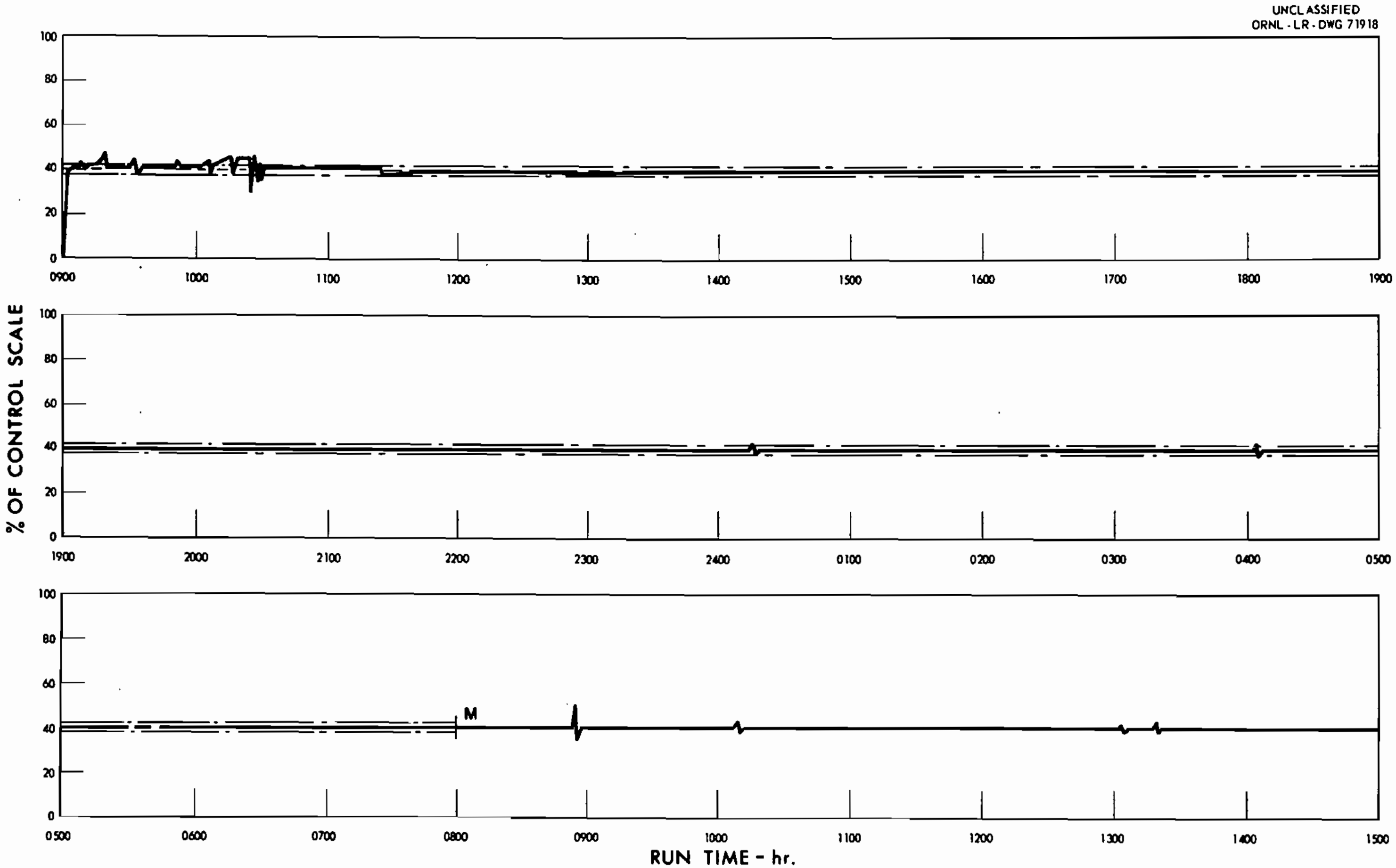


Evaporator Temperature - Continuous - TBP-25

Limits SP ±5% Controller Action Prob. 25%

Reset 10 min

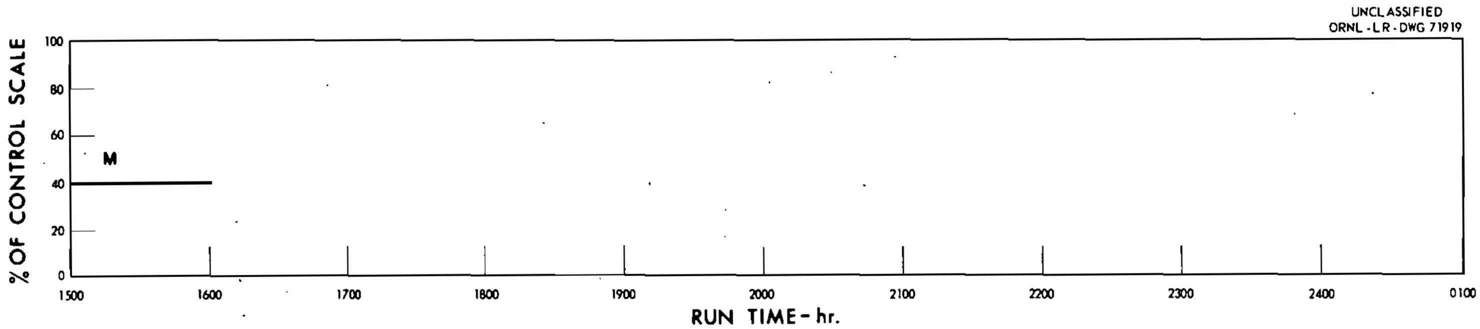
Fig. 17. Waste calcination & evaporation control - Test 50 - Evaporator Temperature.



Evaporator Pressure - Continuous - TBP-25

Limits SP ± 2% Controller Action Prob. 50 %
Reset 0.3 min

Fig. 17. Waste calcination & evaporation control - Test 50 - Evaporator Pressure.

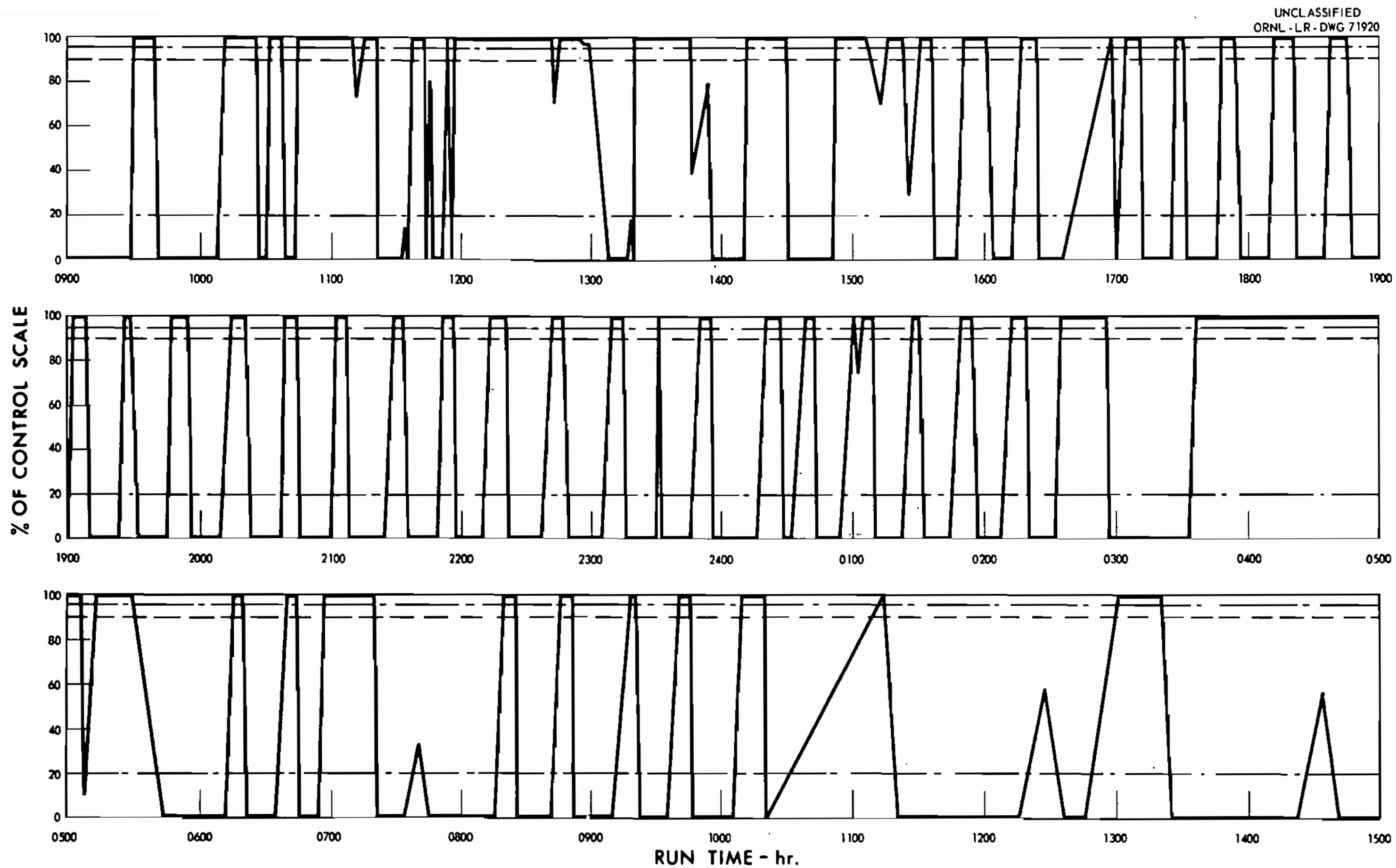


Evaporator Pressure - Continuous - TBP-25

Limits SP ± 2% Controller Action Prob. 50 %

Reset 0.3 min

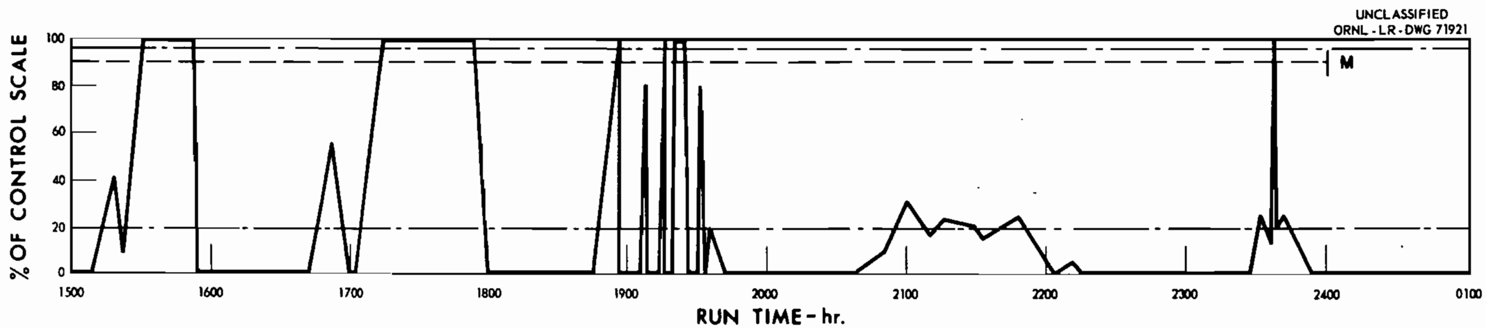
Fig. 17. Waste calcination & evaporation control - Test 50 - Evaporator Pressure.(Cont'd.)



Calciner Liquid Level - Batch - TBP-25

Limits 95-20% Controller Action Prob. 200 %
Reset 0 min

Fig. 17. Waste calcination & evaporation control - Test 51 - Calciner Liquid Level.

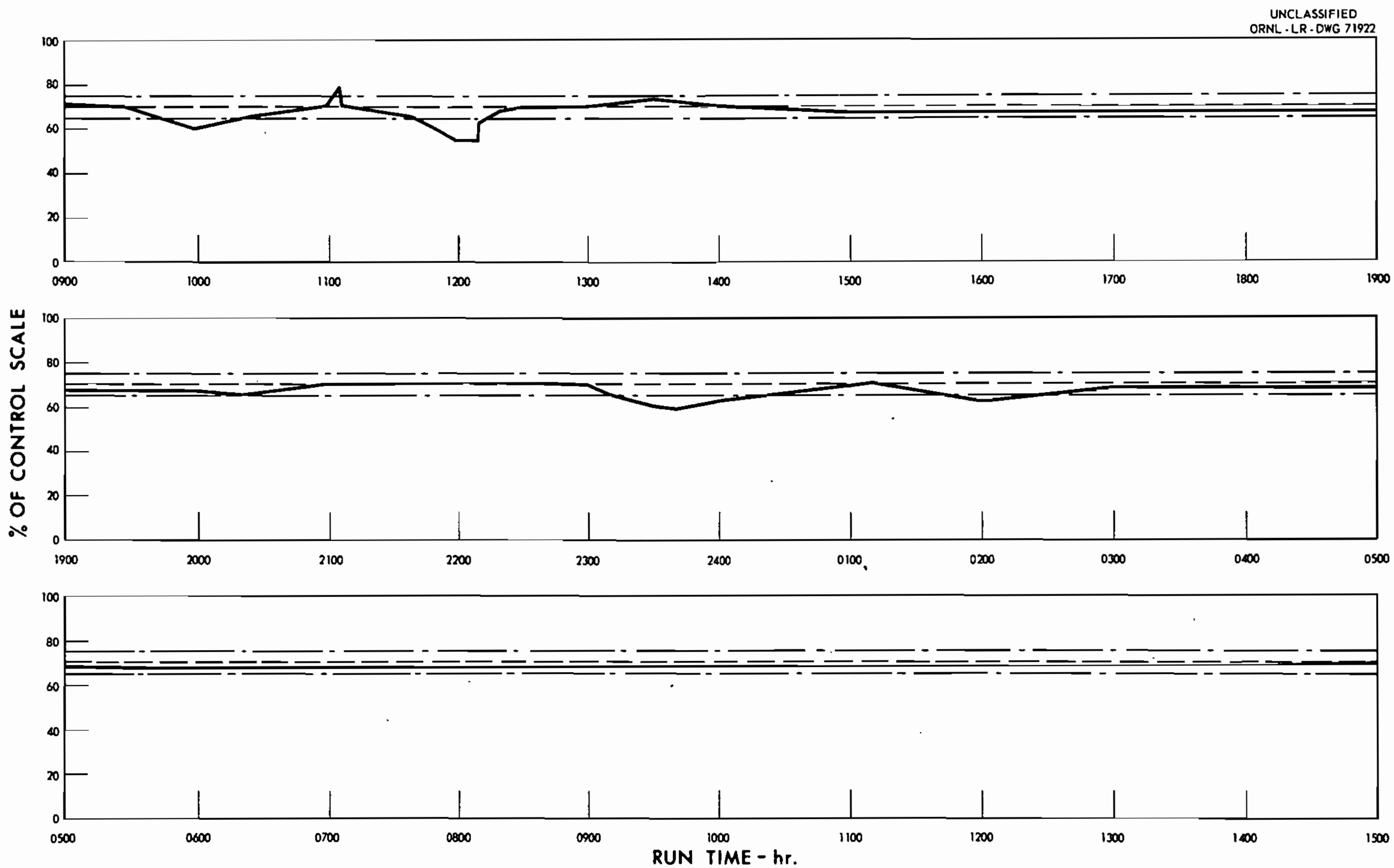


Calciner Liquid Level - Batch - TBP-25

Limits 95-20% Controller Action Prob. 200%

Reset 0 min

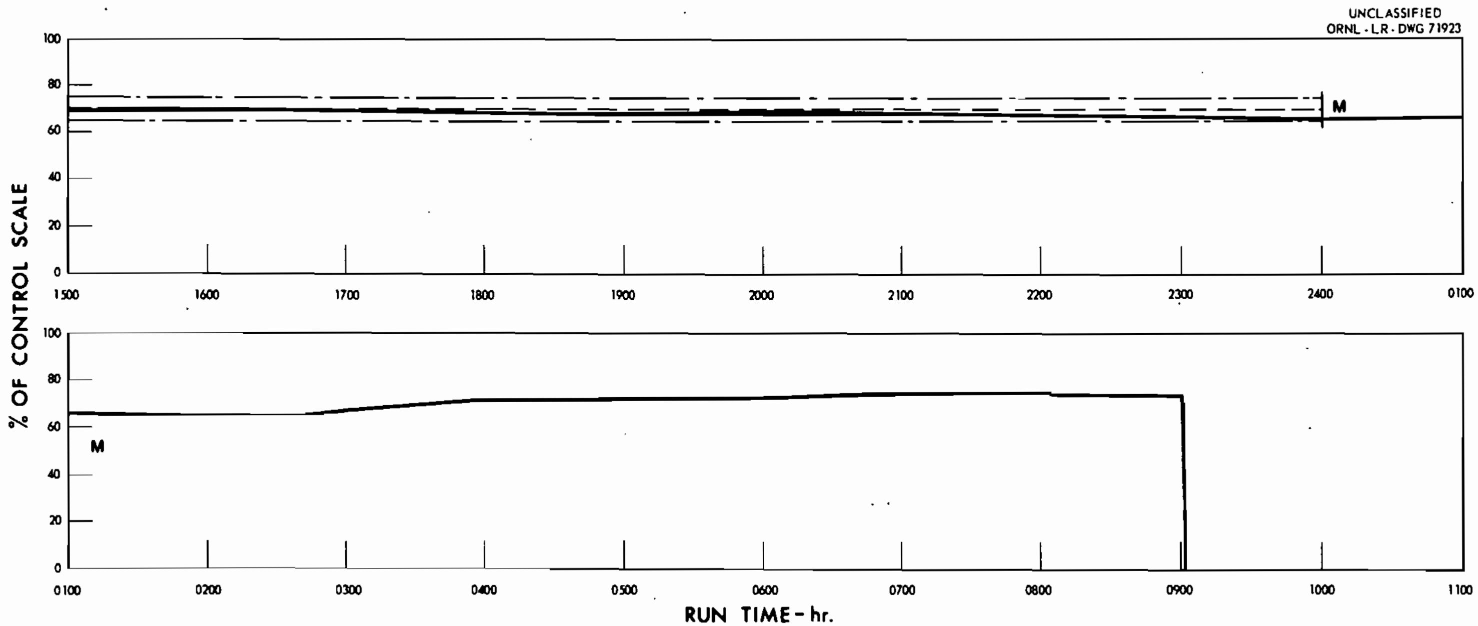
Fig. 17. Waste calcination & evaporation control - Test 51 - Calciner Liquid Level. (Cont'd.)



Evaporator Density - Batch - TBP-25

Limits SP ± 5% Controller Action Prob. 200 %
Reset 9 min

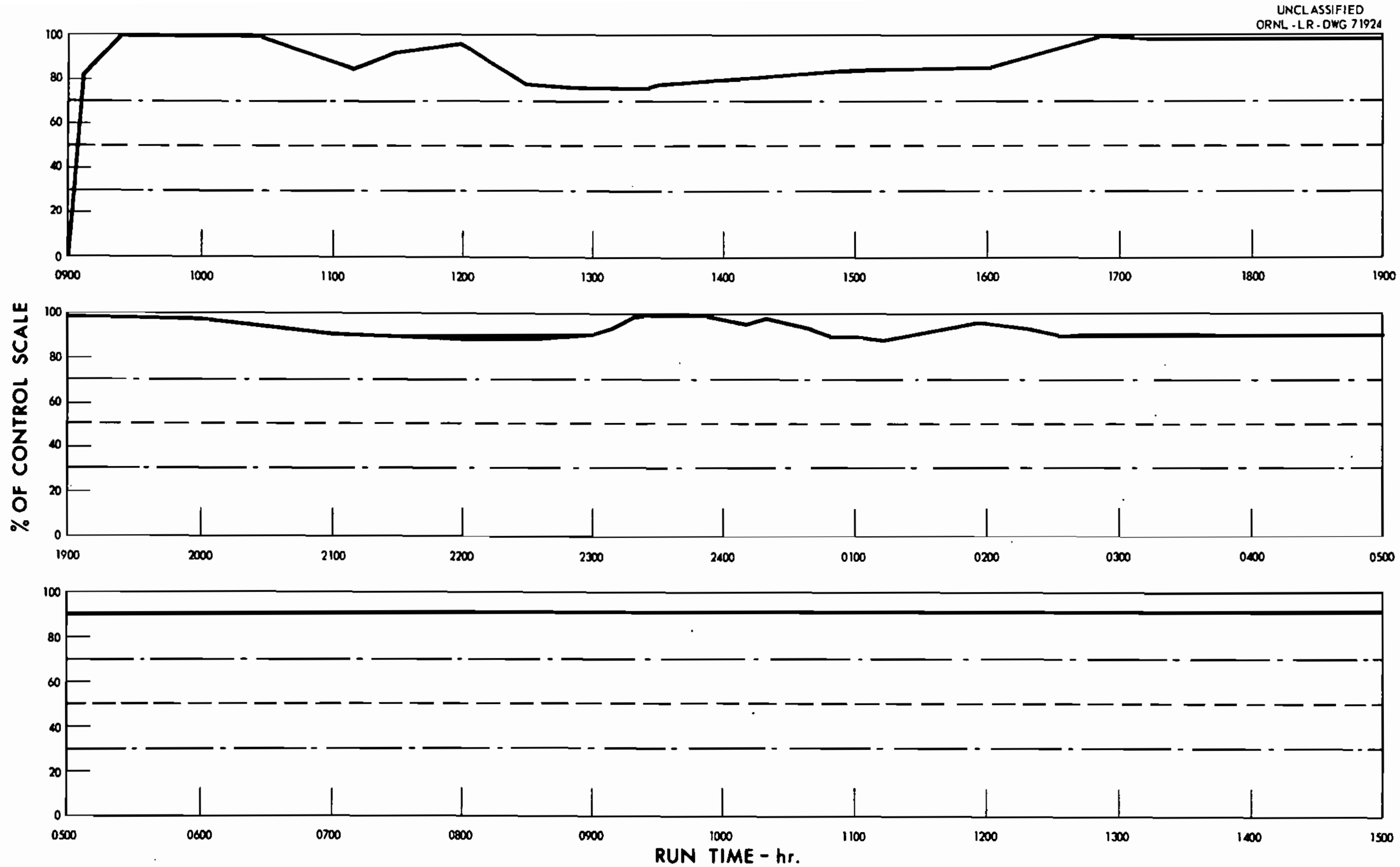
Fig. 17. Waste calcination & evaporation control - Test 51 - Evaporator Density.



Evaporator Density - Batch - TBP-25

Limits SP ±5% Controller Action Prob. 200 %
Reset 9 min

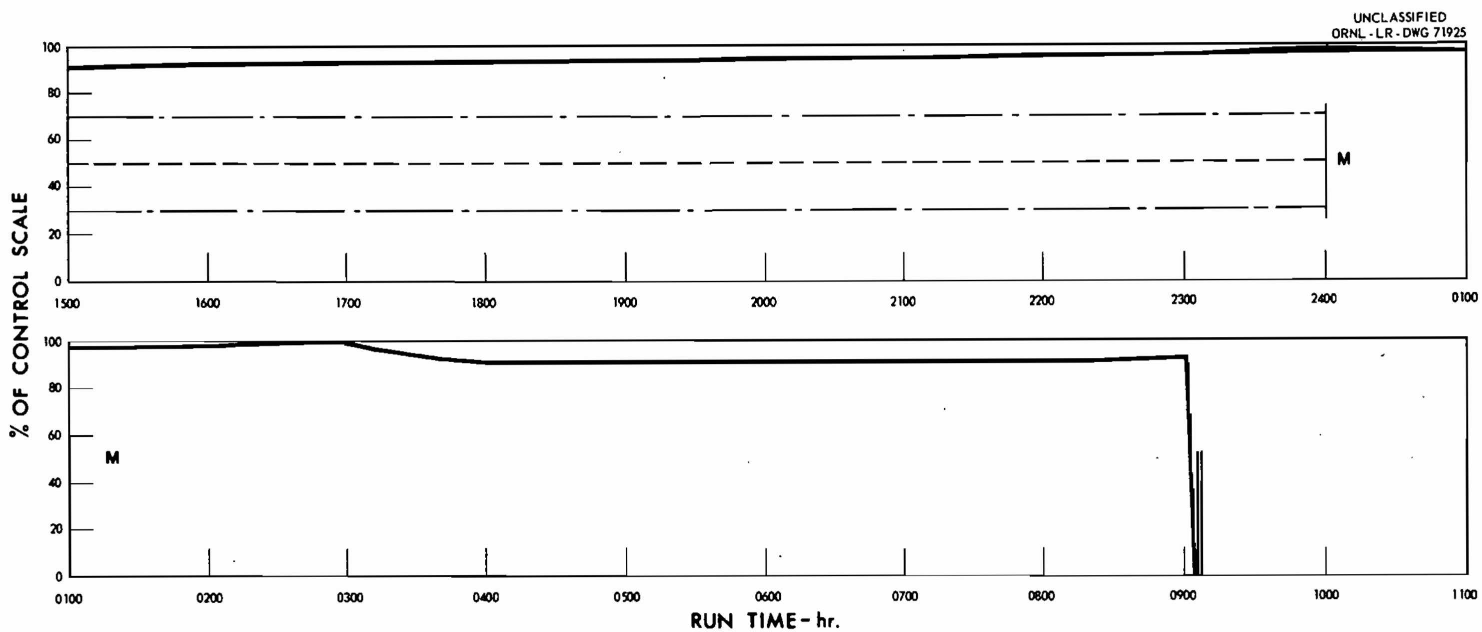
Fig. 17. Waste calcination & evaporation control - Test 51 - Evaporator Density. (Cont'd.)



Evaporator Liquid Level - Batch - TBP-25

Limits SP ±20% Controller Action Prob. 25%
Reset 10 min

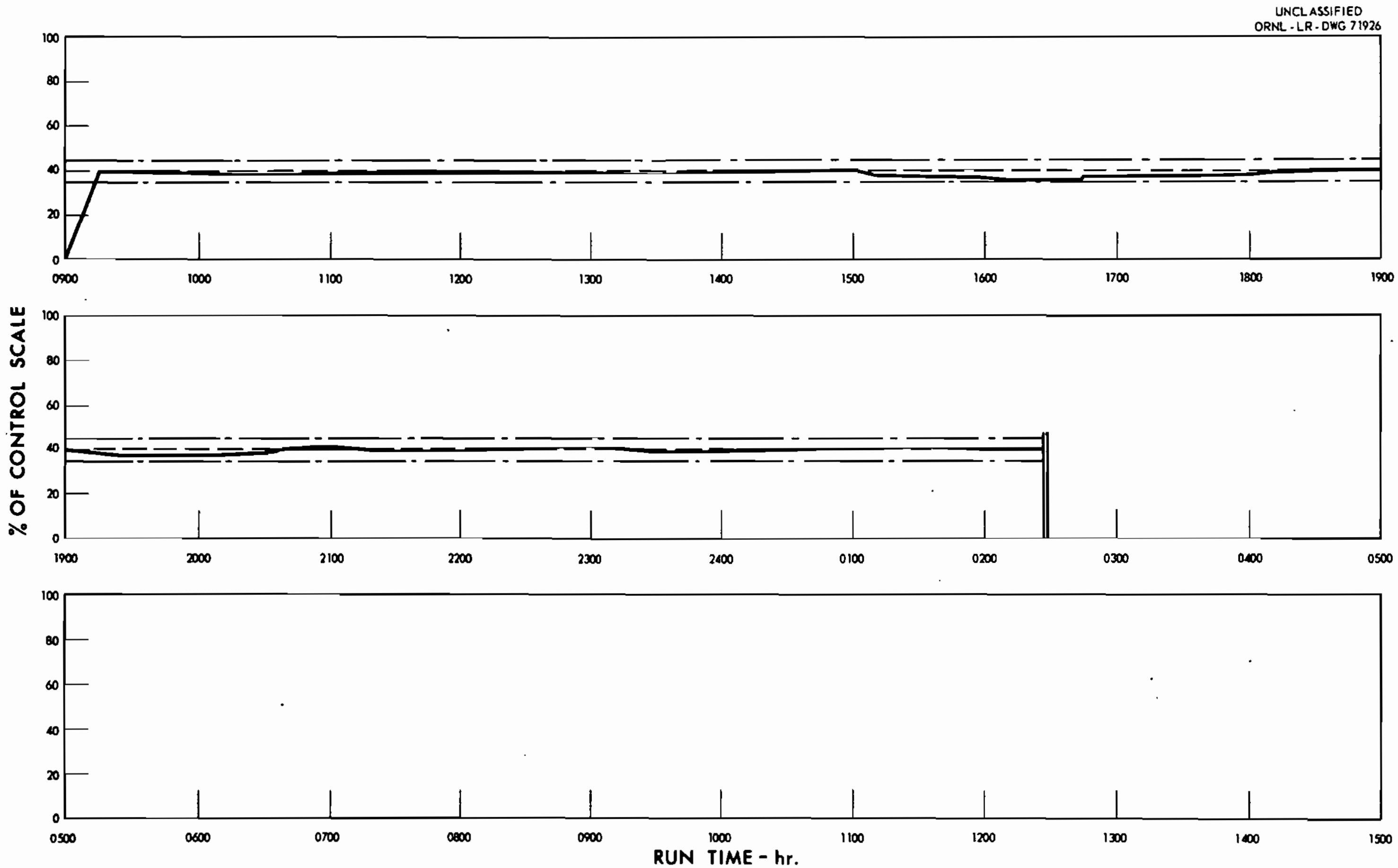
Fig. 17. Waste calcination & evaporation control - Test 51 - Evaporator Liquid Level.



Evaporator Liquid Level - Batch - TBP-25

Limits SP ±20% Controller Action Prob. 25 %
Reset 10 min

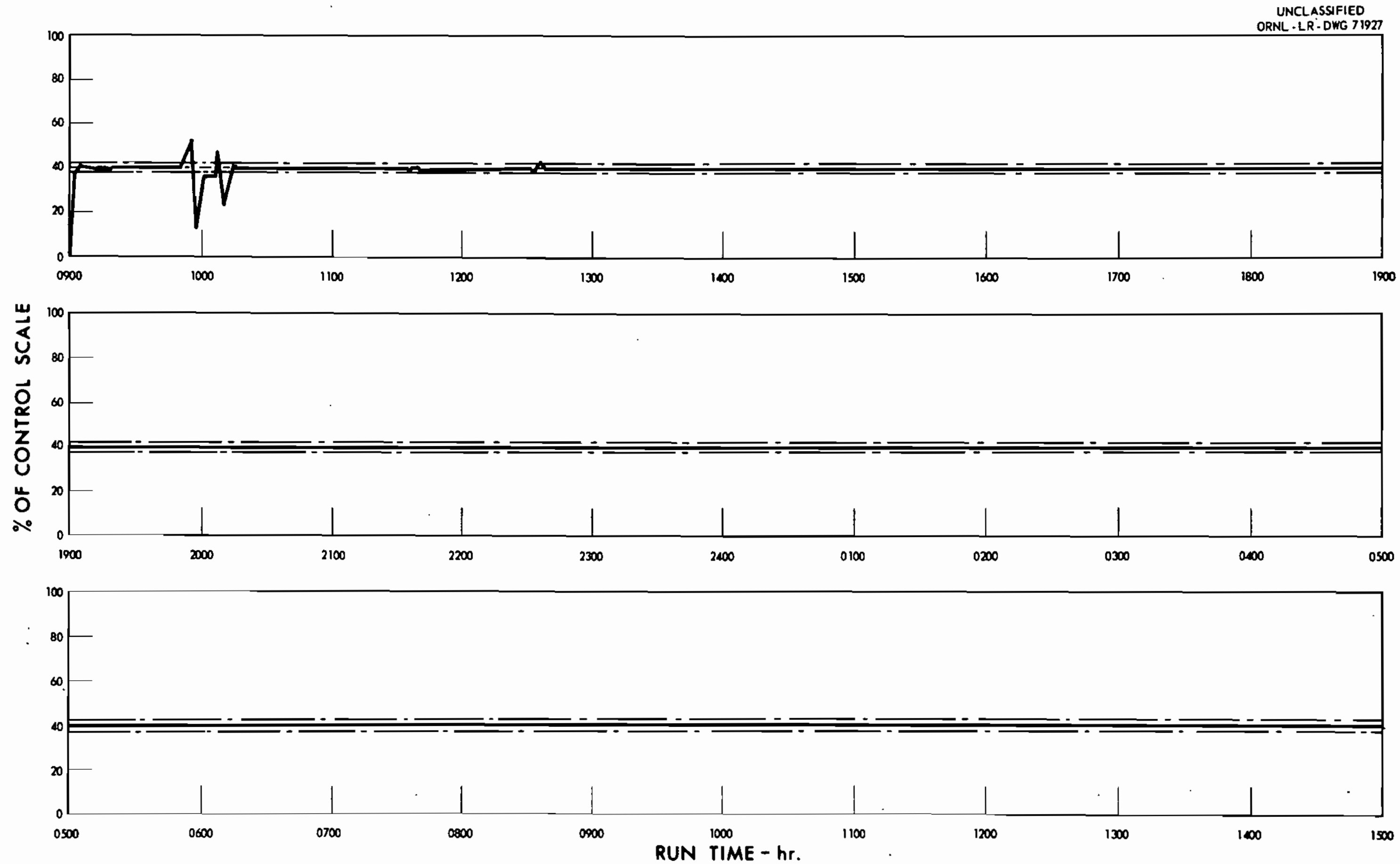
Fig. 17. Waste calcination & evaporation control - Test 51 - Evaporator Liquid Level. (Cont'd.)



Evaporator Temperature - Batch - TBP-25

Limits SP ± 5% Controller Action Prob. 25%
Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 51 - Evaporator Temperature.



Evaporator Pressure - Batch - TBP - 25

Limits SP ± 2% Controller Action Prob. 50 %

Reset 0.3 min

Fig. 17. Waste calcination & evaporation control - Test 51 - Evaporator Pressure.

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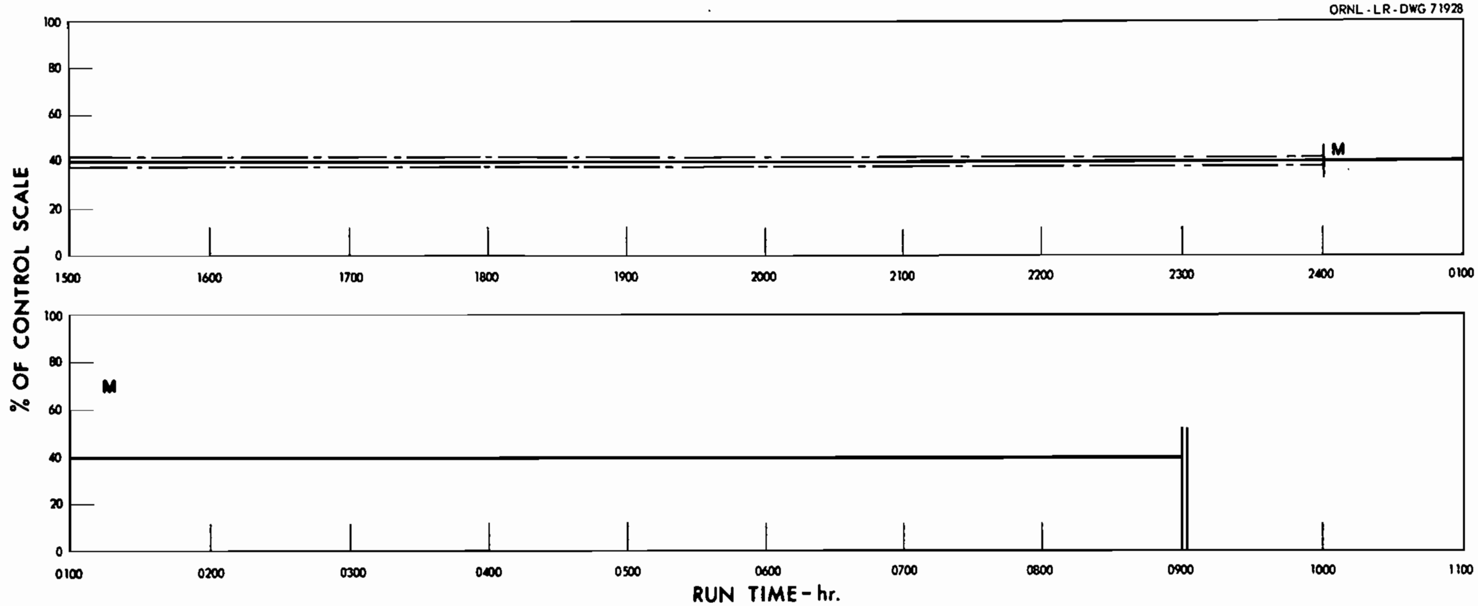
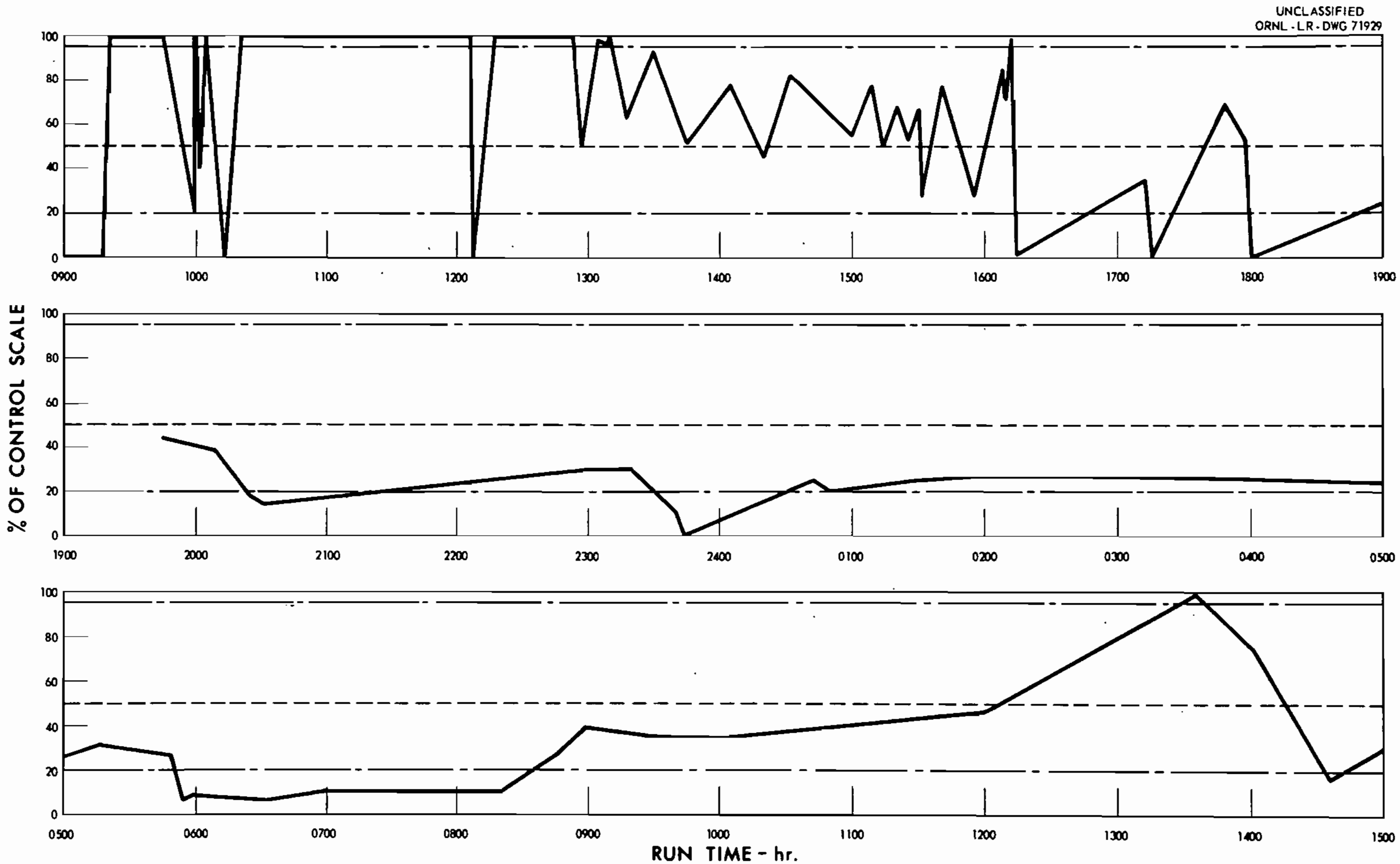


Evaporator Pressure - Batch - TBP-25

Limits SP ± 2% Controller Action Prob. 50 %
Reset 0.3 min

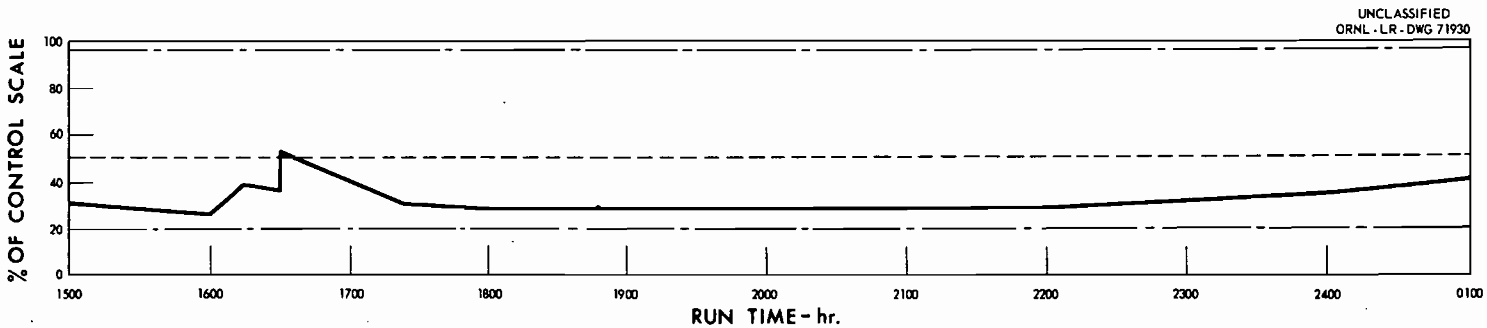
Fig. 17. Waste calcination & evaporation control - Test 51 - Evaporator Pressure. (Cont'd.)



Calciner Liquid Level - Batch - TBP-25

Limits 95-20% Controller Action Prob. 200 %
Reset 0 min

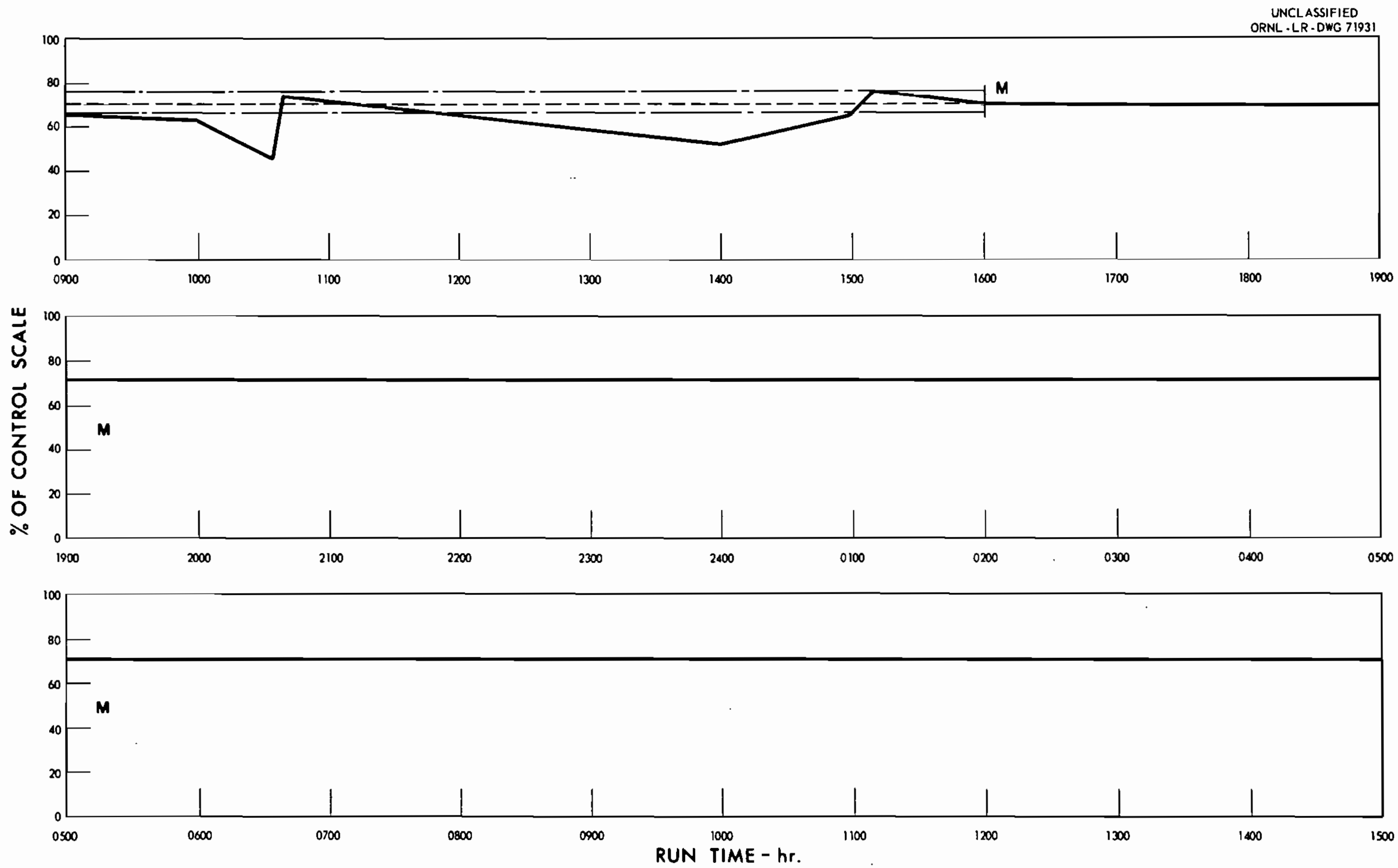
Fig. 17. Waste calcination & evaporation control - Test 52 - Calciner Liquid Level.



Calciner Liquid Level - Batch - TBP-25

Limits 95-20% Controller Action Prob. 200 %
Reset 0 min

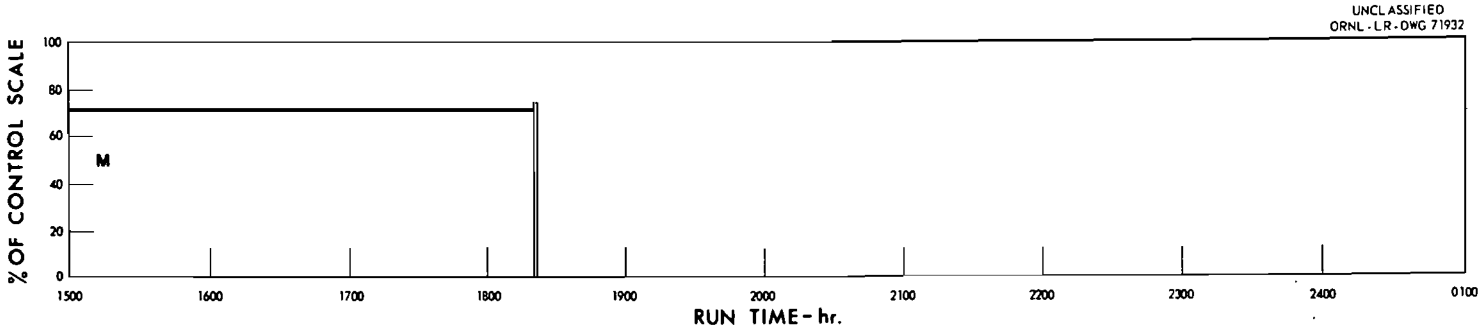
Fig. 17. Waste calcination & evaporation control - Test 52- Calciner Liquid Level. (Cont'd.)



Evaporator Density - Batch - TBP - 25

Limits SP ±5% Controller Action Prob. 200 %
Reset 10 min

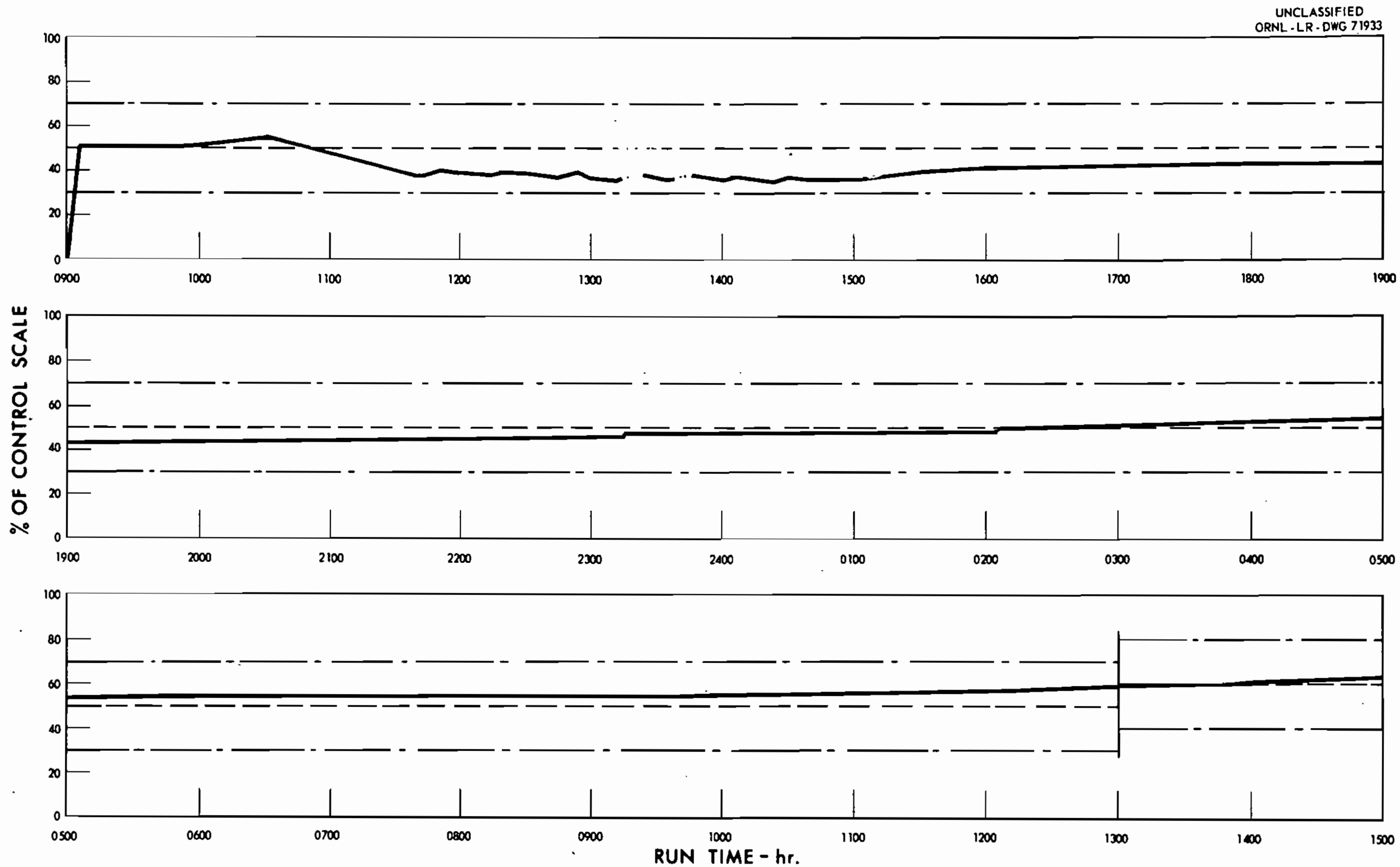
Fig. 17. Waste calcination & evaporation control - Test 52 - Evaporator Density.



Evaporator Density - Batch - TBP-25

Limits SP ±5% Controller Action Prob. 200 %
Reset 10 min

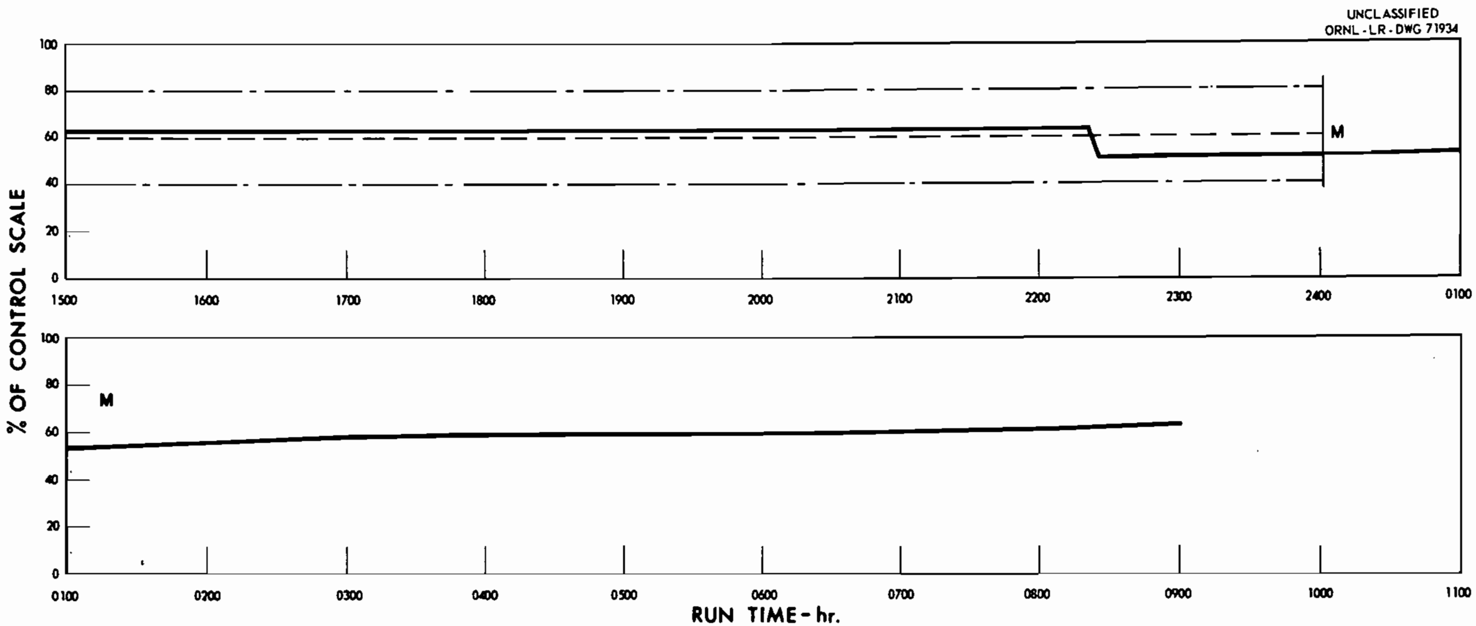
Fig. 17. Waste calcination & evaporation control - Test 52- Evaporator Density. (Cont'd.)



Evaporator Liquid Level - Batch - TBP - 25

Limits SP ±20% Controller Action Prob. 25 %
Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 52 - Evaporator Liquid Level.

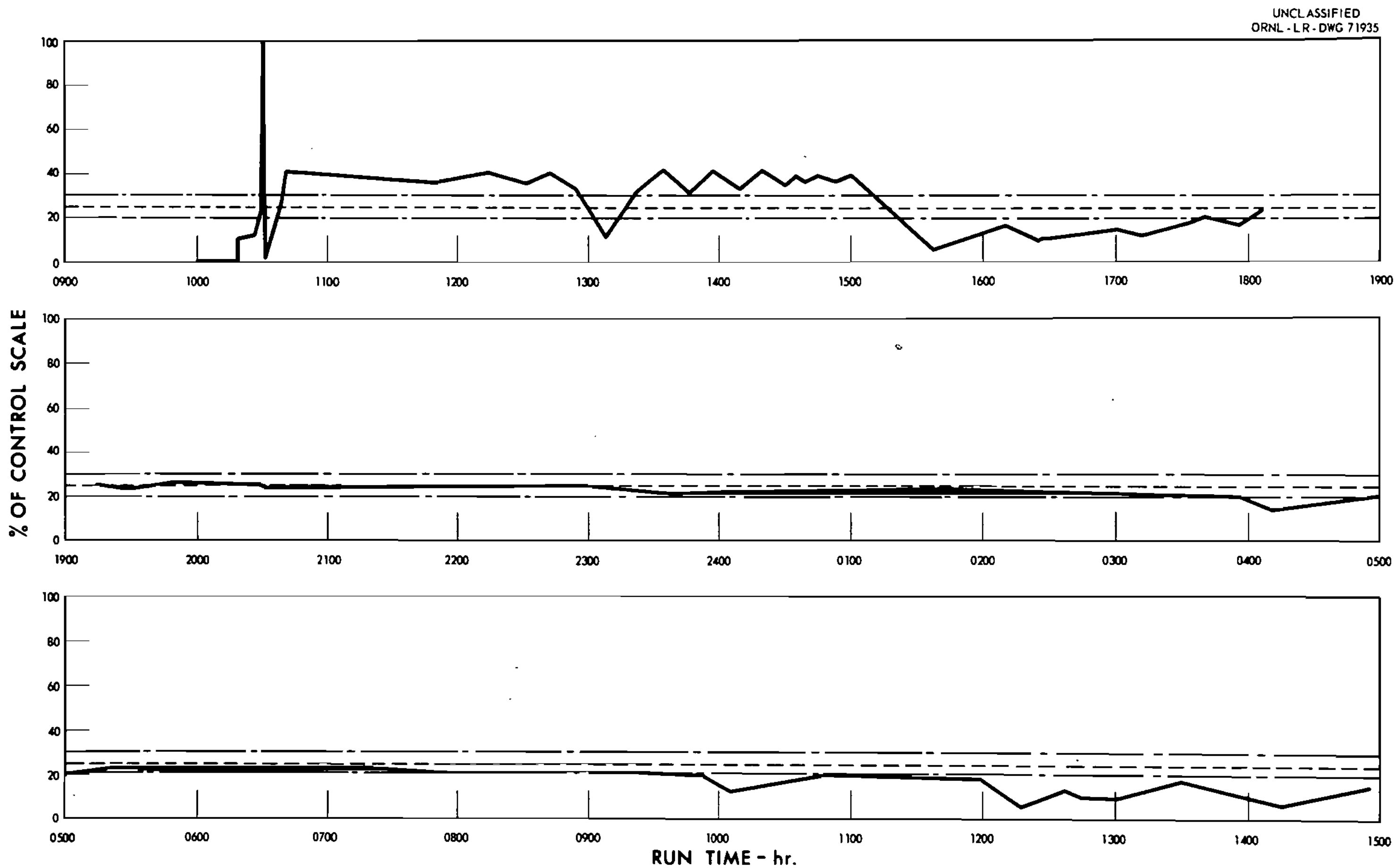


Evaporator Liquid Level - Batch - TBP-25

Limits SP $\pm$20% Controller Action Prob. 25 %

Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 52 - Evaporator Liquid Level. (Cont'd.)

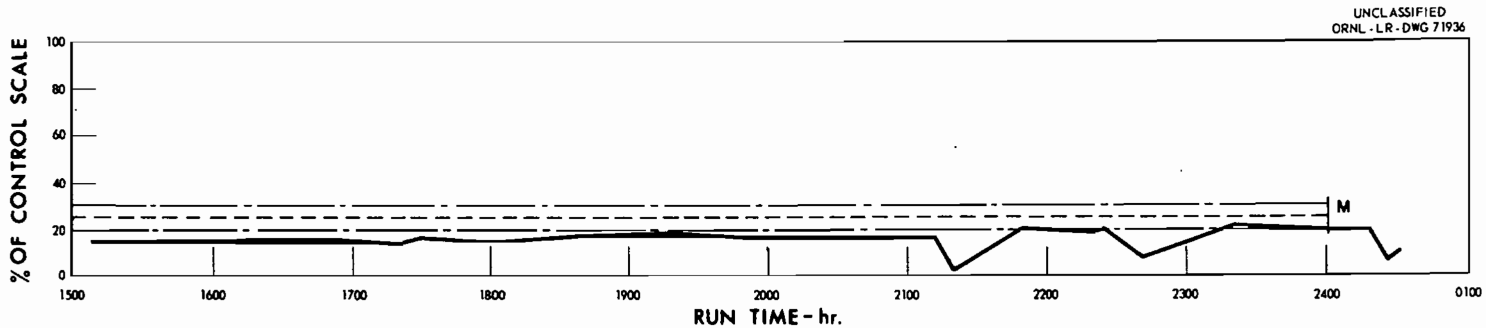


Evaporator Temperature - Batch - TBP-25

Limits SP ± 5% Controller Action Prob. 25 %

Reset 10 min

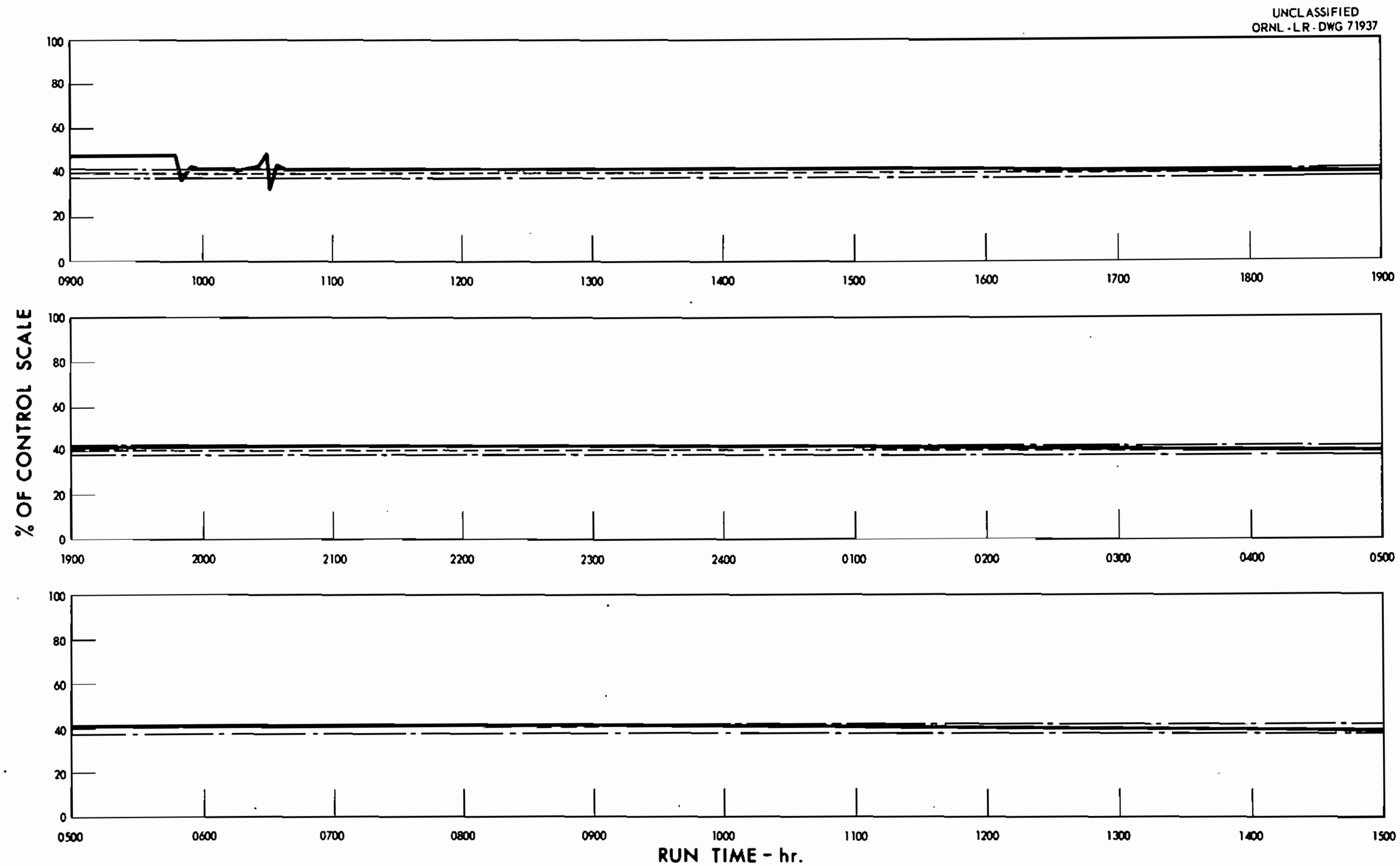
Fig. 17. Waste calcination & evaporation control - Test 52 - Evaporator Temperature.



Evaporator Temperature - Batch - TBP-25

Limits SP ± 5% Controller Action Prob. 25 %
Reset 10 min

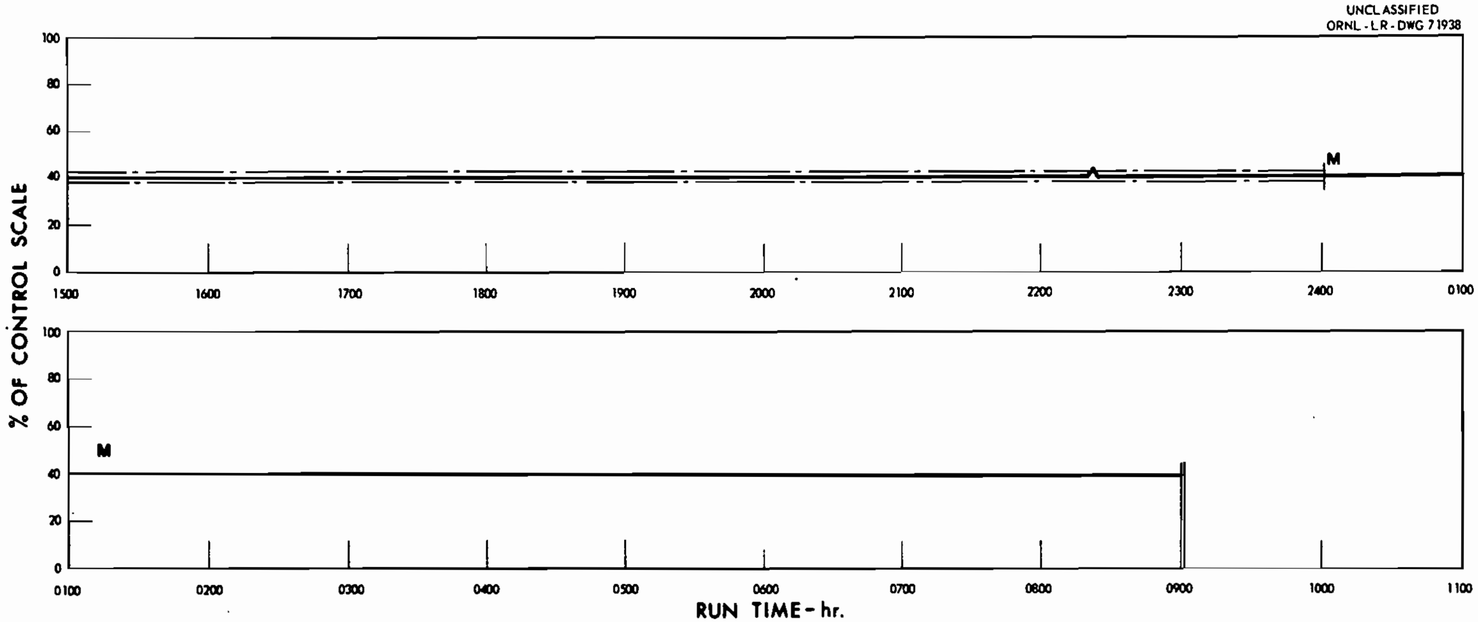
Fig. 17. Waste calcination & evaporation control - Test 52 - Evaporator Temperature. (Cont'd.)



Evaporator Pressure - Batch - TBP-25

Limits SP ± 2% Controller Action Prob. 20 %
Reset 0.3 min

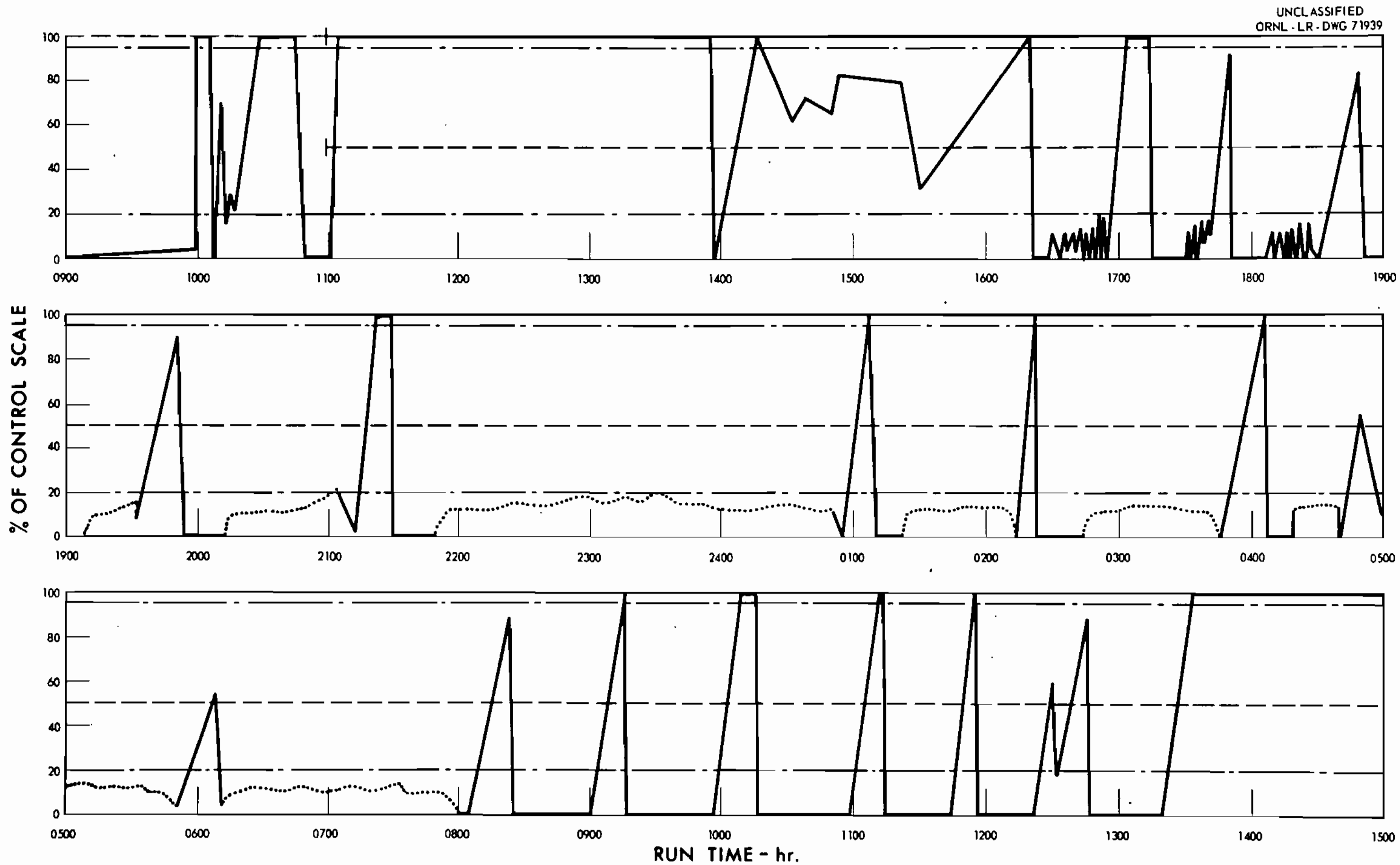
Fig. 17. Waste calcination & evaporation control - Test 52 - Evaporator Pressure.



Evaporator Pressure - Batch - TBP - 25

Limits SP ± 2% Controller Action Prob. 20 %
Reset 0.3 min

Fig. 17. Waste calcination & evaporation control - Test 52 - Evaporator Pressure. (Cont'd.)



Calciner Liquid Level - Continuous - TBP-25

Limits 95-20% Controller Action Prob. 150 %

Reset 0 min

Fig. 17. Waste calcination & evaporation control - Test 54 - Calciner Liquid Level.

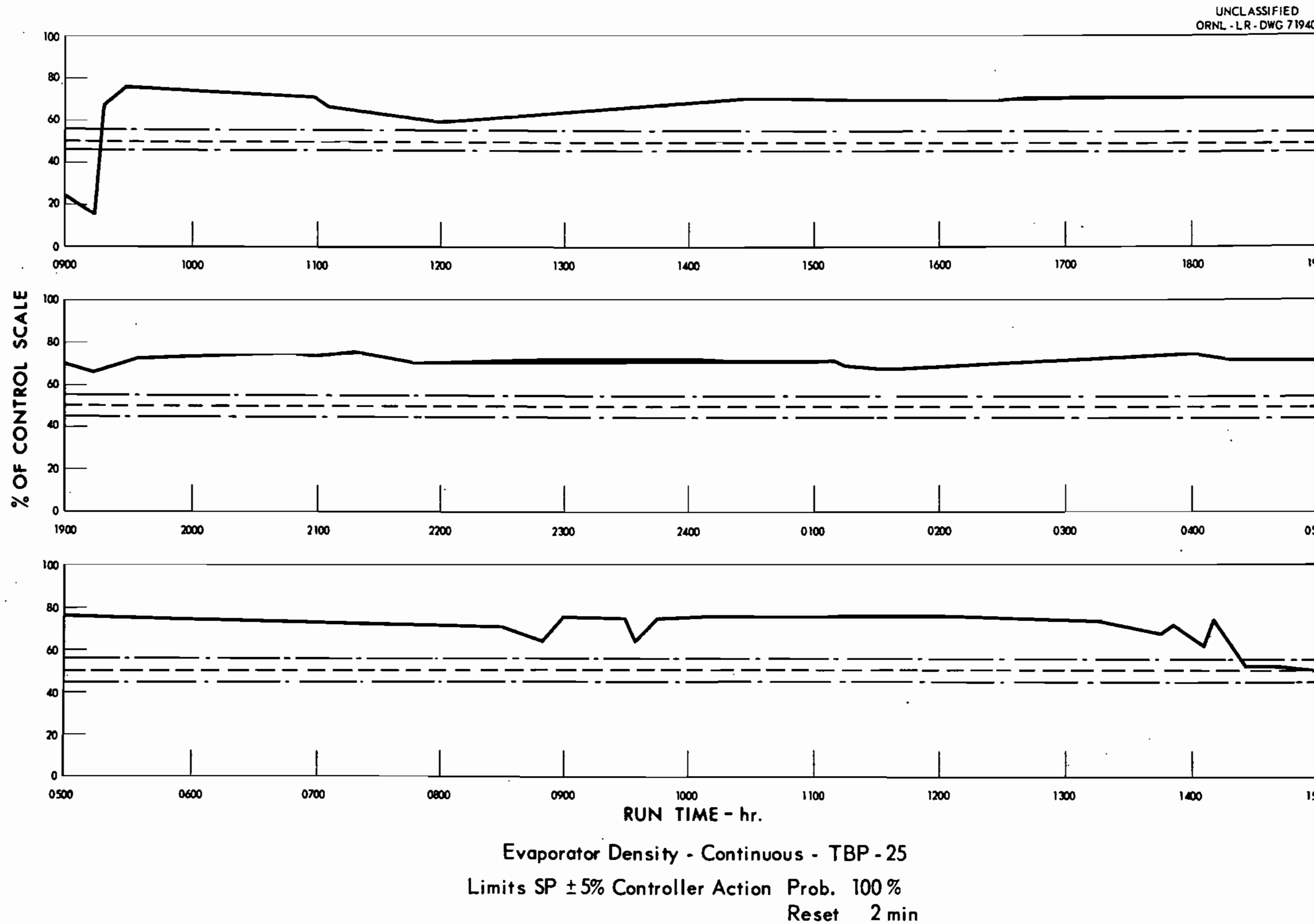
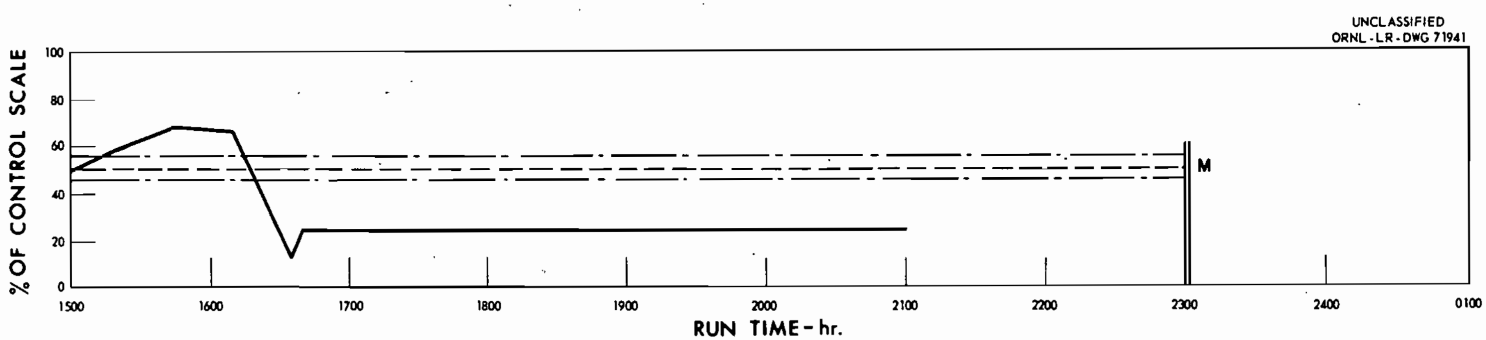


Fig. 17. Waste calcination & evaporation control - Test 54 - Evaporator Density.



Evaporator Density - Continuous - TBP - 25

Limits SP ± 5% Controller Action Prob. 100 %

Reset 2 min

Fig. 17. Waste calcination & evaporation control - Test 54 - Evaporator Density. (Cont'd.)

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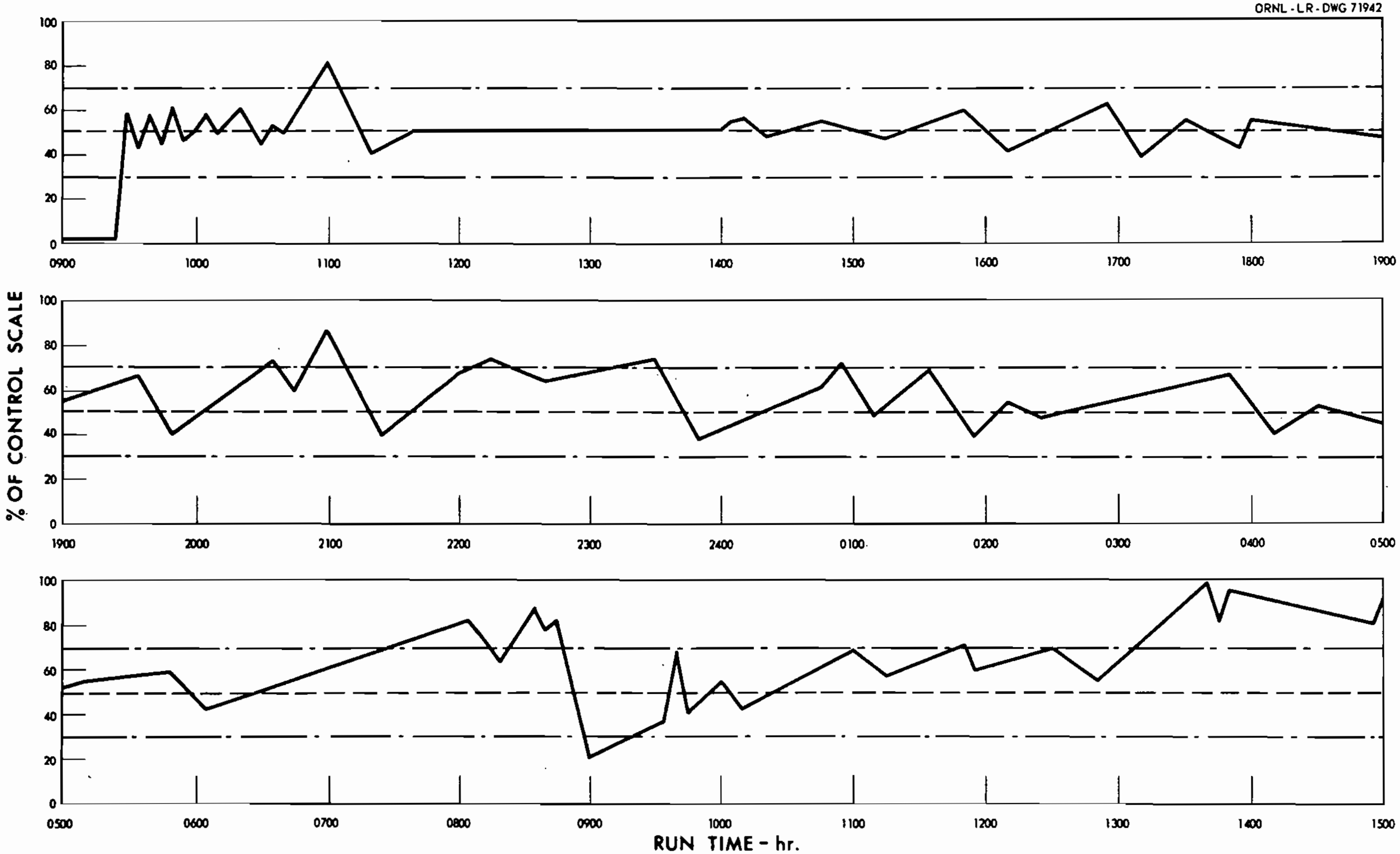
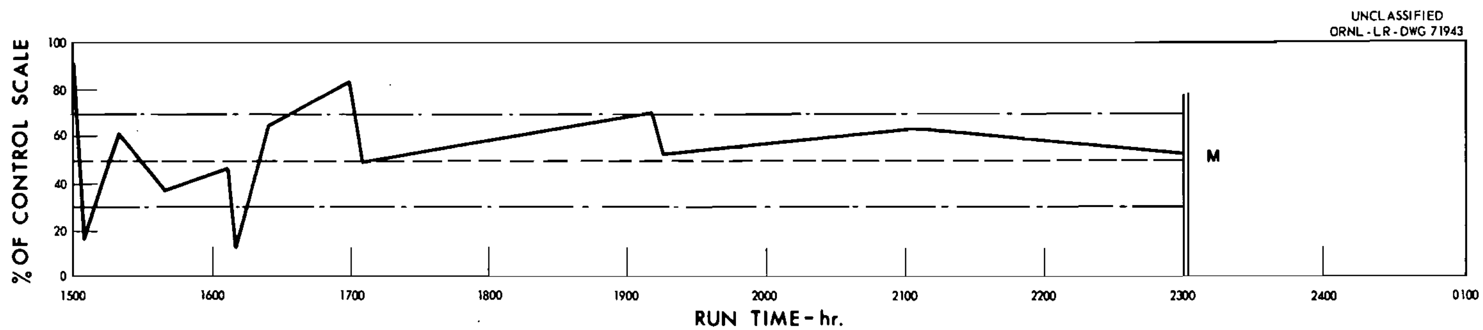


Evaporator Liquid Level - Continuous - TBP - 25

Limits SP ±20% Controller Action Prob. 25 %
Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 54 - Evaporator Liquid Level.



Evaporator Liquid Level - Continuous - TBP-25
Limits SP ±20% Controller Action Prob. 25%
Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 54 - Evaporator Liquid Level. (Cont'd.)

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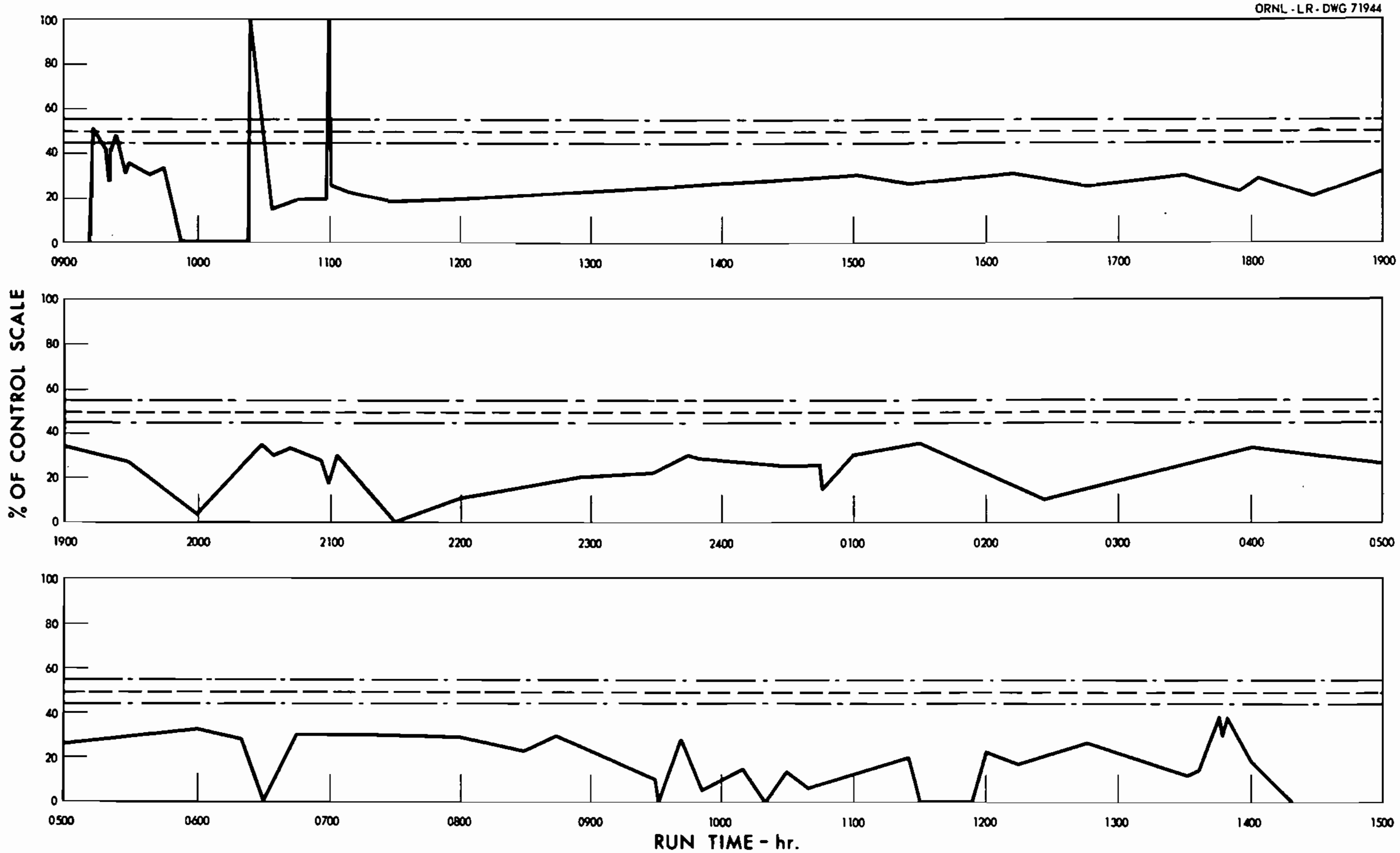
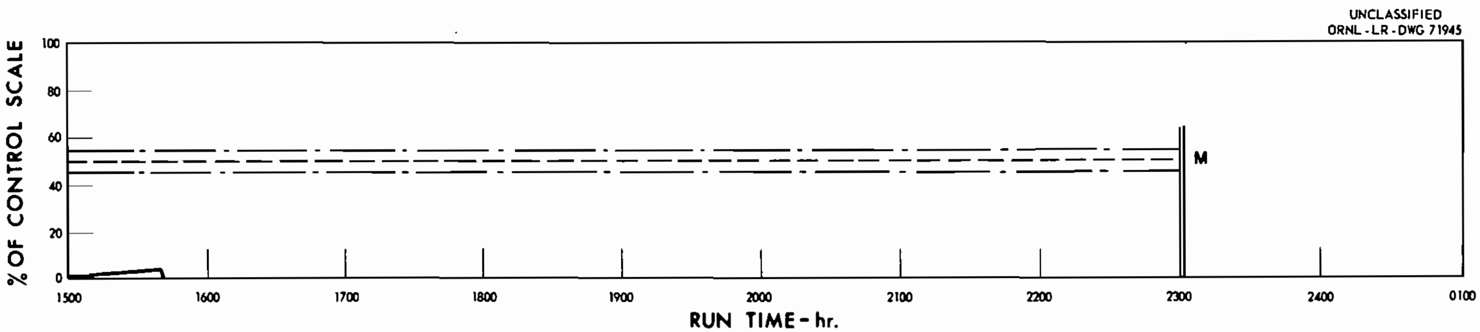


Evaporator Temperature - Continuous - TBP-25

Limits SP ±5% Controller Action Prob. 25%
Reset 8 min

Fig. 17. Waste calcination & evaporation control - Test 54 - Evaporator Temperature.



Evaporator Temperature - Continuous - TBP-25

Limits SP ±5% Controller Action Prob. 25%
Reset 8 min

Fig. 17. Waste calcination & evaporation control - Test 54 - Evaporator Temperature. (Cont'd.)

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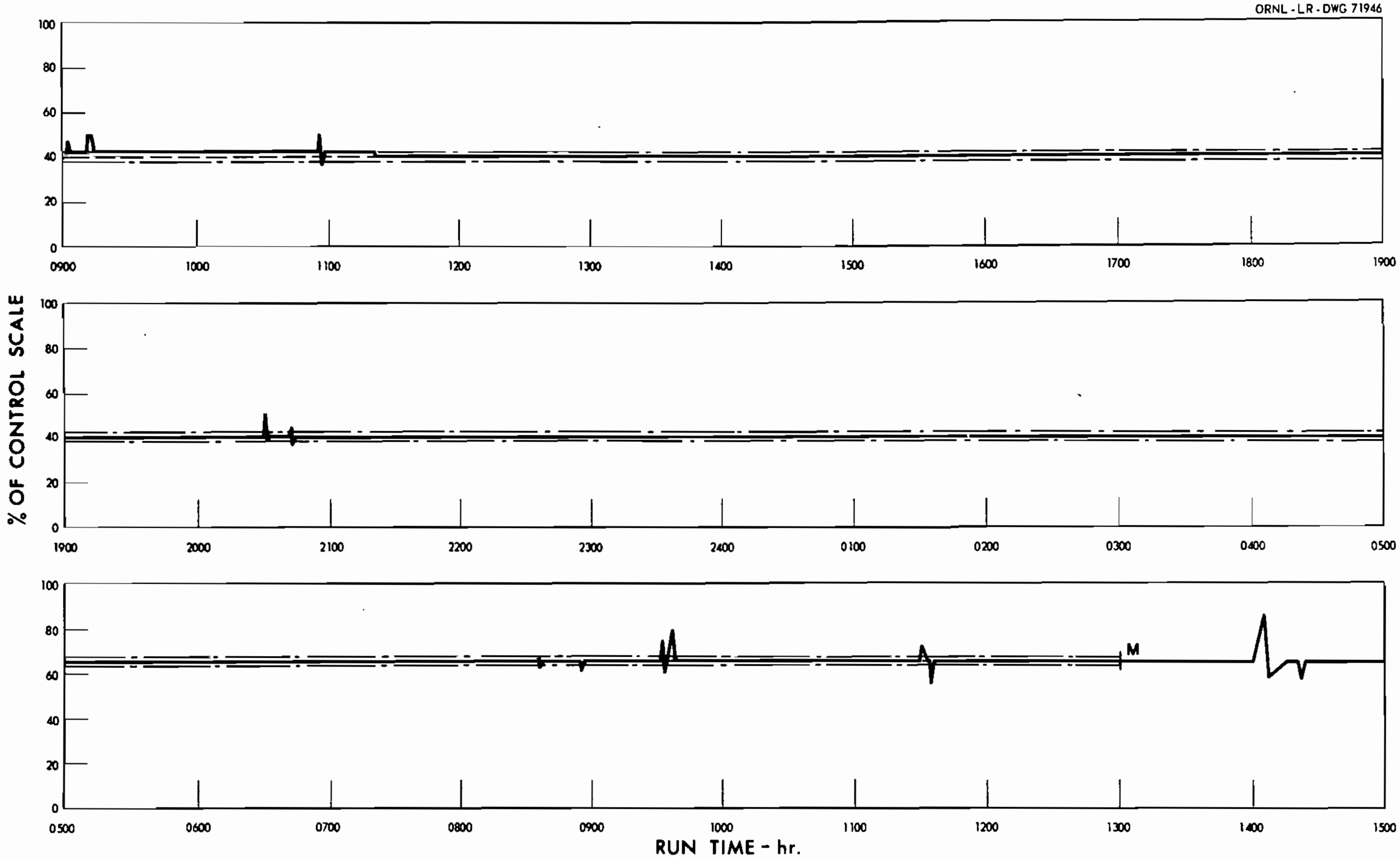
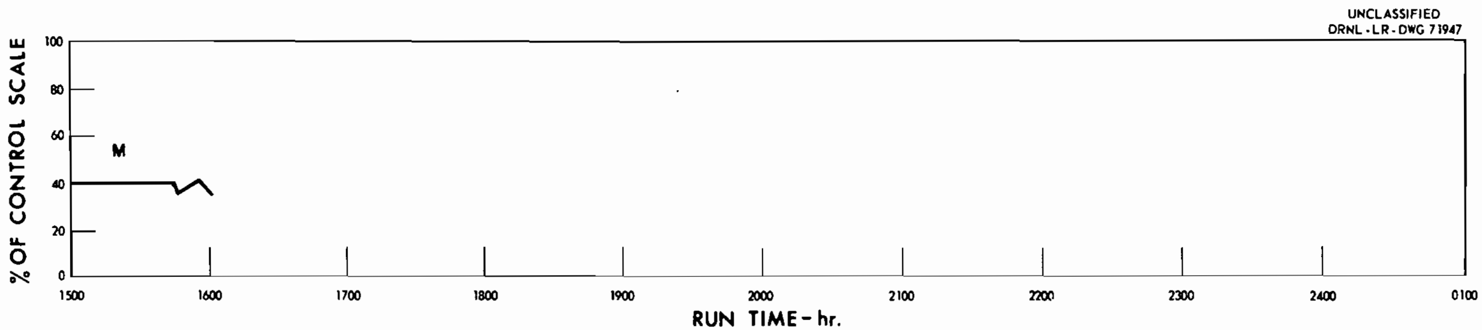


Evaporator Pressure - Continuous - TBP-25

Limits SP ± 2% Controller Action Prob. 10%
Reset 1 min

Fig. 17. Waste calcination & evaporation control - Test 54 - Evaporator Pressure.

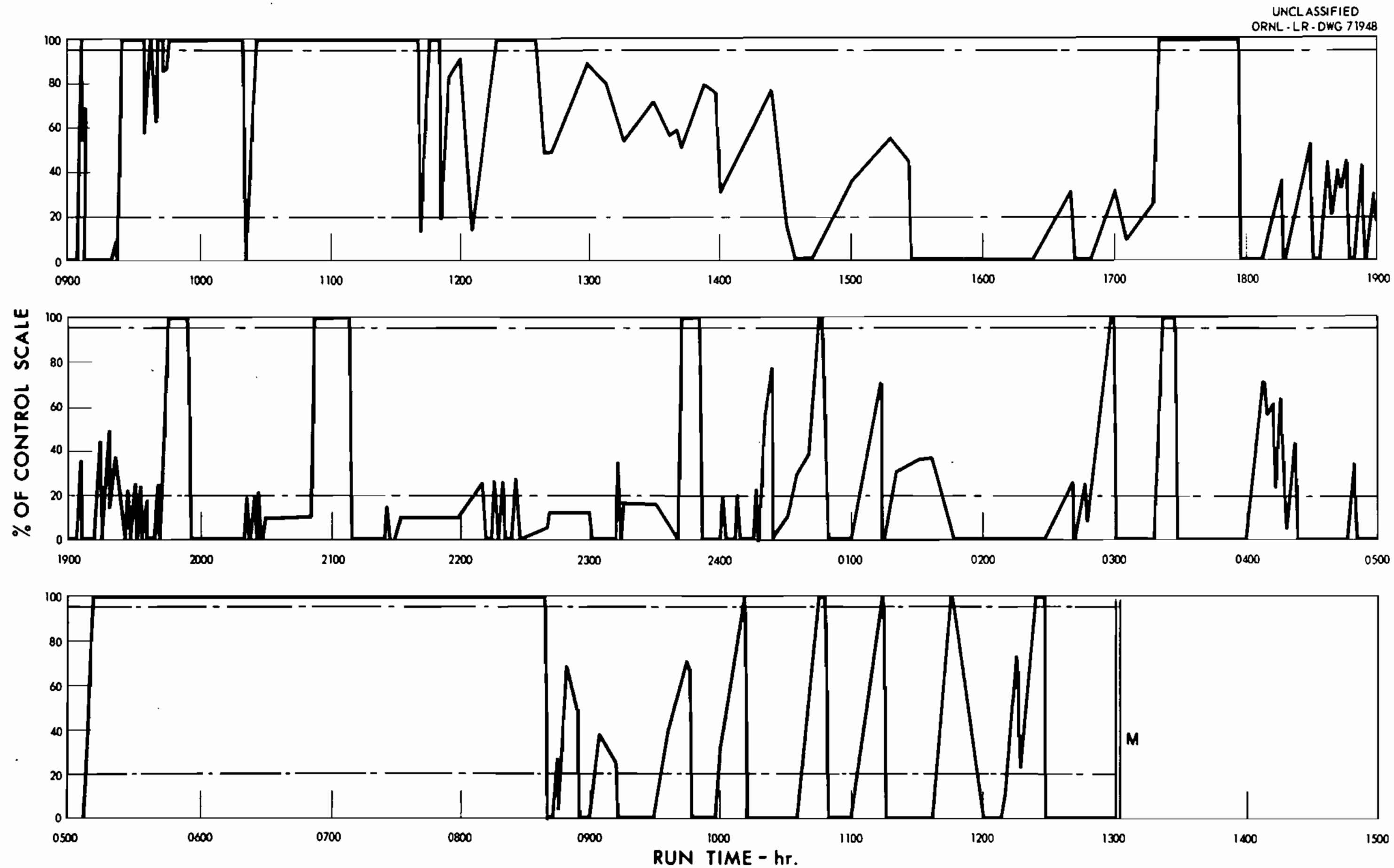


Evaporator Pressure - Continuous - TBP-25

Limits SP ± 2% Controller Action Prob. 10 %

Reset 1 min

Fig. 17. Waste calcination & evaporation control - Test 54 - Evaporator Pressure. (Cont'd.)

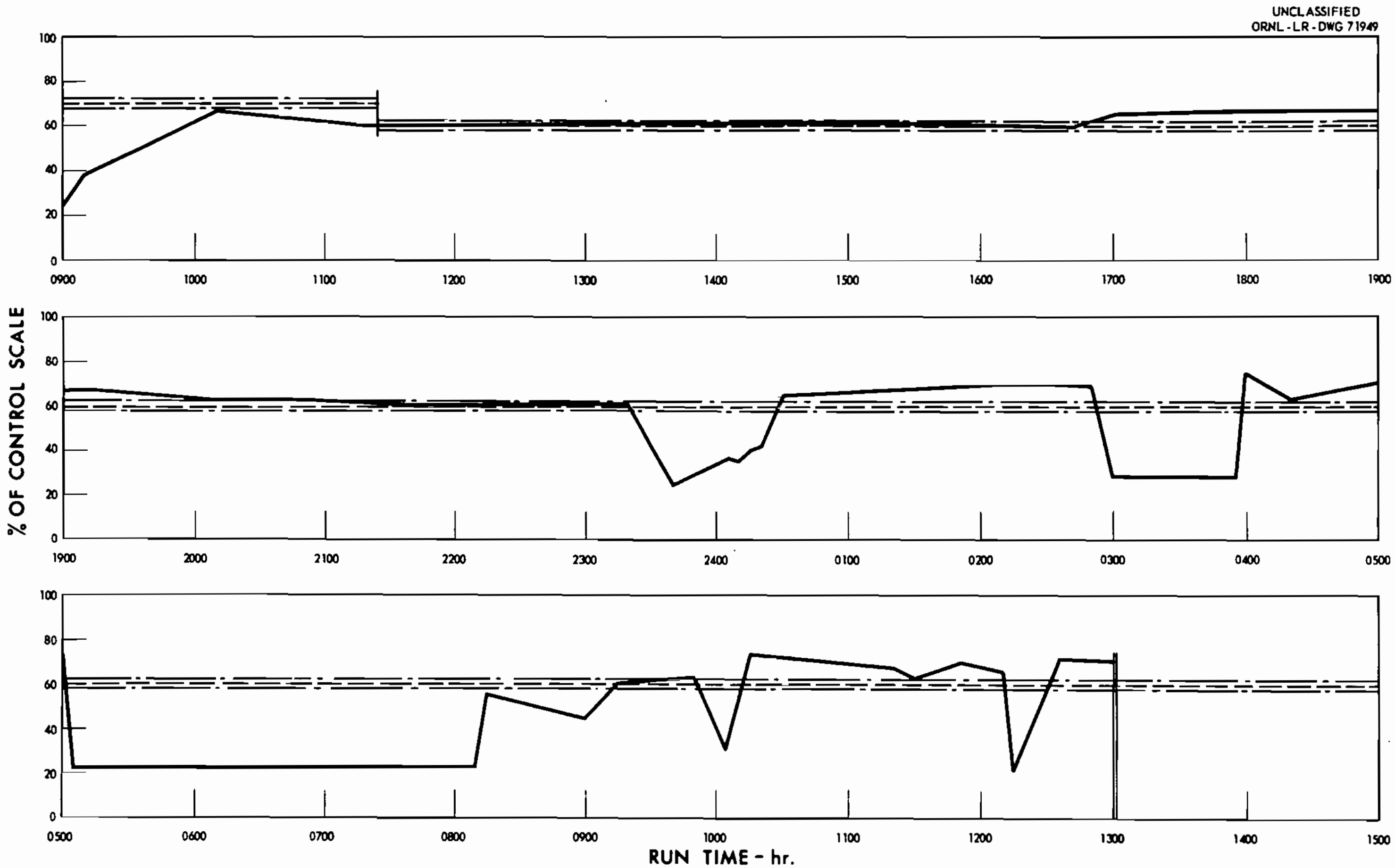


Calciner Liquid Level - Continuous - TBP - 25

Limits 95 - 20% Controller Action Prob. 150 %

Reset 0 min

Fig. 17. Waste calcination & evaporation control - Test 55 - Calciner Liquid Level.



Evaporator Density - Continuous - TBP-25

Limits SP ±5% Controller Action Prob. 100%

Reset 2 min

Fig. 17. Waste calcination & evaporation control - Test 55 - Evaporator Density.

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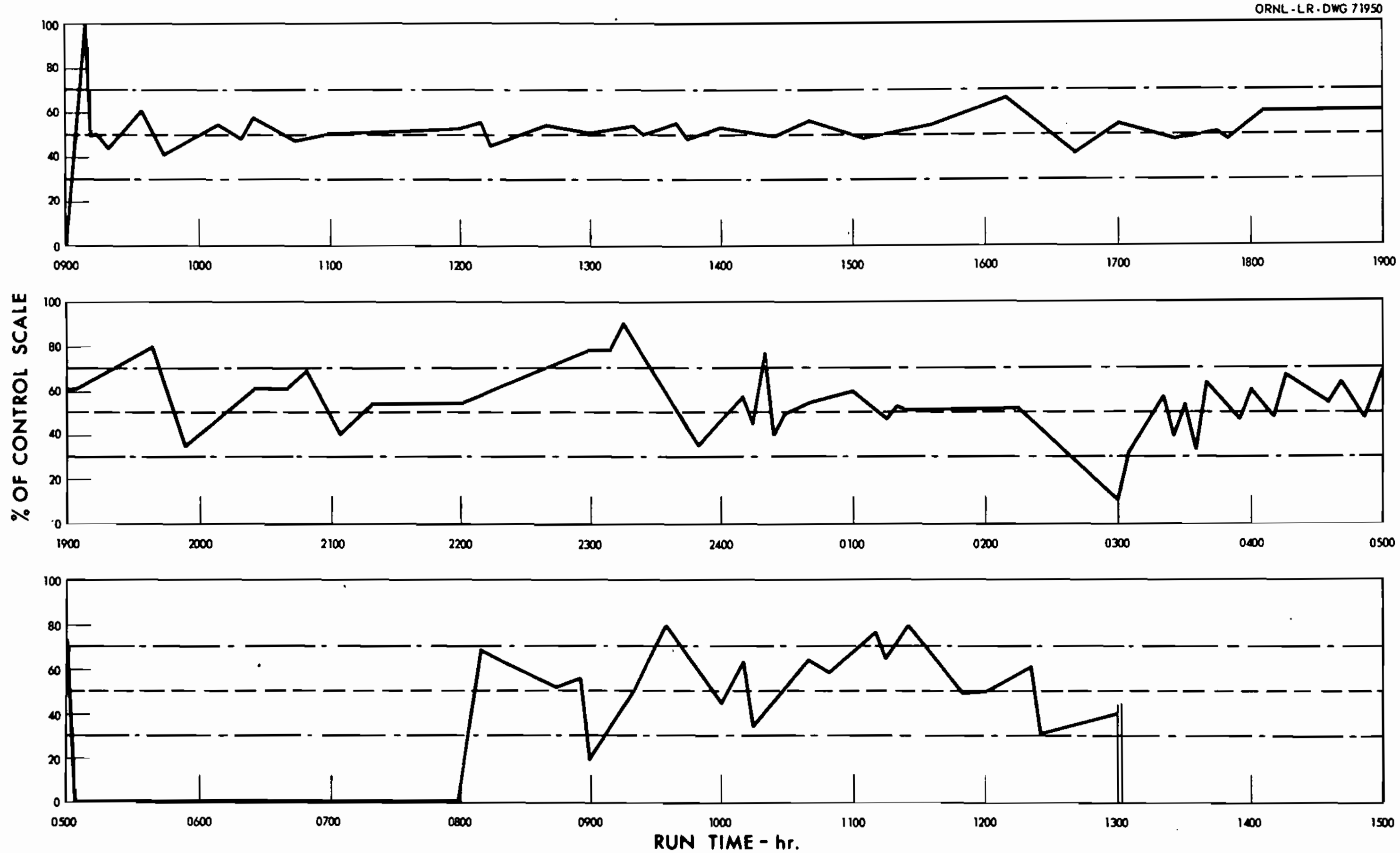
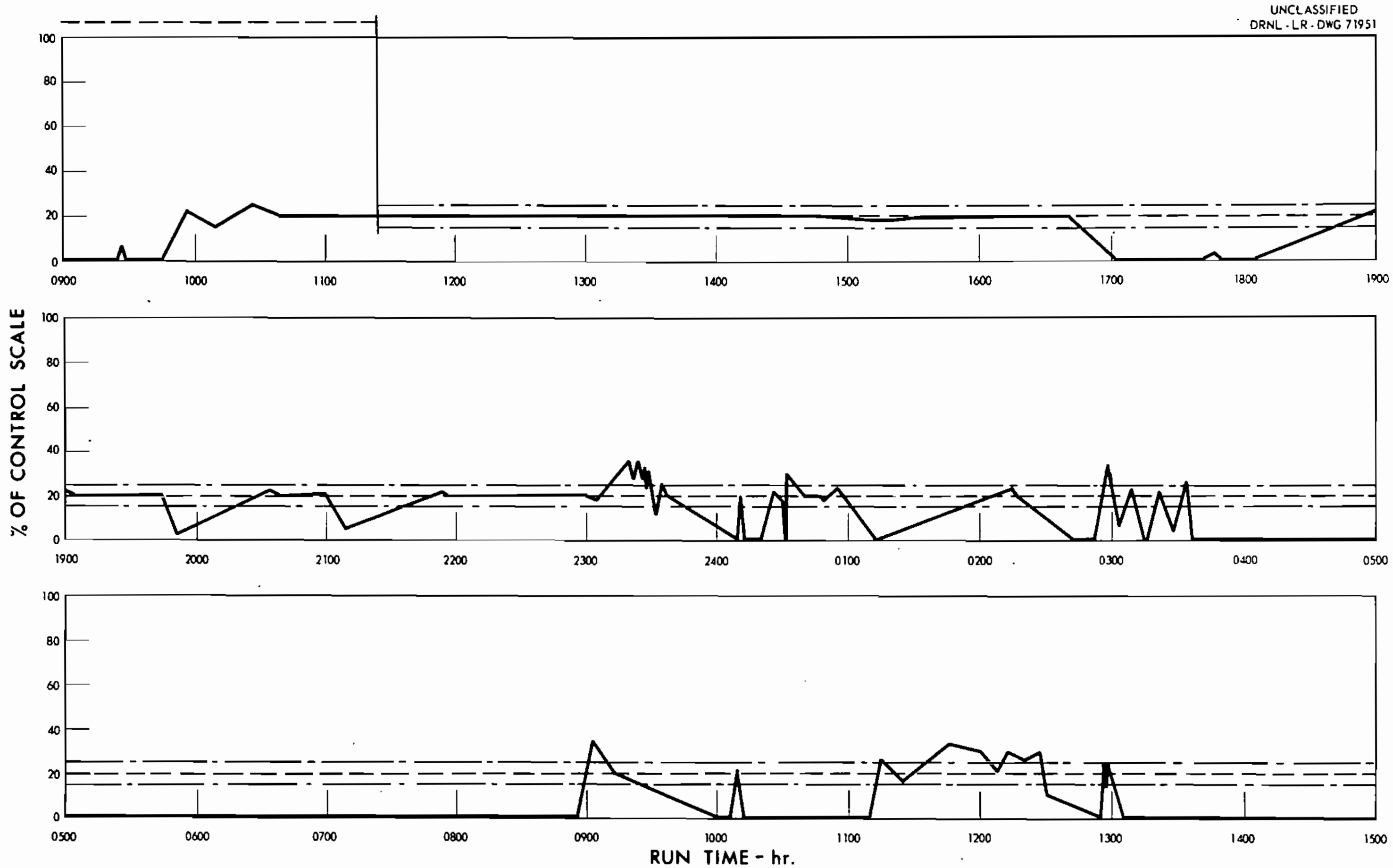


Evaporator Liquid Level - Continuous - TBP-25

Limits SP ±20% Controller Action Prob. 25 %

Reset 10 min

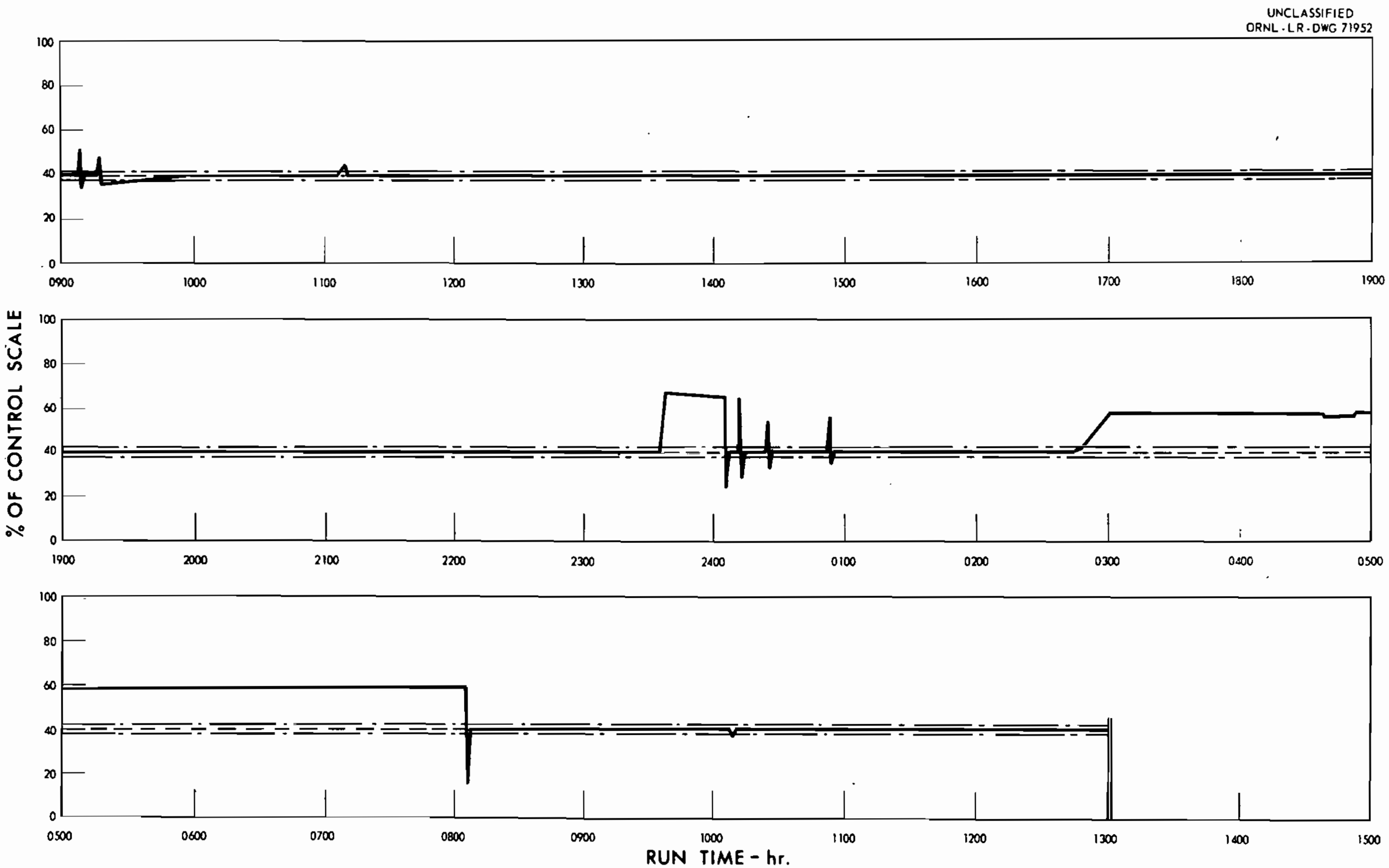
Fig. 17. Waste calcination & evaporation control - Test 55 - Evaporator Liquid Level.



Evaporator Temperature - Continuous - TBP - 25

Limits SP ±5% Controller Action Prob. 25 %
Reset 8 min

Fig. 17. Waste calcination & evaporation control - Test 55 - Evaporator Temperature.

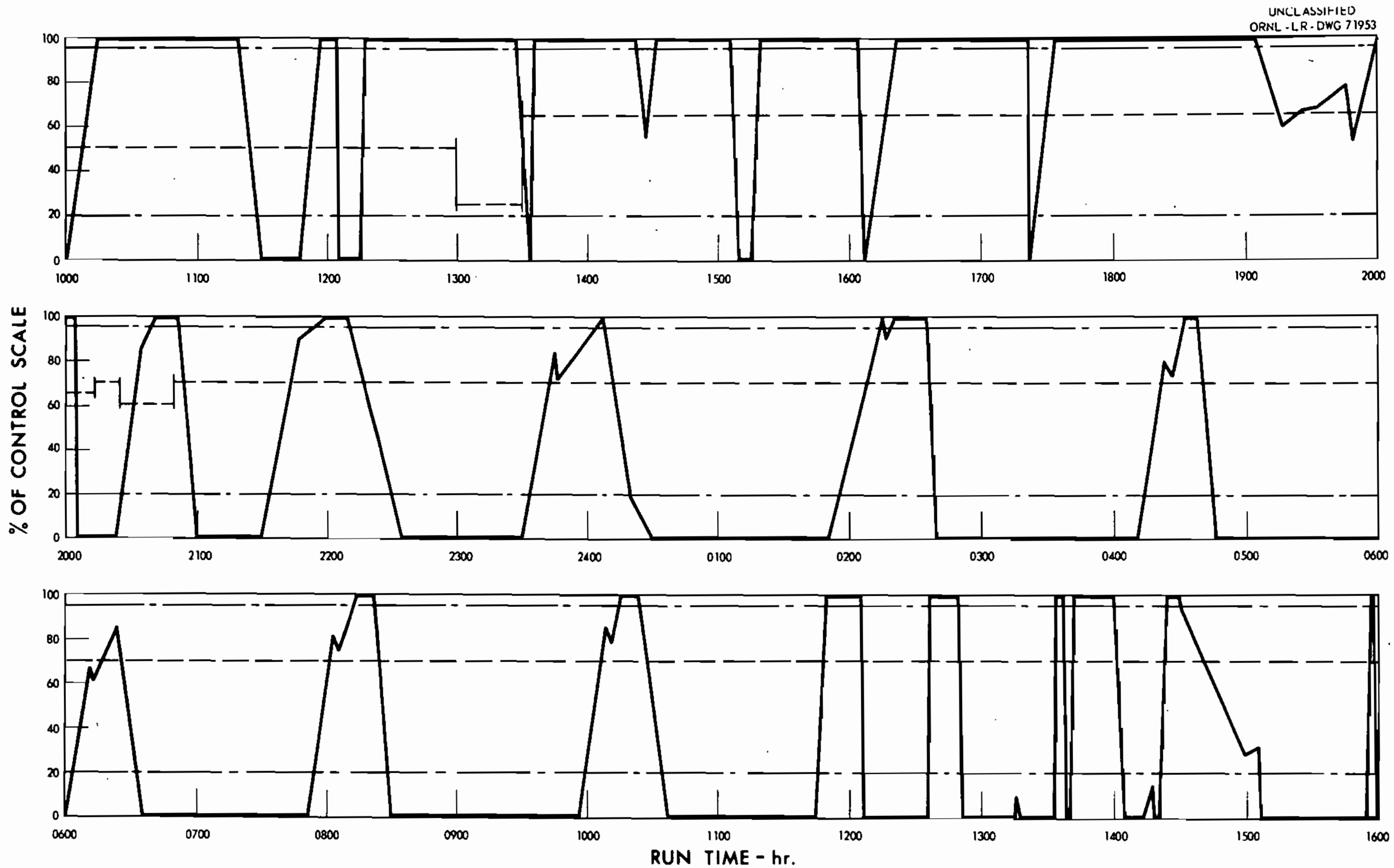


Evaporator Pressure - Continuous - TBP-25

Limits SP ± 2% Controller Action Prob. 10 %

Reset 0.3 min

Fig. 17. Waste calcination & evaporation control - Test 55 - Evaporator Pressure.



Calciner Liquid Level - Continuous - Darex

Limits 95-20% Controller Action Prob. 150 %

Reset 0 min

Fig. 17. Waste calcination & evaporation control - Test 56 - Calciner Liquid Level.

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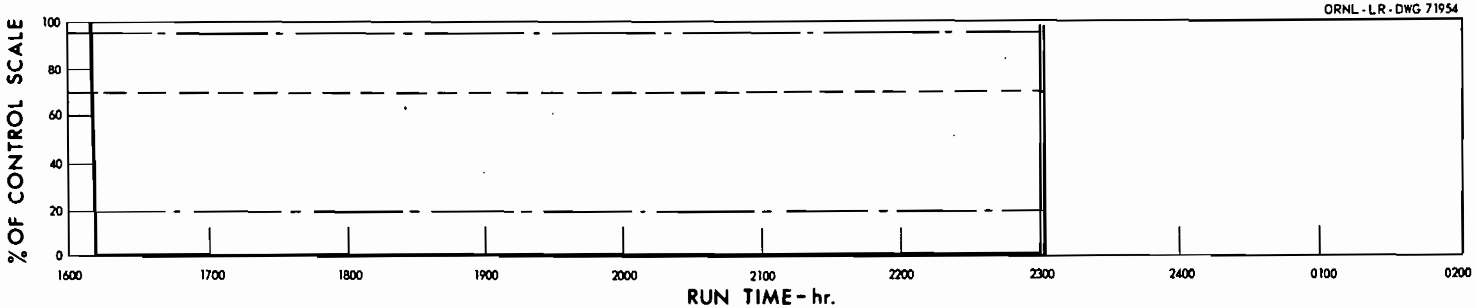
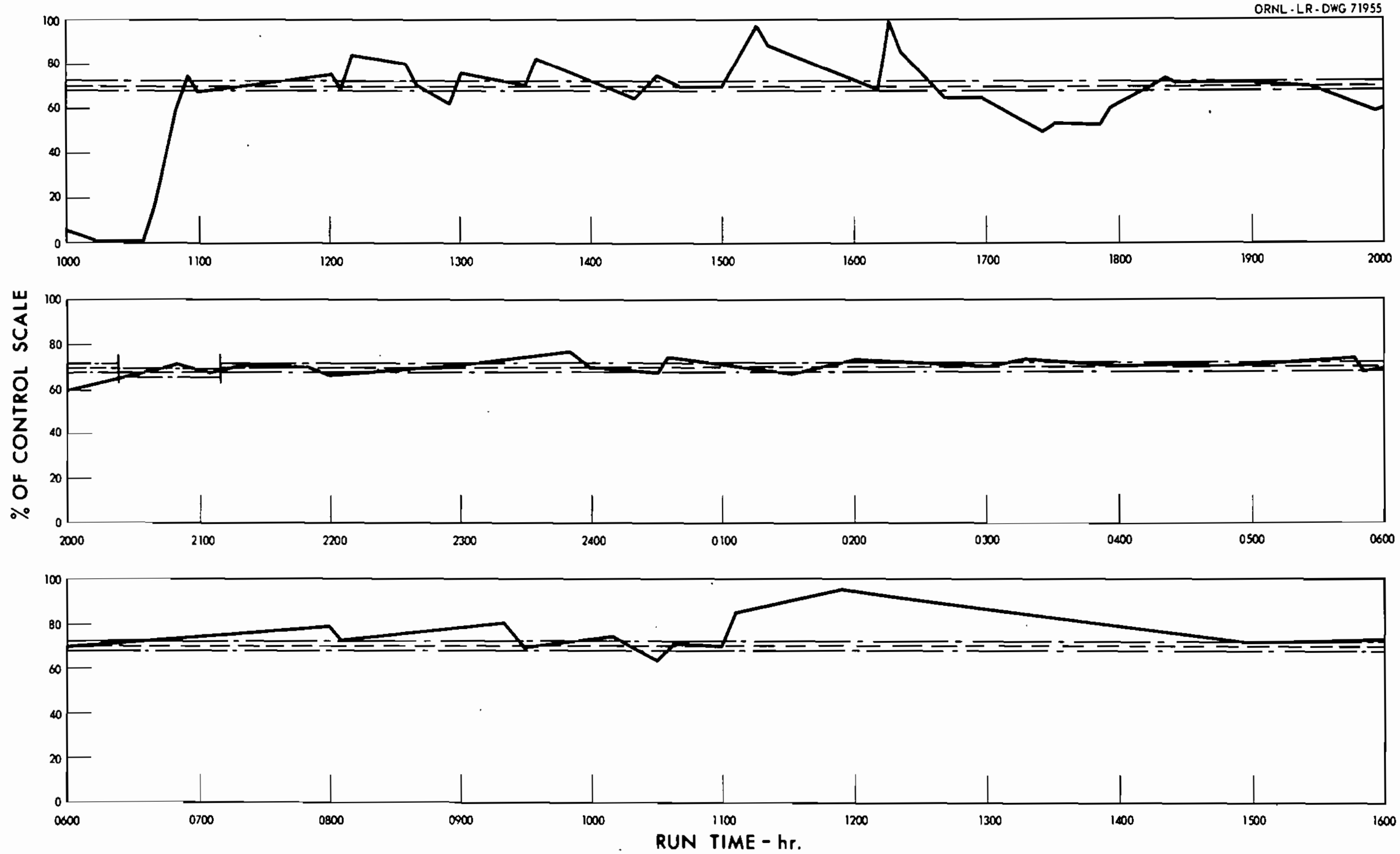


Calciner Liquid Level - Continuous - Darex

Limits 95-20% Controller Action Prob. 150 %

Reset 0 min

Fig. 17. Waste calcination & evaporation control - Test 56 - Calciner Liquid Level. (Cont'd.)



Evaporator Density - Continuous - Darex

Limits SP ±5% Controller Action Prob. 100 %
Reset 2 min

Fig. 17. Waste calcination & evaporation control - Test 56 - Evaporotor Density.

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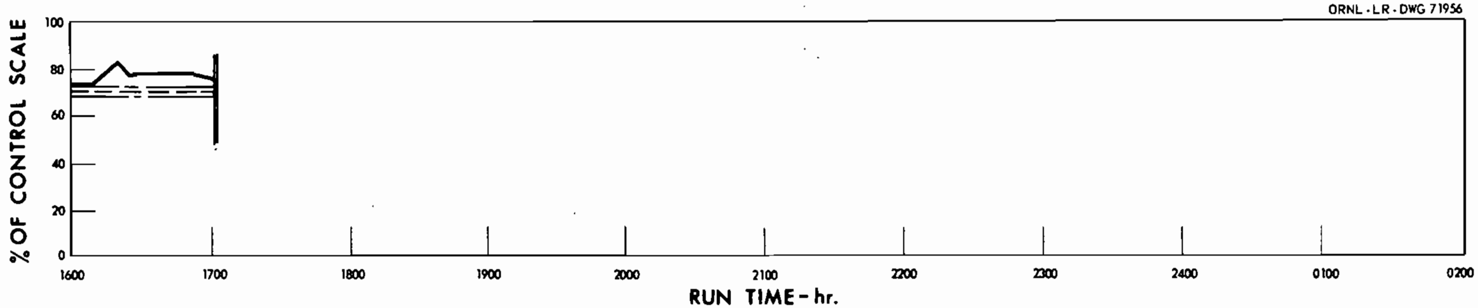
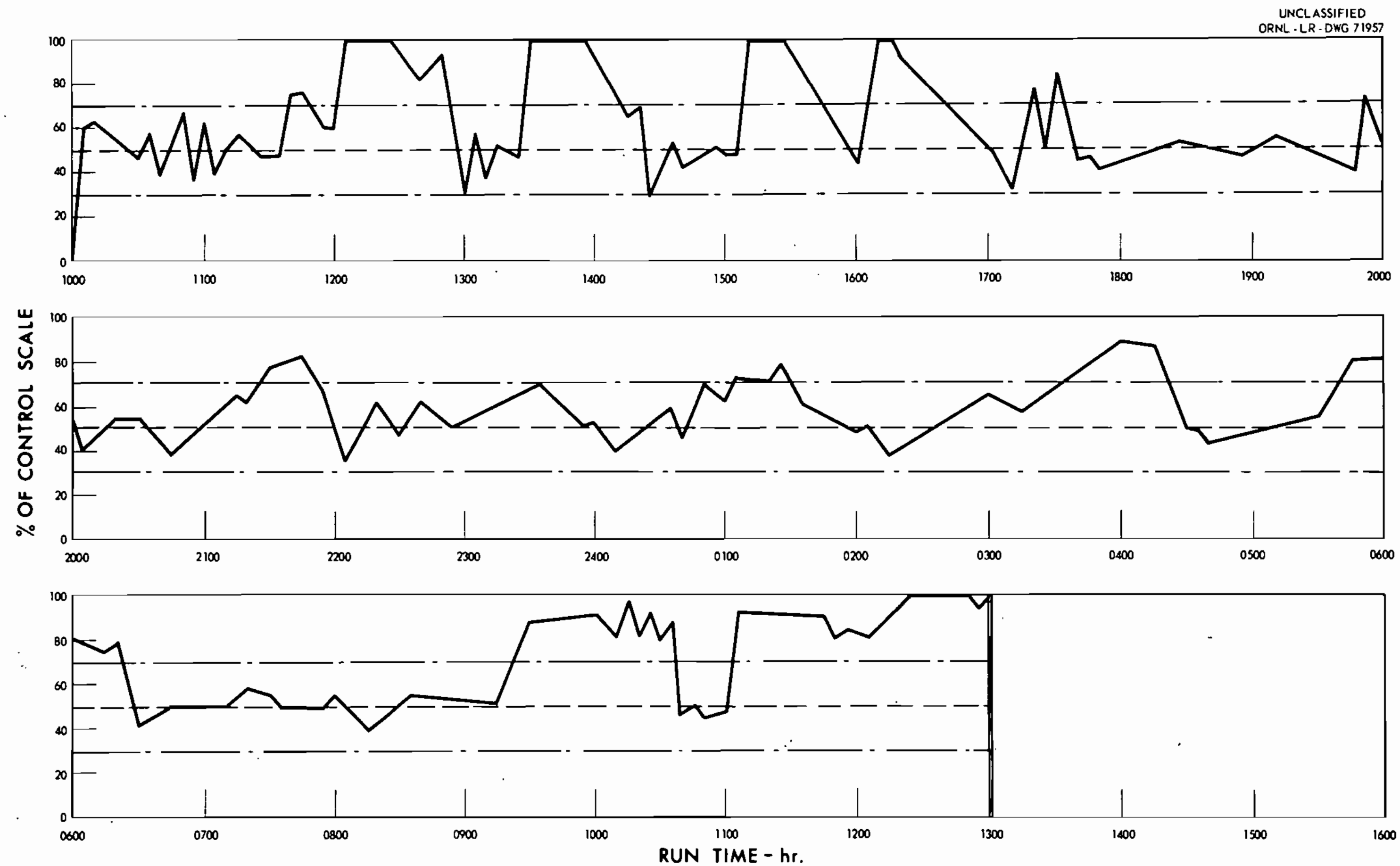


Evaporator Density - Continuous - Darex

Limits SP ±5% Controller Action Prob. 100 %
Reset 2 min

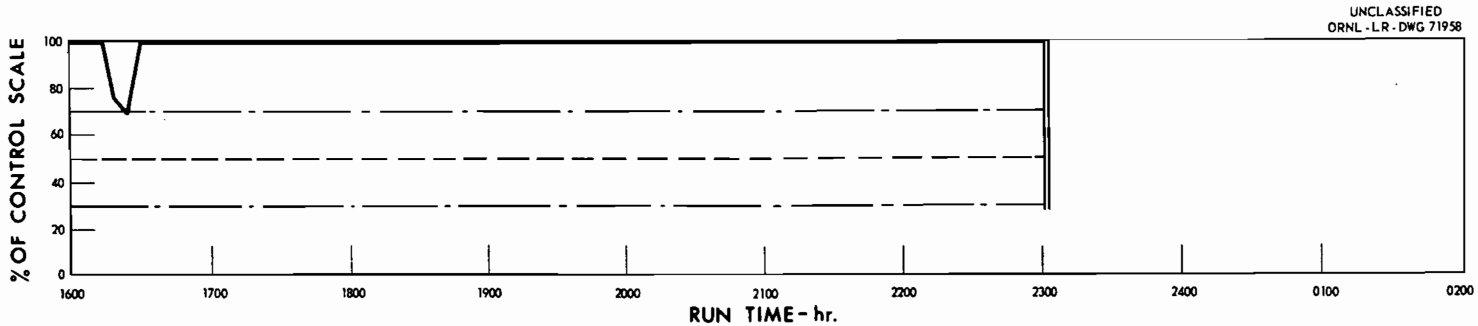
Fig. 17. Waste calcination & evaporation control - Test 56 - Evaporator Density. (Cont'd.)



Evaporator Liquid Level - Continuous - Darex

Limits SP ±20% Controller Action Prob. 25 %
Reset 10 min

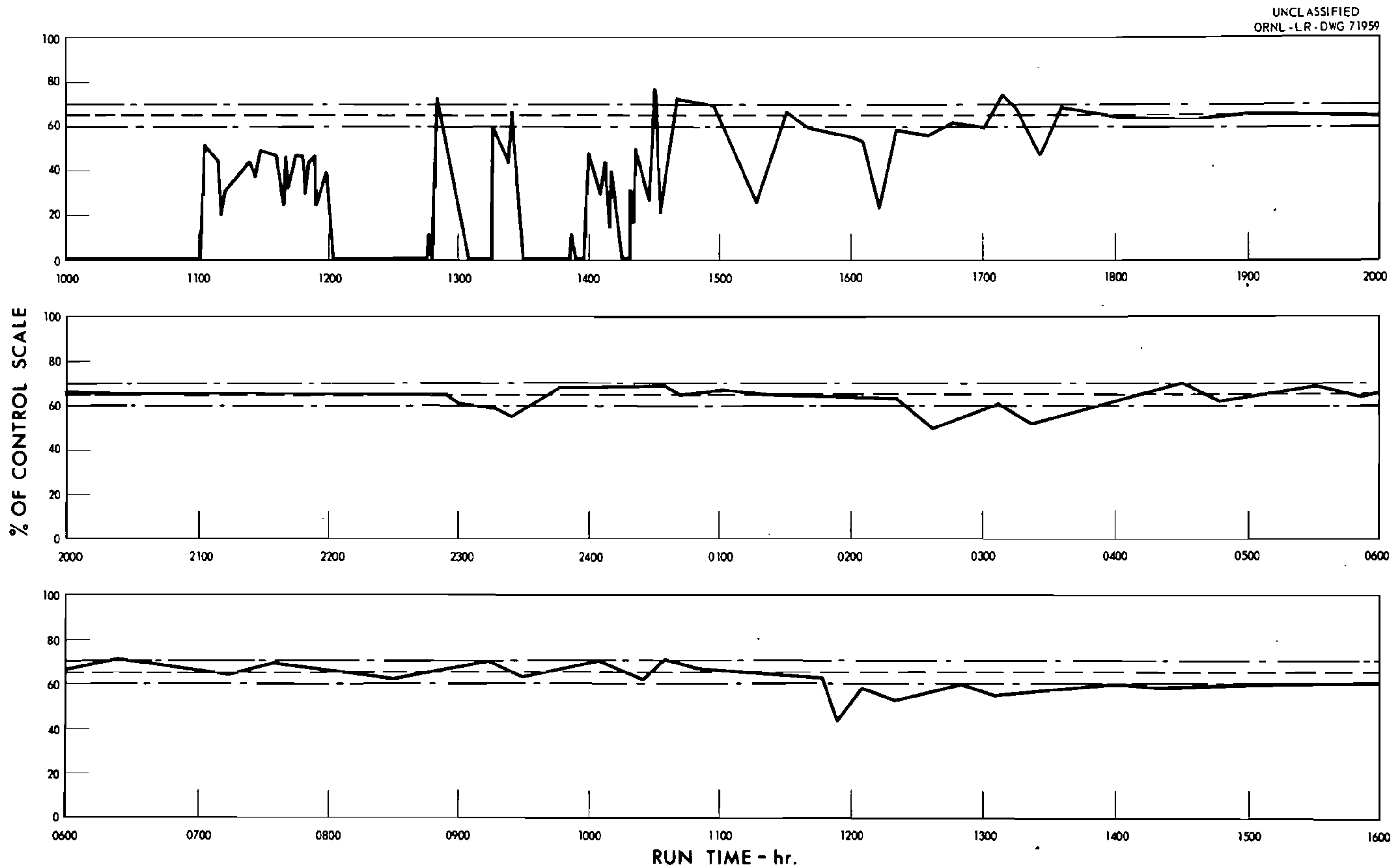
Fig. 17. Waste calcination & evaporation control - Test 56 - Evaporator Liquid Level.



Evaporator Liquid Level - Continuous - Darex

Limits SP ±20% Controller Action Prob. 25 %
Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 56 - Evaporator Liquid Level. (Cont'd.)



Evaporator Temperature - Continuous - Darex

Limits SP ±5% Controller Action Prob. 25 %
Reset 9 min

Fig. 17. Waste calcination & evaporation control - Test 56- Evaporator Temperature.

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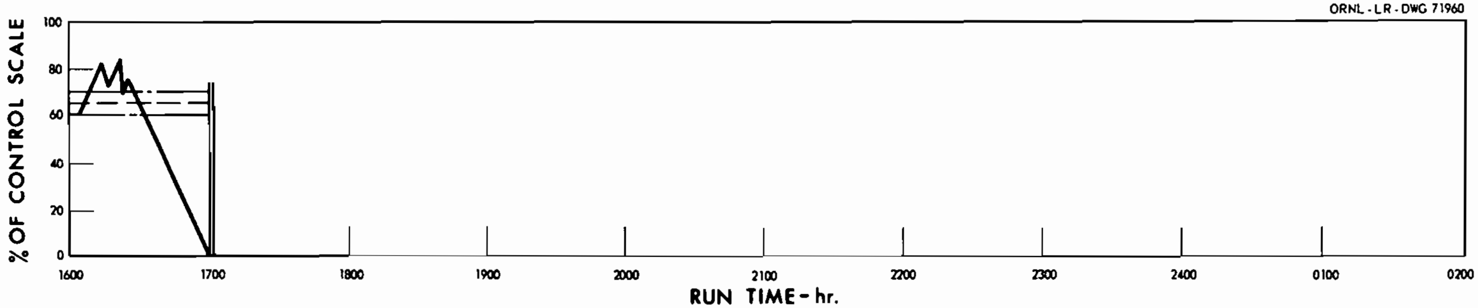
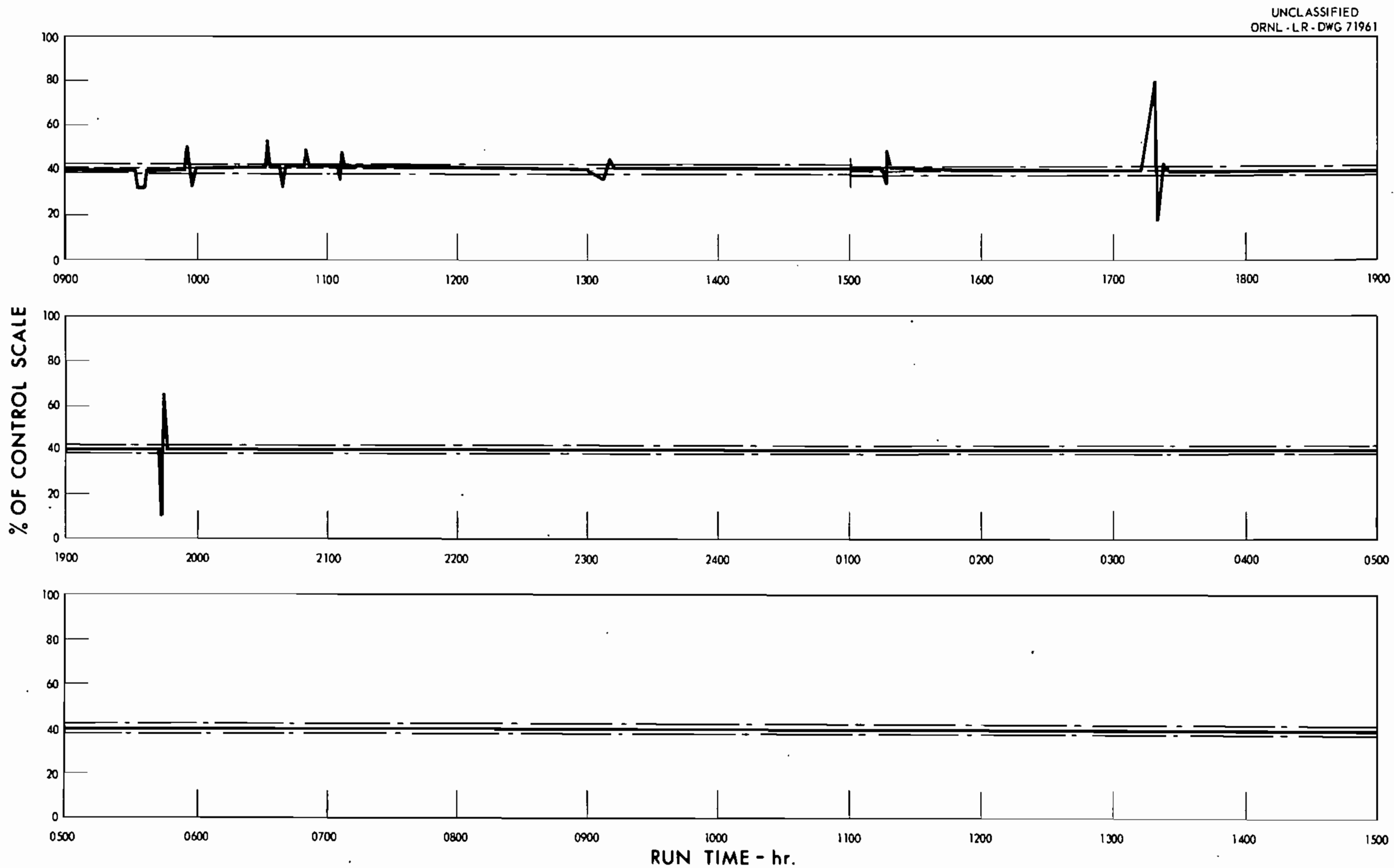


Evaporator Temperature - Continuous - Darex

Limits SP ±5% Controller Action Prob. 25 %
Reset 9 min

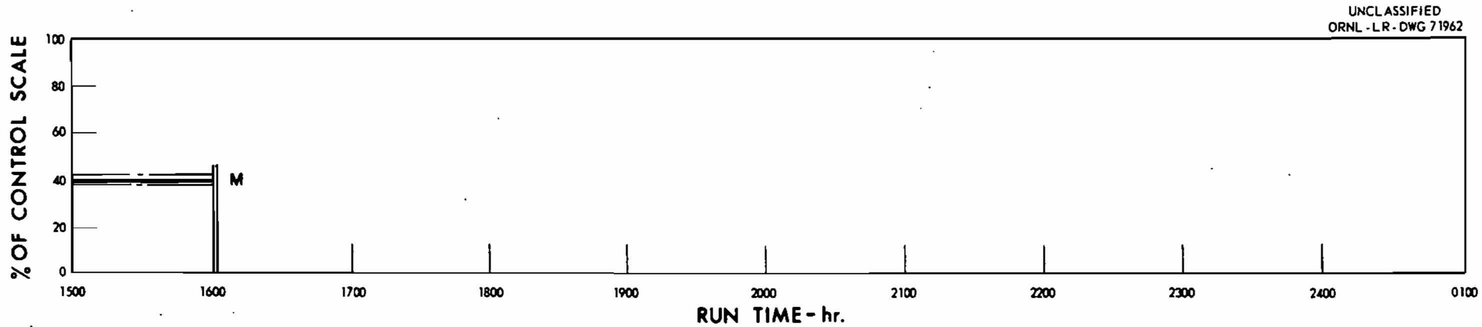
Fig. 17. Waste calcination & evaporation control - Test 56 - Evaporator Temperature. (Cont'd.)



Evaporator Pressure - Continuous - Darex

Limits SP ± 2% Controller Action Prob. 10 %
Reset 1 min

Fig. 17. Waste calcination & evaporation control - Test 56 - Evaporator Pressure.

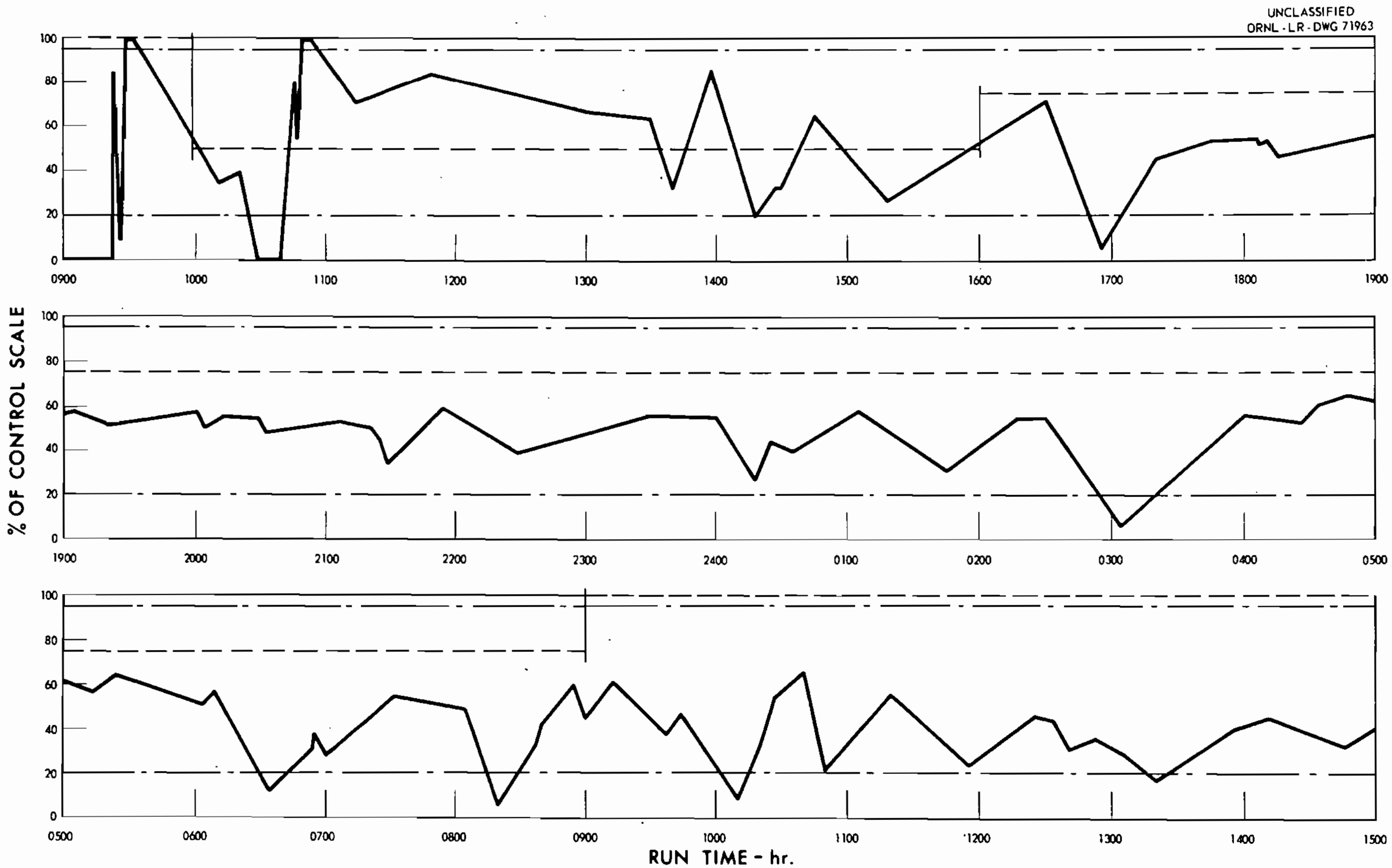


Evaporator Pressure - Continuous - Darex

Limits SP ± 2% Controller Action Prob. 10 %

Reset 1 min

Fig. 17. Waste calcination & evaporation control - Test 56 - Evaporator Pressure. (Cont'd.)

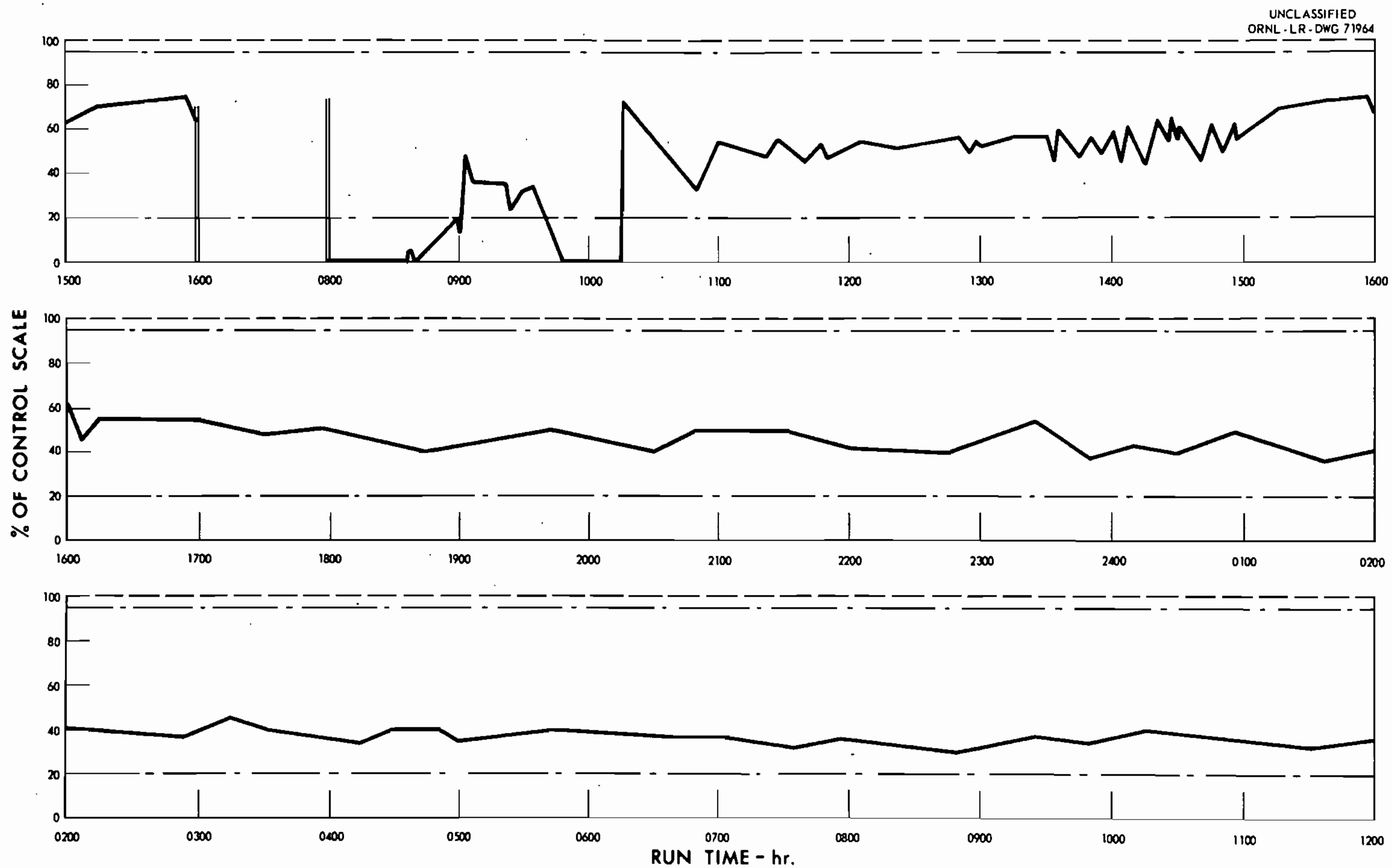


Calciner Liquid Level - Continuous - Darex

Limits 95-20% Controller Action Prob. 150 %

Reset 0 min

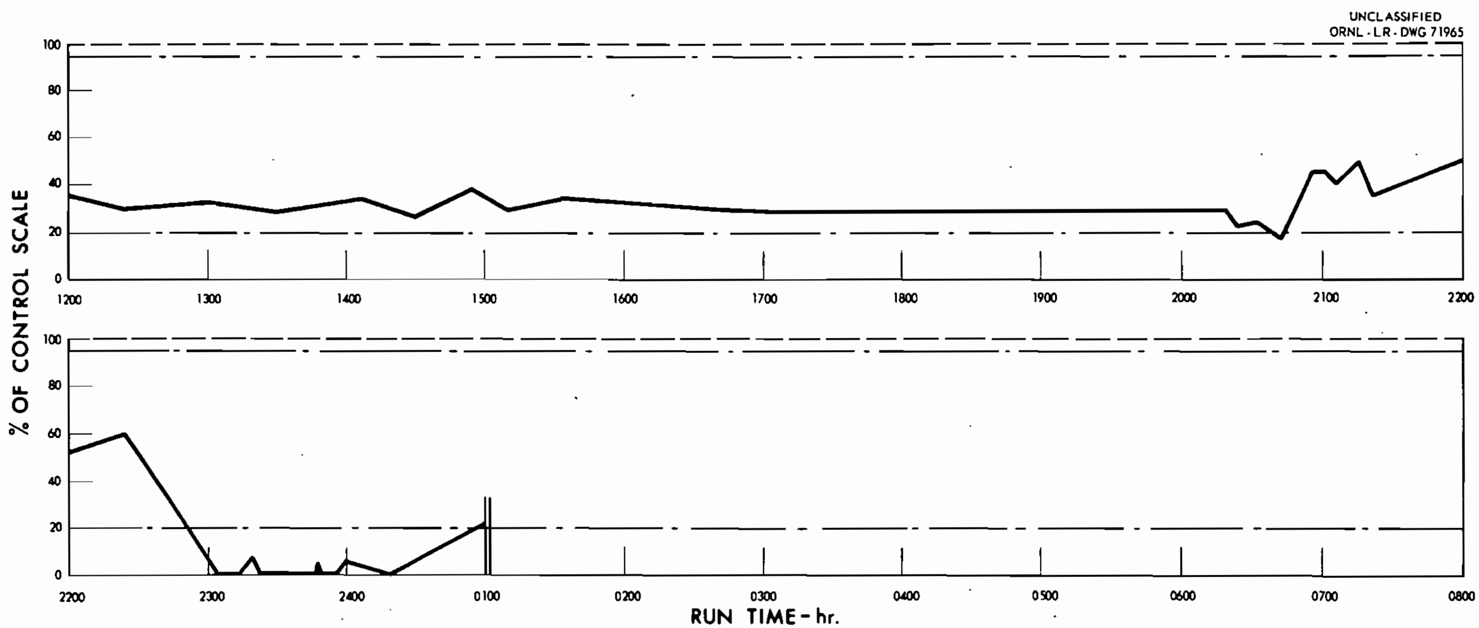
Fig. 17. Waste calcination & evaporation control - Test 57 - Calciner Liquid Level.



Calciner Liquid Level - Continuous - Darex

Limits 95-20% Controller Action Prob. 150 %
Reset 0 min

Fig. 17. Waste calcination & evaporation control - Test 57 - Calciner Liquid Level. (Cont'd.)

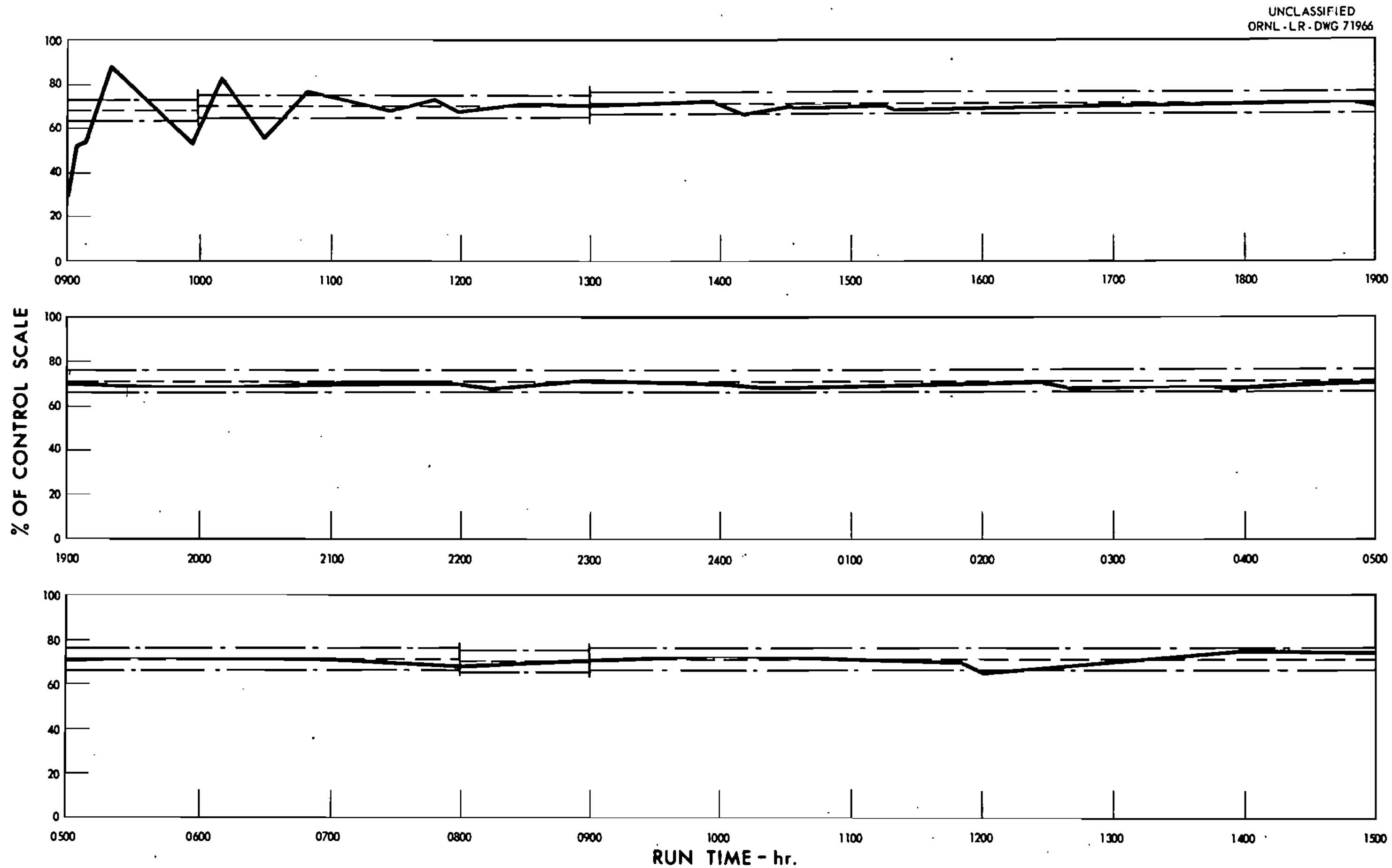


Calciner Liquid Level - Continuous - Darex

Limits 95 - 20% Controller Action Prob. 150 %

Reset 0 min

Fig. 17. Waste calcination & evaporation control - Test 57 - Calciner Liquid Level. (Cont'd.)

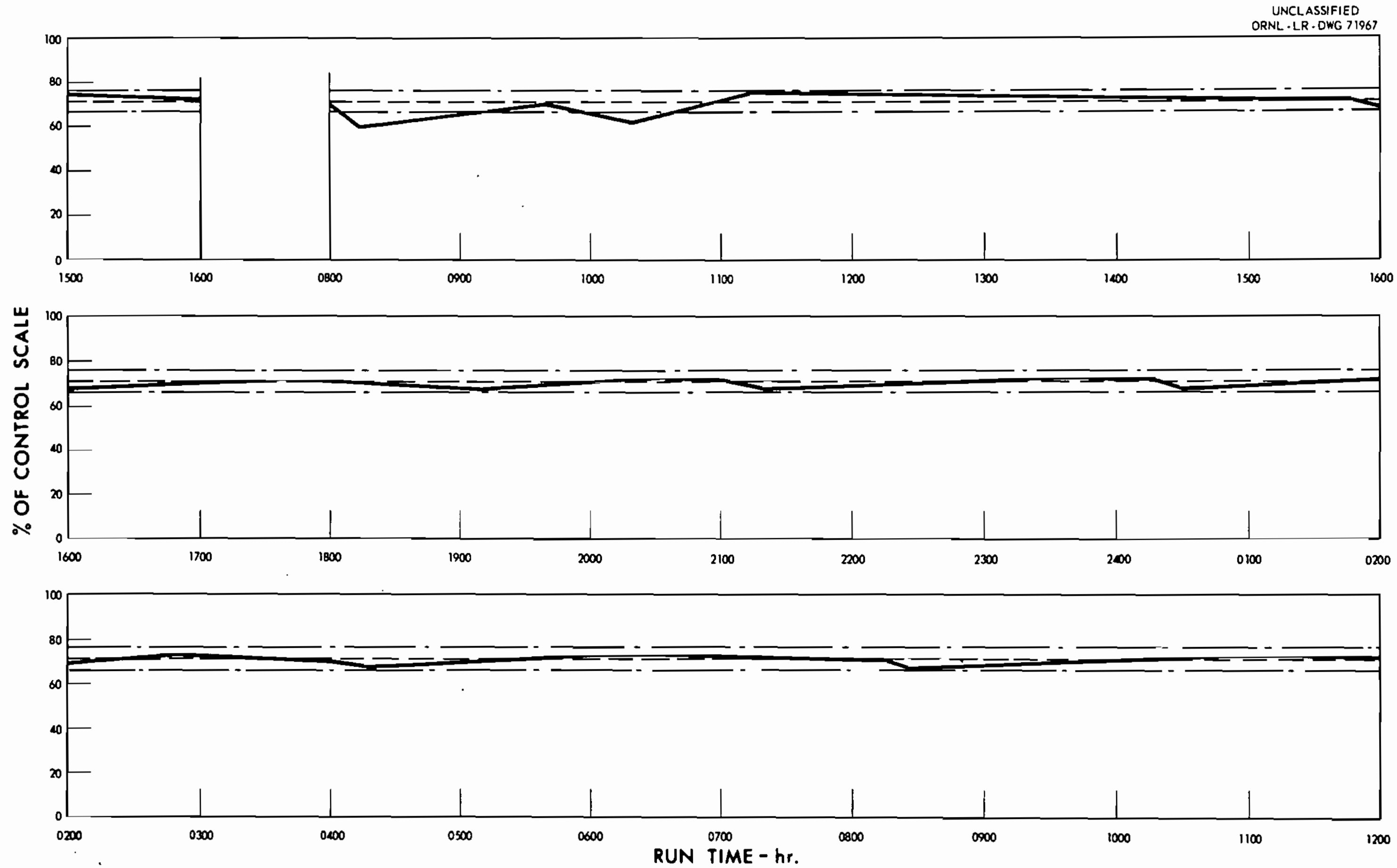


Evaporator Density - Continuous - Darex

Limits SP ±5% Controller Action Prob. 200 %

Reset 10 min

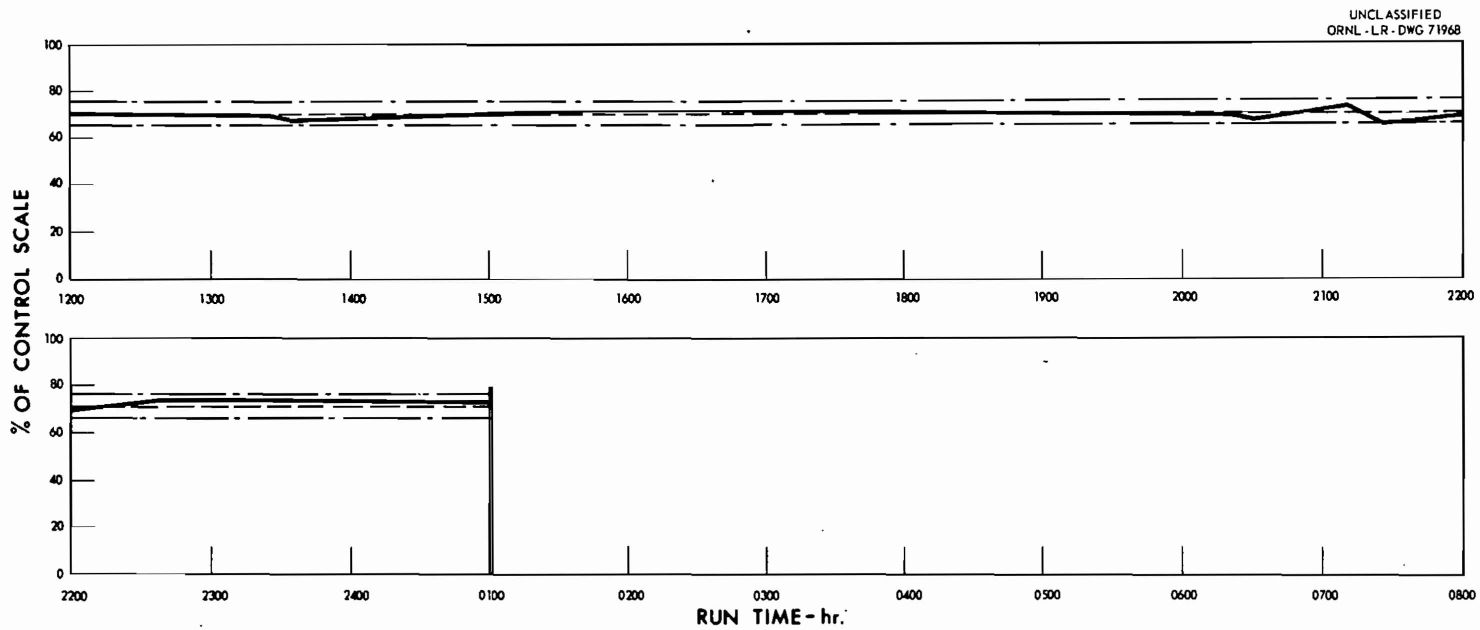
Fig. 17. Waste calcination & evaporation control - Test 57 - Evaporator Density.



Evaporator Density - Continuous - Darex

Limits SP ±5% Controller Action Prob. 200 %
Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 57 - Evaporator Density. (Cont'd.)

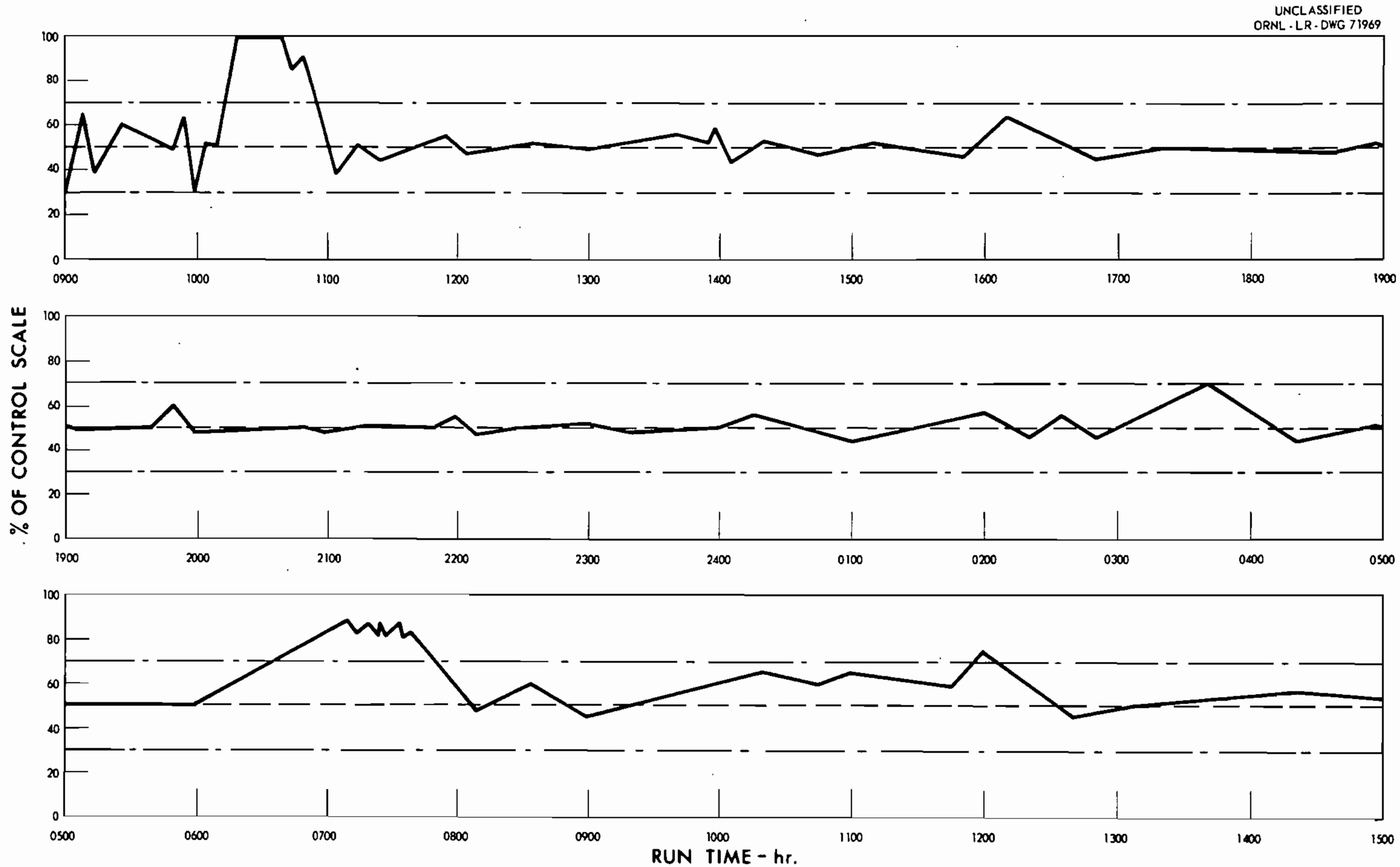


Evaporator Density - Continuous - Darex

Limits SP ±5% Controller Action Prob. 200 %

Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 57 - Evaporator Density. (Cont'd.)

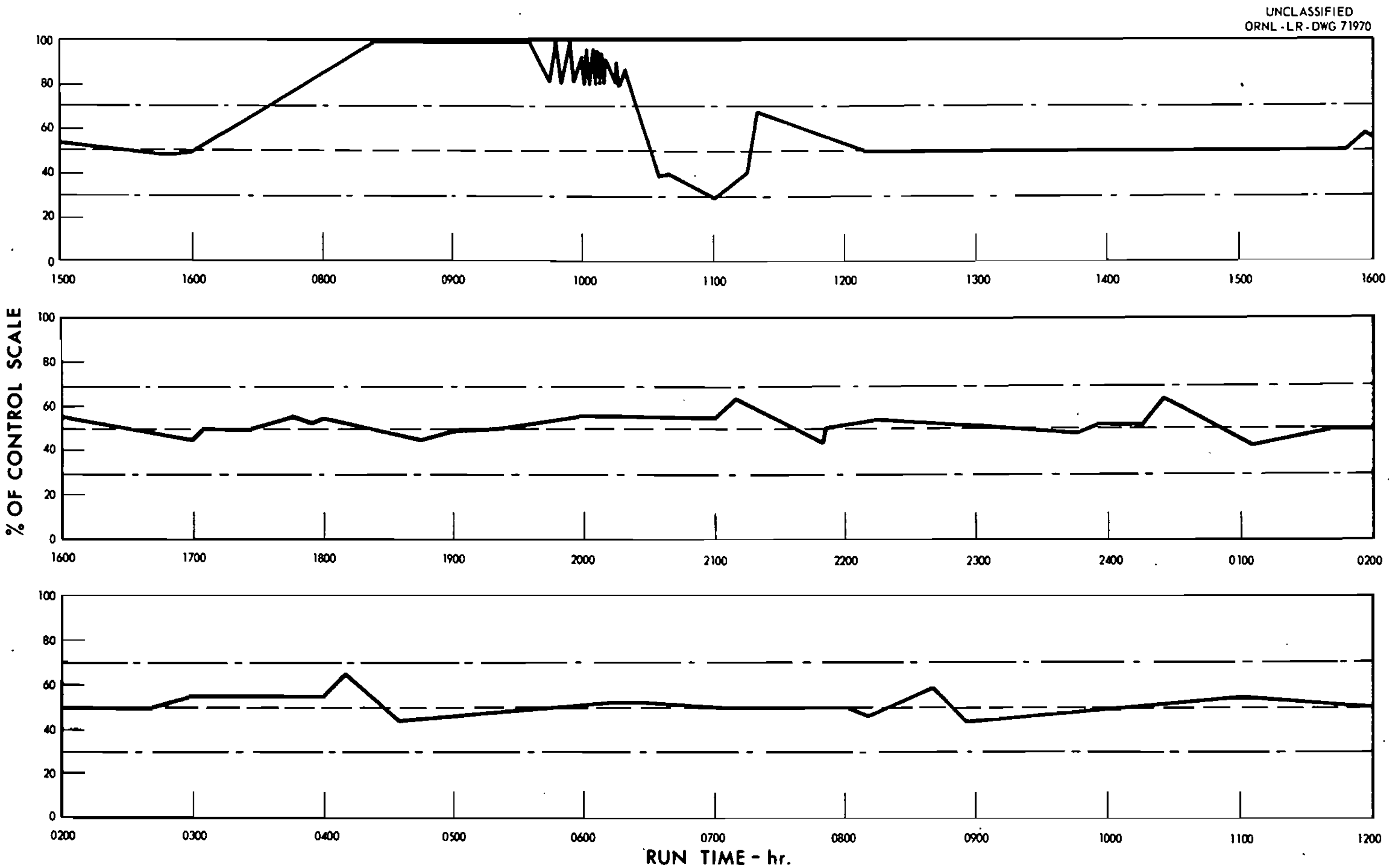


Evaporator Liquid Level - Continuous - Darex

Limits SP ±20% Controller Action Prob. 25%

Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 57 - Evaporator Liquid Level.

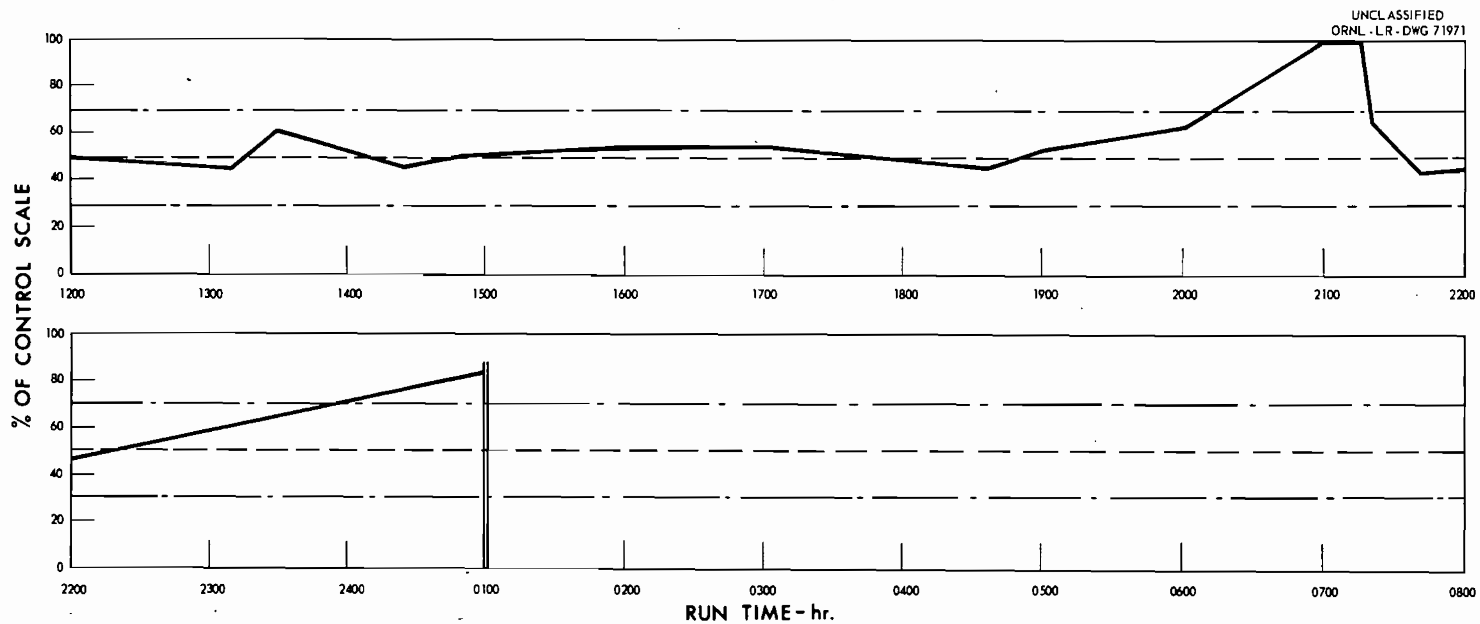


Evaporator Liquid Level - Continuous - Darex

Limits SP ±20% Controller Action Prob. 25 %

Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 57 - Evaporator Liquid Level. (Cont'd.)



Evaporator Liquid Level - Continuous - Darex

Limits SP ±20% Controller Action Prob. 25 %

Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 57 - Evaporator Liquid Level. (Cont'd.)

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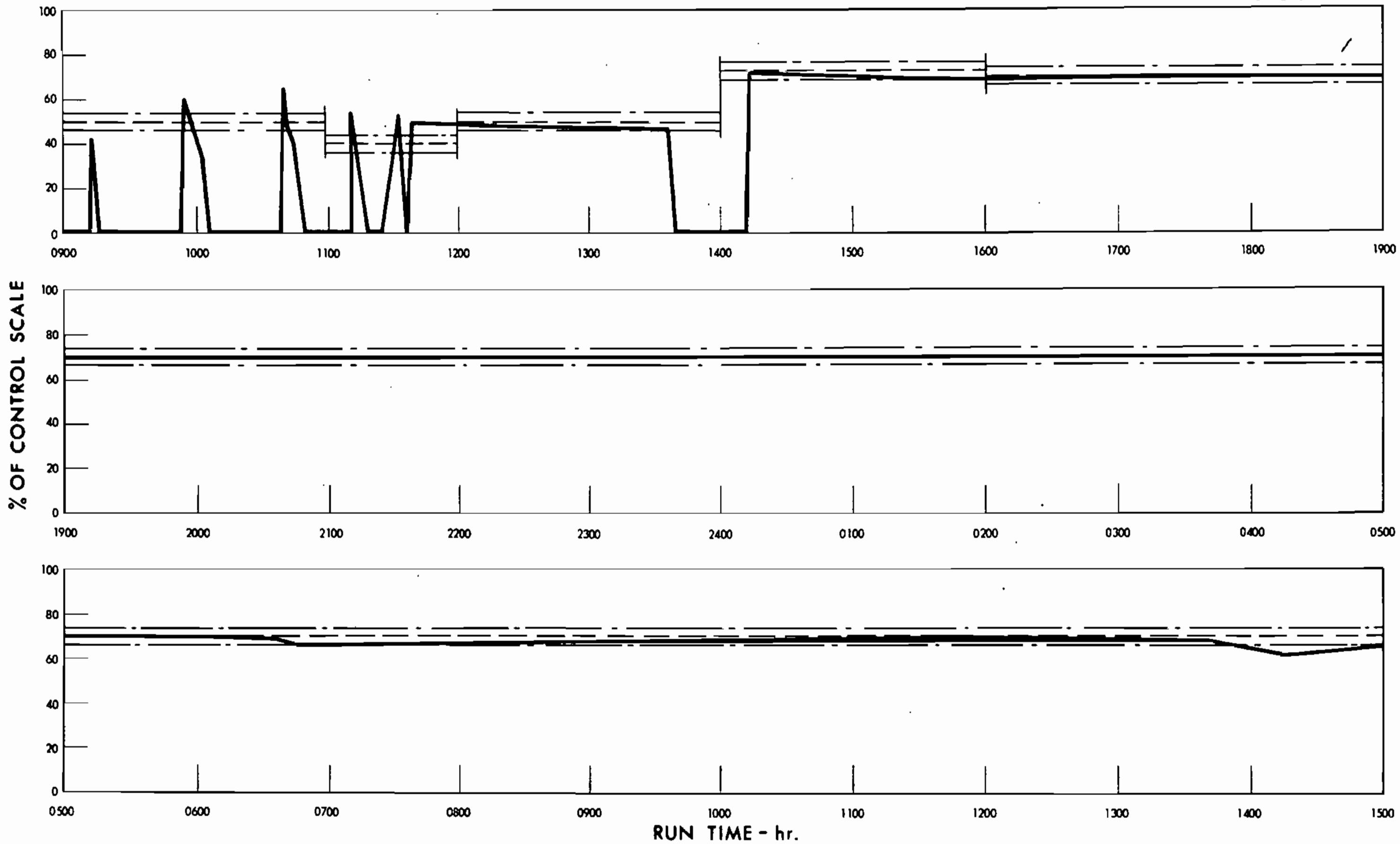
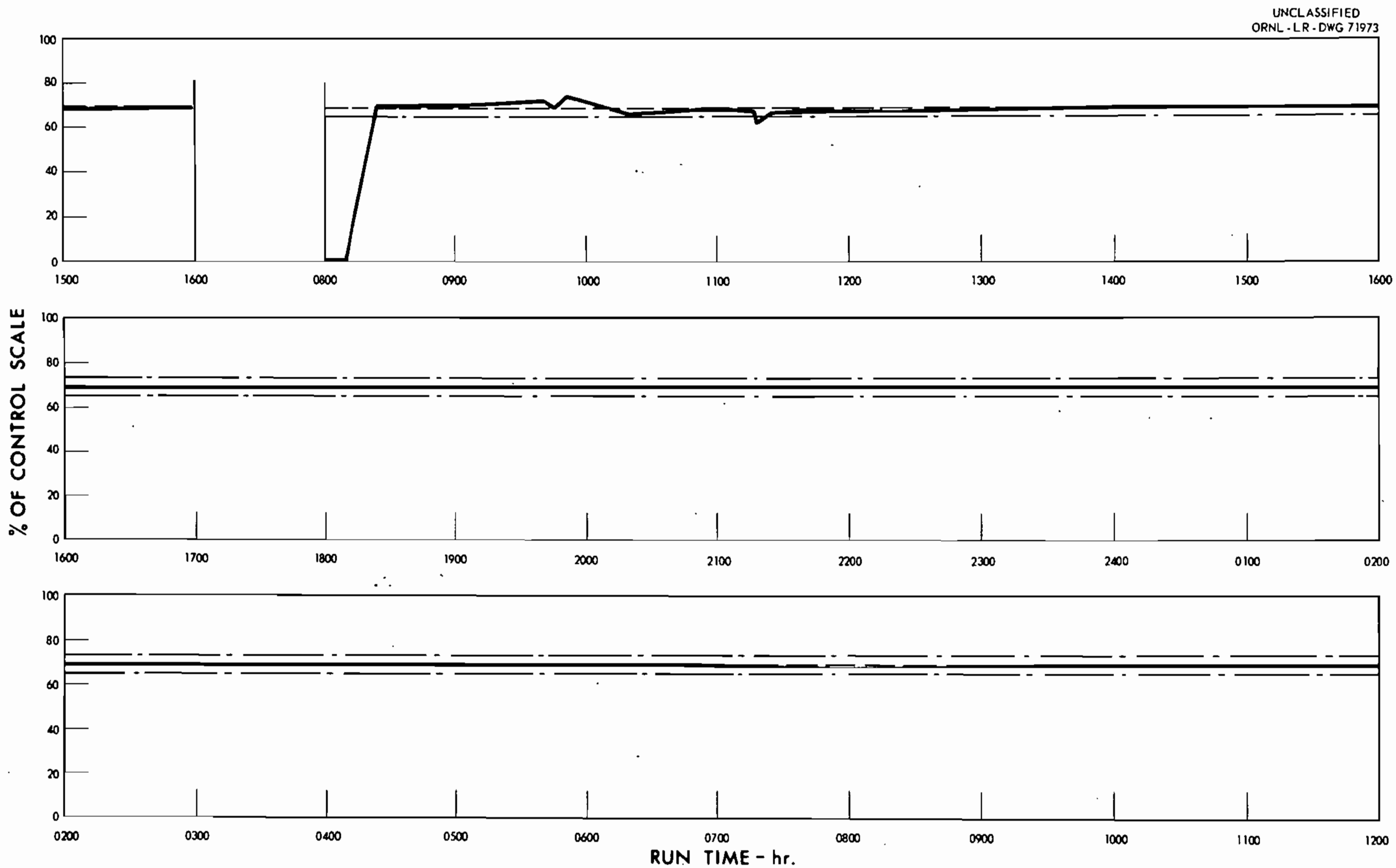


Evaporator Temperature - Continuous - Darex

Limits SP ±5% Controller Action Prob. 25 %

Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 57 - Evaporator Temperature.

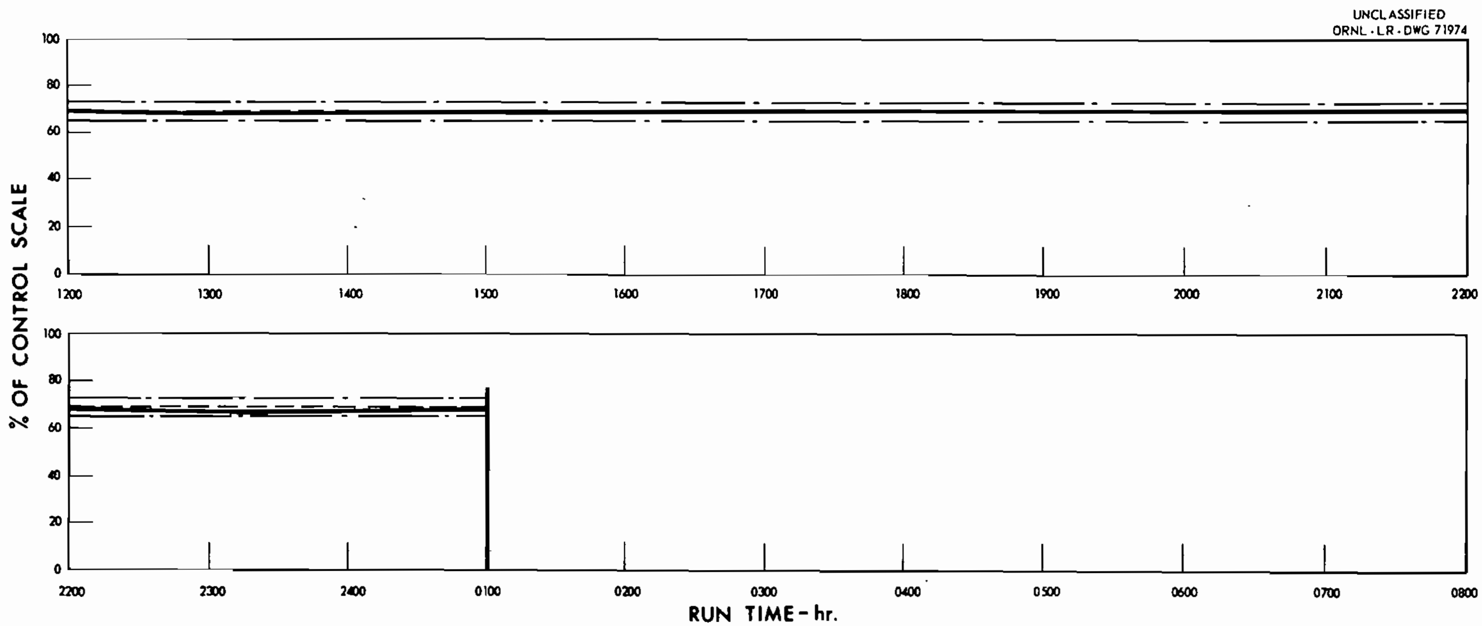


Evaporator Temperature - Continuous - Darex

Limits SP ±5% Controller Action Prob. 25 %

Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 57 - Evaporator Temperature. (Cont'd.)

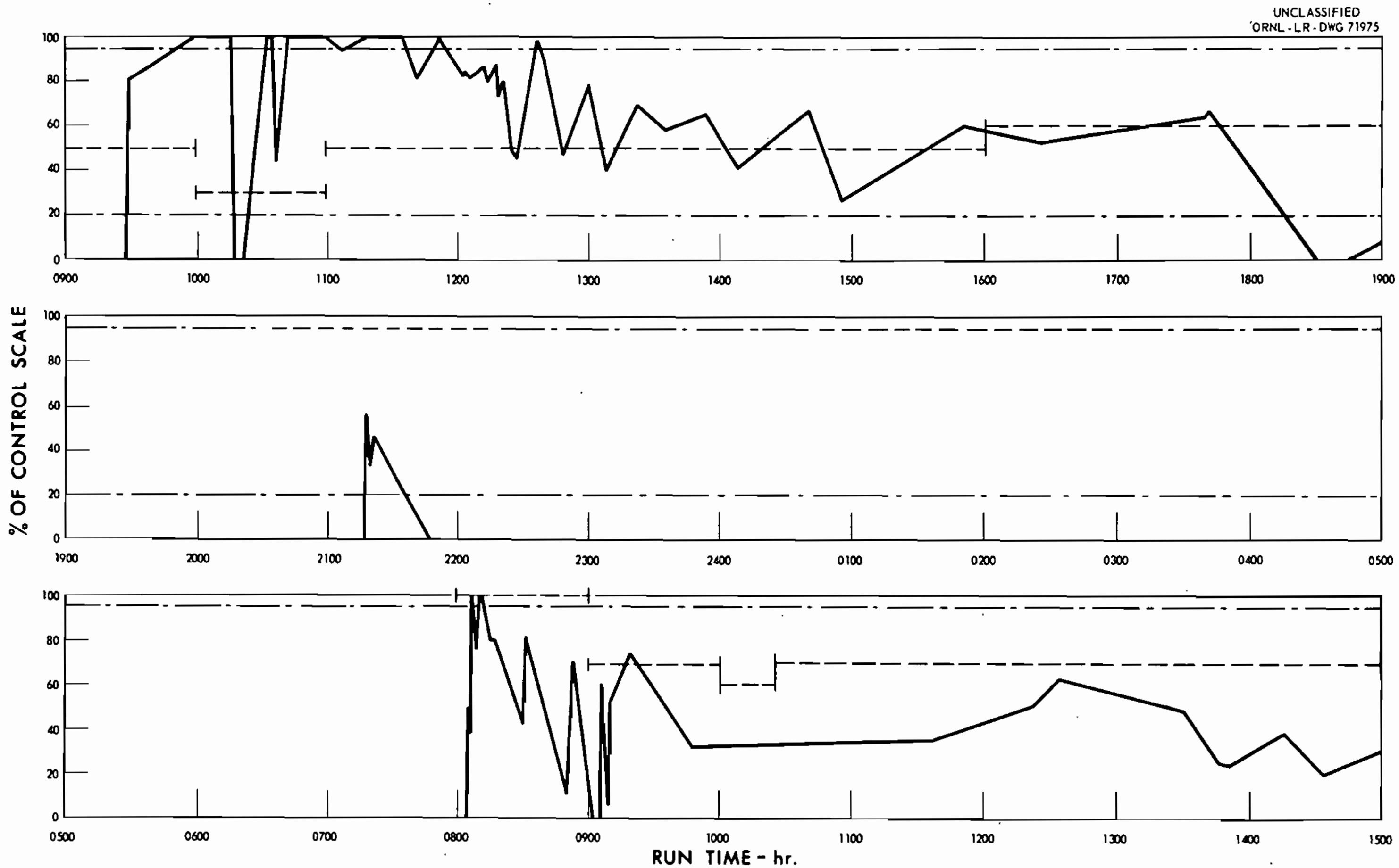


Evaporator Temperature - Continuous - Darex

Limits SP ±5% Controller Action Prob. 25 %

Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 57 - Evaporator Temperature. (Cont'd.)



Calciner Liquid Level - Continuous - Darex

Limits 95-20% Controller Action Prob. 200 %

Reset 0 min

Fig. 17. Waste calcination & evaporation control - Test 58 - Calciner Liquid Level.

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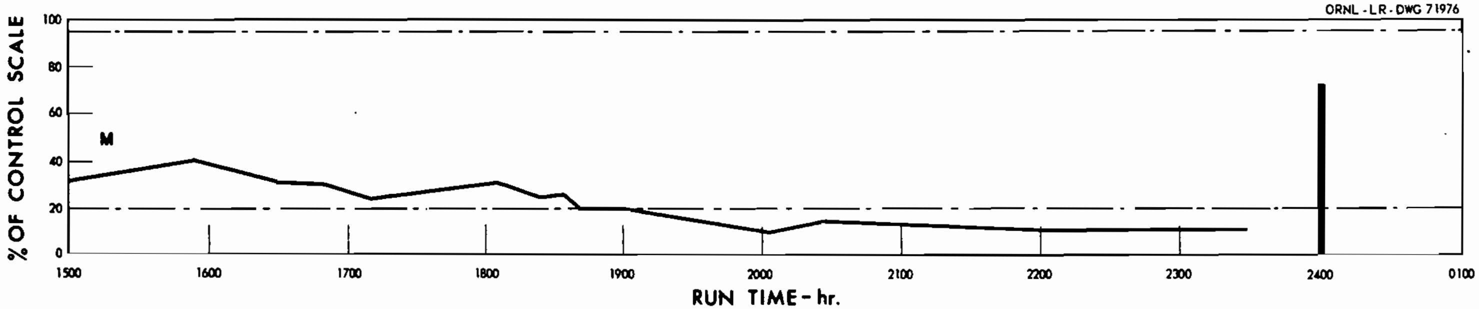
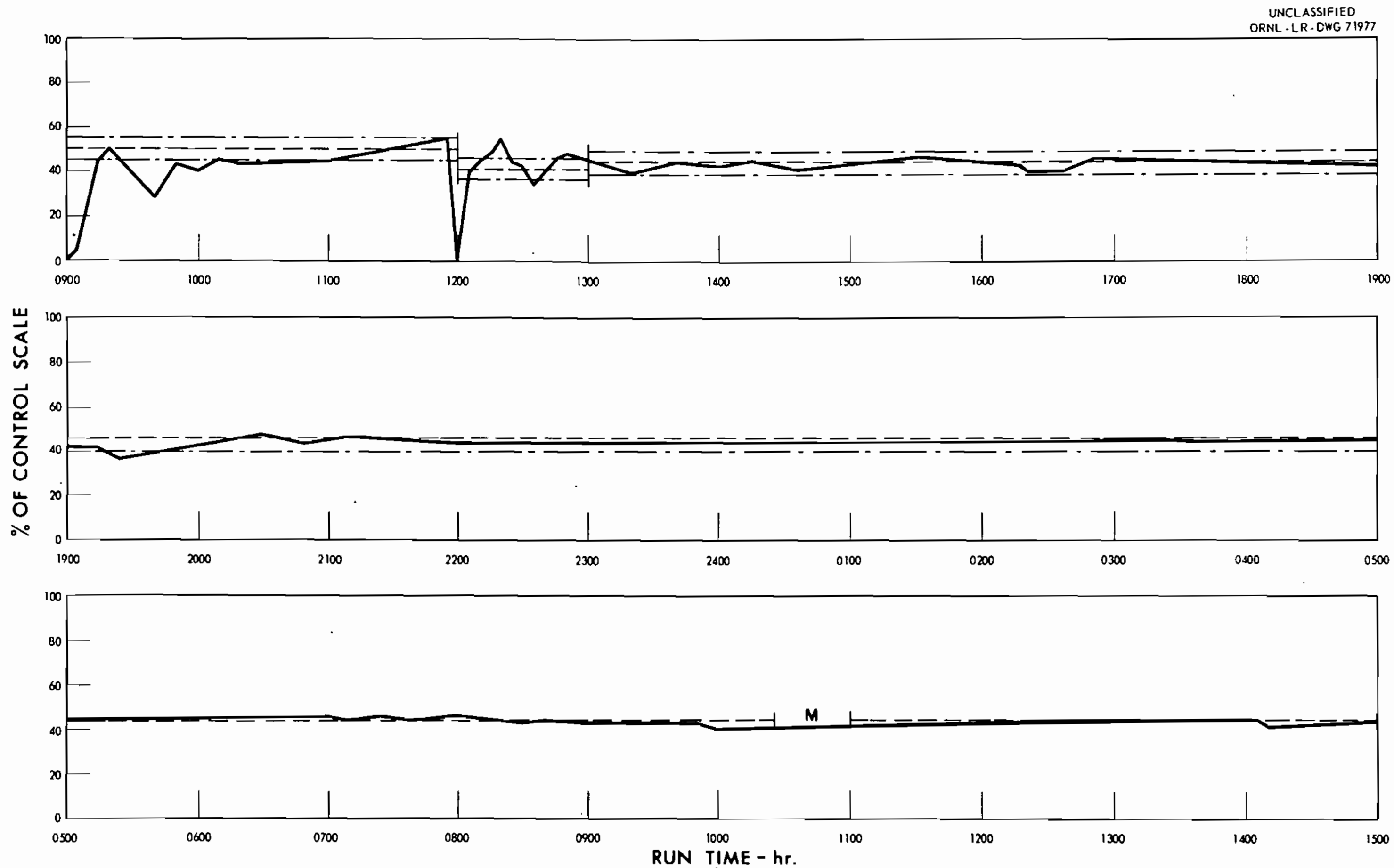


Calciner Liquid Level - Continuous - Darex

Limits 95-20% Controller Action Prob. 200%
Reset 0 min

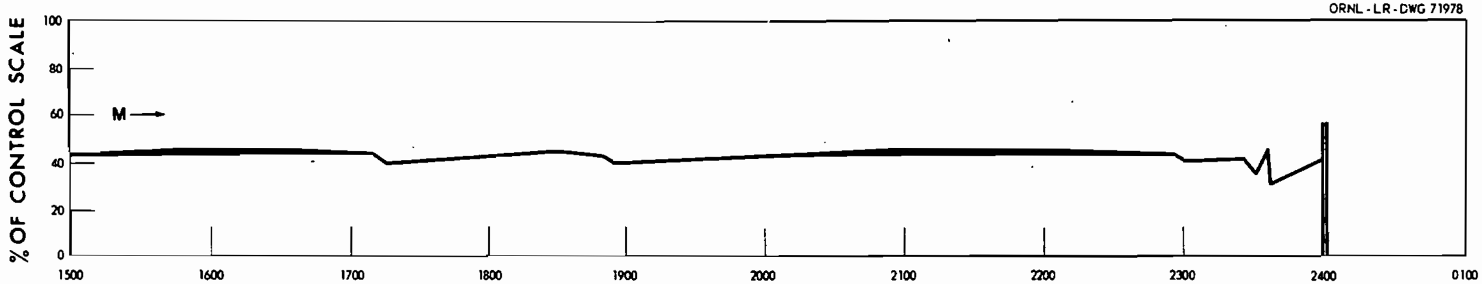
Fig. 17. Waste calcination & evaporation control - Test 58 - Calciner Liquid Level. (Cont'd.)



Evaporator Density - Continuous - Darex

Limits SP ±5% Controller Action Prob. 100 %
Reset 10 min

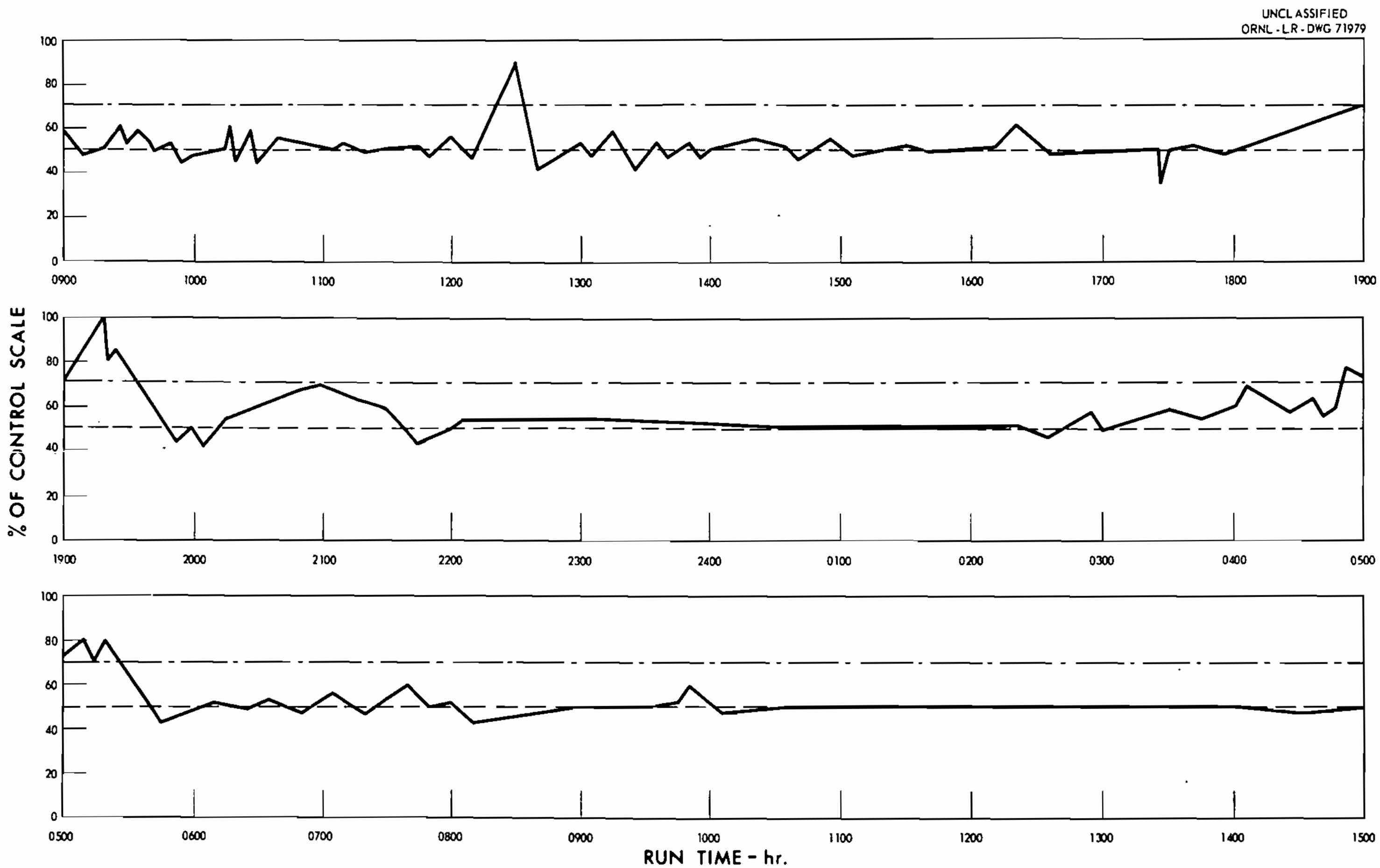
Fig. 17. Waste calcination & evaporation control - Test 58 - Evaporator Density.



Evaporator Density - Continuous - Darex

Limits SP ±5% Controller Action Prob. 100%
Reset 10 min

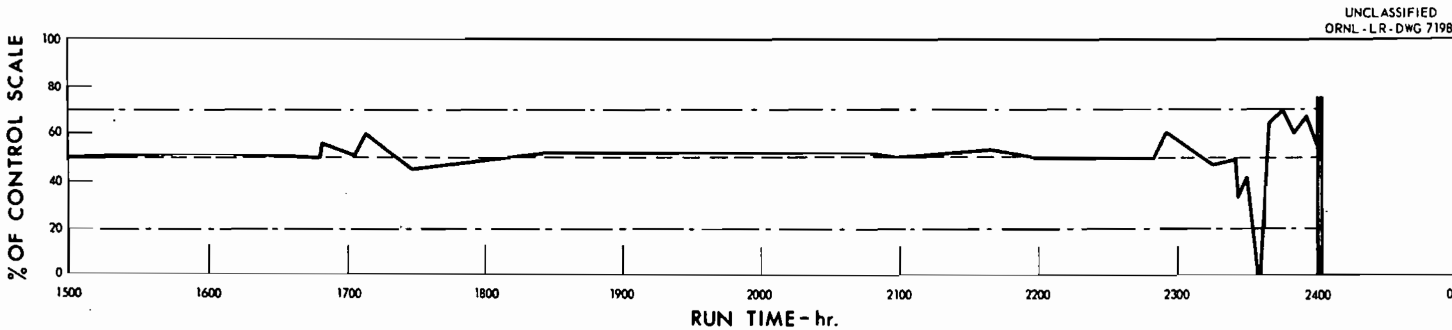
Fig. 17. Waste calcination & evaporation control - Test 58 - Evaporator Density. (Cont'd.)



Evaporator Liquid Level - Continuous - Darex

Limits SP ±20% Controller Action Prob. 25%
Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 58 - Evaporator Liquid Level.

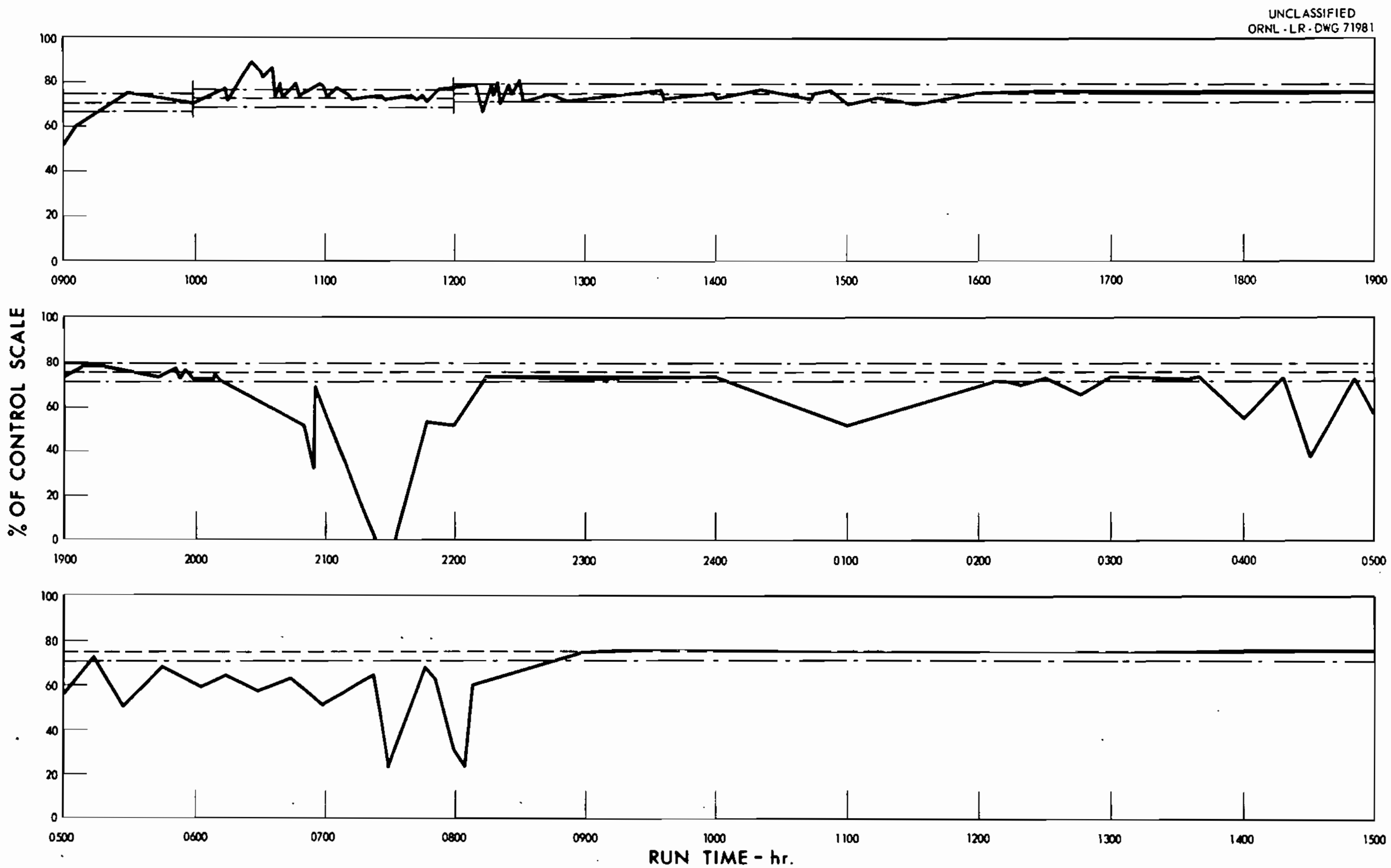


Evaporator Liquid Level - Continuous - Darex

Limits SP ±20% Controller Action Prob. 25%

Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 58 - Evaporator Liquid Level. (Cont'd.)

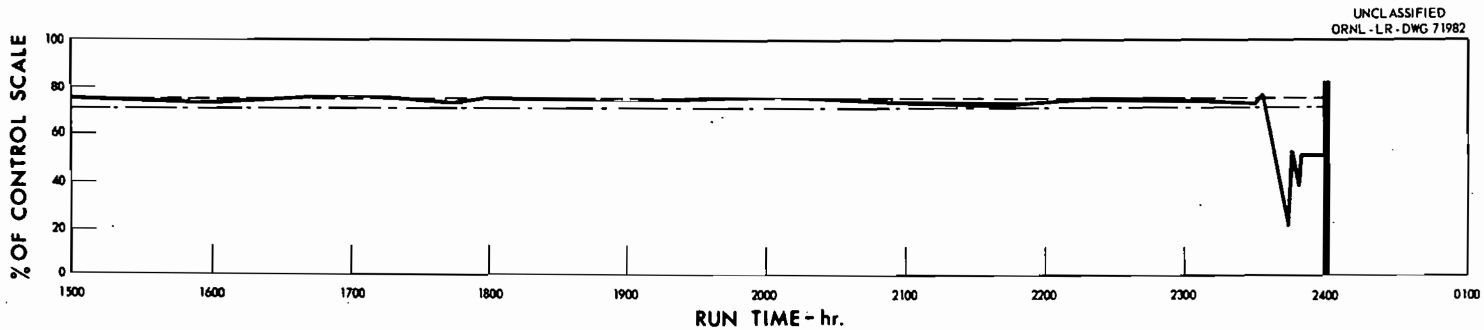


Evaporator Temperature - Continuous - Darex

Limits SP ±5% Controller Action Prob. 25%

Reset 8 min

Fig. 17. Waste calcination & evaporation control - Test 58 - Evaporator Temperature.

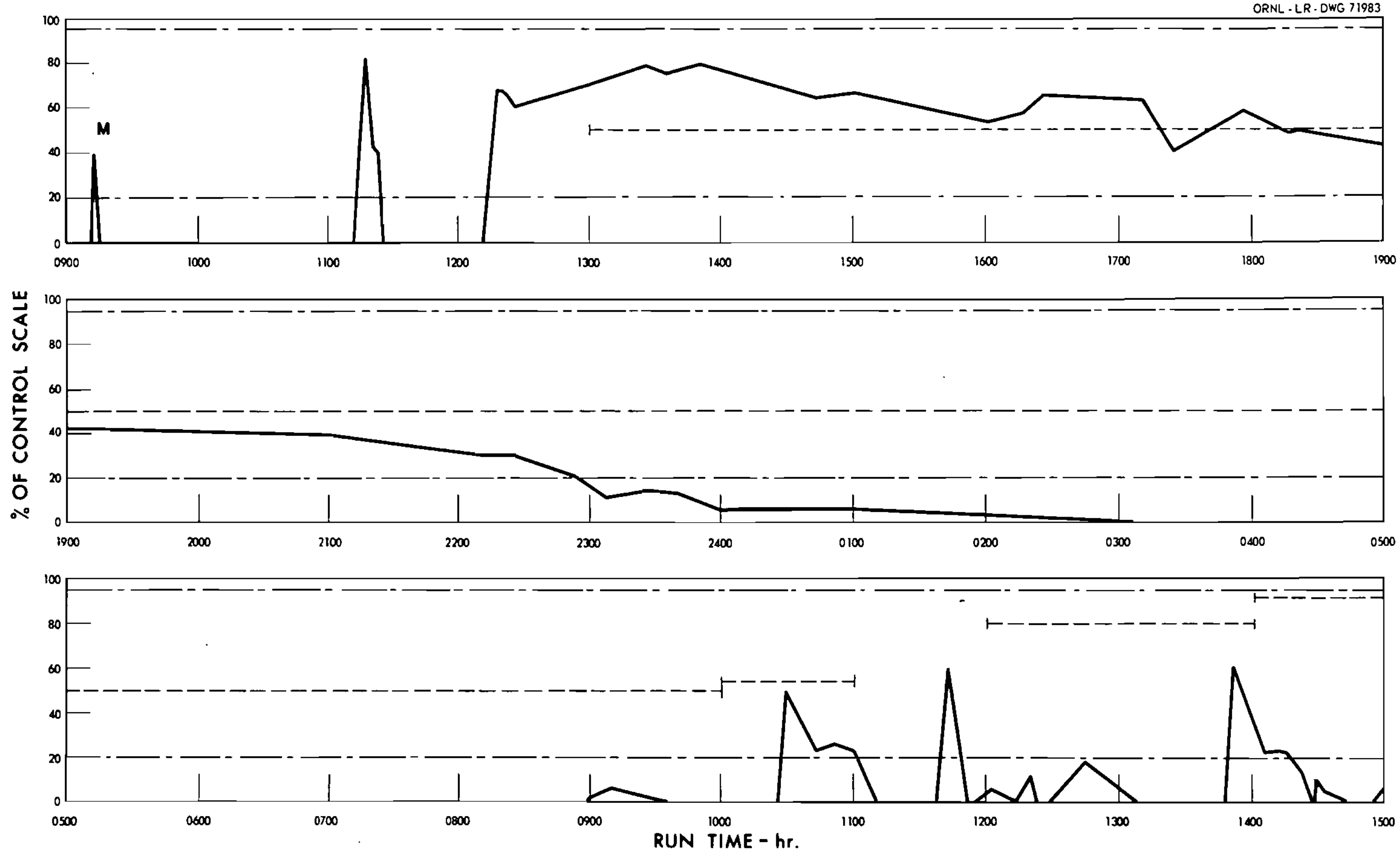


Evaporator Temperature - Continuous - Darex

Limits SP ±5% Controller Action Prob. 25 %

Reset 8 min

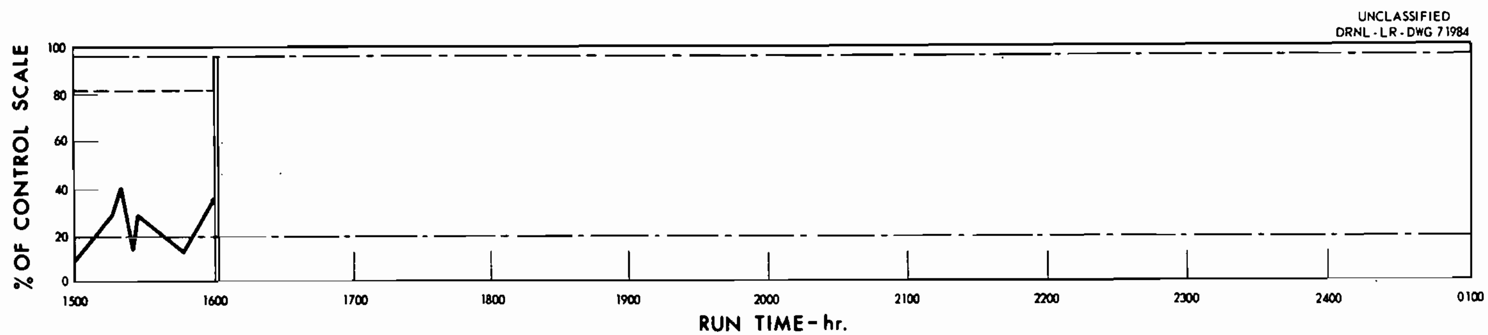
Fig. 17. Waste calcination & evaporation control - Test 58 - Evaporator Temperature. (Cont'd.)



Calciner Liquid Level - Batch - TBP-25

Limits 95-20% Controller Action Prob. 200 %
Reset 0 min

Fig. 17. Waste calcination & evaporation control - Test 59 - Calciner Liquid Level.



Calciner Liquid Level - Batch - TBP - 25
Limits 95 - 20% Controller Action Prob. 200 %
Reset 0 min

Fig. 17. Waste calcination & evaporation control - Test 59 - Calciner Liquid Level. (Cont'd.)

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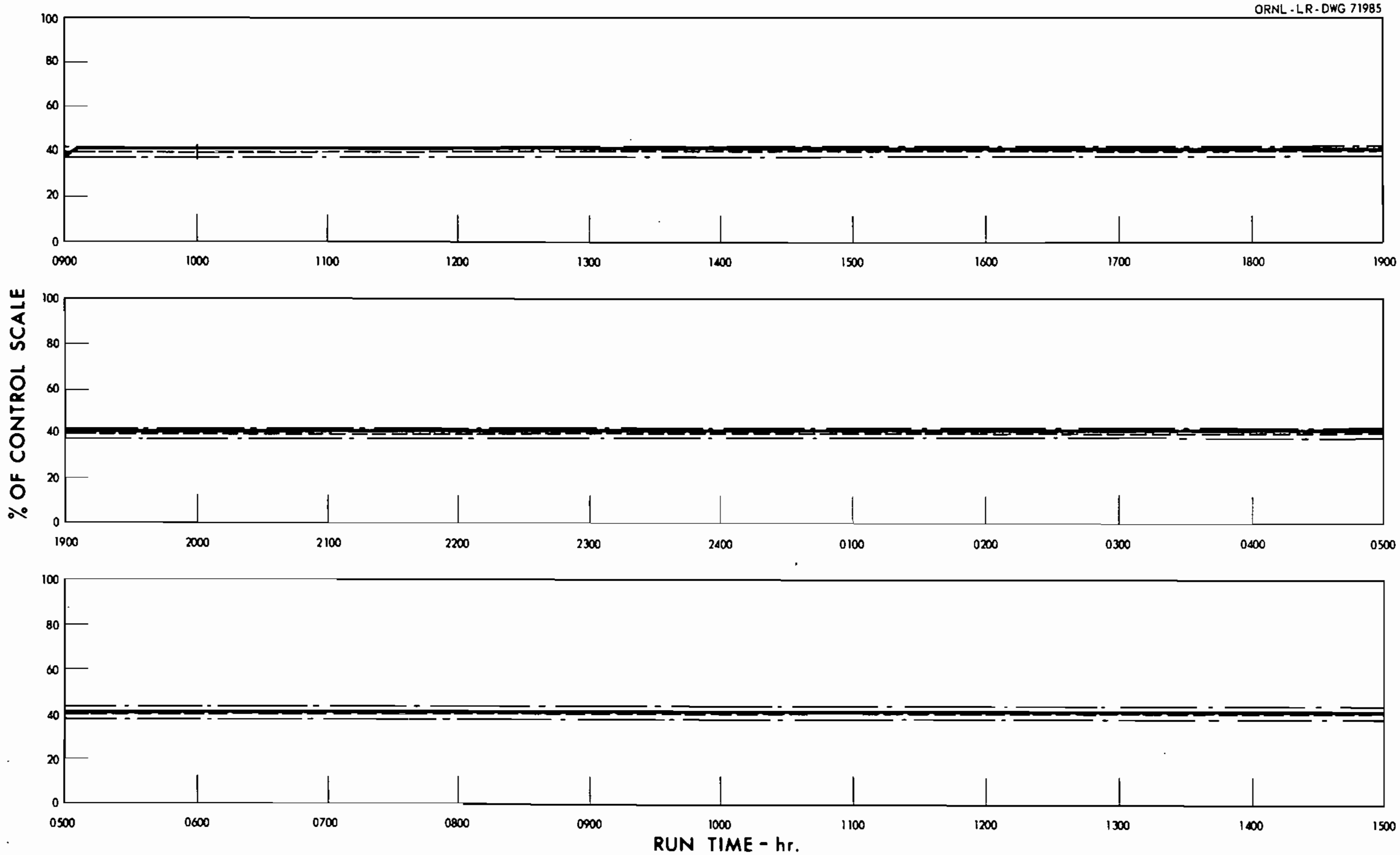
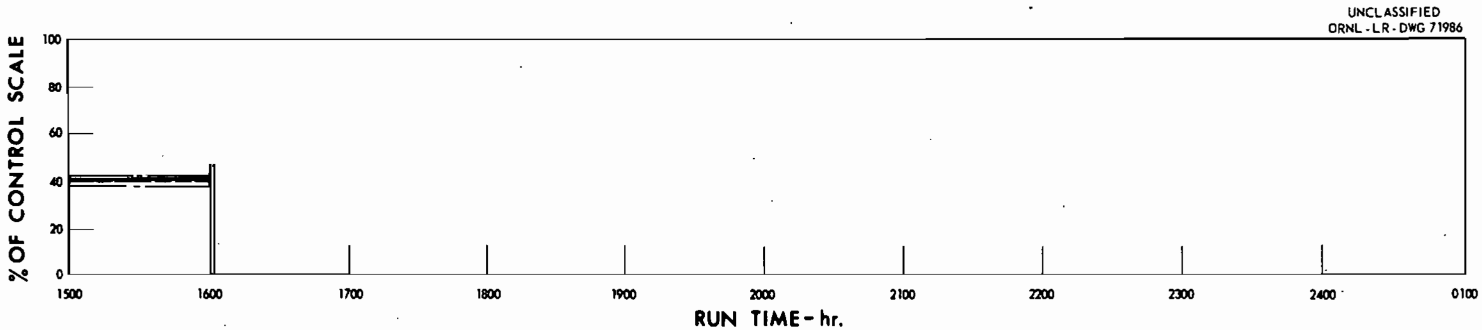


Evaporator Pressure - Batch - TBP - 25

Limits SP ± 2% Controller Action Prob. 10%
Reset 0.1 min

Fig. 17. Waste calcination & evaporation control - Test 59 - Evaporator Pressure.

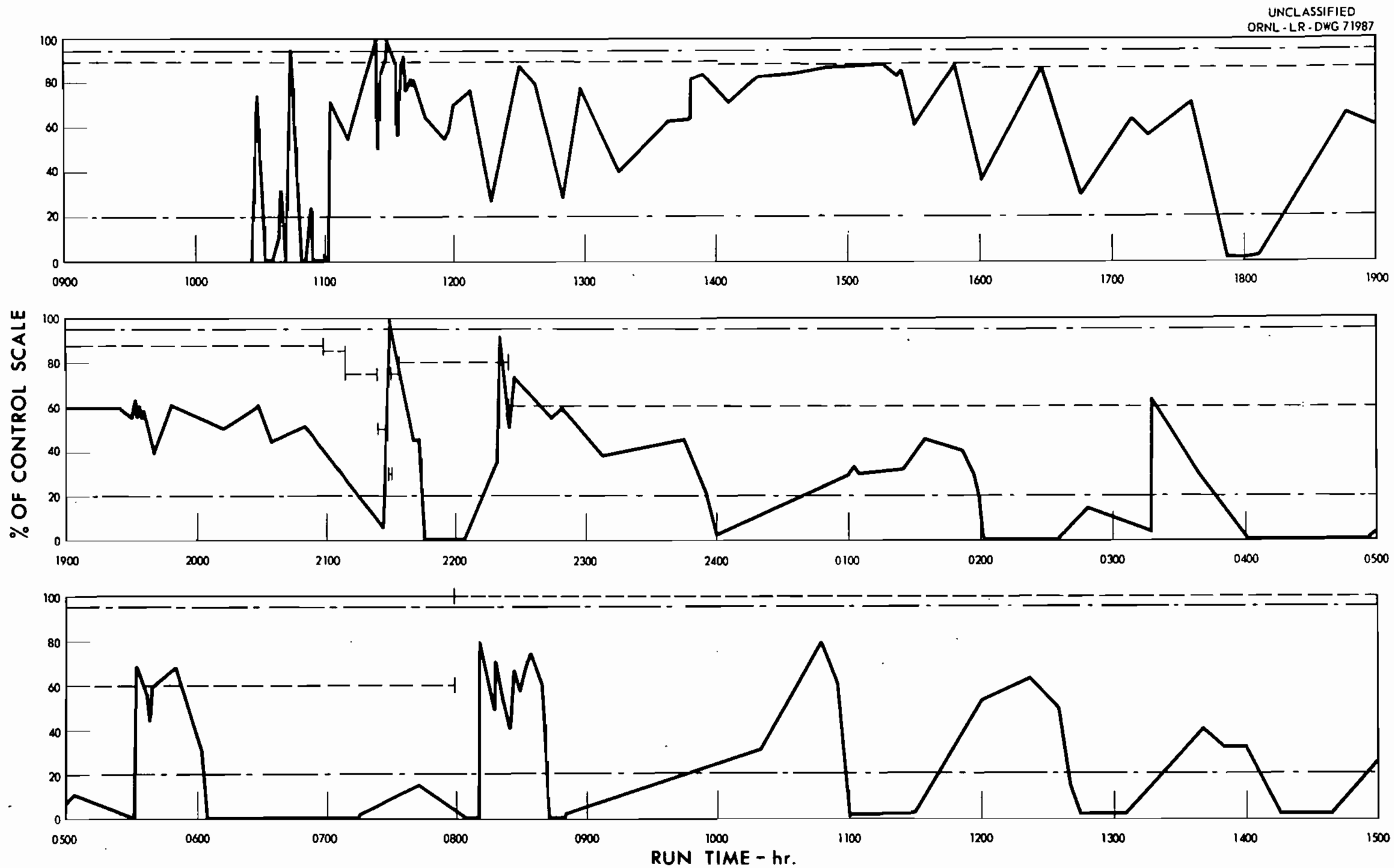


Evaporator Pressure - Batch- TBP-25

Limits SP ±2% Controller Action Prob. 10 %

Reset 0.1 min

Fig. 17. Waste calcination & evaporation control - Test 59 - Evaporator Pressure. (Cont'd.)

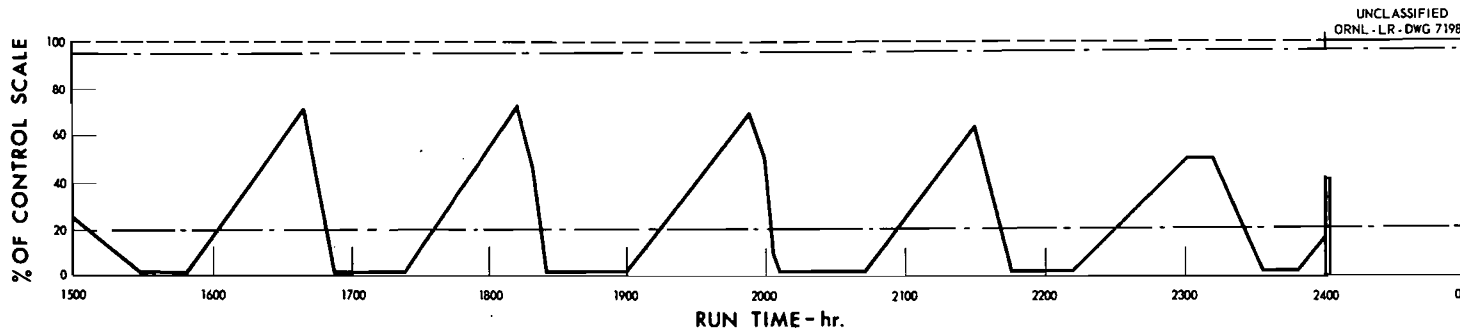


Calciner Liquid Level - Batch - Darex

Limits 95-20% Controller Action Prob. 100 %

Reset 0 min

Fig. 17. Waste calcination & evaporation control - Test 60- Calciner Liquid Level.

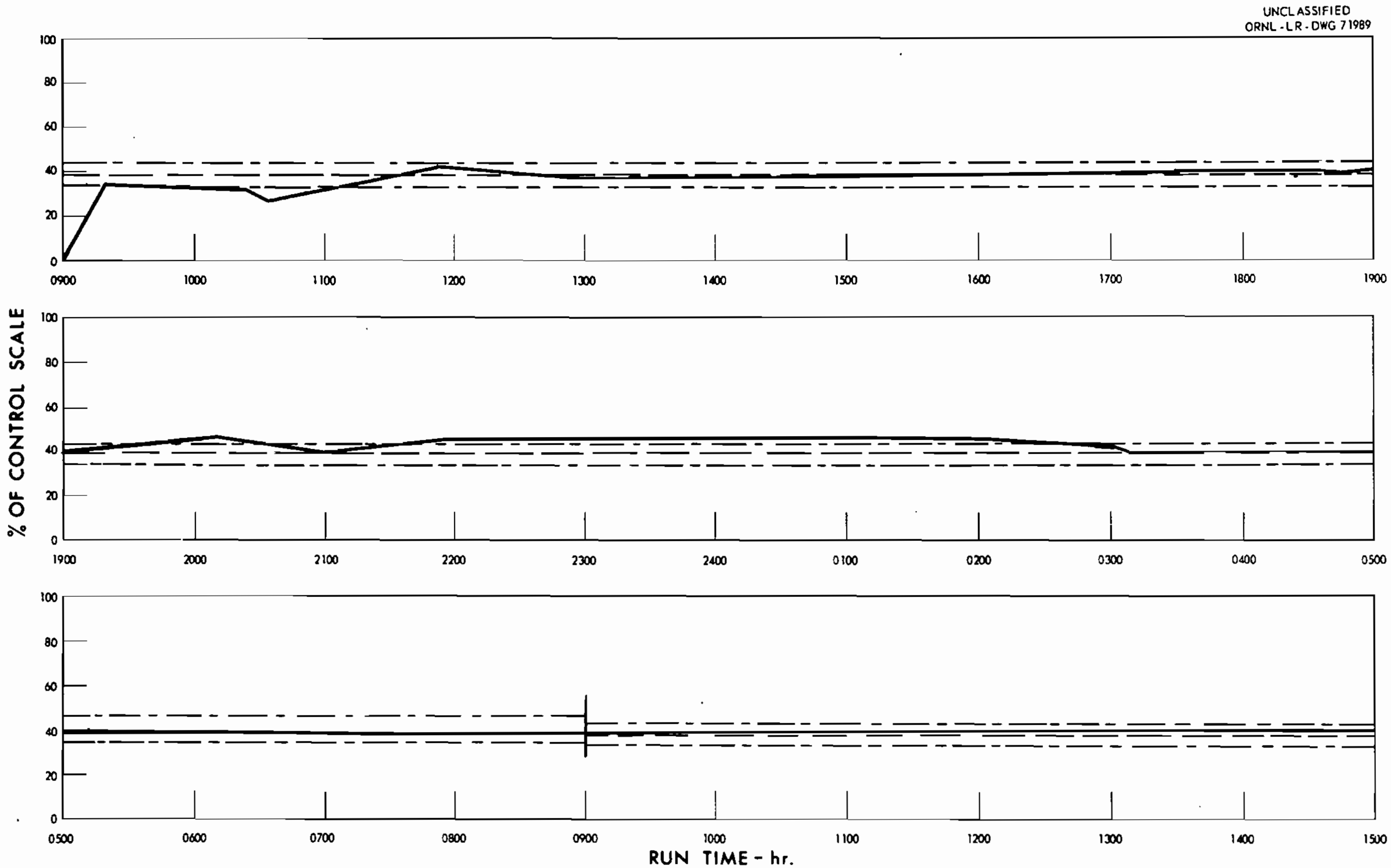


Calciner Liquid Level - Batch - Darex

Limits 95-20% Controller Action Prob. 100 %

Reset 0 min

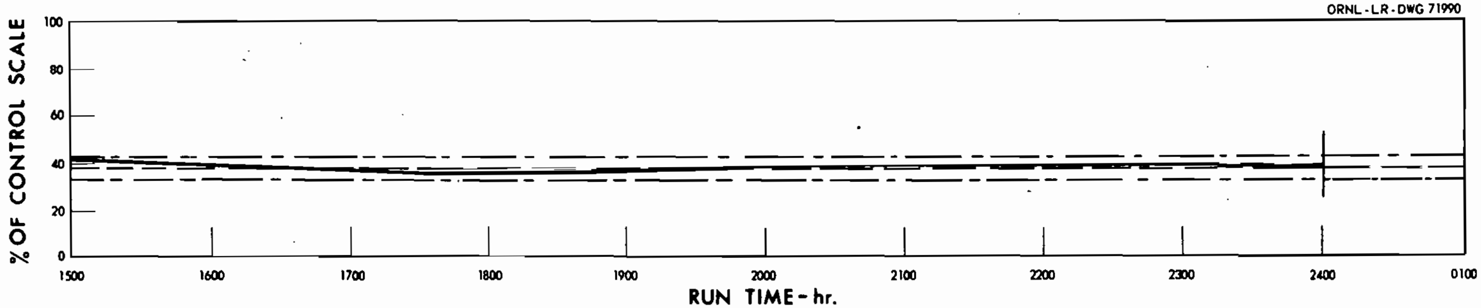
Fig. 17. Waste calcination & evaporation control - Test 60 - Calciner Liquid Level. (Cont'd.)



Evaporator Density - Batch - Darex

Limits SP ±5% Controller Action Prob. 100 %
Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 60- Evaporator Density.

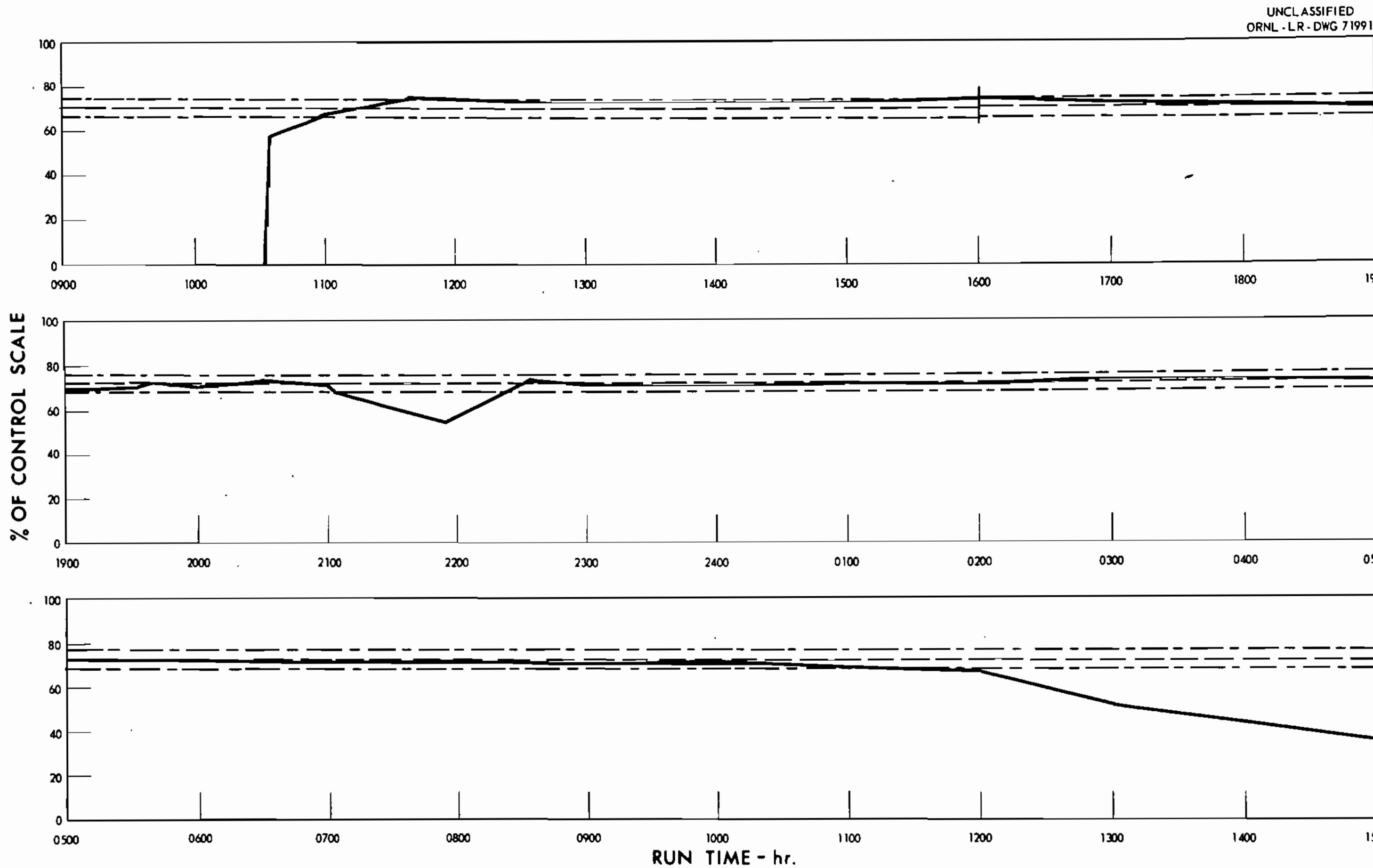


Evaporator Density - Batch - Darex

Limits SP ±5% Controller Action Prob. 100 %

Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 60- Evaporator Density. (Cont'd.)

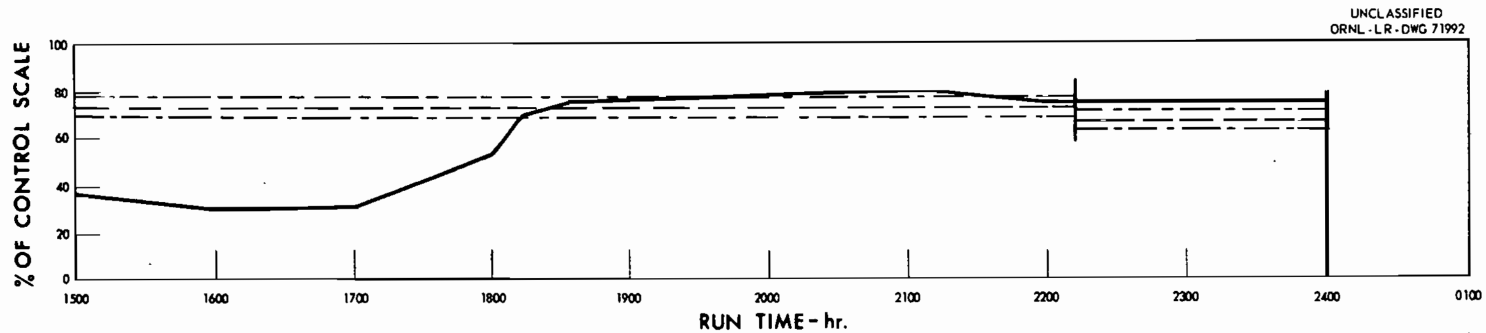


Evaporator Temperature - Batch - Darex

Limits SP ± 5% Controller Action Prob. 25 %

Reset 8 min

Fig. 17. Waste calcination & evaporation control - Test 60 - Evaporator Temperature.

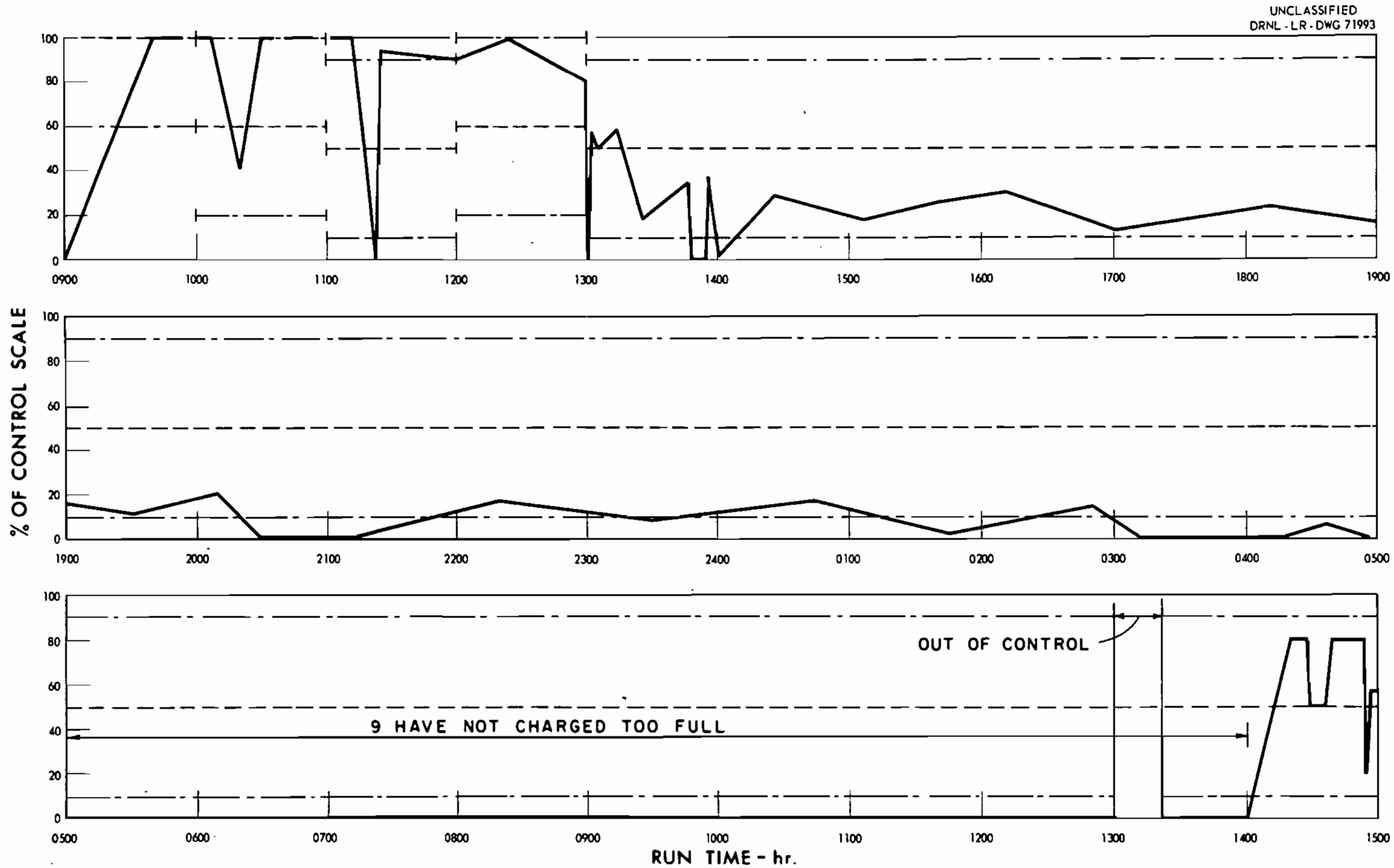


Evaporator Temperature - Batch - Darex

Limits SP ± 5% Controller Action Prob. 25%

Reset 8 min

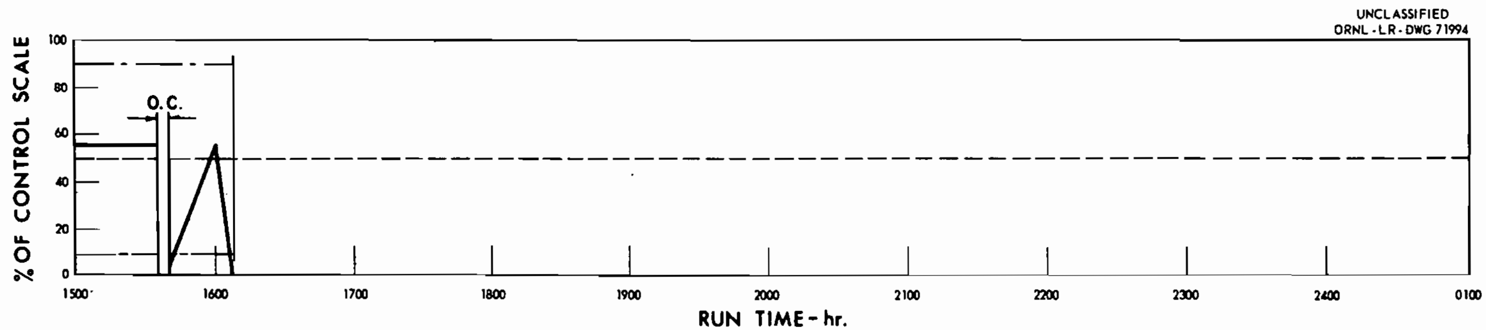
Fig. 17. Waste calcination & evaporation control - Test 60 - Evaporator Temperature. (Cont'd.)



Calciner Liquid Level - Batch - Darex

Limits 95-20% Controller Action Prob. 220 %
Reset 0 min

Fig. 17. Waste calcination & evaporation control - Test 61 - Calciner Liquid Level.

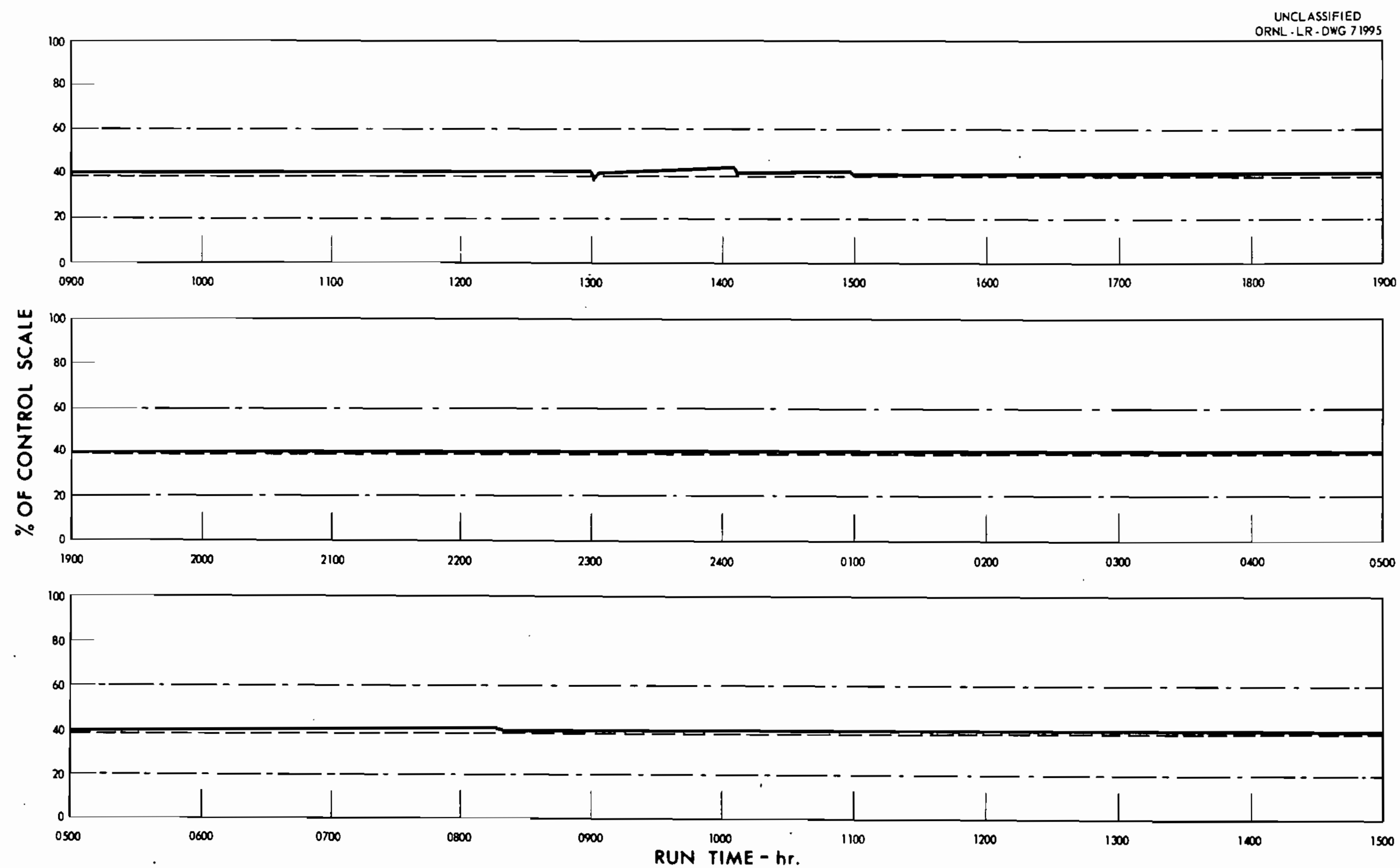


Calciner Liquid Level - Batch - Darex

Limits 95-20% Controller Action Prob. 220 %

Reset 0 min

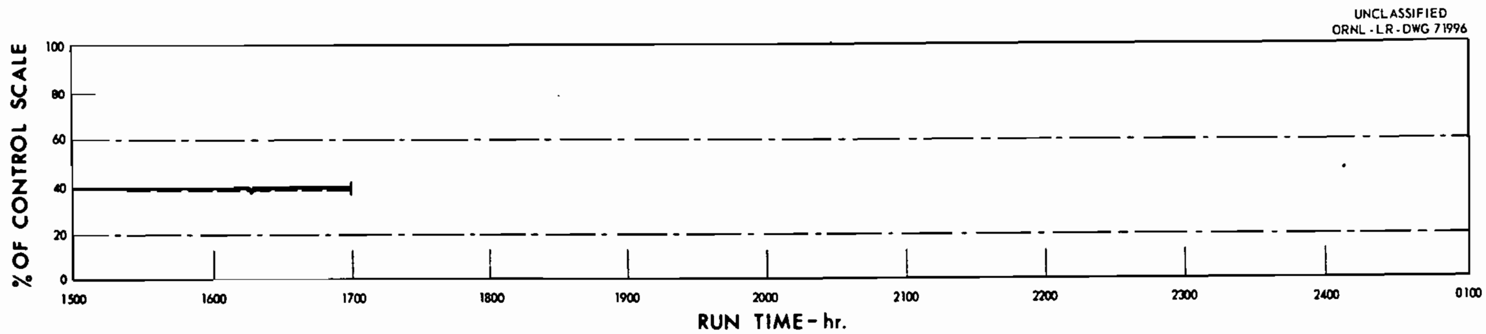
Fig. 17. Waste calcination & evaporation control - Test 61 - Calciner Liquid Level. (Cont'd.)



Evaporator Pressure - Batch - Darex

Limits SP ±2% Controller Action Prob. 25 %
Reset 1 min

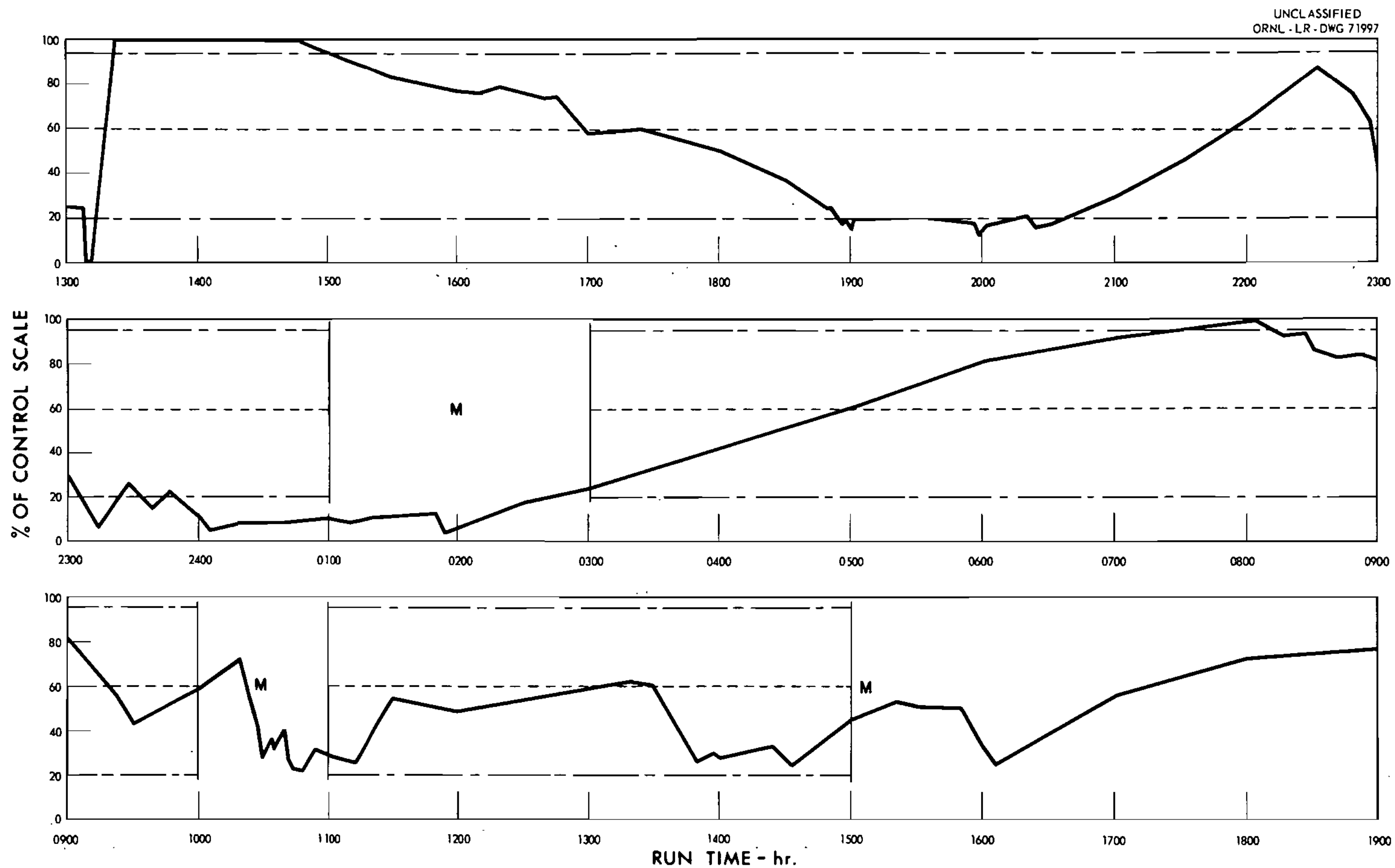
Fig. 17. Waste calcination & evaporation control - Test 61 - Evaporator Pressure.



Evaporator Pressure - Batch - Darex

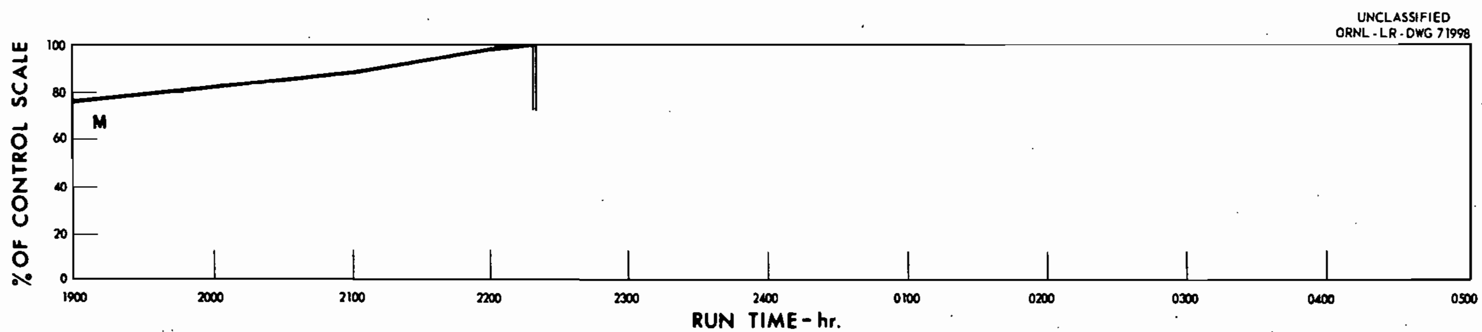
Limits SP ±2% Controller Action Prob. 25%
Reset 1 min

Fig. 17. Waste calcination & evaporation control - Test 61 - Evaporator Pressure. (Cont'd.)



Calciner Liquid Level - Continuous - TBP-25
Limits 95-20% Controller Action Prob. 200%
Reset 240 min

Fig. 17. Waste calcination & evaporation control - Test 62 - Calciner Liquid Level.



Calciner Liquid Level - Continuous - TBP-25

Limits 95-20% Controller Action Prob. 200%
Reset 240 min

Fig. 17. Waste calcination & evaporation control - Test 62 - Calciner Liquid Level. (Cont'd.)

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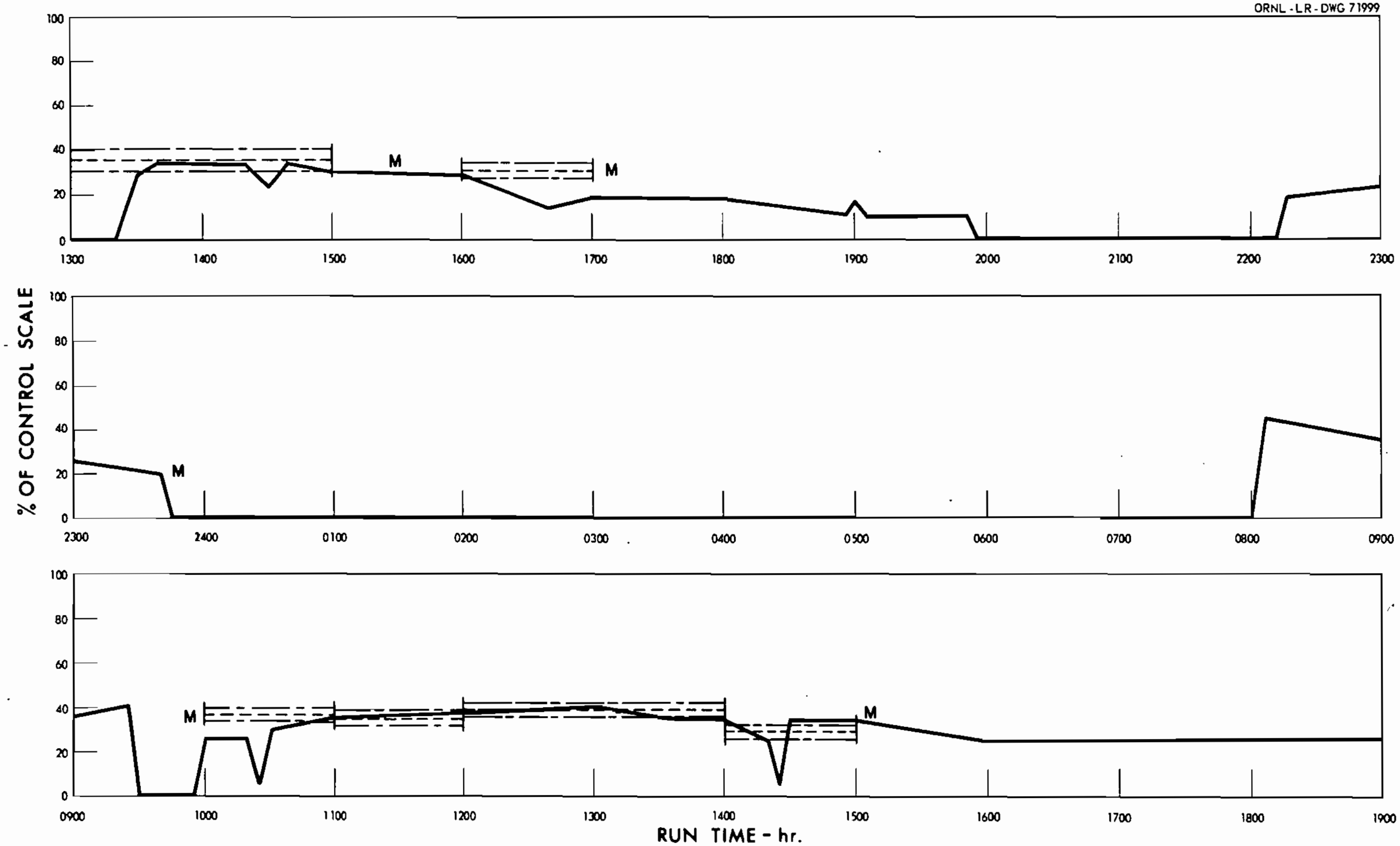

Evaporator Density - Continuous - TBP - 25

Limits SP ±5% Controller Action Prob. 100 %
Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 62 - Evaporator Density.

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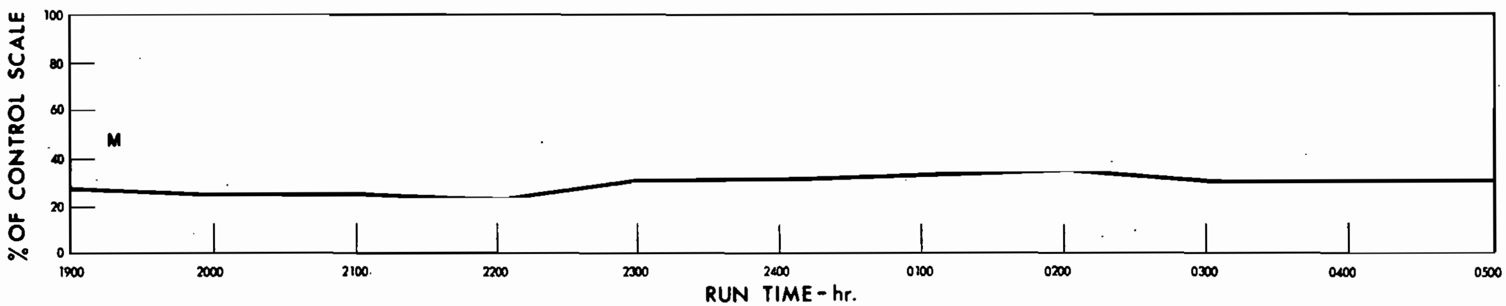
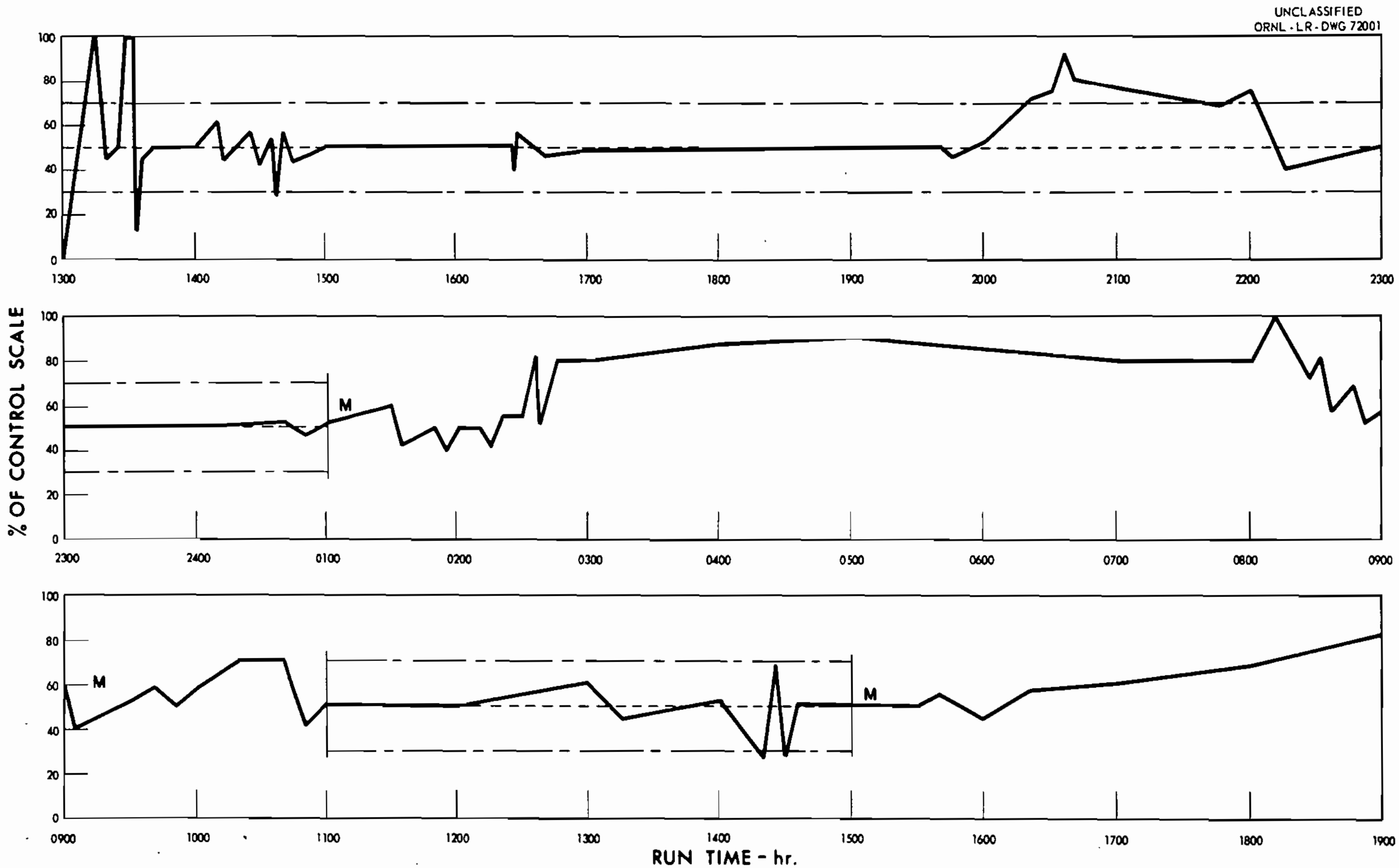


Evaporator Density - Continuous - TBP-25

Limits SP ±5% Controller Action Prob. 100 %

Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 62 - Evaporator Density. (Cont'd.)

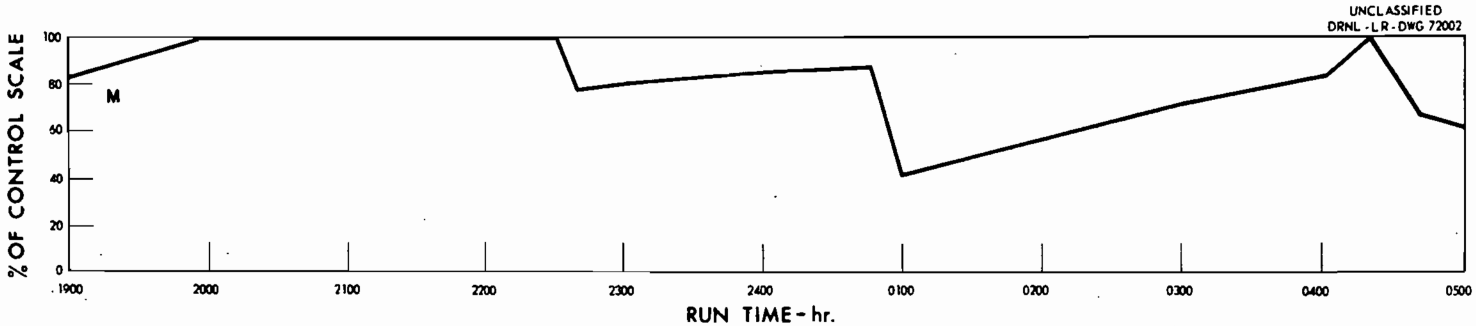


Evaporator Liquid Level - Continuous - TBP - 25

Limits SP ±20% Controller Action Prob. 25 %

Reset 10 min

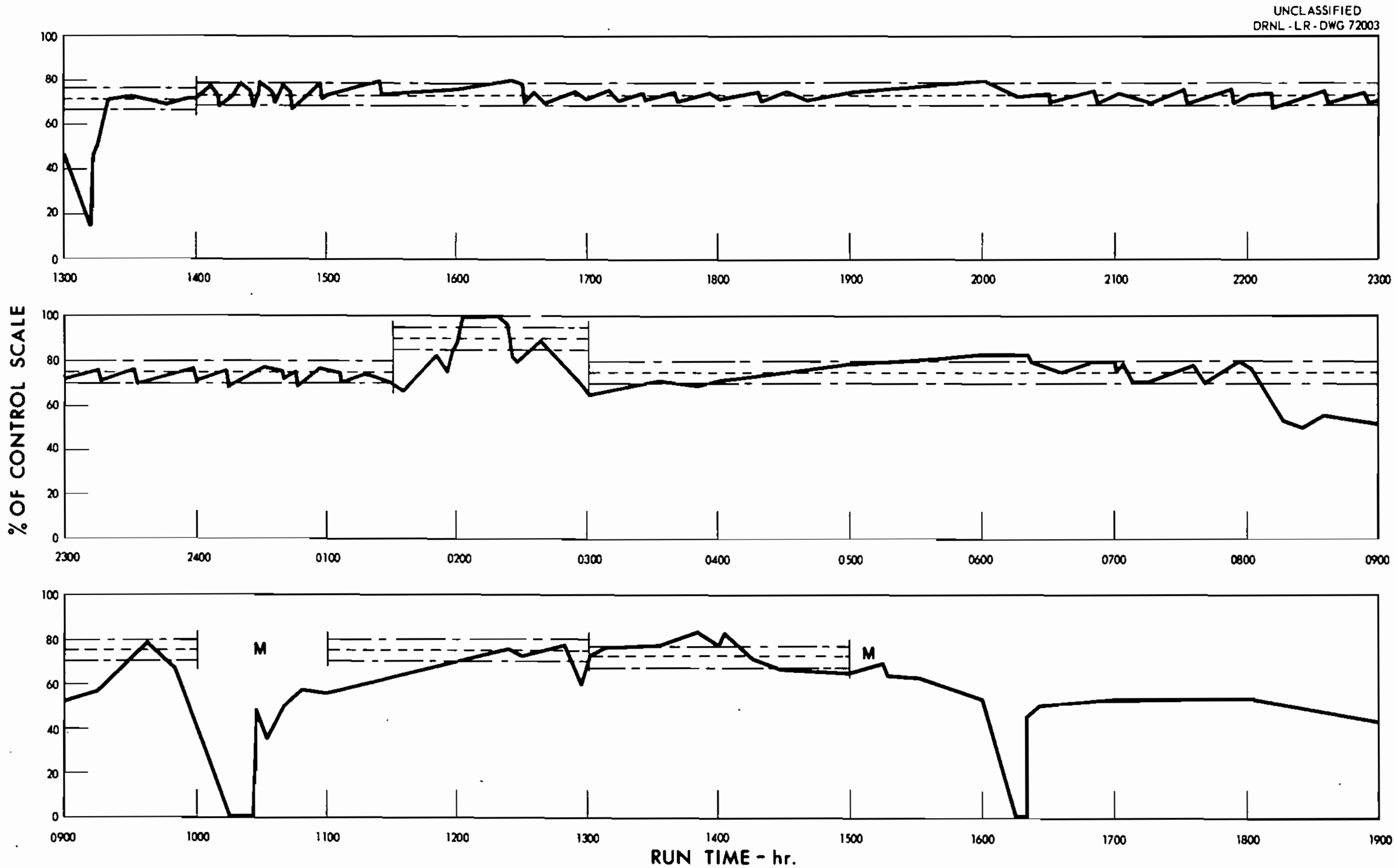
Fig. 17. Waste calcination & evaporation control - Test 62- Evaporator Liquid Level.



Evaporator Liquid Level - Continuous - TBP - 25

Limits SP ±20% Controller Action Prob. 25 %
Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 62- Evaporator Liquid Level. (Cont'd.)

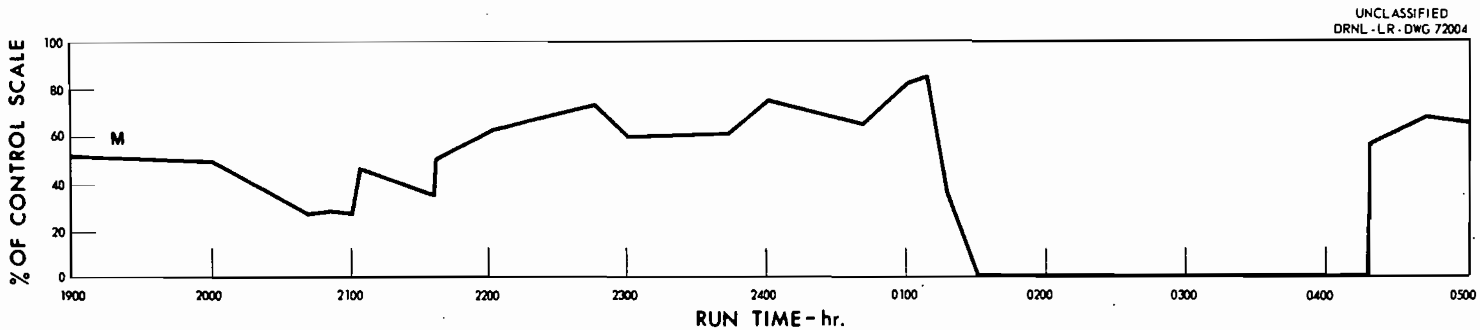


Evaporator Temperature - Continuous - TBP - 25

Limits SP ±5% Controller Action Prob. 100 %

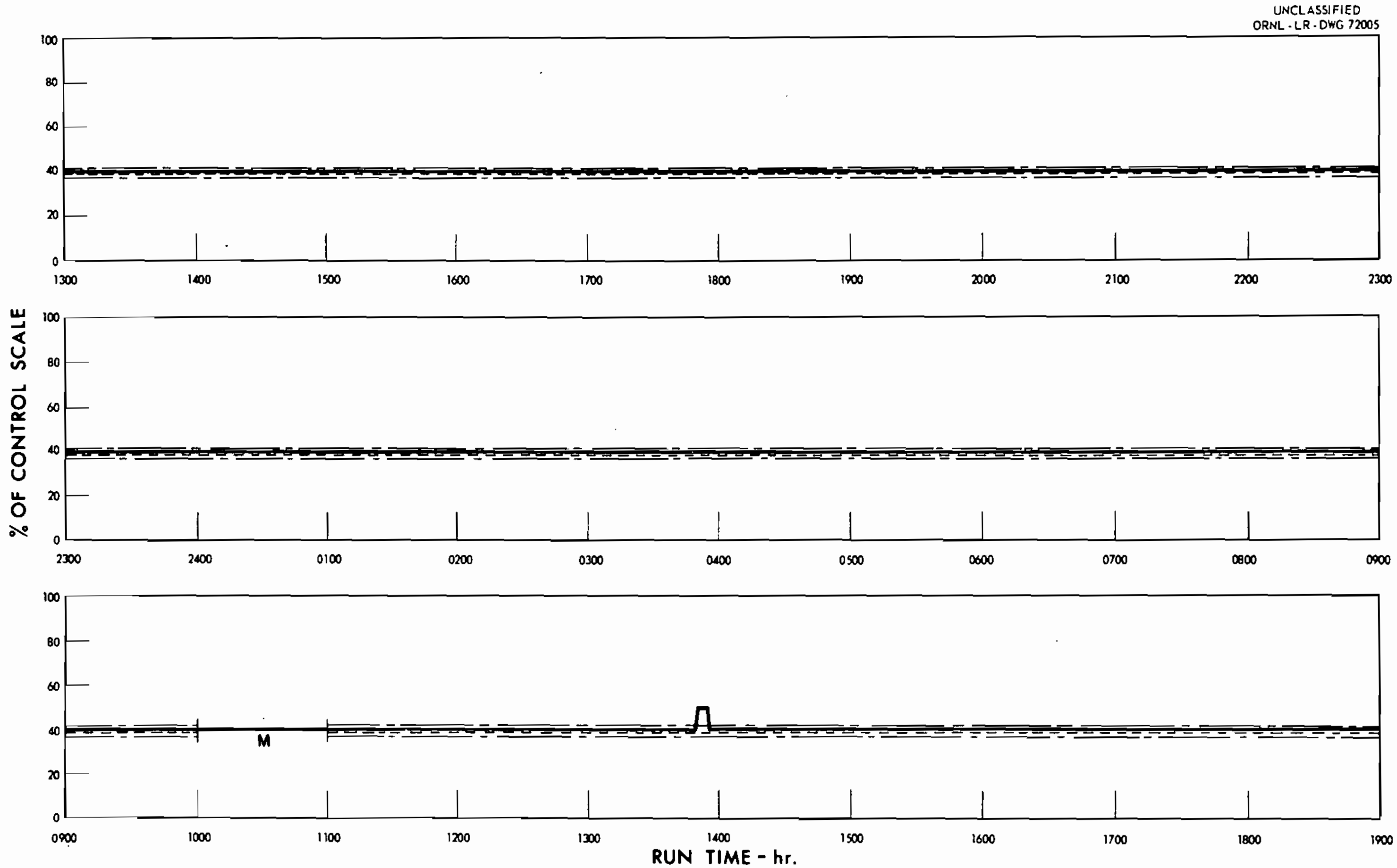
Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 62 - Evaporator Temperature.



Evaporator Temperature - Continuous - TBP-25
Limits SP ±5% Controller Action Prob. 100%
Reset 10 min

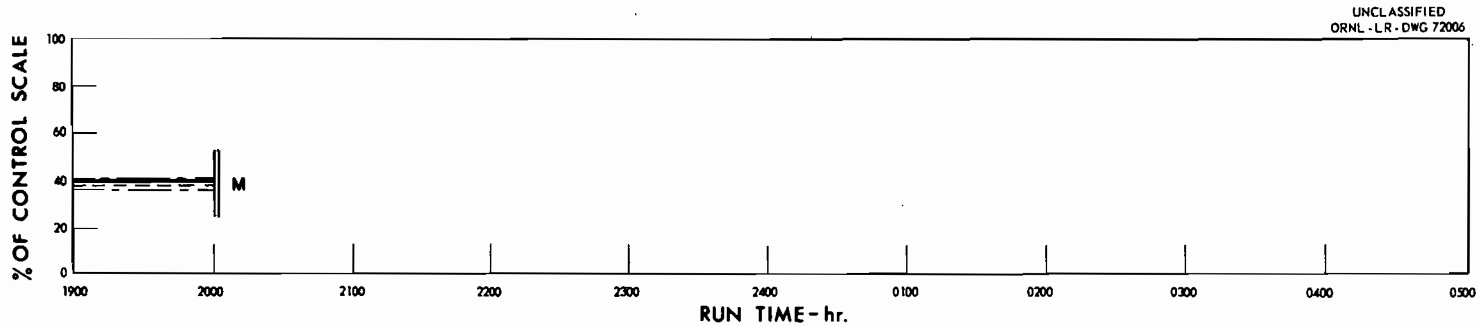
Fig. 17. Waste calcination & evaporation control - Test 62 - Evaporator Temperature. (Cont'd.)



Evaporator Pressure - Continuous - TBP-25

Limits SP ± 2% Controller Action Prob. 25 %
Reset 1 min

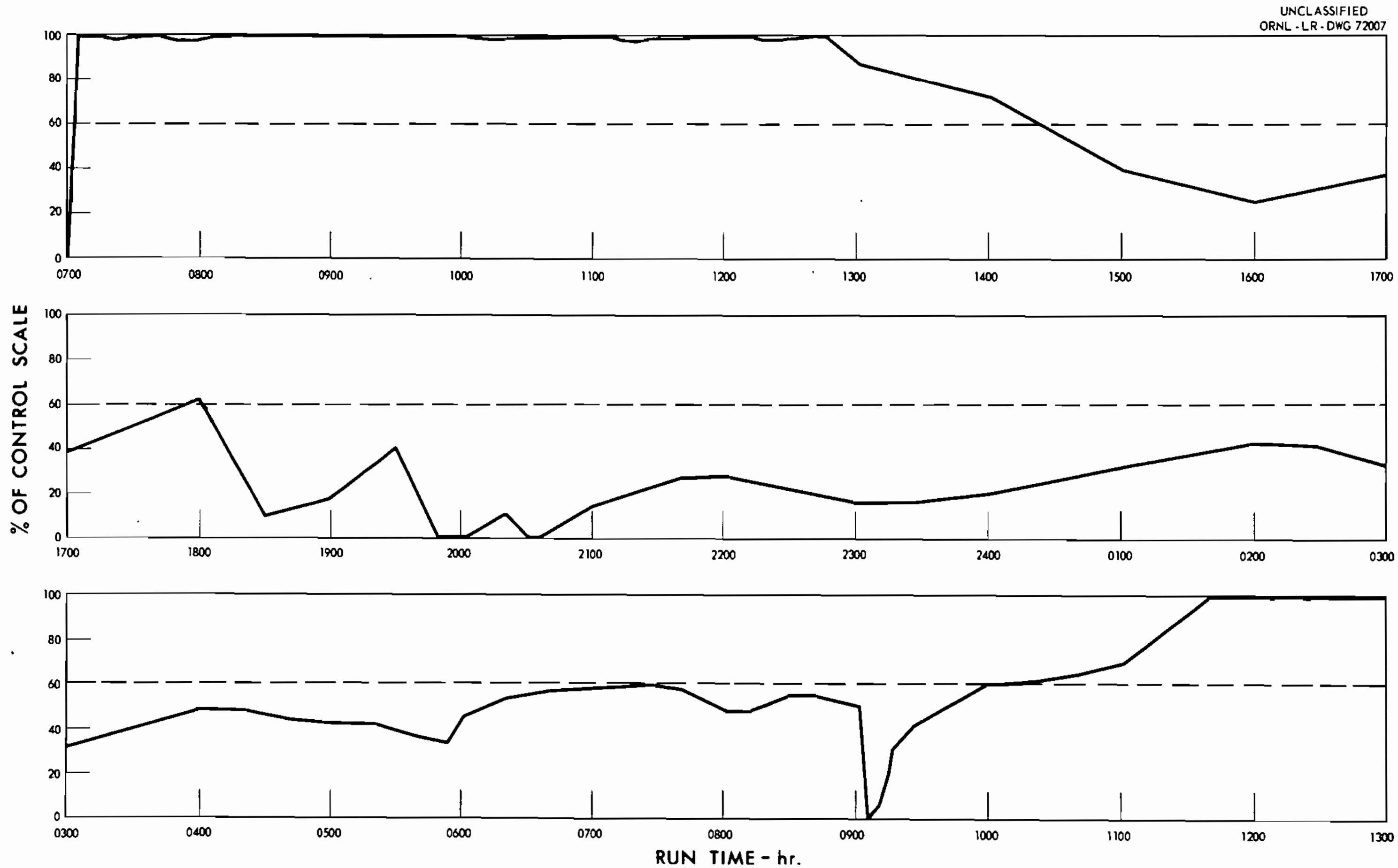
Fig. 17. Waste calcination & evaporation control - Test 62 - Evaporator Pressure.



Evaporator Pressure - Continuous - TBP-25

Limits SP ± 2% Controller Action Prob. 25 %
Reset 1 min

Fig. 17. Waste calcination & evaporation control - Test 62 - Evaporator Pressure. (Cont'd.)

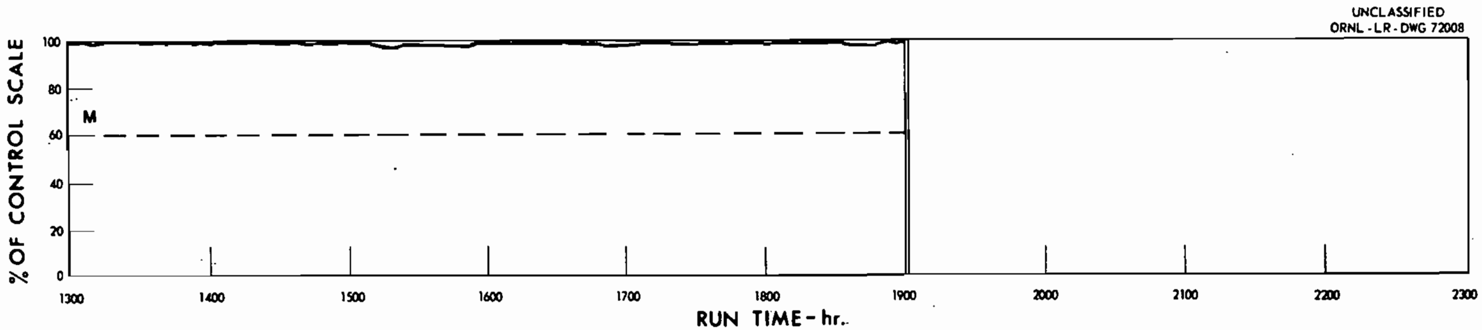


Calciner Liquid Level - Continuous - TBP-25

Limits 95-20% Controller Action Prob. 200 %

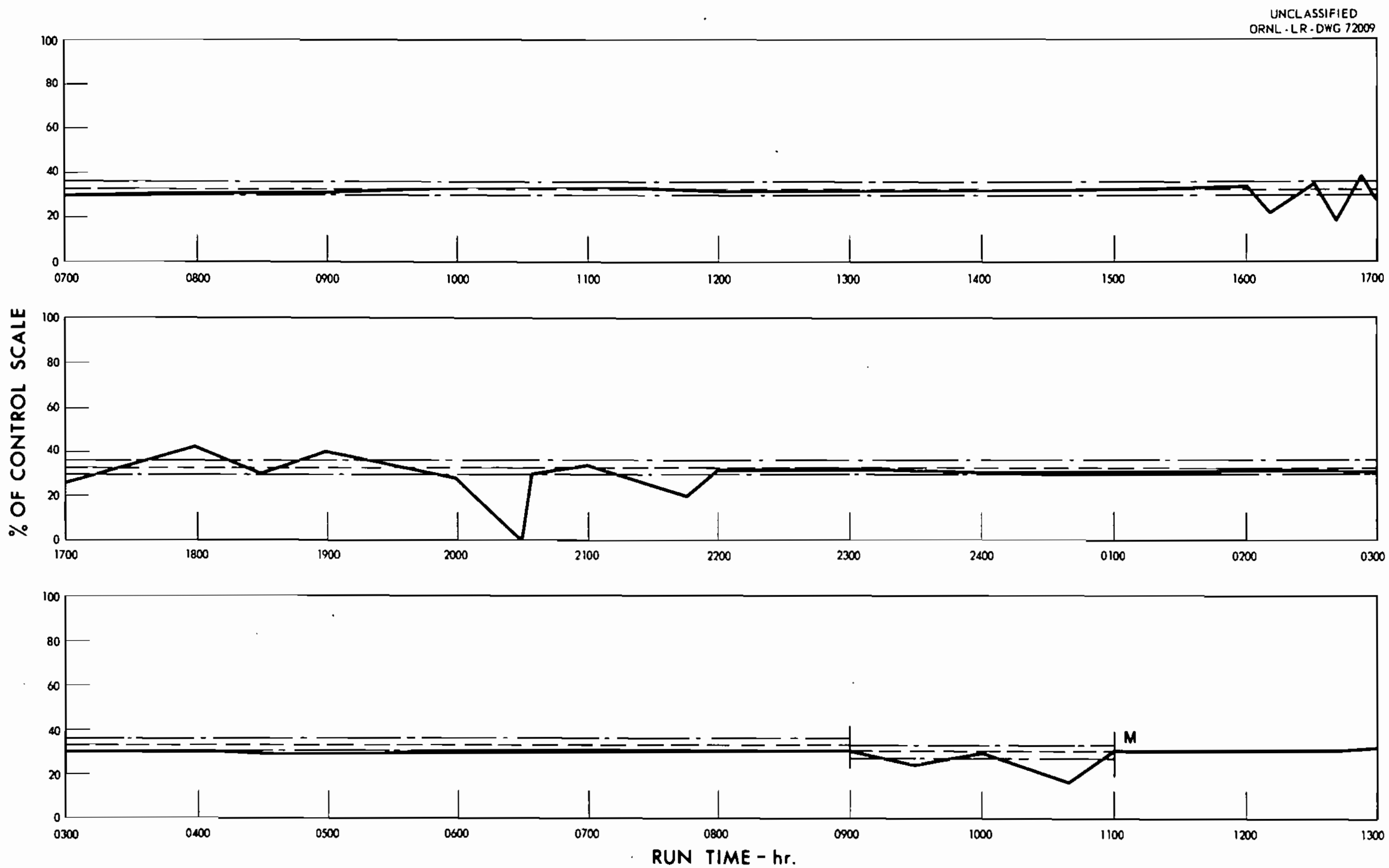
Reset 240 min

Fig. 17. Waste calcination & evaporation control - Test 63 - Calciner Liquid Level.



Calciner Liquid Level - Continuous - TBP-25
Limits 95-20% Controller Action Prob. 200%
Reset 240 min

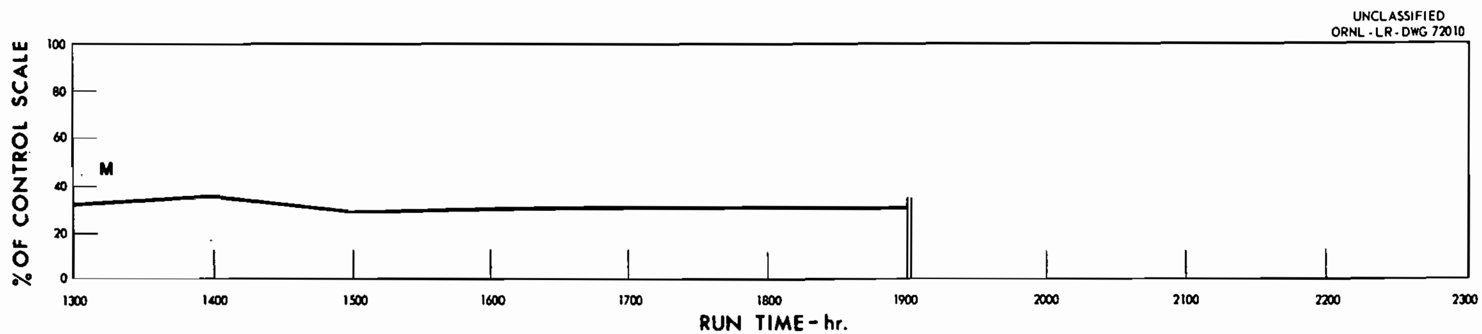
Fig. 17. Waste calcination & evaporation control - Test 63 - Calciner Liquid Level. (Cont'd.)



Evaporator Density - Continuous - TBP - 25

Limits SP ±5% Controller Action Prob. 100 %
Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 63 - Evaporator Density.



Evaporator Density - Continuous - TBP-25

Limits SP ±5% Controller Action Prob. 100%
Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 63 - Evaporator Density. (Cont'd.)

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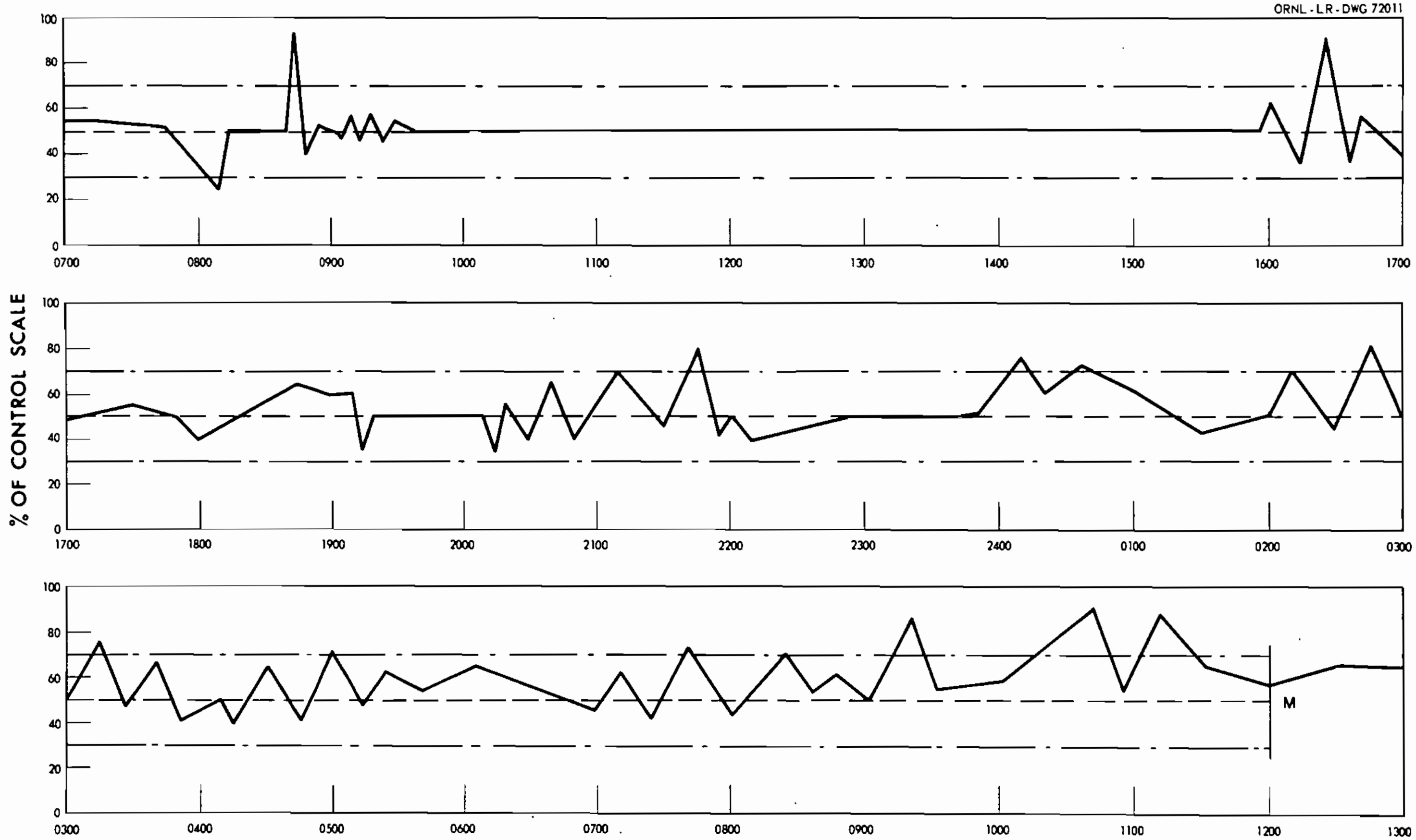
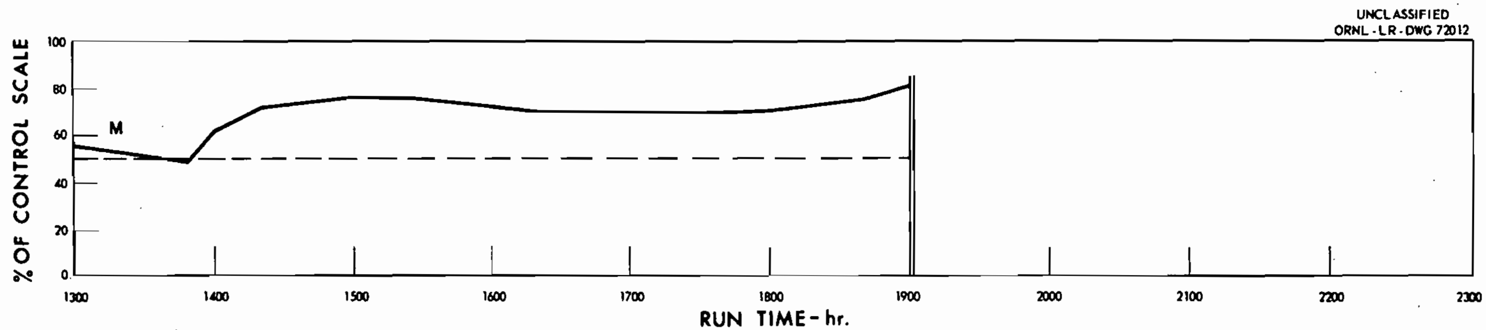


Evaporator Liquid Level - Continuous - TBP - 25

Limits SP ±20% Controller Action Prob. 40 %

Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 63 - Evaporator Liquid Level.

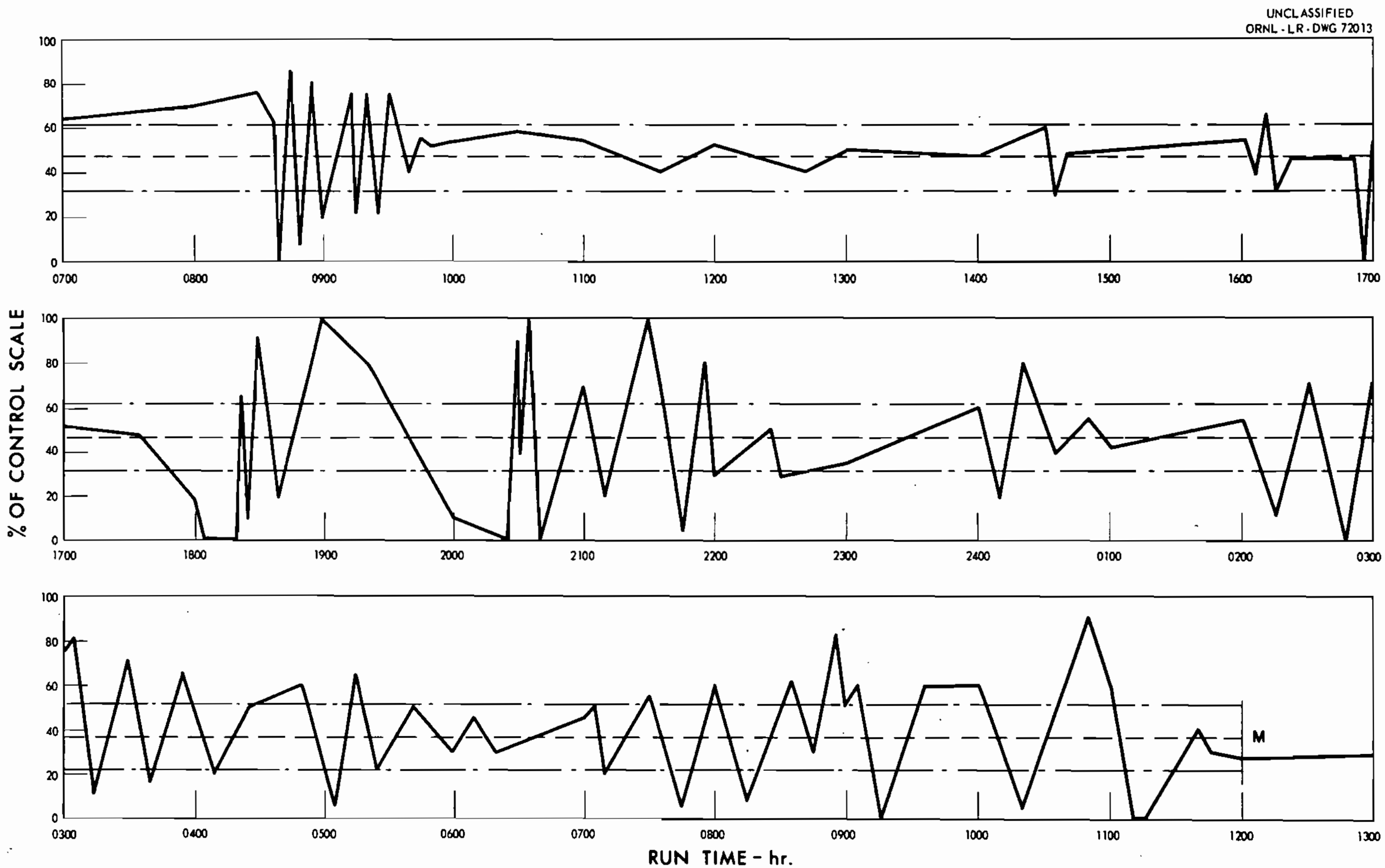


Evaporator Liquid Level - Continuous - TBP-25

Limits SP ±20% Controller Action Prob. 40 %

Reset 10 min

Fig. 17. Waste calcination & evaporation control - Test 63 - Evaporator Liquid Level. (Cont'd.)

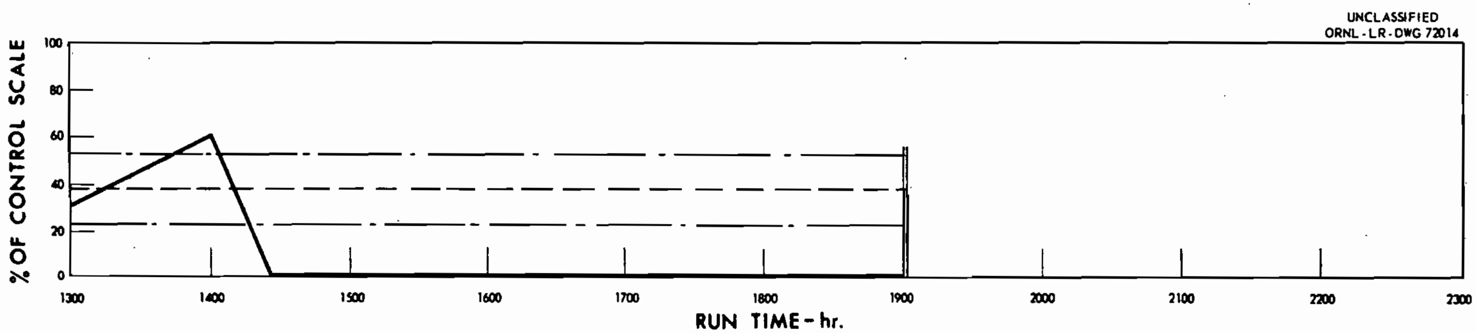


Evaporator Temperature - Continuous - TBP-25

Limits SP ±5% Controller Action Prob. 200 %

Reset 8 min

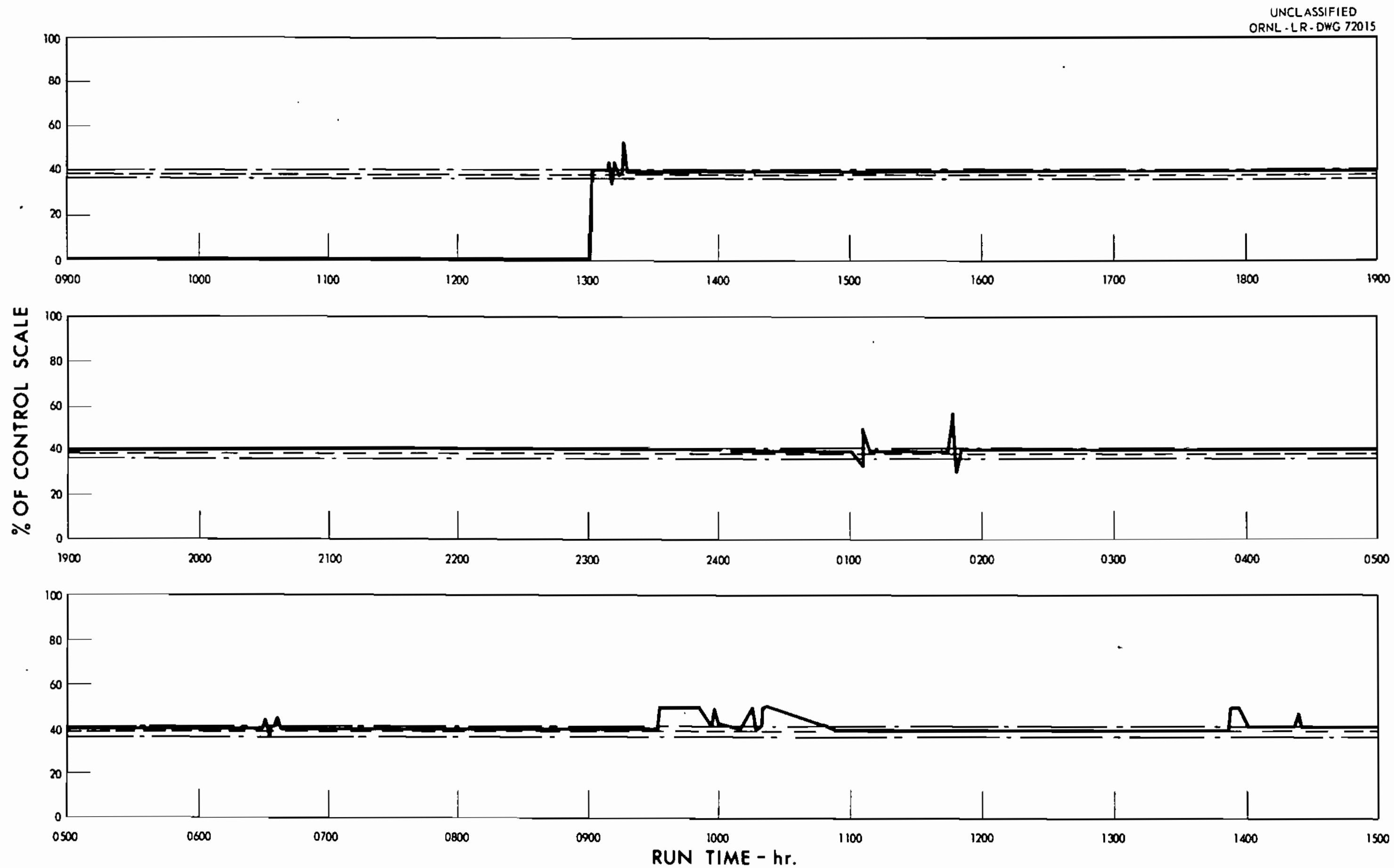
Fig. 17. Waste calcination & evaporation control - Test 63 - Evaporator Temperature.



Evaporator Temperature - Continuous - TBP - 25

Limits SP ±5% Controller Action Prob. 200 %
Reset 8 min

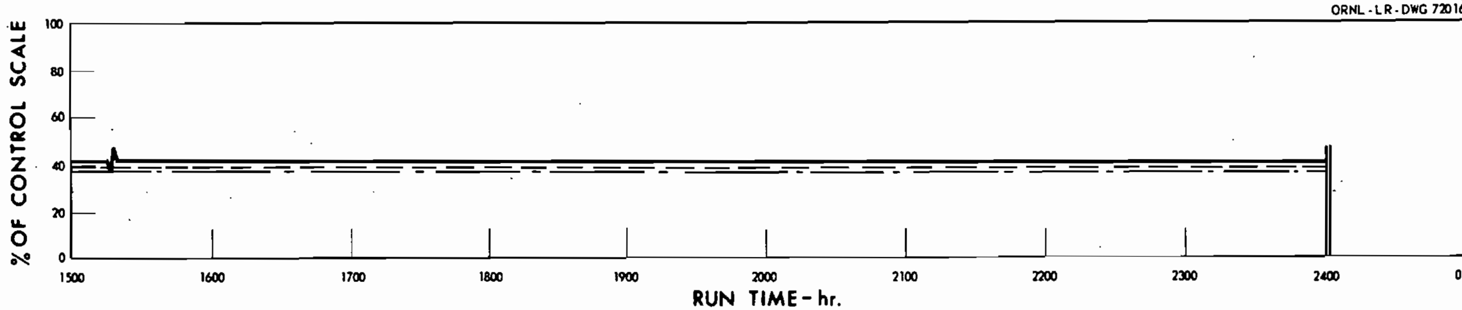
Fig. 17. Waste calcination & evaporation control - Test 63 - Evaporator Temperature. (Cont'd.)



Evaporator Pressure - Continuous - TBP - 25

Limits SP ± 2% Controller Action Prob. 25 %
Reset 1 min

Fig. 17. Waste calcination & evaporation control - Test 63 - Evaporator Pressure.



Evaporator Pressure - Continuous - TBP-25

Limits SP ± 2% Controller Action Prob. 25 %

Reset 1 min

Fig. 17. Waste calcination & evaporation control - Test 63 - Evaporator Pressure. (Cont'd.)

alternative that received the most attention used the boilup rate to control the liquid level, and the feed addition rate to control the density. The small density difference between the evaporator product and the feed, along with the cross effect of boilup rate on apparent liquid level, produced instabilities that could not be overcome.

Similarly, the instruments used in this control system evolved through much trial and error and are thought to be adaptable directly to the hot pilot plant. In most cases the precision of the instruments, which is the necessary feature for stable control, was good. The accuracy was acceptable, and, with the normal course of sampling and general observation of the process, should give no trouble. The estimated precisions and accuracy are given below.

	Precision (%)	Accuracy (%)
Evaporator density as measured by air bubblers in an external chamber	1	3
Evaporator density as measured by a float device	2	5
Evaporator liquid level as measured by air bubbler	1	4
Evaporator pressure	1	3
Vapor acid concentration as measured by electrical conductivity	2	5
Vapor acid concentration as measured by vapor temperature	5	45
Liquid level in the calciner pot as measured by temperature probe	1	10

These numbers are representative of the system in service, which was not immaculately clean, yet not fouled.

An interesting note on density control is that a 1% change in density represents about a 4% change in solids concentration under operating conditions. Although the float-type density instrument (the "Mackey cell") situated on a recycle line was used for most of the work, it is thought that an external chamber with an air bubbler would be preferable for reliability and probably for precision. The chamber used had a volume of about 1 liter. These instruments were used in the pump loop that recirculated the evaporator solution to the calciner feed valve.

When using the electrical conductivity of the evaporator condensate for control, particularly if the whole vapor stream is not condensed, care should be taken to avoid excessive lag times which might be introduced by the transport of the stream to the instrument. It is also necessary to avoid a fractionation due to partial condensation and to make some provision for adequate drainage and removal of noncondensables.

6. SYSTEM PERFORMANCE

6.1 Operating Rates

The operating rate of the calciner varied from a maximum of about 70 liters/hr for water boilup in a clean pot to a practical minimum of about 2 to 3 liters/hr boilup at the termination of calcination for the various types of feed. The average rates for the three types of feed were, in liters per hour: Purex, 30; Darex, 15; TBP, 12. The average system feed rate is for the filling period only and does not include any calcination time. The calcination time for these tests averaged about 10 hr (see Table 6).

The thermosiphon evaporator (Fig. 18) had a maximum water boilup rate of 12 liters/min when the heat exchanger was freshly cleaned; however, due to a heat-deposited film, this boilup rate dropped to about 6 to 8

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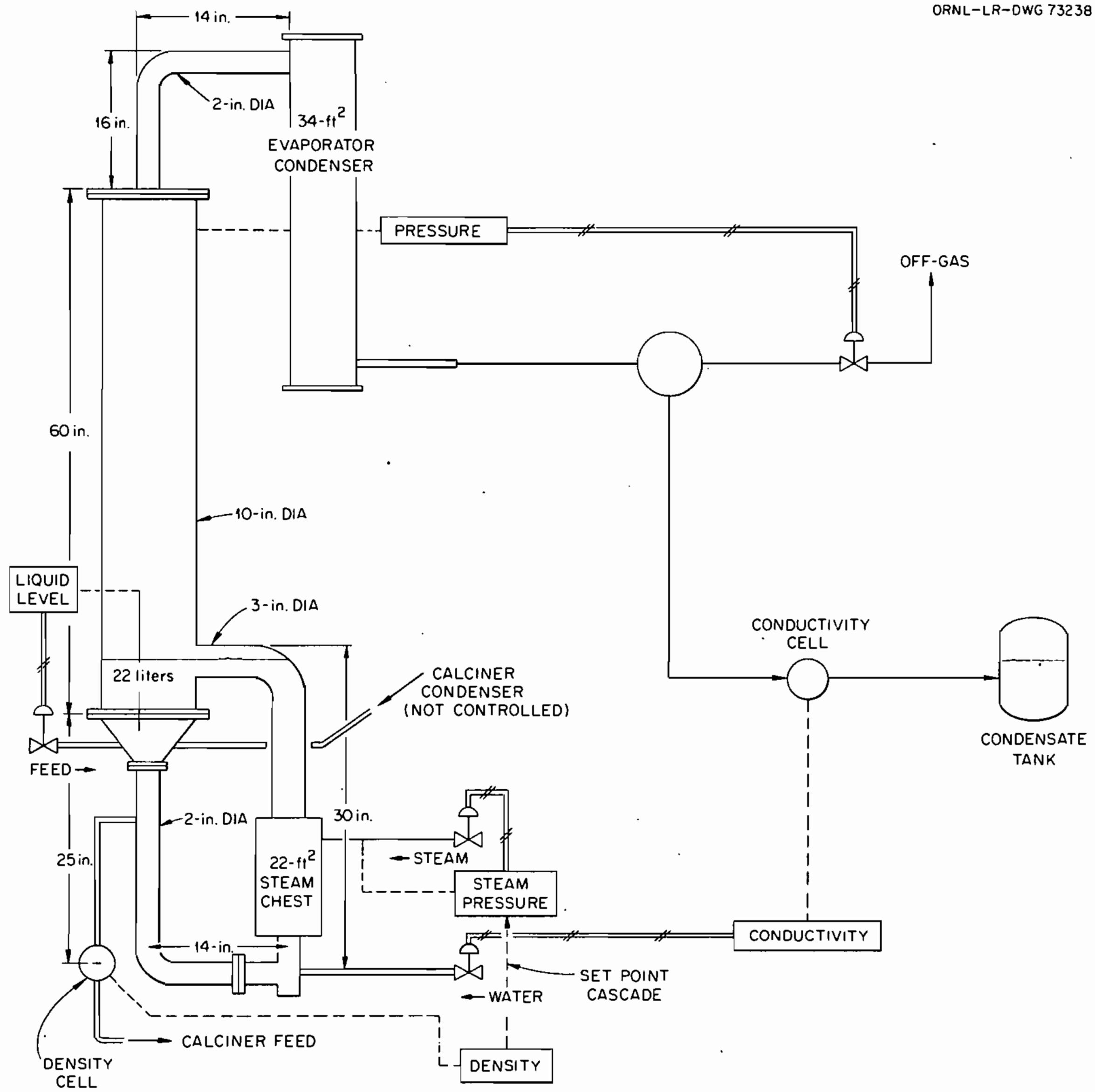

Fig. 18. Control System for the Calciner Evaporator.

liters/min after any wastes had been treated in the evaporator. On the other hand, 6 liters/min was a very satisfactory operating rate for all types of feed tested.

Water was introduced into the evaporator to steam strip the nitric acid in order to keep the nitrate ion concentration in the evaporator below 8 M. This reduced ruthenium volatility. The nitrate concentration in the evaporator liquid was determined indirectly by either measuring the temperature of the vapor phase or the conductivity of the evaporator condensate. The maximum water addition rate was 5 liters/min. The average water-to-feed volume ratio for the three types of feed were as follows: Purex, 5.2 water to feed volume ratio; Darex, 3.9; TBP, 2.8.

7. SPECIAL PROBLEMS

A number of special problems were noted during this operational period, some of which have been partially solved. There was off-gas-line plugging with mercury deposits during TBP operations; liquid in the pot foamed due to organics or finely suspended solids; and slagging and dropping of the calcined cake causing pressure surges in the calciner.

7.1 Mercury Solid Plugging of Off-gas Lines

The TBP feed contained about 4 g of mercury per liter (see Table 2). (Mercury is used as a catalyst in the dissolution of the aluminum jackets on the fuel.) During the first part of the test while there is still liquid in the calciner very little mercury is evaporated in the calciner off-gas; however, as the solids in the calcining vessel reach 300 to 400°C the mercury-oxide-nitrate compound decomposes, and a large amount of mercury enters the off-gas vapor. When this sublimed mercury compound reaches a cooled surface in the off-gas line it condenses to a yellow solid that deposits radially in the off-gas line and plugs it. This solid can be removed by subliming at a temperature greater than 300°C or by dissolution in nitric acid. The approach to be next tested is to keep the off-gas line heated as far as an expanded section in the line, which will be chilled. The section will have a large enough volume so that the condensed solids will not plug the off-gas line during the operation. After the calcination has been completed, the solids in the expanded section will be dissolved with nitric acid and then drained to a receiver (Fig. 19).

8. DATA ACQUISITION

The data needed for thoroughly and completely calculating the results from these calciner tests fall into two classes: the data from the control instruments and the data from the recording instruments, which were recorded in the data book at 1-hr intervals (Table 16). At approximately test 50, an electronic data logger was purchased and used. The system data processed by the logger were punched on paper tape and were represented with a binary decimal number. These numbers, with appropriate codes, were transformed into engineering tables by use of the IBM 7090 computer. An example of the output from the computer is given in Tables 17 and 18.

8.1 Discussion of Table 16: Hourly System Values and Parameters, Parts A and B

Table 16 has the important hourly variables and parameters of the calcining system for both batch and continuous operation for the evaporator

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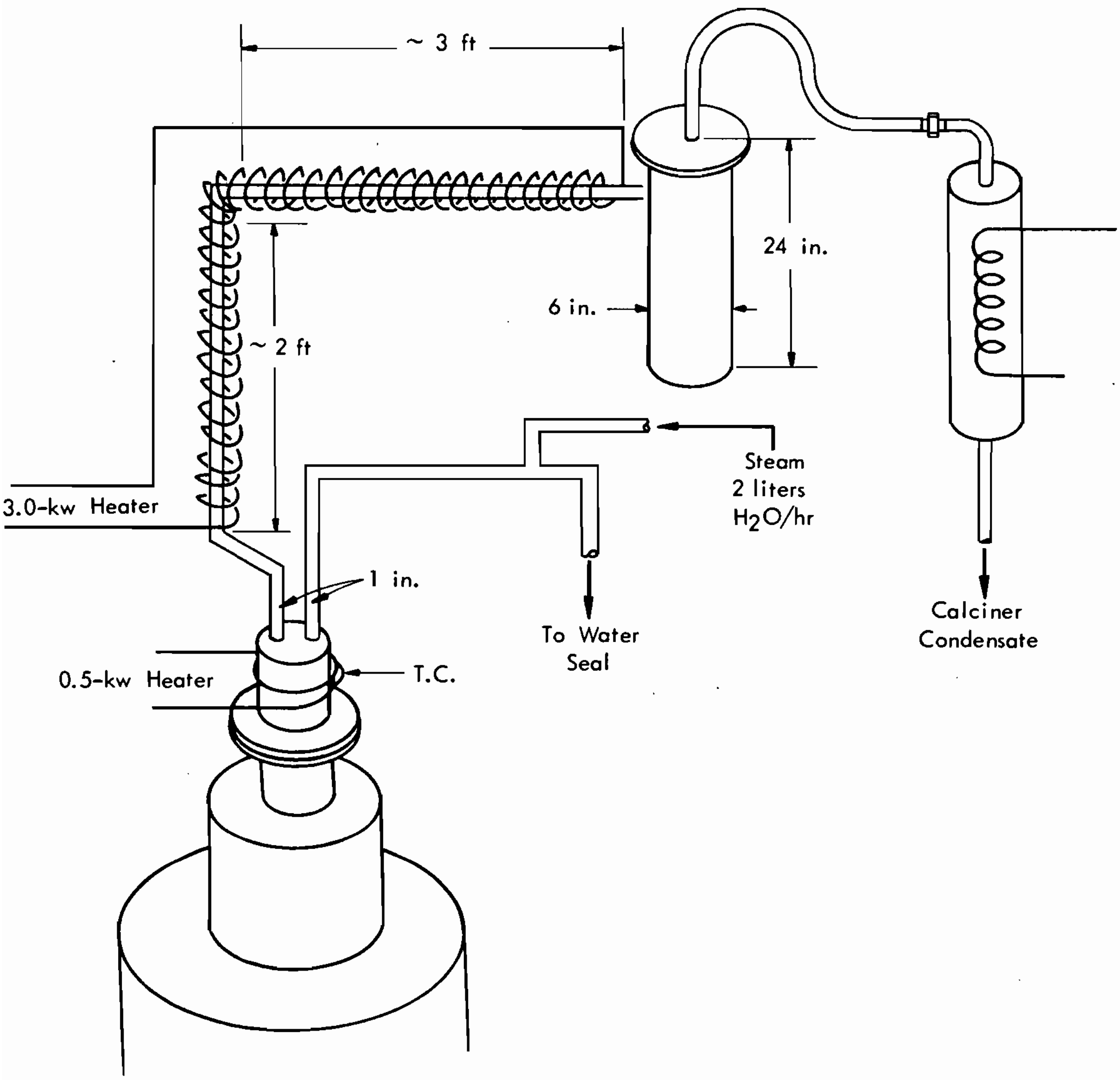

Fig. 19. Mercury Trap in Waste Calcination Runs R-65 and 66.

Table 16.

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART A

TEST NO R-42 FEED TYPE - PUREX OPERATION MODE - CONTINUOUS

RUN TIME	FEED	WATER	CALCINER ADDITIVE	EVAP. COND.	CALCINER FURNACE	CALCINER COND.	EVAP. COND.	SYSTEM OFF-GAS	EVAP. DENSITY
HOURS	LITERS	LITERS	LITERS	LITERS	(HUNDRED-THOUSANDS OF BTUS)			CU FT	GM/CC
1	138.	68.	24.	222.	1.71	0.96	2.45	-0.	1.34
2	201.	83.	28.	255.	3.35	2.06	4.66	-0.	1.34
3	234.	167.	29.	321.	4.99	3.38	9.06	-0.	1.33
4	270.	193.	32.	404.	6.52	4.37	12.13	-0.	1.34
5	320.	273.	32.	491.	8.44	5.37	15.14	-0.	1.34
6	371.	299.	36.	564.	9.43	6.15	17.90	-0.	1.34
7	407.	352.	37.	645.	10.45	7.14	20.11	-0.	1.34
8	446.	428.	42.	725.	11.54	7.47	23.18	-0.	1.34
9	478.	485.	48.	795.	12.60	8.14	24.97	-0.	1.34
10	496.	538.	52.	851.	13.52	8.37	26.10	-0.	1.34
11	496.	564.	56.	914.	13.93	8.61	28.25	-C.	1.35
12	496.	670.	62.	981.	14.45	8.83	30.61	-0.	1.31
13	496.	776.	68.	1053.	15.03	9.06	32.83	-0.	1.32
14	496.	882.	71.	1129.	15.37	9.28	35.33	-0.	1.30
15	496.	1022.	76.	1206.	15.88	9.41	37.8C	-0.	1.24
16	496.	1128.	78.	1206.	16.39	9.73	39.96	-0.	1.26
17	496.	1279.	78.	1206.	16.70	9.96	42.22	-0.	1.20
18	496.	1351.	78.	1206.	17.04	10.07	44.63	-0.	1.19
19	496.	1465.	78.	1206.	17.28	10.18	46.88	-0.	1.17
20	496.	1571.	78.	1206.	17.59	10.53	49.39	-0.	1.17
21	496.	1684.	78.	1206.	17.93	10.64	51.86	-0.	1.16
22	496.	1760.	78.	1206.	18.10	10.87	54.37	-0.	1.16
23	496.	1900.	78.	1206.	18.41	11.11	57.41	-0.	1.15
24	496.	2010.	78.	1206.	18.78	11.31	58.21	-0.	1.15
25	496.	2120.	78.	1206.	19.09	11.42	60.42	-0.	1.14

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART B

TEST NO R-42 FEED TYPE - PUREX OPERATION MODE - CONTINUOUS

RUN TIME	EVAP. LIQUID H+	EVAP.MAJOR CATION FE OR AL	CALCINER COND. H+	EVAP COND. H+	EVAP.COND. MAJOR ION FE OR AL	EVAP. COND. RU	EVAP. LIQUID TEMP.	EVAP. VAPOR TEMP.	CALCINER FEED TEMP.	CALCINER OFF-GAS TEMP.
HOURS	MOLAR	GM/LITER	MOLAR	MOLAR	GM/LITER	GM/LITER	DEG.C	DEG.C	DEG.C	DEG.C
1	6.30	45.0	5.01	2.69	0.058	0.004	113.	109.	73.	100.
2	7.47	39.2	8.19	3.57	0.040	0.003	113.	109.	75.	114.
3	5.57	45.3	3.87	2.05	0.060	0.003	123.	108.	72.	122.
4	6.95	39.2	4.97	3.26	0.057	0.001	120.	110.	72.	145.
5	6.79	32.2	7.75	2.70	0.060	0.003	116.	110.	72.	156.
6	6.44	39.8	7.16	2.80	0.047	0.001	112.	110.	72.	166.
7	6.20	43.6	6.81	2.50	0.058	0.001	113.	109.	74.	103.
8	5.80	42.3	6.39	2.48	0.065	0.001	112.	110.	74.	103.
9	5.70	41.3	6.51	2.25	0.065	0.001	112.	108.	74.	102.
10	5.94	45.3	7.77	2.23	0.015	0.001	112.	108.	75.	93.
11	5.80	46.4	7.45	1.94	0.068	0.001	112.	109.	74.	89.
12	3.90	48.6	6.00	0.70	0.049	0.001	108.	105.	71.	99.
13	3.30	53.5	5.57	0.33	0.021	0.001	107.	103.	71.	99.
14	5.85	51.7	5.00	0.35	0.016	0.001	105.	102.	68.	90.
15	2.85	42.3	4.26	0.31	0.028	0.001	105.	104.	70.	90.
16	2.99	36.8	5.66	0.26	0.020	0.001	105.	102.	68.	84.
17	2.40	32.4	5.96	0.25	0.026	0.001	104.	102.	68.	94.
18	2.50	32.4	5.54	0.19	0.021	0.001	104.	100.	66.	92.
19	2.30	27.1	5.75	0.09	0.018	0.001	102.	98.	65.	93.
20	2.30	26.8	11.00	0.16	0.018	0.001	102.	99.	65.	77.
21	2.25	27.4	13.90	0.26	0.019	0.001	103.	101.	67.	64.
22	2.10	26.9	14.70	0.31	0.019	0.001	102.	98.	64.	74.
23	1.67	26.6	14.80	0.25	0.020	0.001	102.	98.	53.	70.
24	1.73	26.2	14.80	0.21	0.021	0.001	102.	98.	52.	71.
25	1.70	26.2	14.60	0.15	0.020	0.001	101.	98.	53.	68.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART A

TEST NO R-43 FEED TYPE - PUREX OPERATION MODE - CONTINUOUS

RUN TIME	FEED	WATER	CALCINER ADDITIVE	EVAP. COND.	CALCINER FURNACE	CALCINER COND.	EVAP. COND.	SYSTEM OFF-GAS	EVAP. DENSITY
HOURS	LITERS	LITERS	LITERS	LITERS	(HUNDRED-THOUSANDS OF BTUS)			CU FT	GM/CC
1	102.	53.	2.	162.	2.01	1.09	3.50	20.	1.32
2	183.	227.	4.	229.	3.65	2.37	9.54	46.	1.27
3	249.	432.	4.	312.	5.22	3.52	15.12	70.	1.29
4	321.	628.	10.	394.	6.97	4.89	21.17	98.	1.29
5	396.	810.	13.	494.	8.37	5.76	26.97	126.	1.30
6	492.	984.	16.	570.	9.56	6.57	32.80	159.	1.38
7	567.	1128.	19.	604.	10.55	6.91	36.35	190.	1.36
8	594.	1230.	22.	609.	11.47	7.34	40.19	236.	1.17
9	594.	1450.	25.	614.	12.05	7.56	43.90	264.	1.07
10	594.	1643.	28.	619.	12.57	8.14	48.04	288.	1.05
11	594.	1859.	29.	623.	13.08	8.14	50.44	314.	1.07
12	594.	1999.	29.	624.	13.56	8.14	52.96	338.	1.05
13	594.	2135.	29.	624.	13.90	8.14	55.48	363.	1.03
14	594.	2271.	29.	624.	14.14	8.39	58.05	388.	1.01
15	594.	2434.	29.	624.	14.51	8.52	60.65	413.	1.00
16	594.	2608.	29.	624.	14.82	8.52	63.13	438.	1.00
17	594.	2707.	29.	624.	15.03	8.65	65.57	464.	1.00
18	594.	2843.	29.	624.	15.27	8.65	68.07	487.	1.00
19	594.	3009.	29.	624.	15.47	8.65	70.60	511.	0.98
20	594.	3146.	29.	624.	15.71	8.65	73.47	558.	0.98
21	594.	3289.	29.	624.	15.95	8.65	76.80	584.	0.99
22	594.	3426.	29.	624.	16.08	8.65	78.40	604.	0.98
23	594.	3626.	29.	624.	16.46	8.65	81.83	634.	-0.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART B

TEST NO R-43 FEED TYPE - PUREX OPERATION MODE - CONTINUOUS

RUN TIME	EVAP. LIQUID H+	EVAP.MAJOR CATION FE OR AL	CALCINER COND. H+	EVAP COND. H+	EVAP.COND. MAJOR ION FE OR AL	EVAP. COND. RU	EVAP. LIQUID TEMP.	EVAP. VAPOR TEMP.	CALCINER FEED TEMP.	CALCINER OFF-GAS TEMP.
HOURS	MOLAR	GM/LITER	MOLAR	MOLAR	GM/LITER	GM/LITER	DEG.C	DEG.C	DEG.C	DEG.C
1	6.05	42.2	5.37	2.03	0.040	0.001	112.	108.	58.	115.
2	5.35	36.3	5.87	1.55	0.115	0.003	105.	109.	39.	125.
3	5.90	36.4	6.20	1.75	0.068	0.003	112.	107.	36.	120.
4	6.00	35.3	6.21	1.74	0.063	0.003	112.	108.	36.	118.
5	6.00	43.8	6.80	2.10	0.113	0.002	121.	110.	35.	118.
6	5.75	61.0	6.90	1.98	0.106	0.002	115.	109.	34.	116.
7	5.86	57.9	7.03	1.12	0.048	0.001	115.	108.	35.	106.
8	3.50	19.8	6.25	0.30	0.010	0.001	105.	102.	36.	110.
9	2.10	5.3	4.43	0.11	0.002	0.001	102.	99.	37.	108.
10	1.90	2.2	3.67	0.08	0.002	0.001	102.	98.	38.	111.
11	2.80	1.2	7.92	0.20	0.002	0.001	103.	99.	30.	113.
12	2.10	0.6	7.06	0.09	0.002	0.001	103.	98.	29.	106.
13	1.40	0.3	8.35	0.06	0.002	0.001	103.	97.	29.	90.
14	0.92	0.2	10.20	0.03	0.002	0.001	103.	97.	27.	90.
15	0.40	0.1	13.40	0.10	0.002	0.001	100.	96.	27.	76.
16	0.23	0.1	14.10	0.10	0.002	0.001	100.	98.	29.	85.
17	0.15	0.1	-0.	0.09	0.002	0.001	100.	96.	30.	82.
18	0.14	0.1	-0.	0.08	0.002	0.001	100.	98.	33.	76.
19	0.08	0.	-0.	0.06	0.002	0.001	100.	98.	34.	76.
20	0.07	0.	-0.	0.06	0.002	0.001	100.	98.	33.	75.
21	0.05	0.	-0.	0.06	0.002	0.001	100.	98.	34.	70.
22	0.04	0.	-0.	0.04	0.002	0.001	103.	96.	32.	62.
23	-0.	-0.	-0.	-0.	-0.	-0.	102.	96.	33.	57.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART A

TEST NO R-44 FEED TYPE - PUREX OPERATION MODE - CONTINUOUS

RUN TIME	FEED	WATER	CALCINER ADDITIVE	EVAP. COND.	CALCINER FURNACE	CALCINER COND.	EVAP. COND.	SYSTEM OFF-GAS	EVAP. DENSITY
HOURS	LITERS	LITERS	LITERS	LITERS	(HUNDRED-THOUSANDS OF BTUS)			CU FT	GM/CC
1	129.	98.	17.	149.	1,64	1,19	5,62	37.	1.35
2	201.	238.	19.	362.	3,41	2.41	10,80	73.	1.32
3	275.	401.	22.	599.	5,05	3,60	16,33	109.	1.30
4	324.	594.	31.	845.	6,69	4.76	21,99	144.	1.30
5	358.	734.	33.	1020.	8,26	6.37	27,23	179.	1.40
6	375.	844.	63.	1147.	9,29	6.81	29.46	222.	1.60
7	382.	931.	68.	1244.	9,90	7.16	29,69	256.	1.46
8	382.	958.	69.	1271.	10,52	7.67	30,15	291.	1.24
9	382.	1049.	72.	1363.	11,13	7.92	29,92	325.	1.30
10	409.	1056.	76.	1467.	11,54	8.10	31,07	363.	1.40
11	409.	1109.	77.	1523.	11,95	8.30	31,80	399.	1.42
12	409.	1189.	-0.	1603.	12,36	8.36	32,93	434.	1.38
13	409.	1276.	-0.	1691.	12,64	8.43	36,97	472.	1.40
14	409.	1442.	-0.	1859.	12,98	8.49	41,21	507.	1.30
15	409.	1666.	-0.	2083.	13,32	8.49	45,79	554.	1.30
16	409.	1828.	-0.	2246.	13,52	8.49	50,06	582.	1.28
17	409.	2025.	-0.	2445.	13,86	8.49	54,23	618.	1.28
18	409.	2385.	-0.	2805.	14,07	8.49	58,41	652.	1.28
19	409.	2551.	-0.	2971.	14,21	8.49	62,51	686.	1.28
20	409.	2744.	-0.	3164.	14,48	8.49	67,00	722.	1.26
21	409.	2937.	-0.	3358.	14,75	8.49	71,47	756.	1.26
22	409.	3104.	-0.	3524.	14,96	8.49	73,82	788.	1.24

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART B

TEST NO R-44 FEED TYPE - PUREX OPERATION MODE - CONTINUOUS

RUN TIME	EVAP. LIQUID H+	EVAP.MAJOR CATION FE OR AL	CALCINER COND. H+	EVAP COND. H+	EVAP.COND. MAJOR ION FE OR AL	EVAP. COND. RU	EVAP. LIQUID TEMP.	EVAP. VAPOR TEMP.	CALCINER FEED TEMP.	CALCINER OFF-GAS TEMP.
HOURS	MOLAR	GM/LITER	MOLAR	MOLAR	GM/LITER	GM/LITER	DEG.C	DEG.C	DEG.C	DEG.C
1	5,40	46,1	6,80	1,89	0,006	0,009	112.	111.	50.	138.
2	5,90	38,0	6,85	2,12	0,019	0,004	111.	111.	49.	130.
3	5,50	36,5	6,90	1,75	0,017	0,003	111.	111.	47.	123.
4	5,55	40,2	5,90	1,76	0,024	0,003	109.	111.	47.	120.
5	5,55	66,4	5,34	1,60	0,070	0,002	112.	112.	43.	140.
6	2,60	105,0	5,55	2,16	0,007	0,002	110.	110.	50.	150.
7	1,81	46,0	5,99	0,33	0,003	0,002	106.	102.	57.	150.
8	3,22	18,2	4,10	2,46	0,017	0,004	111.	111.	4[illegible].	112.
9	2,40	51,3	7,02	1,44	0,068	0,002	81.	81.	33.	108.
10	5,52	56,8	-0.	3,30	0,015	0,004	112.	112.	79.	108.
11	3,51	72,5	-0.	1,00	0,004	0,002	108.	108.	76.	105.
12	2,61	66,7	-0.	0,62	0,001	0,002	105.	105.	75.	95.
13	2,81	74,9	9,30	0,37	0,003	0,002	104.	104.	72.	92.
14	0,67	63,4	-0.	0,16	0,004	0,002	101.	101.	69.	91.
15	0,46	58,5	-0.	0,12	0,004	0,002	100.	100.	66.	77.
16	0,40	57,5	-0.	0,08	0,004	0,002	100.	100.	66.	75.
17	0,33	57,4	-0.	0,08	0,004	0,002	102.	100.	66.	80.
18	0,38	53,0	-0.	0,07	0,004	0,002	100.	99.	67.	75.
19	0,50	53,2	-0.	0,05	0,002	0,002	100.	100.	67.	70.
20	0,58	52,7	-0.	0,04	0,003	0,002	100.	99.	67.	65.
21	0,58	54,2	-0.	0,03	0,003	0,002	100.	99.	67.	60.
22	0,58	51,6	-0.	0,03	0,003	0,002	100.	98.	67.	58.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART A

TEST NO R-45 FEED TYPE - PUREX OPERATION MODE - BATCH

RUN TIME	FEED	WATER	CALCINER ADDITIVE	EVAP. COND.	CALCINER FURNACE	CALCINER COND.	EVAP. COND.	SYSTEM OFF-GAS	EVAP. DENSITY
HOURS	LITERS	LITERS	LITERS	LITERS	(HUNDRED-THOUSANDS OF BTUS)			CU FT	GM/CC
1	76.	0.	4.	42.	1.98	1.57	0.78	37.	1.30
2	96.	94.	5.	122.	3.55	2.39	2.42	74.	1.30
3	168.	292.	10.	401.	4.99	3.28	3.86	102.	1.32
4	212.	536.	14.	697.	6.69	4.31	5.10	132.	1.32
5	252.	785.	18.	994.	7.92	5.24	6.31	166.	1.32
6	280.	1011.	21.	1253.	8.88	6.12	7.39	197.	1.32
7	320.	1116.	25.	1406.	9.63	6.66	8.76	222.	1.34
8	320.	1124.	30.	1422.	10.38	7.76	9.52	236.	1.34
9	324.	1129.	34.	1437.	11.00	8.73	10.28	255.	1.34
10	324.	1132.	38.	1448.	11.61	9.70	10.97	295.	1.32
11	328.	1135.	42.	1464.	12.16	10.63	11.68	322.	1.33
12	328.	1137.	46.	1469.	12.70	11.43	12.35	346.	1.33
13	328.	1139.	51.	1479.	13.32	12.29	13.00	377.	1.34
14	328.	1140.	56.	1488.	13.73	13.07	13.50	397.	1.34
15	328.	1146.	60.	1502.	14.27	13.75	14.18	423.	1.34
16	328.	1146.	64.	1509.	14.68	14.39	14.74	448.	1.34
17	328.	1148.	71.	1519.	15.16	15.01	15.45	473.	1.34
18	328.	1148.	75.	1526.	15.50	15.39	15.88	498.	1.34
19	328.	1149.	78.	1530.	15.91	15.87	16.43	522.	1.34
20	328.	1157.	84.	1540.	16.26	16.32	17.03	548.	1.34
21	328.	1158.	87.	1550.	16.60	16.69	17.63	572.	1.34
22	328.	1158.	90.	1556.	17.07	17.03	18.17	592.	1.34
23	328.	1160.	92.	1561.	17.28	17.31	18.73	614.	1.34
24	328.	1180.	93.	1583.	17.69	17.61	19.33	647.	1.34
25	328.	1186.	93.	1590.	17.96	17.87	19.85	666.	1.34
26	328.	1193.	93.	1596.	18.30	17.90	19.94	692.	1.34

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART 6

TEST NO R-45 FEED TYPE - PUREX OPERATION MODE - BATCH

RUN TIME	EVAP. LIQUID H+	EVAP.MAJOR CATION FE OR AL	CALCINER COND. H+	EVAP COND. H+	EVAP.COND. MAJOR ION FE OR AL	EVAP. COND. RU	EVAP. LIQUID TEMP.	EVAP. VAPOR TEMP.	CALCINER FEED TEMP.	CALCINER OFF-GAS TEMP.
HOURS	MOLAR	GM/LITER	MOLAR	MOLAR	GM/LITER	GM/LITER	DEG.C	DEG.C	DEG.C	DEG.C
1	3,81	26,4	-0.	0,86	0,156	-0.	113.	88.	21.	121.
2	6,22	28,7	-0.	2,09	0,005	-0.	114.	111.	46.	248.
3	6,32	31,6	-0.	2,10	0,005	-0.	115.	111.	50.	118.
4	6,27	32,2	-0.	1,83	0,004	-0.	115.	111.	46.	118.
5	5,82	32,0	-0.	1,51	0,017	-0.	115.	110.	49.	130.
6	5,42	34,6	-0.	1,59	0,004	-0.	114.	110.	49.	128.
7	6,02	36,4	-0.	1,71	0,017	-0.	111.	99.	21.	113.
8	5,82	37,3	-0.	1,68	0,02T	-0.	100.	72.	21.	142.
9	5,82	35,6	-0.	1,66	0,020	-0.	93.	57.	21.	142.
10	5,52	33,7	-0.	4,46	0,014	-0.	114.	106.	24.	155.
11	6,52	35,5	-0.	1,70	0,001	-0.	113.	106.	22.	152.
12	6,02	35,0	-0.	1,90	0,004	-0.	113.	106.	22.	160.
13	6,27	30,2	-0.	2,07	0,004	-0.	114.	105.	22.	160.
14	6,07	35,6	-0.	2,01	0,009	-0.	114.	104.	22.	140.
15	6,10	34,3	-0.	1,83	0,008	-0.	114.	105.	22.	124.
16	6,02	34,5	-0.	1,45	0,001	-0.	114.	106.	22.	128.
17	6,31	26,7	-0.	1,68	0,015	-0.	114.	105.	22.	128.
18	6,51	31,7	-0.	1,63	0,003	-0.	114.	105.	22.	122.
19	6,44	33,5	-0.	1,71	0,049	-0.	114.	104.	22.	114.
20	6,64	33,1	-0.	1,81	0,016	-0.	114.	104.	22.	106.
21	6,30	33,6	-0.	1,64	0,018	-0.	114.	104.	22.	110.
22	6,38	35,0	-0.	1,64	0,019	-0.	114.	102.	21.	104.
23	6,02	34,7	-0.	1,60	0,020	-0.	114.	103.	22.	103.
24	6,14	34,7	-0.	1,60	0,001	-0.	114.	110.	25.	133.
25	6,14	35,0	-0.	2,15	0,014	-0.	114.	107.	22.	128.
26	6,14	35,0	-0.	2,01	0,028	-0.	112.	97.	21.	100.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART A

TEST NO R-46 FEED TYPE - PUREX OPERATION MODE - BATCH

RUN TIME	FEED	WATER	CALCINER ADDITIVE	EVAP. COND.	CALCINER FURNACE	CALCINER COND.	EVAP. COND.	SYSTEM OFF-GAS	EVAP. DENSITY
HOURS	LITERS	LITERS	LITERS	LITERS	(HUNDRED-THOUSANDS OF BTUS)			CU.FT	GM/CC
1	49.	1.	0.	25.	1.78	0.21	0.98	49.	1.34
2	89.	3.	9.	57.	3.48	0.62	2.31	85.	1.34
3	128.	70.	12.	146.	5.19	0.78	2.48	127.	1.34
4	166.	240.	22.	369.	6.63	1.16	3.10	170.	1.33
5	197.	439.	33.	611.	8.33	1.51	3.69	208.	1.29
6	231.	629.	40.	845.	9.90	1.89	4.33	247.	1.30
7	274.	723.	44.	989.	11.06	2.25	4.81	287.	1.34
8	289.	856.	60.	1157.	12.43	2.49	5.40	315.	1.29
9	295.	996.	70.	1316.	13.52	2.49	6.29	379.	1.32
10	305.	1032.	77.	1372.	14.34	2.76	6.89	425.	1.36
11	311.	1043.	87.	1394.	14.96	3.10	8.11	480.	1.34
12	320.	1050.	94.	1422.	15.71	3.92	9.77	532.	1.34
13	326.	1058.	102.	1445.	16.32	4.14	10.42	585.	1.34
14	335.	1074.	110.	1481.	16.87	4.28	11.39	640.	1.34
15	335.	1103.	117.	1524.	17.42	4.42	12.08	691.	1.34
16	335.	1141.	124.	1575.	18.10	4.42	12.76	742.	1.32
17	335.	1171.	127.	1614.	18.58	5.28	14.41	795.	1.32
18	335.	1184.	128.	1618.	19.06	5.54	14.94	838.	1.34
19	335.	1190.	128.	1626.	19.47	5.92	15.39	885.	1.34
20	335.	1197.	128.	1632.	19.88	6.26	15.80	930.	1.34
21	335.	1203.	128.	1646.	20.35	6.63	16.24	979.	1.33
22	335.	1244.	128.	1689.	20.76	6.92	16.69	1035.	1.31
23	335.	1288.	128.	1736.	21.24	7.36	17.35	1094.	1.30
24	335.	1302.	128.	1737.	21.65	7.75	17.86	1139.	1.30

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART B

TEST NO R-46 FEED TYPE - PUREX OPERATION MODE - BATCH

RUN TIME	EVAP. LIQUID H+	EVAP.MAJOR CATION FE OR AL	CALCINER COND. H+	EVAP COND. H+	EVAP.COND. MAJOR ION FE OR AL	EVAP. COND. RU	EVAP. LIQUID TEMP.	EVAP. VAPOR TEMP.	CALCINER FEED TEMP.	CALCINER OFF-GAS TEMP.
HOURS	MOLAR	GM/LITER	MOLAR	MOLAR	GM/LITER	GM/LITER	DEG.C	DEG.C	DEG.C	DEG.C
1	6.18	33.5	-0.	1.64	0.001	-0.	114.	110.	25.	114.
2	6.28	33.5	-0.	1.81	0.002	-0.	115.	113.	28.	135.
3	6.20	27.8	-0.	1.58	0.005	-0.	114.	112.	72.	130.
4	6.20	31.0	-0.	1.58	0.005	-0.	114.	111.	68.	140.
5	6.20	33.1	-0.	1.61	0.007	-0.	115.	112.	69.	133.
6	6.18	34.3	-0.	1.73	0.002	-0.	114.	111.	68.	135.
7	5.98	31.7	-0.	1.64	0.002	-0.	114.	112.	44.	130.
8	5.98	34.4	-0.	1.77	0.001	-0.	114.	112.	56.	136.
9	6.18	35.3	-0.	3.10	0.004	-0.	114.	112.	42.	148.
10	6.18	34.6	-0.	1.52	0.001	-0.	113.	103.	24.	140.
11	6.26	35.0	-0.	1.66	0.001	-0.	114.	108.	27.	146.
12	6.28	35.0	-0.	1.79	0.003	-0.	114.	108.	25.	144.
13	6.18	35.2	-0.	1.66	0.002	-0.	114.	107.	24.	129.
14	6.40	35.6	-0.	1.48	0.001	-0.	114.	109.	26.	135.
15	6.28	35.9	-0.	1.28	0.001	-0.	114.	110.	28.	122.
16	6.14	35.5	-0.	1.45	0.001	-0.	114.	110.	30.	128.
17	6.49	33.2	-0.	1.52	0.001	-0.	114.	109.	28.	130.
18	6.64	38.4	-0.	2.16	0.003	-0.	114.	118.	24.	117.
19	6.51	35.1	-0.	4.33	0.003	-0.	114.	102.	23.	116.
20	6.39	35.9	-0.	1.97	0.002	-0.	113.	110.	22.	118.
21	6.38	35.3	-0.	1.52	0.001	-0.	116.	110.	29.	113.
22	6.18	37.8	-0.	1.20	0.001	-0.	114.	111.	34.	101.
23	6.23	36.8	-0.	2.13	0.002	-0.	114.	109.	34.	95.
24	6.18	35.5	-0.	2.24	0.003	-0.	114.	105.	23.	80.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART A

TEST NO R-47 FEED TYPE - TBP-25 OPERATION MODE - CONTINUOUS

RUN TIME	FEED	WATER	CALCINER ADDITIVE	EVAP. COND.	CALCINER FURNACE	CALCINER COND.	EVAP. COND.	SYSTEM OFF-GAS	EVAP. DENSITY
HOURS	LITERS	LITERS	LITERS	LITERS	(HUNDRED-THOUSANDS OF BTUS)			CU FT	GM/CC
1	69.	144.	-0.	131.	1,30	0,36	5,44	32.	1.36
2	144.	401.	-0.	463.	2,05	0,56	12,16	67.	1.36
3	153.	632.	-0.	706.	2,73	0,76	17,43	98.	1.41
4	168.	829.	-0.	921.	3,41	1,47	23,02	131.	1.39
5	207.	999.	-0.	1132.	4,58	2,74	28,23	163.	1.38
6	291.	1170.	-0.	1387.	6,35	4.08	33,59	196.	1.34
7	339.	1366.	-0.	1633.	7,99	4,84	39,17	231.	1.38
8	375.	1537.	-0.	1840.	9,02	5.51	43,60	263.	1.37
9	375.	1734.	-0.	2037.	9,70	5,88	47,64	301.	1.38
10	390.	1790.	-0.	2109.	10,38	6.19	47,64	334.	1.38
11	396.	1817.	-0.	2142.	10,86	6.47	47,64	369.	1.46
12	417.	1843.	-0.	2194.	11,47	6,68	48,14	410.	1.33
13	429.	1843.	-0.	2207.	12,09	6,68	48,38	464.	1.36
14	429.	1870.	-0.	2233.	12,57	7,13	48,38	508.	1.22
15	429.	1896.	-0.	2260.	13,05	7,36	48,59	526.	1.20
16	429.	1927.	-0.	2290.	13,52	7,57	48,59	561.	1.19
17	429.	1953.	-0.	2316.	13,93	7,69	48,59	591.	1.16
18	429.	1953.	-0.	2316.	14,34	7,83	48,59	624.	1.18
19	429.	1980.	-0.	2343.	14,75	8,02	48,82	653.	1.29
20	429.	1980.	-0.	2343.	15,09	8,08	48,82	688.	1.17
21	429.	2006.	-0.	2369.	15,50	8,15	48,82	729.	1.20
22	429.	2033.	-0.	2370.	15,64	8,21	48,82	751.	1.21
23	429.	2059.	-0.	2422.	16,05	8,28	48,82	783.	1.21

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Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART B

TEST NO R-47 FEED TYPE - TBP-25 OPERATION MODE - CONTINUOUS

RUN TIME	EVAP. LIQUID H+	EVAP. MAJOR CATION FE OR AL	CALCINER COND. H+	EVAP COND. H+	EVAP. COND. MAJOR ION FE OR AL	EVAP. COND. RU	EVAP. LIQUID TEMP.	EVAP. VAPOR TEMP.	CALCINER FEED TEMP.	CALCINER OFF-GAS TEMP.
HOURS	MOLAR	GM/LITER	MOLAR	MOLAR	GM/LITER	GM/LITER	DEG.C	DEG.C	DEG.C	DEG.C
1	0.44	67.5	-0.	0.71	2.960	-0.	112.	103.	65.	313.
2	0.	85.5	-0.	0.41	0.440	-0.	111.	111.	60.	204.
3	0.	80.9	-0.	0.43	0.057	-0.	116.	112.	62.	217.
4	0.25	67.4	-0.	0.84	0.015	-0.	112.	112.	54.	319.
5	1.70	53.9	-0.	1.41	0.017	-0.	113.	113.	52.	130.
6	0.94	64.7	-0.	1.47	0.006	-0.	112.	112.	50.	150.
7	0.30	67.4	-0.	0.85	0.006	-0.	113.	114.	58.	116.
8	0.28	69.2	-0.	0.75	0.004	-0.	114.	114.	61.	115.
9	1.26	67.4	-0.	1.01	0.004	-0.	114.	114.	60.	128.
10	1.76	103.0	-0.	2.84	0.042	-0.	111.	106.	63.	112.
11	1.92	53.5	-0.	1.32	0.012	-0.	118.	107.	76.	125.
12	2.79	57.5	-0.	1.70	0.006	-0.	105.	102.	62.	97.
13	3.24	30.6	-0.	0.61	0.007	-0.	113.	110.	70.	133.
14	4.34	21.4	-0.	0.77	0.005	-0.	105.	103.	60.	113.
15	4.78	15.3	-0.	0.58	0.001	-0.	107.	105.	59.	113.
16	4.20	8.5	-0.	0.54	0.003	-0.	106.	104.	56.	112.
17	5.85	7.1	-0.	0.86	0.003	-0.	105.	100.	54.	110.
18	9.68	12.6	-0.	2.96	0.020	-0.	107.	106.	56.	114.
19	5.20	8.5	-0.	1.78	0.028	-0.	116.	117.	54.	140.
20	6.68	7.7	-0.	1.59	0.056	-0.	105.	91.	52.	146.
21	7.02	7.7	-0.	1.72	0.008	-0.	108.	107.	53.	135.
22	6.80	7.2	-0.	1.58	0.011	-0.	110.	93.	54.	130.
23	6.30	8.4	-0.	1.44	0.004	-0.	107.	107.	53.	126.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART A

TEST NO R-48 FEED TYPE - TBP-25 OPERATION MODE - CONTINUOUS

RUN TIME	FEED	WATER	CALCINER ADDITIVE	EVAP. COND.	CALCINER FURNACE	CALCINER COND.	EVAP. COND.	SYSTEM OFF-GAS	EVAP. DENSITY
HOURS	LITERS	LITERS	LITERS	LITERS	(HUNDRED-THOUSANDS	OF BTUS)		CU FT	GM/CC
1	111.	0.	-0.	57.	1.57	0.97	1.17	56.	1.44
2	144.	57.	-0.	125.	3.28	2.23	1.58	100.	1.32
3	171.	114.	-0.	210.	4.92	3.51	3.40	167.	1.29
4	219.	250.	-0.	395.	6.63	4.49	5.31	225.	1.40
5	261.	424.	-0.	612.	7.85	5.25	10.16	283.	1.33
6	282.	594.	-0.	804.	8.74	5.76	12.91	340.	1.36
7	297.	621.	-0.	848.	9.90	6.30	13.41	403.	1.36
8	333.	676.	-0.	943.	10.52	6.89	13.89	455.	1.36
9	333.	676.	-0.	944.	11.34	7.24	13.89	509.	1.30
10	333.	704.	-0.	971.	11.95	7.50	13.89	565.	1.38
11	351.	704.	-0.	991.	12.64	7.92	13.89	626.	1.40
12	360.	704.	-0.	1001.	13.18	8.17	14.13	677.	1.39
13	378.	757.	-0.	1073.	13.66	8.45	15.63	722.	1.34
14	384.	818.	-0.	1140.	14.07	8.63	16.54	770.	1.45
15	390.	849.	-0.	1178.	14.68	8.78	16.54	829.	1.39
16	390.	849.	-0.	1179.	14.96	8.98	16.54	862.	1.39
17	396.	882.	-0.	1220.	15.37	9.15	16.54	895.	1.38
18	402.	882.	-0.	1227.	15.78	9.35	16.54	932.	1.42
19	402.	882.	-0.	1229.	16.32	9.56	16.54	966.	1.38
20	411.	882.	-0.	1239.	16.73	9.75	16.54	998.	1.42
21	420.	908.	-0.	1275.	17.07	10.04	16.54	1032.	1.34
22	420.	908.	-0.	1277.	17.48	10.23	16.31	1064.	1.34
23	426.	939.	-0.	1314.	17.83	10.44	15.55	1097.	1.32
24	435.	965.	-0.	1350.	18.17	10.63	16.01	1124.	1.34
25	435.	1026.	-0.	1411.	18.51	10.81	16.45	1155.	1.34
26	444.	1075.	-0.	1470.	18.99	10.98	16.88	1189.	1.34
27	444.	1128.	-0.	1523.	19.33	11.20	17.71	1231.	1.34
28	454.	1185.	-0.	1591.	19.81	11.37	18.11	1260.	1.34
29	454.	1211.	-0.	1618.	20.15	11.51	18.29	1305.	1.34
30	462.	1268.	-0.	1683.	20.49	11.63	18.72	1341.	1.34
31	468.	1294.	-0.	1716.	20.83	11.69	18.01	1376.	1.35
32	468.	1294.	-0.	1718.	21.38	11.60	17.61	1407.	1.34
33	468.	1294.	-0.	1718.	21.65	11.66	17.61	1441.	1.34
34	468.	1294.	-0.	1719.	21.99	12.02	17.41	1476.	1.34
35	468.	1321.	-0.	1746.	22.33	12.15	16.71	1511.	1.34
36	468.	1321.	-0.	1746.	22.68	12.22	15.99	1546.	1.34
37	468.	1321.	-0.	1746.	22.95	12.28	15.28	1581.	1.34
38	468.	1321.	-0.	1747.	23.29	12.35	14.79	1615.	1.34

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART 6

TEST NO R-48 FEED TYPE - TBP-25 OPERATION MODE - CONTINUOUS

RUN TIME	EVAP. LIQUID H+	EVAP.MAJOR CATION FE OR AL	CALCINER COND. H+	EVAP COND. H+	EVAP.COND. MAJOR ION FE OR AL	EVAP. COND. RU	EVAP. LIQUID TEMP.	EVAP. VAPOR TEMP.	CALCINER FEED TEMP.	CALCINER OFF-GAS TEMP.
HOURS	MOLAR	GM/LITER	MOLAR	MOLAR	GM/LITER	GM/LITER	DEG.C	DEG.C	DEG.C	DEG.C
1	3,02	42,2	6,04	1,58	0,010	-0.	115.	115.	55.	250.
2	4,50	22,4	7,72	1,62	0,010	-0.	112.	112.	42.	146.
3	1,68	63,8	8,19	3,10	0,010	-0.	112.	112.	36.	154.
4	1,96	46,8	8,09	1,52	0,010	-0.	116.	116.	43.	146.
5	1,04	54,8	5,09	1,22	0,010	-0.	112.	112.	42.	129.
6	3,46	44,9	7,52	2,05	0,010	-0.	112.	112.	42.	128.
7	2,29	53,9	5,76	1,90	0,010	-0.	109.	109.	52.	123.
8	3,45	36,9	7,59	1,80	0,010	-0.	109.	109.	63.	116.
9	4,84	46,2	9,02	5,19	0,010	-0.	110.	110.	61.	129.
10	4,40	50,4	7,94	4,38	0,010	-0.	114.	114.	63.	119.
11	3,94	51,3	9,72	4,50	0,010	-0.	114.	114.	62.	115.
12	0,97	56,3	6,99	0,62	0,010	-0.	112.	112.	63.	123.
13	0,84	72,0	9,39	1,76	0,010	-0.	113.	113.	62.	113.
14	1,07	63,8	9,55	1,94	0,010	-0.	118.	118.	65.	113.
15	1,97	62,0	6,90	1,33	0,010	-0.	103.	103.	56.	106.
16	3,02	56,6	7,63	1,62	0,010	-0.	111.	111.	56.	112.
17	3,72	61,1	8,98	3,28	0,010	-0.	114.	113.	56.	110.
18	3,18	53,0	7,85	1,66	0,010	-0.	118.	118.	60.	102.
19	4,40	51,2	7,83	3,62	0,010	-0.	113.	111.	56.	109.
20	2,91	49,4	6,82	1,34	0,010	-0.	118.	118.	59.	110.
21	3,30	47,2	8,35	3,30	0,010	-0.	112.	111.	54.	112.
22	3,42	41,4	8,41	2,12	0,010	-0.	114.	114.	55.	114.
23	2,10	50,3	7,20	1,10	0,010	-0.	114.	114.	55.	107.
24	1,79	53,9	8,21	0,92	0,010	-0.	110.	110.	63.	111.
25	1,36	52,6	5,50	0,69	0,010	-0.	111.	111.	64.	107.
26	1,28	54,8	5,50	0,81	0,010	-0.	108.	108.	64.	108.
27	1,30	51,3	7,56	0,70	0,010	-0.	107.	107.	63.	104.
28	1,42	53,9	5,90	0,72	0,010	-0.	106.	106.	65.	-0.
29	1,54	51,1	7,95	0,80	0,010	-0.	106.	106.	64.	-0.
30	1,70	52,1	6,86	0,87	0,010	-0.	107.	107.	64.	-0.
31	2,22	48,2	7,65	0,93	0,010	-0.	107.	104.	63.	-0.
32	2,64	49,0	6,98	1,02	0,010	-0.	108.	108.	65.	-0.
33	3,12	42,9	7,69	1,28	0,010	-0.	110.	110.	64.	-0.
34	3,36	44,1	7,79	1,34	0,010	-0.	111.	111.	65.	-0.
35	3,76	42,3	9,40	1,60	0,010	-0.	112.	112.	63.	-0.
36	4,10	40,5	9,18	1,68	0,010	-0.	111.	111.	63.	-0.
37	4,23	40,8	7,60	1,40	0,010	-0.	110.	110.	64.	-0.
38	4,60	40,6	8,75	1,24	0,010	-0.	114.	114.	63.	-0.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART A

TEST NO R-49 FEED TYPE - TBP-25 OPERATION MODE - CONTINUOUS

RUN TIME	FEED	WATER	CALCINER ADDITIVE	EVAP. COND.	CALCINER FURNACE	CALCINER COND.	EVAP. COND.	SYSTEM OFF-GAS	EVAP. DENSITY
HOURS	LITERS	LITERS	LITERS	LITERS	(HUNDRED-THOUSANDS OF BTUS)			CU FT	GM/CC
1	76.	0.	-0.	38.	1.84	0.98	0.48	0.	1.36
2	110.	0.	-0.	55.	3.41	2.11	0.96	25.	1.35
3	138.	0.	-0.	69.	4.99	3.18	0.96	60.	1.35
4	173.	87.	-0.	183.	6.76	4.39	5.70	95.	1.34
5	207.	257.	-0.	389.	8.47	5.46	9.57	132.	1.31
6	249.	341.	-0.	515.	9.63	6.32	13.30	167.	1.31
7	284.	484.	-0.	698.	10.65	7.00	17.02	182.	1.32
8	304.	613.	-0.	850.	11.82	7.68	19.95	183.	1.32
9	325.	708.	-0.	967.	12.64	8.27	22.98	223.	1.32
10	346.	852.	-0.	1134.	13.46	8.77	26.07	263.	1.32
11	367.	965.	-0.	1272.	14.27	9.22	28.56	301.	1.33
12	381.	965.	-0.	1288.	15.03	9.78	28.56	341.	1.43
13	388.	992.	-0.	1323.	15.71	10.10	28.79	380.	1.38
14	388.	1048.	-0.	1382.	16.39	10.38	30.52	425.	1.32
15	394.	1101.	-0.	1443.	16.80	10.56	31.34	462.	1.35
16	394.	1158.	-0.	1501.	17.28	10.74	32.23	503.	1.35
17	408.	1215.	-0.	1574.	17.69	10.94	33.35	545.	1.34
18	408.	1268.	-0.	1628.	18.03	11.07	34.03	586.	1.35
19	415.	1298.	-0.	1667.	18.58	11.27	34.91	625.	1.35
20	422.	1351.	-0.	1728.	19.06	11.46	35.58	659.	1.35
21	429.	1408.	-0.	1792.	19.53	11.72	36.69	665.	1.34
22	429.	1465.	-0.	1848.	19.88	11.84	37.58	707.	1.35
23	443.	1518.	-0.	1915.	20.22	11.99	38.47	752.	1.34
24	458.	1575.	-0.	1987.	20.76	12.11	39.34	796.	1.35
25	464.	1631.	-0.	2050.	21.17	12.24	40.18	838.	1.35
26	464.	1688.	-0.	2107.	21.65	12.44	40.61	884.	1.34
27	478.	1737.	-0.	2170.	22.06	12.56	41.18	924.	1.34

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART B

TEST NO R-49 FEED TYPE - TBP-25 OPERATION MODE - CONTINUOUS

RUN TIME	EVAP. LIQUID H+	EVAP.MAJOR CATION FE OR AL	CALCINER COND. H+	EVAP COND. H+	EVAP.COND. MAJOR ION FE OR AL	EVAP. COND. RU	EVAP. LIQUID TEMP.	EVAP. VAPOR TEMP.	CALCINER FEED TEMP.	CALCINER OFF-GAS TEMP.
HOURS	MOLAR	GM/LITER	MOLAR	MOLAR	GM/LITER	GM/LITER	DEG.C	DEG.C	DEG.C	DEG.C
1	1.28	56.6	0.84	1.04	0.010	-0.	115.	-0.	43.	134.
2	2.72	51.1	3.34	1.74	0.010	-0.	112.	-0.	45.	160.
3	5.43	36.9	6.81	3.02	0.010	-0.	118.	-0.	46.	168.
4	3.71	44.1	7.20	2.24	0.042	-0.	120.	-0.	45.	181.
5	2.59	43.6	6.41	1.14	0.010	-0.	112.	-0.	42.	171.
6	1.88	46.8	6.00	0.82	0.010	-0.	111.	-0.	41.	143.
7	1.72	46.8	5.69	0.94	0.010	-0.	112.	-0.	40.	128.
8	1.64	45.5	5.70	0.86	0.010	-0.	109.	-0.	40.	125.
9	1.55	47.7	5.71	0.94	0.010	-0.	110.	-0.	39.	121.
10	1.26	49.4	5.42	0.88	0.010	-0.	110.	-0.	39.	120.
11	1.29	50.3	4.78	0.80	0.010	-0.	110.	-0.	40.	122.
12	2.85	48.1	6.78	1.30	0.010	-0.	111.	-0.	41.	134.
13	3.30	50.3	8.77	4.16	0.010	-0.	121.	-0.	41.	124.
14	2.83	41.4	6.98	1.36	0.010	-0.	110.	-0.	38.	122.
15	1.85	52.1	6.80	1.40	0.012	-0.	111.	-0.	40.	127.
16	1.30	55.7	6.50	1.00	0.010	-0.	110.	26.	90.	118.
17	1.36	53.9	6.00	0.90	0.010	-0.	110.	26.	40.	112.
18	1.15	54.4	7.22	0.87	0.010	-0.	120.	26.	40.	116.
19	1.20	55.3	6.60	0.85	0.010	-0.	110.	26.	40.	113.
20	1.20	54.4	8.60	0.93	0.010	-0.	110.	26.	40.	114.
21	1.40	53.0	7.35	0.98	0.010	-0.	110.	26.	40.	116.
22	1.00	56.6	6.65	0.76	0.010	-0.	110.	25.	40.	113.
23	1.20	59.3	8.30	0.86	0.010	-0.	110.	26.	40.	114.
24	0.94	56.6	3.80	0.76	0.010	-0.	110.	26.	40.	107.
25	0.78	58.4	3.90	0.59	0.010	-0.	110.	26.	39.	108.
26	0.78	57.5	4.20	0.49	0.010	-0.	110.	26.	39.	110.
27	0.86	54.8	4.60	0.52	0.010	-0.	109.	26.	39.	113.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART A

TEST NO R-50 FEED TYPE - TBP-25 OPERATION MODE - CONTINUOUS

RUN TIME	FEED	WATER	CALCINER ADDITIVE	EVAP. COND.	CALCINER FURNACE	CALCINER COND.	EVAP. COND.	SYSTEM OFF-GAS	EVAP. DENSITY
HOURS	LITERS	LITERS	LITERS	LITERS	(HUNDRED-THOUSANDS	OF	BTUS)	CU FT	GM/CC
1	42.	0.	-0.	21.	0.89	0.29	0.06	25.	1.38
2	69.	53.	-0.	63.	1.98	1.33	0.12	57.	1.36
3	96.	83.	-0.	104.	3.55	2.60	0.18	83.	1.35
4	T26.	83.	-0.	135.	4.92	3.51	0.18	110.	1.34
5	153.	167.	-0.	247.	6.15	4.42	0.87	139.	1.35
6	174.	280.	-0.	377.	7.24	5.01	1.66	170.	1.33
7	195.	367.	-0.	486.	7.92	5.62	2.23	195.	1.34
8	222.	450.	-0.	597.	8.67	6.04	2.23	225.	1.36
9	222.	450.	-0.	598.	9.29	6.31	2.23	247.	1.34
10	231.	450.	-0.	608.	9.97	6.63	2.23	274.	1.34
11	234.	477.	-0.	639.	10.45	6.89	2.23	301.	1.34
12	243.	477.	-0.	649.	11.00	7.13	2.23	328.	1.30
13	258.	560.	-0.	738.	11.54	7.44	3.15	355.	1.30
14	270.	674.	-0.	858.	11.95	8.36	3.76	383.	1.34
15	285.	753.	-0.	952.	12.43	8.62	3.89	407.	1.34
16	291.	788.	-0.	984.	12.77	8.79	3.89	433.	1.39
17	291.	810.	-0.	1017.	13.18	8.98	3.89	460.	1.36
18	291.	810.	-0.	1018.	13.66	9.10	3.89	488.	1.36
19	291.	836.	-0.	1044.	14.07	9.23	3.89	515.	1.36
20	291.	863.	-0.	1072.	14.55	9.35	3.89	542.	1.32
21	306.	889.	-0.	1114.	15.03	9.48	3.89	570.	1.38
22	312.	920.	-0.	1150.	15.44	9.60	3.89	597.	1.36
23	327.	924.	-0.	1171.	15.78	9.68	3.89	628.	1.34
24	327.	946.	-0.	1194.	16.32	9.80	3.95	655.	1.34
25	333.	999.	-0.	1254.	16.80	9.87	4.16	683.	1.34
26	339.	1033.	-0.	1286.	17.28	10.05	4.22	710.	1.38
27	339.	1060.	-0.	1315.	17.76	10.12	4.28	737.	1.36
28	339.	1090.	-0.	1348.	18.24	10.38	4.35	764.	1.38
29	339.	1117.	-0.	1375.	18.92	10.56	4.41	790.	1.27
30	346.	1143.	-0.	1402.	19.40	10.70	4.48	820.	1.38
31	346.	1170.	-0.	1429.	19.67	10.80	4.53	843.	1.36
32	346.	1170.	-0.	1429.	20.08	10.93	4.53	848.	-0.
33	346.	1170.	-0.	1429.	20.42	10.99	4.53	848.	-0.
34	346.	1170.	-0.	1429.	20.83	11.05	4.53	848.	-0.
35	346.	1170.	-0.	1429.	21.17	11.11	4.53	848.	-0.
36	346.	1170.	-0.	1429.	21.24	11.11	4.53	848.	-0.
37	346.	1170.	-0.	1429.	21.65	11.11	4.53	848.	-0.
38	346.	1170.	-0.	1429.	21.86	11.11	4.53	848.	-0.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART B

TEST NO R-50 FEED TYPE - TBP-25 OPERATION MODE - CONTINUOUS

RUN TIME	EVAP. LIQUID H+	EVAP.MAJOR CATION FE OR AL	CALCINER COND. H+	EVAP COND. H+	EVAP.COND. MAJOR ION FE OR AL	EVAP. COND. RU	EVAP. LIQUID TEMP.	EVAP. VAPOR TEMP.	CALCINER FEED TEMP.	CALCINER OFF-GAS TEMP.
HOURS	MOLAR	GM/LITER	MOLAR	MOLAR	GM/LITER	GM/LITER	DEG.C	DEG.C	DEG.C	DEG.C
1	0.03	66.0	1.24	0.70	0.010	0.001	113.	110.	67.	148.
2	1.80	55.4	5.30	1.04	0.010	0.001	113.	109.	67.	256.
3	5.40	40.9	8.69	3.15	0.010	0.001	112.	110.	64.	146.
4	6.53	35.1	9.51	4.54	0.010	0.001	113.	107.	72.	156.
5	2.73	49.9	8.59	1.60	0.010	0.001	113.	109.	77.	222.
6	2.15	49.4	7.75	1.25	0.010	0.001	110.	106.	68.	154.
7	1.80	53.2	7.06	1.21	0.010	0.001	110.	106.	68.	162.
8	2.46	55.3	7.42	1.46	0.010	0.001	111.	107.	67.	150.
9	4.02	44.1	8.53	1.83	0.010	0.001	108.	106.	64.	144.
10	5.00	41.6	9.03	2.53	0.010	0.001	109.	108.	62.	156.
11	5.52	39.6	9.90	3.20	0.010	0.001	112.	108.	62.	168.
12	5.06	32.2	9.78	2.28	0.010	0.001	108.	104.	59.	170.
13	3.05	41.4	7.20	1.30	0.010	0.001	112.	108.	62.	120.
14	1.18	55.8	6.50	0.80	0.010	0.001	112.	108.	65.	125.
15	1.12	57.5	4.50	0.70	0.010	0.001	109.	108.	67.	113.
16	0.65	66.5	4.30	0.56	0.010	0.001	112.	108.	69.	129.
17	0.86	62.9	2.30	0.61	0.010	0.001	109.	107.	67.	136.
18	0.72	62.0	-0.	0.51	0.010	0.001	110.	107.	67.	138.
19	1.80	58.5	8.00	1.24	0.010	0.001	110.	109.	66.	151.
20	2.68	46.7	6.11	0.87	0.010	0.001	108.	106.	63.	121.
21	2.66	54.8	6.80	1.84	0.010	0.001	113.	111.	68.	117.
22	2.64	52.6	5.60	1.48	0.010	0.001	110.	109.	66.	124.
23	1.67	45.2	-0.	1.08	0.010	0.001	109.	108.	67.	123.
24	2.15	49.3	-0.	1.13	0.010	0.005	108.	108.	64.	128.
25	2.02	51.4	-0.	1.27	0.010	0.001	108.	108.	66.	127.
26	0.	68.9	-0.	0.23	0.010	0.001	109.	108.	63.	126.
27	0.14	64.3	-0.	0.31	0.010	0.001	109.	107.	63.	114.
28	0.	70.5	-0.	0.15	0.010	0.001	107.	106.	62.	127.
29	0.	49.5	2.14	0.17	0.010	0.001	103.	103.	57.	113.
30	0.78	63.8	-0.	0.44	0.010	0.001	112.	110.	65.	130.
31	1.81	56.6	-0.	1.18	0.010	0.001	109.	109.	64.	120.
32	-0.	-0.	10.00	-0.	-0.	-0.	-0.	-0.	-0.	110.
33	-0.	-0.	12.40	-0.	-0.	-0.	-0.	-0.	-0.	115.
34	-0.	-0.	12.50	-0.	-0.	-0.	-0.	-0.	-0.	120.
35	-0.	-0.	11.70	-0.	-0.	-0.	-0.	-0.	-0.	106.
36	-0.	-0.	11.20	-0.	-0.	-0.	-0.	-0.	-0.	102.
37	-0.	-0.	10.10	-0.	-0.	-0.	-0.	-0.	-0.	96.
38	-0.	-0.	8.62	-0.	-0.	-0.	-0.	-0.	-0.	93.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART A

TEST NO R-51 FEED TYPE - TBP-25 OPERATION MODE - BATCH

RUN TIME	FEED	WATER	CALCINER ADDITIVE	EVAP. COND.	CALCINER FURNACE	CALCINER COND.	EVAP. COND.	SYSTEM OFF-GAS	EVAP. DENSITY
HOURS	LITERS	LITERS	LITERS	LITERS	(HUNDRED-THOUSANDS OF BTUS)			CU FT	GM/CC
1	28.	0.	-0.	16.	1.30	2.82	0.81	38.	1.32
2	28.	26.	-0.	31.	2.53	5.22	1.59	63.	1.39
3	58.	303.	-0.	279.	3.69	7.77	2.65	92.	1.34
4	90.	329.	-0.	338.	4.92	9.96	3.01	120.	1.38
5	110.	386.	-0.	418.	6.15	12.09	3.07	144.	1.37
6	132.	413.	-0.	469.	7.03	14.17	3.31	166.	1.37
7	148.	439.	-0.	514.	7.79	16.20	3.43	188.	1.36
8	152.	469.	-0.	553.	8.40	18.31	3.60	211.	1.36
9	160.	522.	-0.	600.	8.88	20.48	3.78	233.	1.34
10	168.	579.	-0.	667.	9.43	22.67	4.03	256.	1.34
11	174.	606.	-0.	702.	9.90	25.03	4.37	277.	1.34
12	174.	659.	-0.	740.	10.45	27.34	4.83	300.	1.36
13	180.	715.	-0.	805.	10.72	29.54	5.09	322.	1.38
14	190.	742.	-0.	844.	11.13	31.78	5.09	345.	1.38
15	198.	786.	-0.	900.	11.75	34.28	5.75	370.	1.34
16	198.	846.	-0.	960.	12.23	36.39	6.31	392.	1.36
17	206.	939.	-0.	970.	12.64	38.72	6.86	415.	1.34
18	218.	1032.	-0.	1171.	13.18	41.24	7.13	435.	1.34
19	218.	1055.	-0.	1197.	13.73	43.45	7.26	457.	1.36
20	218.	1074.	-0.	1220.	14.00	45.37	7.39	476.	1.38
21	226.	1096.	-0.	1253.	14.68	48.05	7.53	498.	1.36
22	226.	1122.	-0.	1281.	15.16	50.31	7.66	519.	1.36
23	236.	1133.	-0.	1305.	15.50	52.59	7.80	526.	1.36
24	236.	1148.	-0.	1321.	15.98	54.44	7.80	548.	1.37
25	236.	1161.	-0.	1336.	16.39	55.99	7.87	568.	1.37
26	236.	1169.	-0.	1346.	16.80	57.41	7.93	589.	1.37
27	236.	1175.	-0.	1355.	17.35	58.71	7.99	612.	1.37
28	236.	1182.	-0.	1365.	17.69	60.02	8.06	635.	1.37
29	248.	1187.	-0.	1384.	18.17	61.14	8.11	658.	1.38
30	248.	1192.	-0.	1390.	18.65	62.25	8.11	679.	1.38
31	248.	1221.	-0.	1397.	19.06	63.42	8.11	702.	1.39
32	256.	1221.	-0.	1407.	19.67	64.53	8.11	723.	1.37
33	270.	1221.	-0.	1422.	20.08	65.68	8.17	743.	1.37
34	270.	1221.	-0.	1424.	20.56	66.91	8.17	765.	1.37
35	276.	1221.	-0.	1432.	20.90	68.16	8.17	780.	1.37
36	276.	1221.	-0.	1434.	21.38	69.39	8.17	780.	1.37
37	276.	1221.	-0.	1435.	21.65	70.60	8.17	796.	1.37
38	288.	1221.	-0.	1445.	22.06	71.89	8.24	817.	1.36
39	288.	1221.	-0.	1446.	22.47	73.29	8.38	841.	1.36
40	296.	1221.	-0.	1455.	22.88	74.52	8.45	863.	1.36
41	296.	1300.	-0.	1535.	23.29	75.15	8.48	885.	1.36
42	304.	1357.	-0.	1602.	23.56	76.96	9.05	906.	1.34
43	308.	1357.	-0.	1608.	24.11	78.24	9.18	926.	1.36
44	308.	1357.	-0.	1609.	24.45	79.69	9.25	948.	1.38
45	308.	1357.	-0.	1609.	24.72	81.37	9.25	956.	1.38
46	308.	1357.	-0.	1609.	25.13	82.93	9.31	970.	1.40
47	308.	1357.	-0.	1609.	25.27	84.68	9.31	982.	-0.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART B

TEST NO R-51 FEED TYPE - TBP-25 OPERATION MODE - BATCH

RUN TIME	EVAP. LIQUID H+	EVAP.MAJOR CATION FE OR AL	CALCINER COND. H+	EVAP COND. H+	EVAP.COND. MAJOR ION FE OR AL	EVAP. COND. RU	EVAP. LIQUID TEMP.	EVAP. VAPOR TEMP.	CALCINER FEED TEMP.	CALCINER OFF-GAS TEMP.
HOURS	MOLAR	GM/LITER	MOLAR	MOLAR	GM/LITER	GM/LITER	DEG.C	DEG.C	DEG.C	DEG.C
1	1.86	49.8	-0.	0.74	0.020	0.001	118.	110.	48.	130.
2	2.12	60.4	-0.	2.37	0.012	0.009	123.	119.	37.	253.
3	1.52	54.8	-0.	1.08	0.015	0.001	118.	114.	54.	330.
4	1.27	62.1	-0.	1.56	0.010	0.004	122.	117.	42.	175.
5	1.40	60.3	-0.	2.40	0.010	0.001	119.	107.	46.	166.
6	1.56	60.0	-0.	2.30	0.010	0.001	118.	108.	44.	224.
7	1.80	53.0	-0.	1.52	0.010	0.001	119.	110.	46.	202.
8	1.65	57.4	-0.	1.10	0.010	0.001	118.	112.	63.	171.
9	1.68	55.6	-0.	1.02	0.010	0.001	118.	112.	54.	150.
10	1.71	5417	-0.	0.90	0.010	0.001	118.	112.	64.	158.
11	1.72	54.7	-0.	1.01	0.010	0.001	118.	112.	56.	140.
12	1.72	57.4	-0.	1.34	0.010	0.001	120.	115.	66.	155.
13	1.68	60.6	-0.	1.40	0.010	0.001	120.	114.	66.	142.
14	1.60	60.6	-0.	1.02	0.010	0.001	119.	112.	58.	133.
15	1.42	57.1	-0.	0.71	0.010	0.001	117.	112.	56.	141.
16	1.35	59.8	-0.	0.97	0.010	0.001	119.	115.	78.	176.
17	1.20	53.9	-0.	0.60	0.010	0.001	117.	111.	60.	135.
18	1.18	56.6	-0.	0.91	0.010	0.001	118.	111.	50.	120.
19	1.20	59.3	-0.	0.66	0.010	0.001	118.	110.	70.	208.
20	1.24	60.2	-0.	0.67	0.010	0.001	118.	110.	63.	220.
21	1.31	59.3	-0.	0.80	0.010	0.001	118.	110.	71.	126.
22	1.28	59.3	-0.	0.82	0.010	0.001	118.	110.	68.	162.
23	1.32	59.2	-0.	0.99	0.010	0.001	118.	110.	72.	121.
24	1.48	58.9	-0.	1.04	0.010	0.001	117.	110.	43.	135.
25	1.54	57.9	-0.	0.87	0.010	0.001	117.	110.	41.	141.
26	1.45	60.8	-0.	0.82	0.010	0.001	117.	111.	41.	143.
27	1.56	56.6	-0.	1.02	0.010	0.001	117.	110.	41.	122.
28	1.64	54.0	-0.	0.94	0.010	0.001	120.	111.	40.	137.
29	1.68	55.3	-0.	1.26	0.010	0.001	117.	110.	39.	121.
30	1.70	56.0	-0.	1.14	0.010	0.001	119.	110.	40.	118.
31	1.78	55.7	-0.	1.20	0.010	0.001	119.	104.	40.	121.
32	1.80	53.9	-0.	1.59	0.010	0.001	118.	104.	40.	124.
33	1.84	55.7	-0.	1.26	0.010	0.001	119.	107.	40.	119.
34	1.92	55.7	-0.	1.33	0.010	0.001	119.	107.	40.	144.
35	1.96	54.8	-0.	1.30	0.010	0.001	118.	103.	38.	122.
36	2.00	53.9	-0.	1.37	0.010	0.001	119.	109.	39.	148.
37	2.04	54.4	-0.	1.19	0.010	0.001	118.	105.	39.	203.
38	2.08	53.5	-0.	1.16	0.010	0.001	119.	110.	39.	128.
39	2.00	53.9	-0.	0.88	0.010	0.001	118.	112.	39.	191.
40	1.98	53.5	-0.	1.01	0.010	0.001	118.	112.	40.	124.
41	2.00	53.3	-0.	0.94	0.010	0.001	118.	112.	40.	130.
42	1.88	52.6	-0.	0.95	0.010	0.001	-0.	112.	40.	200.
43	2.00	57.1	-0.	1.41	0.010	0.001	-0.	114.	40.	154.
44	2.04	58.4	-0.	1.50	0.010	0.001	-0.	107.	34.	152.
45	2.06	58.4	-0.	1.19	0.010	0.001	-0.	47.	34.	124.
46	2.12	58.3	-0.	1.19	0.010	0.001	-0.	41.	32.	110.
47	-0.	-0.	-0.	-0.	-0.	-0.	-0.	41.	32.	114.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART A

TEST NO R-52 FEED TYPE - TBP-25 OPERATION MODE - BATCH

RUN TIME	FEED	WATER	CALCINER ADDITIVE	EVAP. COND.	CALCINER FURNACE	CALCINER COND.	EVAP. COND.	SYSTEM OFF-GAS	EVAP. DENSITY
HOURS	LITERS	LITERS	LITERS	LITERS	(HUNDRED-THOUSANDS OF BTUS)			CU FT	GM/CC
1	38.	14.	-0.	19.	1.57	0.63	0.75	40.	1.32
2	92.	62.	-0.	47.	3.14	1.92	1.27	64.	1.40
3	120.	153.	-0.	62.	4.44	3.82	1.93	92.	1.41
4	148.	257.	-0.	78.	5.53	6.04	2.48	116.	1.39
5	178.	330.	-0.	111.	6.63	8.62	2.98	142.	1.42
6	192.	363.	-0.	128.	7.51	11.21	3.17	167.	1.40
7	200.	386.	-0.	138.	8.33	13.66	3.30	169.	1.38
8	200.	410.	-0.	140.	8.95	16.06	3.36	169.	1.38
9	200.	431.	-0.	141.	9.43	18.44	3.49	191.	1.37
10	208.	451.	-0.	150.	9.84	20.75	3.63	216.	1.37
11	216.	471.	-0.	160.	10.18	25.15	3.70	242.	1.37
12	224.	490.	-0.	171.	10.65	25.23	3.82	264.	1.37
13	228.	508.	-0.	176.	11.13	27.49	3.95	287.	1.37
14	234.	526.	-0.	186.	11.54	29.92	4.02	313.	1.37
15	234.	544.	-0.	189.	12.09	32.43	4.15	337.	1.36
16	242.	561.	-0.	198.	12.50	34.68	4.22	358.	1.36
17	248.	577.	-0.	205.	12.91	36.84	4.29	383.	1.37
18	256.	592.	-0.	218.	13.25	38.84	4.41	406.	1.38
19	264.	607.	-0.	228.	13.73	40.89	4.55	427.	1.37
20	264.	622.	-0.	230.	14.21	42.98	4.68	439.	1.37
21	272.	636.	-0.	240.	14.62	45.08	4.82	454.	1.37
22	272.	649.	-0.	242.	15.03	47.12	4.95	476.	1.37
23	282.	663.	-0.	255.	15.64	49.22	5.02	501.	1.37
24	290.	676.	-0.	265.	16.05	51.22	5.08	522.	1.37
25	298.	690.	-0.	274.	16.53	53.28	5.15	545.	1.38
26	302.	702.	-0.	279.	17.01	55.25	5.21	568.	1.38
27	310.	715.	-0.	288.	17.42	57.42	5.27	587.	1.38
28	326.	728.	-0.	305.	17.96	59.55	5.27	606.	1.38
29	334.	741.	-0.	314.	18.37	61.69	5.40	631.	1.36
30	342.	753.	-0.	323.	18.71	63.88	5.53	656.	1.37
31	348.	765.	-0.	328.	19.26	66.08	5.66	682.	1.37
32	364.	777.	-0.	345.	19.60	68.34	5.66	709.	1.37
33	372.	789.	-0.	354.	20.08	70.64	5.73	730.	1.37
34	380.	800.	-0.	362.	20.56	72.96	5.73	752.	1.37
35	380.	813.	-0.	364.	21.04	75.44	5.86	788.	1.37
36	388.	823.	-0.	373.	21.45	77.84	6.00	803.	1.38
37	388.	834.	-0.	375.	21.92	80.48	6.06	827.	1.37
38	388.	846.	-0.	376.	22.33	82.82	6.19	853.	1.38
39	396.	856.	-0.	385.	22.81	85.09	6.26	878.	1.38
40	403.	867.	-0.	385.	23.36	87.34	6.33	902.	1.38
41	410.	876.	-0.	385.	23.77	89.63	6.33	928.	1.38
42	418.	888.	-0.	385.	24.18	91.80	6.45	954.	1.38
43	426.	898.	-0.	385.	24.59	93.91	6.52	980.	1.38
44	434.	907.	-0.	385.	25.07	96.19	6.59	1003.	1.38
45	440.	917.	-0.	385.	25.54	98.47	6.66	1030.	1.38

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS – PART B

TEST NO R-52 FEED TYPE – TRP-25 OPERATION MODE – BATCH

RUN TIME	EVAP. LIQUID H+	EVAP.MAJOR CATION FE OR AL	CALCINER COND. H+	EVAP COND. H+	EVAP.COND. MAJOR ION FE OR AL	EVAP. COND. RU	EVAP. LIQUID TEMP.	EVAP. VAPOR TEMP.	CALCINER FEED TEMP.	CALCINER OFF-GAS TEMP.
HOURS	MOLAR	GM/LITER	MOLAR	MOLAR	GM/LITER	GM/LITER	DEG.C	DEG.C	DEG.C	DEG.C
1	1.93	48.5	-0.	0.90	0.010	0.001	115.	111.	35.	325.
2	2.24	63.1	-0.	2.66	0.010	0.001	122.	117.	42.	232.
3	1.89	63.6	-0.	2.34	0.010	0.001	123.	117.	46.	200.
4	1.32	62.0	-0.	1.49	0.010	0.001	121.	115.	48.	185.
5	1.24	65.1	-0.	1.83	0.010	0.001	121.	115.	50.	161.
6	1.49	62.9	-0.	1.22	0.010	0.001	118.	112.	50.	144.
7	1.80	57.5	-0.	2.56	0.010	0.001	118.	111.	46.	195.
8	2.00	55.7	-0.	2.00	0.010	0.001	118.	112.	46.	122.
9	2.16	56.6	-0.	1.24	0.010	0.001	118.	113.	46.	114.
10	2.20	55.7	-0.	1.12	0.010	0.001	119.	112.	45.	122.
11	2.16	56.6	-0.	1.00	0.010	0.001	118.	112.	44.	120.
12	2.12	56.3	-0.	0.96	0.010	0.001	118.	112.	44.	120.
13	2.10	55.7	-0.	0.90	0.010	0.001	118.	112.	44.	122.
14	1.94	56.6	-0.	0.82	0.010	0.001	118.	112.	44.	120.
15	1.92	54.4	-0.	1.00	0.010	0.001	118.	112.	45.	118.
16	1.94	54.8	-0.	0.88	0.010	0.001	118.	111.	44.	123.
17	1.77	57.0	-0.	0.88	0.010	0.001	118.	111.	42.	122.
18	1.64	58.0	-0.	0.88	0.010	0.001	118.	110.	42.	126.
19	1.53	58.9	-0.	0.61	0.010	0.001	117.	110.	42.	129.
20	1.46	56.6	-0.	0.78	0.010	0.001	117.	110.	42.	120.
21	1.48	58.2	-0.	0.82	0.010	0.001	118.	110.	41.	119.
22	1.52	57.8	-0.	0.68	0.010	0.001	118.	111.	41.	120.
23	1.61	57.5	-0.	0.80	0.010	0.001	118.	111.	42.	117.
24	1.61	59.6	-0.	0.72	0.010	0.001	118.	110.	42.	122.
25	1.60	58.2	-0.	0.72	0.010	0.001	118.	111.	42.	130.
26	1.61	58.4	-0.	0.68	0.010	0.001	118.	111.	43.	126.
27	1.58	58.4	-0.	0.57	0.010	0.001	118.	109.	43.	134.
28	1.61	58.1	-0.	1.16	0.010	0.001	118.	108.	45.	120.
29	1.58	58.4	-0.	0.77	0.010	0.001	118.	110.	43.	120.
30	1.64	58.0	-0.	0.76	0.010	0.001	118.	111.	43.	120.
31	1.68	57.5	-0.	0.73	0.010	0.001	117.	110.	43.	118.
32	1.69	56.2	-0.	0.66	0.010	0.001	117.	111.	43.	120.
33	1.72	58.0	-0.	0.68	0.010	0.001	118.	110.	44.	127.
34	1.76	58.0	-0.	0.69	0.010	0.001	118.	111.	47.	126.
35	1.80	58.4	-0.	0.68	0.010	0.001	118.	110.	44.	125.
36	1.76	58.4	-0.	0.68	0.010	0.001	117.	111.	43.	124.
37	1.76	58.8	-0.	0.53	0.010	0.001	117.	108.	46.	122.
38	1.74	57.9	-0.	0.75	0.010	0.001	117.	111.	44.	124.
39	1.70	58.8	-0.	0.51	0.010	0.001	117.	108.	42.	122.
40	1.61	61.0	-0.	0.64	0.010	0.001	118.	110.	42.	128.
41	1.44	60.2	-0.	0.38	0.010	0.001	117.	108.	42.	118.
42	1.30	60.2	-0.	0.52	0.010	0.001	117.	110.	42.	126.
43	1.28	58.4	-0.	0.55	0.010	0.001	117.	110.	42.	124.
44	1.32	59.4	-0.	0.57	0.010	0.001	117.	110.	42.	133.
45	1.40	60.2	-0.	0.60	0.010	0.001	117.	110.	42.	122.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART A

TEST NO R-54 FEED TYPE - TBP-25 OPERATION MODE - CONTINUOUS

RUN TIME	FEED	WATER	CALCINER ADDITIVE	EVAP. COND.	CALCINER FURNACE	CALCINER COND.	EVAP. COND.	SYSTEM OFF-GAS	EVAP. DENSITY
HOURS	LITERS	LITERS	LITERS	LITERS	(HUNDRED-THOUSANDS OF BTUS)			CU FT	GM/CC
1	79.	23.	-0.	52.	1.37	0.70	0.74	19.	-0.
2	108.	0.	-0.	67.	2.73	1.68	1.78	37.	-0.
3	142.	165.	-0.	232.	4.37	2.95	4.04	59.	-0.
4	200.	278.	-0.	404.	6.01	4.16	8.30	81.	-0.
5	249.	421.	-0.	597.	7.92	5.25	13.14	101.	-0.
6	278.	567.	-0.	775.	9.22	6.11	15.51	123.	-0.
7	307.	620.	-0.	860.	10.31	7.32	16.96	147.	-0.
8	325.	676.	-0.	936.	11.34	7.67	17.93	167.	-0.
9	332.	706.	-0.	976.	12.09	8.06	18.35	189.	-0.
10	332.	706.	-0.	979.	12.70	8.38	18.75	211.	-0.
11	361.	789.	-0.	1093.	13.18	8.73	18.95	232.	-0.
12	361.	815.	-0.	1122.	13.80	8.97	20.70	253.	-0.
13	370.	845.	-0.	1164.	14.41	9.16	21.12	298.	-0.
14	372.	845.	-0.	-0.	14.68	9.42	21.33	311.	-0.
15	373.	845.	-0.	1173.	15.30	9.71	21.82	323.	-0.
16	373.	845.	-0.	1174.	15.78	9.66	21.99	341.	-0.
17	379.	901.	-0.	1237.	16.26	10.10	22.40	362.	-0.
18	394.	901.	-0.	1254.	16.73	10.29	22.61	383.	-0.
19	394.	901.	-0.	1257.	17.21	10.40	22.81	405.	-0.
20	394.	901.	-0.	1259.	17.69	10.54	22.81	407.	-0.
21	400.	901.	-0.	1268.	18.17	10.60	23.03	428.	-0.
22	400.	901.	-0.	1269.	18.65	10.72	23.23	450.	-0.
23	400.	901.	-0.	1269.	19.06	10.90	23.23	472.	-0.
24	412.	984.	-0.	1364.	19.40	11.02	26.32	494.	-0.
25	421.	1014.	-0.	1403.	19.94	11.14	26.51	515.	-0.
26	428.	1014.	-0.	1410.	20.29	11.26	26.51	537.	-0.
27	428.	1014.	-0.	1410.	20.83	11.49	26.51	557.	-0.
28	428.	1014.	-0.	1410.	21.17	11.62	26.51	579.	-0.
29	-0.	1082.	-0.	1478.	21.58	11.68	32.78	600.	-0.
30	-0.	1112.	-0.	1508.	21.86	11.74	33.00	625.	-0.
31	-0.	1112.	-0.	1508.	22.40	11.74	33.00	669.	-0.
32	-0.	-0.	-0.	1508.	22.68	11.74	33.00	669.	-0.
33	-0.	-0.	-0.	1508.	23.02	11.74	33.00	700.	-0.
34	-0.	-0.	-0.	1508.	23.09	11.74	33.00	764.	-0.
35	-0.	-0.	-0.	1508.	23.56	11.74	33.00	794.	-0.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART B

TEST NO R-54 FEED TYPE - TBP-25 OPERATION MODE - CONTINUOUS

RUN TIME	EVAP. LIQUID H+	EVAP. MAJOR CATION FE OR AL	CALCINER COND. H+	EVAP COND. H+	EVAP. COND. MAJOR ION FE OR AL	EVAP. COND. RU	EVAP. LIQUID TEMP.	EVAP. VAPOR TEMP.	CALCINER FEED TEMP.	CALCINER OFF-GAS TEMP.
HOURS	MOLAR	GM/LITER	MOLAR	MOLAR	GM/LITER	GM/LITER	DEG.C	DEG.C	DEG.C	DEG.C
1	2,95	42,9	6,07	1,62	0,002	0,001	111.	109.	37.	320.
2	3,11	44,1	6,70	1,89	0,002	0,001	111.	27.	52.	156.
3	2,69	46,5	6,99	1,57	0,002	0,001	112.	103.	45.	237.
4	2,61	45,2	7,29	1,50	0,002	0,001	111.	113.	43.	252.
5	3,17	44,6	8,37	2,06	0,002	0,001	111.	112.	45.	166.
6	3,94	43,2	8,10	2,52	0,002	0,001	111.	112.	43.	168.
7	3,10	48,2	9,20	2,22	0,005	0,001	112.	111.	43.	160.
8	3,38	46,9	5,95	1,73	0,002	0,001	112.	112.	44.	168.
9	4,56	40,9	6,37	2,06	0,003	0,001	112.	110.	43.	150.
10	2,38	48,2	5,06	1,45	0,003	0,001	112.	112.	43.	150.
11	2,68	53,0	8,51	1,68	0,002	0,001	110.	108.	44.	150.
12	3,06	46,9	5,40	1,58	0,002	0,001	111.	109.	43.	151.
13	3,94	45,0	7,80	1,64	0,003	0,001	111.	110.	43.	142.
14	4,40	43,7	7,21	1,96	0,002	0,001	112.	110.	43.	151.
15	4,97	41,6	5,84	2,00	0,002	0,001	112.	110.	41.	153.
16	2,78	47,7	7,20	1,70	0,004	0,001	114.	110.	43.	151.
17	3,32	49,0	7,13	1,62	0,002	0,001	111.	111.	41.	159.
18	4,38	46,3	7,86	2,18	0,002	0,001	112.	108.	38.	153.
19	4,38	43,6	6,44	1,96	0,006	0,001	114.	111.	43.	148.
20	4,89	41,8	7,38	2,14	0,002	0,001	113.	108.	38.	150.
21	5,26	39,9	7,49	2,12	0,003	0,001	114.	113.	43.	148.
22	5,65	36,9	7,73	2,24	0,002	0,001	114.	112.	42.	148.
23	2,35	52,0	10,91	2,06	0,002	0,001	113.	111.	41.	145.
24	3,11	49,1	11,61	2,25	0,003	0,001	112.	111.	40.	133.
25	4,06	45,6	11,90	2,47	0,002	0,001	110.	108.	41.	129.
26	4,45	44,3	5,95	2,19	0,002	0,001	113.	108.	42.	122.
27	4,84	38,3	9,88	2,57	0,002	0,001	113.	108.	41.	130.
28	3,30	42,0	11,41	1,40	0,002	0,001	113.	108.	39.	110.
29	1,55	48,9	11,60	0,60	0,002	0,001	112.	106.	38.	124.
30	2,15	47,5	11,70	1,70	0,002	0,001	108.	102.	35.	129.
31	-0.	-0.	-0.	-0.	-0.	-0.	104.	88.	92.	137.
32	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
33	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
34	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.
35	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART A

TEST NO R-55 FEED TYPE - TBP-25 OPERATION MODE - CONTINUOUS

RUN TIME	FEED	WATER	CALCINER ADDITIVE	EVAP. COND.	CALCINER FURNACE	CALCINER COND.	EVAP. COND.	SYSTEM OFF-GAS	EVAP. DENSITY
HOURS	LITERS	LITERS	LITERS	LITERS	(HUNDRED-THOUSANDS	OF	BTUS)	CU FT	GM/CC
1	61.	0.	-0.	31.	1.16	1.41	0.79	24.	-0.
2	104.	30.	-0.	68.	2.87	2.90	6.38	58.	-0.
3	156.	203.	-0.	283.	4.64	4.49	10.76	72.	-0.
4	199.	409.	-0.	533.	6.08	5.88	17.19	108.	-0.
5	232.	615.	-0.	773.	7.72	7.19	23.28	122.	-0.
6	278.	833.	-0.	1038.	8.95	8.05	29.88	158.	-0.
7	291.	916.	-0.	1135.	10.04	8.70	32.50	170.	-0.
8	305.	1088.	-0.	1323.	10.65	9.18	33.62	196.	-0.
9	312.	1088.	-0.	1332.	11.34	9.85	33.83	220.	-0.
10	312.	1088.	-0.	1333.	12.02	10.37	34.04	245.	-0.
11	320.	1114.	-0.	1368.	12.50	11.04	34.48	270.	-0.
12	320.	1114.	-0.	1369.	13.05	11.62	34.92	295.	-0.
13	327.	1114.	-0.	1379.	13.59	12.10	35.35	319.	-0.
14	327.	1114.	-0.	1381.	14.07	12.50	35.73	340.	-0.
15	354.	1114.	-0.	1408.	14.41	13.06	52.84	350.	-0.
16	370.	1392.	-0.	1707.	15.03	13.53	48.93	377.	-0.
17	376.	1422.	-0.	1745.	15.57	14.01	54.38	402.	-0.
18	399.	1422.	-0.	1768.	16.05	14.40	57.48	434.	-0.
19	399.	1448.	-0.	1794.	16.60	14.55	57.82	473.	-0.
20	399.	1478.	-0.	1794.	17.01	14.79	57.82	514.	-0.
21	399.	1478.	-0.	1794.	17.42	14.92	65.92	518.	-0.
22	399.	1478.	-0.	1794.	17.96	15.06	66.36	528.	-0.
23	399.	1478.	-0.	1794.	18.30	15.13	57.42	545.	-0.
24	440.	1478.	-0.	1794.	18.71	15.31	57.42	558.	-0.
25	449.	1564.	-0.	1794.	19.19	15.60	56.10	577.	-0.
26	469.	1564.	-0.	1794.	19.67	15.74	55.02	595.	-0.
27	469.	1594.	-0.	1794.	20.08	15.88	54.81	613.	-0.
28	469.	1594.	-0.	1794.	20.42	16.03	54.14	632.	-0.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART B

TEST NO R-55 FEED TYPE - TBP-25 OPERATION MODE - CONTINUOUS

RUN TIME	EVAP. LIQUID H+	EVAP.MAJOR CATION FE OR AL	CALCINER COND. H+	EVAP COND. H+	EVAP.COND. MAJOR ION FE OR AL	EVAP. COND. RU	EVAP. LIQUID TEMP.	EVAP. VAPOR TEMP.	CALCINER FEED TEMP.	CALCINER OFF-GAS TEMP.
HOURS	MOLAR	GM/LITER	MOLAR	MOLAR	GM/LITER	GM/LITER	DEG.C	DEG.C	DEG.C	DEG.C
1	2.30	44.6	5.25	1.01	0.010	0.001	113.	108.	45.	95.
2	2.51	36.9	6.00	0.96	0.010	0.001	110.	109.	39.	221.
3	2.05	46.8	5.95	0.91	0.010	0.001	109.	109.	35.	201.
4	2.42	42.5	6.49	1.09	0.010	0.001	110.	109.	36.	197.
5	2.25	43.4	6.98	1.08	0.010	0.001	110.	109.	34.	165.
6	3.18	36.0	9.15	1.43	0.010	0.001	109.	109.	33.	147.
7	1.45	48.2	9.32	1.12	0.010	0.001	109.	110.	32.	141.
8	2.49	49.5	6.42	1.91	0.010	0.001	110.	106.	34.	222.
9	3.54	47.7	7.25	2.00	0.010	0.001	111.	104.	37.	233.
10	3.70	40.0	6.89	2.01	0.010	0.001	113.	108.	34.	179.
11	4.66	36.9	6.58	2.27	0.010	0.001	110.	106.	35.	135.
12	4.58	35.1	6.53	1.98	0.010	0.001	110.	108.	36.	202.
13	5.06	27.0	7.46	2.03	0.010	0.001	111.	108.	34.	178.
14	2.25	42.0	6.60	1.30	0.010	0.001	111.	108.	34.	86.
15	0.86	56.7	5.90	0.65	0.010	0.001	108.	104.	31.	180.
16	1.53	60.1	5.76	1.09	0.040	0.001	110.	110.	35.	146.
17	0.	80.9	2.85	7.04	0.030	0.001	112.	107.	35.	132.
18	0.13	67.7	6.53	1.10	0.108	0.001	107.	101.	50.	125.
19	-0.	-0.	1.92	1.07	0.177	0.001	102.	95.	60.	117.
20	-0.	-0.	-0.	-0.	-0.	-0.	80.	48.	46.	105.
21	-0.	-0.	-0.	-0.	-0.	-0.	65.	40.	31.	170.
22	-0.	-0.	-0.	-0.	-0.	-0.	59.	36.	26.	190.
23	-0.	-0.	-0.	-0.	-0.	-0.	41.	32.	26.	175.
24	-0.	-0.	-0.	-0.	-0.	-0.	114.	109.	39.	208.
25	-0.	-0.	-0.	-0.	-0.	-0.	111.	102.	49.	182.
26	-0.	-0.	-0.	-0.	-0.	-0.	111.	104.	60.	153.
27	-0.	-0.	-0.	-0.	-0.	-0.	115.	110.	56.	136.
28	-0.	-0.	-0.	-0.	-0.	-0.	111.	109.	62.	124.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART A

TEST NO R-56 FEED TYPE - DAREX OPERATION MODE - CONTINUOUS

RUN TIME	FEED	WATER	CALCINER ADDITIVE	EVAP. COND.	CALCINER FURNACE	CALCINER COND.	EVAP. COND.	SYSTEM OFF-GAS	EVAP. DENSITY
HOURS	LITERS	LITERS	LITERS	LITERS	(HUNDRED-THOUSANDS OF BTUS)			CU FT	GM/CC
1	75.	26.	-0.	51.	0.96	1.39	0.35	19.	-0.
2	118.	26.	-0.	73.	2.39	3.07	0.35	38.	-0.
3	125.	52.	-0.	101.	3.82	4.64	0.35	57.	-0.
4	140.	78.	-0.	143.	5.26	5.93	0.35	74.	-0.
5	163.	104.	-0.	192.	6.69	7.13	2.13	84.	-0.
6	168.	104.	-0.	199.	7.85	8.57	2.32	103.	-0.
7	168.	104.	-0.	201.	8.88	10.06	2.54	124.	-0.
8	197.	253.	-0.	309.	9.97	11.10	7.79	141.	-0.
9	240.	492.	-0.	473.	11.00	12.43	9.33	167.	-0.
10	253.	638.	-0.	629.	12.23	13.33	14.55	171.	-0.
11	276.	867.	-0.	886.	12.84	14.07	15.92	193.	-0.
12	276.	979.	-0.	999.	13.46	14.67	21.73	214.	-0.
13	298.	1065.	-0.	1109.	14.07	15.30	21.73	236.	1.36
14	298.	1065.	-0.	1112.	14.68	15.87	21.73	252.	-0.
15	312.	1091.	-0.	1153.	15.03	16.45	22.70	274.	-0.
16	312.	1289.	-0.	1352.	15.57	16.90	24.97	297.	-0.
17	332.	1289.	-0.	1374.	16.12	17.39	25.17	319.	-0.
18	339.	1289.	-0.	1383.	16.53	17.87	25.17	338.	-0.
19	339.	1314.	-0.	1409.	16.87	18.34	25.17	356.	-0.
20	339.	1314.	-0.	1411.	17.28	18.74	25.17	366.	-0.
21	354.	1397.	-0.	1510.	17.83	19.20	27.15	390.	-0.
22	354.	1427.	-0.	1542.	18.24	19.60	27.15	412.	-0.
23	368.	1427.	-0.	1557.	18.71	20.07	27.15	433.	1.39
24	374.	1452.	-0.	1589.	19.33	20.55	27.15	452.	-0.
25	374.	1508.	-0.	1647.	19.88	21.51	29.51	473.	-0.
26	374.	1508.	-0.	1647.	20.42	22.16	29.10	494.	-0.
27	383.	1534.	-0.	1682.	20.83	22.93	28.66	518.	-0.
28	383.	1534.	-0.	1682.	21.17	23.72	28.24	542.	-0.
29	383.	1534.	-0.	1682.	21.65	24.35	27.82	559.	-0.
30	383.	1571.	-0.	1682.	21.92	24.35	27.42	559.	-0.
31	-0.	-0.	-0.	1662.	22.20	24.35	27.01	-0.	-0.
32	-0.	-0.	-0.	1682.	22.68	24.58	26.60	-0.	-0.
33	-0.	-0.	-0.	1662.	22.81	24.81	26.15	-0.	-0.
34	-0.	-0.	-0.	1682.	23.15	25.08	25.51	-0.	-0.
35	-0.	-0.	-0.	1682.	23.36	25.08	24.89	-0.	-0.
36	-0.	-0.	-0.	1682.	23.70	25.08	24.44	-0.	-0.
37	-0.	-0.	-0.	1682.	23.84	25.08	23.80	-0.	-0.
38	-0.	-0.	-0.	1682.	24.18	25.08	23.41	-0.	-0.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART B

TEST NO R-56 FEED TYPE - DAREX OPERATION MODE - CONTINUOUS

RUN TIME	EVAP. LIQUID H+	EVAP.MAJOR CATION FE OR AL	CALCINER COND. H+	EVAP COND. H+	EVAP.COND. MAJOR ION FE OR AL	EVAP. COND. RU	EVAP. LIQUID TEMP.	EVAP. VAPOR TEMP.	CALCINER FEED TEMP.	CALCINER OFF-GAS TEMP.
HOURS	MOLAR	GM/LITER	MOLAR	MOLAR	GM/LITER	GM/LITER	DEG.C	DEG.C	DEG.C	DEG.C
1	3,40	54.4	5,25	1,06	0,001	-0.	112.	100.	62.	320.
2	4,30	51.0	6,76	2,22	0,002	-0.	110.	105.	66.	219.
3	3,97	52.5	5,25	1,98	0,002	-0.	110.	109.	65.	258.
4	3,93	52.5	6,07	1,65	0,002	-0.	111.	109.	67.	332.
5	3,91	52.5	5,61	1,06	0,003	-0.	111.	110.	54.	225.
6	4,32	47.3	5,83	1,91	0,002	-0.	109.	106.	54.	210.
7	2,48	55.9	5,38	0,78	0,001	-0.	110.	106.	52.	210.
8	2,26	68.8	4,78	0,83	0,001	-0.	109.	108.	51.	248.
9	2,21	48.4	7,58	0,87	0,001	-0.	110.	109.	51.	203.
10	1,54	73.9	5,73	0,46	0,001	-0.	109.	109.	41.	215.
11	2,37	57.0	6,72	0,77	0,001	-0.	108.	107.	38.	144.
12	1,96	72.8	5,76	0,62	0,001	-0.	109.	109.	42.	188.
13	3,25	52.7	7,37	1,19	0,002	-0.	110.	106.	38.	129.
14	3,00	49.5	5,62	0,97	0,002	-0.	109.	107.	43.	172.
15	1,74	66.6	8,43	0,62	0,001	-0.	109.	109.	38.	118.
16	1,84	63.6	6,26	0,52	0,001	-0.	108.	109.	36.	150.
17	2,80	58.1	6,95	0,82	0,001	-0.	109.	105.	37.	115.
18	3,31	56.3	6,26	0,95	0,001	-0.	110.	105.	37.	132.
19	3,71	60.8	7,92	1,22	0,001	-0.	110.	108.	37.	114.
20	2,32	55.9	6,94	0,80	0,002	-0.	110.	109.	37.	136.
21	3,00	63.9	8,62	1,17	0,002	-0.	110.	108.	37.	115.
22	3,04	71.3	6,33	1,09	0,002	-0.	110.	109.	36.	138.
23	3,81	61.9	8,86	1,46	0,003	-0.	111.	108.	36.	113.
24	2,27	81.7	6,51	0,89	0,002	-0.	112.	109.	36.	145.
25	2,47	82.5	8,45	1,49	0,003	-0.	111.	109.	37.	124.
26	3,62	66.0	10,10	1,22	0,003	-0.	112.	114.	67.	152.
27	4,36	60.6	10,40	1,28	0,002	-0.	112.	103.	65.	123.
28	4,86	54.0	12,40	1,15	0,002	-0.	111.	105.	65.	200.
29	5,05	48.8	9,50	1,22	0,002	-0.	112.	106.	64.	143.
30	4,23	61.9	12,60	2,30	1,690	-0.	112.	106.	64.	51.
31	4,47	61.5	13,40	1,44	0,594	-0.	100.	72.	40.	37.
32	4,35	62.3	12,90	1,38	0,489	-0.	25.	50.	30.	34.
33	4,53	60.0	12,50	1,38	0,479	-0.	22.	40.	26.	32.
34	4,23	62.1	12,20	1,36	0,471	-0.	21.	36.	26.	31.
35	4,30	58.1	12,10	1,33	0,486	-0.	20.	35.	26.	30.
36	3,87	56.3	12,00	1,39	0,479	-0.	19.	33.	26.	30.
37	4,30	48.5	11,60	1,36	0,488	-0.	18.	32.	26.	30.
38	4,30	48.5	11,60	1,36	0,488	-0.	50.	31.	26.	100.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART A

TEST NO R-57 FEED TYPE - DAREX OPERATION MODE - CONTINUOUS

RUN TIME	FEED	WATER	CALCINER ADDITIVE	EVAP. COND.	CALCINER FURNACE	CALCINER COND.	EVAP. COND.	SYSTEM OFF-GAS	EVAP. DENSITY
HOURS	LITERS	LITERS	LITERS	LITERS	(HUNDRED-THOUSANDS OF BTUS)			CU FT	GM/CC
1	90.	0.	-0.	46.	1.71	1.55	6.54	19.	1.42
2	104.	52.	-0.	80.	3.14	3.04	8.02	47.	-0.
3	140.	104.	-0.	169.	4.71	4.38	10.12	57.	-0.
4	175.	156.	-0.	259.	6.08	5.78	11.01	78.	-0.
5	197.	182.	-0.	307.	7.10	6.98	12.61	96.	-0.
6	218.	281.	-0.	408.	7.85	8.10	15.11	115.	-0.
7	234.	337.	-0.	485.	8.74	9.04	16.32	133.	-0.
8	240.	386.	-0.	542.	9.49	7.61	17.90	153.	-0.
9	247.	442.	-0.	608.	10.24	10.55	18.96	174.	-0.
10	254.	494.	-0.	668.	10.79	11.39	19.39	194.	-0.
11	262.	494.	-0.	677.	11.41	12.38	20.23	215.	-0.
12	269.	546.	-0.	739.	12.09	13.20	20.66	236.	-0.
13	283.	572.	-0.	781.	12.64	13.99	21.52	257.	-0.
14	290.	602.	-0.	818.	13.18	14.73	21.94	277.	-0.
15	296.	628.	-0.	853.	13.59	15.45	22.36	298.	-0.
16	306.	654.	-0.	893.	14.14	16.17	23.03	320.	-0.
17	312.	684.	-0.	930.	14.68	16.90	23.03	339.	-0.
18	312.	710.	-0.	958.	15.09	17.67	23.66	359.	-0.
19	324.	736.	-0.	996.	15.50	18.67	24.51	380.	-0.
20	332.	762.	-0.	1031.	16.05	18.74	24.99	401.	-0.
21	346.	792.	-0.	1076.	16.67	19.81	25.37	422.	-0.
22	346.	792.	-0.	1078.	17.14	20.53	-8.23	442.	-0.
23	346.	844.	-0.	1131.	17.69	21.23	-6.05	463.	-0.
24	361.	900.	-0.	1202.	18.24	21.88	-5.22	488.	-0.
25	375.	926.	-0.	1242.	18.65	22.61	-4.74	504.	-0.
26	383.	926.	-0.	1250.	19.19	23.23	-4.74	514.	-0.
27	383.	952.	-0.	1276.	19.60	23.84	-3.51	544.	-0.
28	390.	1065.	-0.	1388.	20.08	24.41	-2.04	565.	-0.
29	405.	1091.	-0.	1428.	20.49	25.00	-2.04	586.	-0.
30	405.	1121.	-0.	1458.	20.76	25.61	-1.83	606.	-0.
31	412.	1121.	-0.	1465.	21.17	26.09	-1.83	627.	-0.
32	412.	1121.	-0.	1465.	21.17	26.09	-1.83	627.	-0.
33	412.	1121.	-0.	1491.	21.17	26.52	-1.83	627.	-0.
34	412.	1121.	-0.	1521.	21.17	26.52	-1.83	627.	-0.
35	412.	1121.	-0.	1586.	21.17	27.12	-1.83	627.	-0.
36	412.	1121.	-0.	1627.	21.17	27.66	-1.83	627.	-0.
37	412.	1121.	-0.	1635.	23.02	28.32	-1.83	775.	-0.
38	412.	1147.	-0.	1641.	24.38	28.86	-1.42	775.	-0.
39	412.	1177.	-0.	1677.	25.07	28.10	1.19	795.	-0.
40	427.	1237.	-0.	1711.	25.41	30.53	1.66	807.	-0.
41	442.	1263.	-0.	1751.	25.95	31.02	2.10	824.	-0.
42	450.	1263.	-0.	1783.	26.43	31.83	2.53	840.	-0.
43	456.	1263.	-0.	1809.	26.71	32.55	2.74	854.	-0.
44	462.	1293.	-0.	1879.	27.39	33.26	3.20	872.	-0.
45	470.	1319.	-0.	1879.	27.80	34.04	3.80	888.	-0.
46	484.	1345.	-0.	1941.	28.48	34.70	4.22	905.	-0.
47	490.	1371.	-0.	1977.	28.89	35.32	4.64	921.	-0.
48	490.	1397.	-0.	2014.	29.30	36.75	5.89	936.	-0.
49	504.	1453.	-0.	2040.	29.85	37.42	6.52	952.	-0.
50	504.	1453.	-0.	2103.	30.33	38.07	7.16	968.	-0.
51	513.	1506.	-0.	2103.	30.80	38.72	8.46	985.	-0.
52	519.	1536.	-0.	2146.	31.21	39.34	9.06	1000.	-0.
53	530.	1562.	-0.	2169.	31.69	39.86	9.43	1015.	-0.
54	530.	1588.	-0.	2209.	32.17	40.45	10.62	1032.	-0.
55	540.	1641.	-0.	2235.	32.51	41.01	11.25	1048.	-0.
56	540.	1641.	-0.	2241.	32.85	41.55	11.65	1064.	-0.
57	549.	1675.	-0.	2273.	33.33	42.13	12.08	1081.	-0.
58	549.	1698.	-0.	2344.	33.74	42.70	13.16	1098.	-0.
59	563.	1724.	-0.	2352.	34.01	43.27	13.58	1114.	-0.
60	563.	1750.	-0.	2352.	34.42	43.84	14.01	1131.	-0.
61	569.	1750.	-0.	2378.	34.90	44.41	14.43	1149.	-0.
62	575.	1776.	-0.	2411.	35.24	44.96	15.47	1166.	-0.
63	590.	1832.	-0.	2443.	35.52	45.56	15.69	1185.	-0.
64	598.	1832.	-0.	2450.	35.99	46.13	15.90	1203.	-0.
65	598.	1832.	-0.	2450.	36.34	46.68	16.08	1219.	-0.
66	598.	1858.	-0.	2476.	36.61	47.28	16.54	1238.	-0.
67	605.	1884.	-0.	2476.	37.09	47.83	17.36	1255.	-0.
68	611.	1910.	-0.	2476.	37.50	48.41	17.79	1273.	-0.
69	618.	1910.	-0.	2515.	37.63	48.94	17.98	1288.	-0.
70	618.	1910.	-0.	2575.	37.91	49.44	18.41	1307.	-0.
71	618.	1936.	-0.	2582.	38.32	50.01	18.83	1326.	-0.
72	618.	1936.	-0.	2608.	38.52	50.85	19.26	1341.	-0.
73	618.	1936.	-0.	2608.	38.86	51.27	19.46	1359.	-0.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART II

TEST NO R-57 FEED TYPE - DAREX OPERATION MODE - CONTINUOUS

RUN TIME	EVAP. LIQUID H+	EVAP.MAJOR CATION FE OR AL	CALCINER COND. H+	EVAP COND. H+	EVAP.COND. MAJOR ION FE OR AL	EVAP. COND. RU	EVAP. LIQUID TEMP.	EVAP. VAPOR TEMP.	CALCINER FEED TEMP.	CALCINER OFF-GAS TEMP.
HOURS	MOLAR	GM/LITER	MOLAR	MOLAR	GM/LITER	GM/LITER	DEG.C	DEG.C	DEG.C	DEG.C
1	4.07	65.8	6.16	2.14	0.008	-0.	114.	112.	55.	174.
2	2.68	64.7	5.56	0.99	0.004	-0.	113.	112.	58.	280.
3	3.45	66.0	6.78	1.84	0.004	-0.	112.	110.	57.	286.
4	4.24	50.6	8.03	2.49	0.004	-0.	112.	111.	58.	242.
5	3.09	64.3	7.62	1.42	0.003	-0.	112.	111.	56.	252.
6	2.71	67.7	7.25	1.25	0.003	-0.	112.	110.	54.	179.
7	3.39	59.6	7.50	1.48	0.003	-0.	112.	111.	53.	166.
8	3.09	64.1	7.12	1.28	0.003	-0.	112.	111.	52.	224.
9	3.24	64.3	6.87	1.46	0.002	-0.	110.	110.	52.	225.
10	3.55	59.1	6.14	1.45	0.003	-0.	111.	109.	53.	224.
11	3.14	65.1	6.80	1.31	0.004	-0.	110.	109.	53.	222.
12	3.48	59.4	6.52	1.24	0.004	-0.	111.	105.	58.	212.
13	3.32	65.3	6.84	1.35	0.002	-0.	110.	108.	53.	221.
14	3.30	62.6	6.79	1.30	0.002	-0.	112.	108.	54.	202.
15	3.26	59.8	6.86	1.28	0.003	-0.	111.	109.	53.	205.
16	3.11	65.3	7.33	1.19	0.002	-0.	110.	107.	53.	204.
17	3.42	61.9	6.94	1.28	0.002	-0.	110.	108.	53.	193.
18	3.50	62.1	7.56	1.37	0.007	-0.	110.	109.	52.	166.
19	2.90	67.7	6.31	1.11	0.007	-0.	110.	107.	54.	180.
20	3.21	65.6	5.91	1.04	0.003	-0.	113.	108.	54.	274.
21	3.73	60.0	7.45	1.71	0.004	-0.	111.	108.	54.	211.
22	3.04	60.2	7.27	1.24	0.007	-0.	111.	109.	54.	163.
23	2.82	66.0	8.94	1.23	0.005	-0.	113.	110.	54.	188.
24	2.89	71.3	7.98	1.10	0.003	-0.	112.	111.	54.	175.
25	3.65	62.8	9.94	1.33	0.003	-0.	111.	109.	55.	164.
26	3.63	53.4	8.75	1.35	0.002	-0.	111.	112.	54.	154.
27	2.90	66.0	8.29	1.10	0.005	-0.	112.	110.	53.	150.
28	2.38	76.7	7.46	1.01	0.002	-0.	110.	109.	54.	160.
29	2.66	71.4	7.88	0.99	0.002	-0.	111.	108.	56.	150.
30	3.43	67.1	7.86	1.14	0.003	-0.	111.	109.	55.	148.
31	3.43	67.1	11.50	1.14	0.003	-0.	111.	109.	55.	147.
32	3.43	67.1	13.00	1.14	0.003	-0.	111.	107.	55.	147.
33	3.43	67.1	13.30	1.14	0.003	-0.	111.	109.	55.	149.
34	3.43	67.1	13.10	1.14	0.003	-0.	111.	107.	55.	147.
35	3.43	67.1	12.50	1.14	0.003	-0.	111.	109.	55.	149.
36	3.43	67.1	12.20	1.14	0.003	-0.	111.	107.	55.	147.
37	3.43	67.1	8.37	1.14	0.003	-0.	36.	25.	23.	26.
38	3.55	57.3	6.28	1.32	0.003	-0.	113.	110.	45.	101.
39	2.95	58.1	8.53	0.87	0.008	-0.	112.	110.	44.	116.
40	2.07	80.4	6.84	0.97	0.005	-0.	111.	109.	50.	155.
41	2.28	75.6	6.63	0.85	0.003	-0.	111.	104.	52.	165.
42	2.38	76.7	6.42	0.96	0.002	-0.	111.	107.	53.	174.
43	2.47	74.1	6.65	1.08	0.002	-0.	111.	107.	51.	178.
44	2.75	73.1	6.42	1.08	0.003	-0.	111.	108.	51.	182.
45	2.80	70.1	6.05	1.12	0.004	-0.	111.	109.	52.	179.
46	2.57	79.4	6.25	1.04	0.003	-0.	111.	107.	52.	187.
47	2.91	67.7	6.57	1.18	0.003	-0.	111.	108.	52.	185.
48	2.65	67.9	7.36	1.06	0.006	-0.	110.	109.	53.	181.
49	2.64	76.3	7.30	1.06	0.002	-0.	111.	107.	54.	183.
50	3.01	70.1	8.32	1.23	0.003	-0.	111.	109.	52.	175.
51	2.62	71.3	7.89	1.02	0.005	-0.	110.	108.	52.	175.
52	2.34	76.3	8.29	1.07	0.002	-0.	111.	108.	54.	169.
53	2.49	74.4	8.21	1.06	0.002	-0.	111.	107.	53.	171.
54	2.38	67.7	7.99	1.05	0.004	-0.	112.	108.	52.	167.
55	2.07	76.3	8.12	0.97	0.002	-0.	111.	108.	53.	162.
56	2.39	75.0	8.18	0.93	0.001	-0.	111.	108.	53.	162.
57	2.69	68.4	8.15	1.08	0.002	-0.	111.	109.	53.	160.
58	2.32	70.2	7.96	1.01	0.004	-0.	110.	108.	52.	150.
59	2.07	77.8	7.89	0.88	0.002	-0.	111.	109.	54.	148.
60	2.28	77.4	8.10	0.98	0.002	-0.	111.	108.	54.	145.
61	2.61	70.5	8.29	1.04	0.002	-0.	111.	107.	54.	141.
62	2.28	70.9	8.08	1.04	0.004	-0.	110.	109.	53.	139.
63	2.26	80.6	7.81	0.94	0.002	-0.	111.	108.	55.	140.
64	2.32	77.8	7.95	0.93	0.001	-0.	111.	108.	55.	137.
65	2.30	75.0	7.96	0.99	0.002	-0.	111.	107.	53.	129.
66	2.74	72.0	7.87	1.05	0.003	-0.	111.	107.	53.	124.
67	2.35	70.1	7.77	1.03	0.003	-0.	110.	108.	54.	128.
68	2.18	79.1	7.67	0.93	0.002	-0.	111.	106.	54.	126.
69	2.39	77.8	7.45	0.92	0.002	-0.	111.	107.	56.	122.
70	2.55	70.9	7.68	0.95	0.002	-0.	111.	107.	56.	115.
71	2.81	72.4	7.89	0.99	0.002	-0.	111.	107.	56.	115.
72	2.70	72.2	7.85	1.01	0.002	-0.	111.	108.	57.	114.
73	3.03	72.0	7.81	1.02	0.002	-0.	111.	108.	55.	113.

175STOP TIME 05 HRS 03 MIN 30 SEC COST + $1.75 ELAPSED TIME+ .21 HOURS 05 024
27666 LINES OUTPUT THIS JOB.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART A

TEST NO R-58 FEED TYPE - DAREX OPERATION MODE - CONTINUOUS

RUN TIME	FEED	WATER	CALCINER ADDITIVE	EVAP. COND.	CALCINER FURNACE	CALCINER COND.	EVAP. COND.	SYSTEM OFF-GAS	EVAP. DENSITY
HOURS	LITERS	LITERS	LITERS	LITERS	(HUNDRED-THOUSANDS OF BTUS)			CU FT	GM/CC
1	99.	173.	-0.	74.	1,64	1,44	6,93	19.	-0.
2	170.	379.	-0.	351.	3,14	2,55	13,95	34.	-0.
3	235.	672.	-0.	709.	4.64	3.60	19.42	49.	-0.
4	271.	83T.	-0.	904.	5,81	4,88	22,75	66.	-0.
5	291.	996.	-0.	1089.	6,69	5,84	26,32	79.	-0.
6	307.	1105.	-0.	1214.	7,38	6,74	28,44	92.	-0.
7	313.	1105.	-0.	1220.	8,06	7.60	28,84	104.	-0.
8	327.	1148.	-0.	1277.	8,54	8,46	30.22	117.	-0.
9	349.	1172.	-0.	1323.	9,08	9,23	30,42	130.	-0.
10	349.	1172.	-0.	1323.	9,49	9,68	30,42	143.	-0.
11	357.	1228.	-0.	1387.	9,84	10,64	32,96	152.	-0.
12	357.	1258.	-0.	1417.	10,24	11,34	33,20	173.	-0.
13	362.	1284.	-0.	1448.	10,52	11,95	33,40	185.	-0.
14	362.	1284.	-0.	1448.	10,93	12,63	33,61	199.	-0.
15	362.	1284.	-0.	1448.	11,06	13,29	33,83	212.	-0.
16	362.	1284.	-0.	1448.	11,41	13,86	33,83	224.	-0.
17	362.	1284.	-0.	1448.	11,54	14,38	34,04	238.	-0.
18	362.	1310.	-0.	1474.	11,82	15,03	34,26	250.	-0.
19	362.	1336.	-0.	1500.	12,02	15,65	34,47	262.	-0.
20	362.	1336.	-0.	1500.	12,23	16,21	34,47	276.	-0.
21	376.	1336.	-0.	1516.	12,50	16,60	34,47	288.	-0.
22	376.	1336.	-0.	1516.	12,57	17,42	34,47	300.	-0.
23	376.	1366.	-0.	1546.	12,77	18,07	34,47	313.	-0.
24	405.	1366.	-0.	1575.	13,18	18,64	34,89	324.	-0.
25	434.	1392.	-0.	1630.	13,86	19,51	36,15	336.	-0.
26	449.	1418.	-0.	1671.	14,41	20,50	37,85	347.	-0.
27	470.	1497.	-0.	1771.	15,16	21,28	39,04	358.	-0.
28	490.	1553.	-0.	1847.	15,57	22,16	40,17	371.	-0.
29	506.	1553.	-0.	1863.	16,05	22,93	40,57	380.	-0.
30	513.	1606.	-0.	1923.	16,53	23,73	41,98	392.	-0.
31	527.	1632.	-0.	1963.	17,14	24,54	42,19	407.	-0.
32	533.	1632.	-0.	1969.	17,62	25,23	42,40	416.	-0.
33	540.	1688.	-0.	2032.	18,03	25,96	43,42	428.	-0.
34	558.	1688.	-0.	2050.	18,37	26,63	43,62	440.	-0.
35	558.	1688.	-0.	2050.	18,78	27,31	44,64	440.	-0.
36	562.	1707.	-0.	2073.	19,19	27,93	45,06	463.	-0.
37	569.	1707.	-0.	2080.	19,60	28,54	45,69	476.	-0.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART B

TEST NO R-58 FEED TYPE - DAREX OPERATION MODE - CONTINUOUS

RUN TIME	EVAP. LIQUID H+	EVAP.MAJOR CATION FE OR AL	CALCINER COND. H+	EVAP COND. H+	EVAP.COND. MAJOR ION FE OR AL	EVAP. COND. RU	EVAP. LIQUID TEMP.	EVAP. VAPOR TEMP.	CALCINER FEED TEMP.	CALCINER OFF-GAS TEMP.
HOURS	MOLAR	GM/LITER	MOLAR	MOLAR	GM/LITER	GM/LITER	DEG.C	DEG.C	DEG.C	DEG.C
1	1,11	126.0	4,45	0,93	0,001	-0.	115.	114.	71.	292.
2	0,57	124.0	5,02	0,62	0,001	-0.	117.	115.	35.	281.
3	0,84	110.0	6,50	0,89	0,001	-0.	112.	113.	63.	252.
4	1,47	115.0	8,91	1,26	0,002	-0.	115.	115.	72.	246.
5	1,22	120.0	8,65	1,01	0,001	-0.	115.	114.	66.	207.
6	1,36	120.8	8,81	1,10	0,001	-0.	115.	114.	71.	183.
7	2,28	98.8	8,70	1,94	0,004	-0.	116.	112.	70.	196.
8	1,92	111.0	11,10	1,88	0,002	-0.	116.	113.	70.	188.
9	2,17	113.0	9,15	1,62	0,002	-0.	115.	110.	71.	180.
10	2,96	94.5	12,20	1,80	0,003	-0.	116.	112.	71.	130.
11	1,18	120.0	12,40	1,42	0,002	-0.	115.	114.	69.	158.
12	1,55	117.0	13,30	1,32	0,003	-0.	112.	108.	71.	145.
13	1,97	109.0	8,55	1,45	0,002	-0.	116.	110.	71.	168.
14	2,18	109.0	12,00	1,56	0,002	-0.	116.	110.	70.	137.
15	2,38	116.0	12,40	1,62	0,002	-0.	116.	110.	70.	116.
16	2,38	117.0	12,20	1,45	0,002	-0.	116.	110.	70.	104.
17	2,34	109.0	12,00	1,41	0,002	-0.	116.	110.	70.	102.
18	2,14	109.0	12,40	1,48	0,002	-0.	115.	110.	72.	100.
19	2,14	109.0	11,70	1,42	0,003	-0.	114.	110.	70.	96.
20	1,95	116.0	11,50	1,28	0,002	-0.	115.	102.	68.	95.
21	1,79	93.9	11,00	1,21	0,002	-0.	115.	107.	70.	93.
22	1,66	121.0	10,20	0,92	0,002	-0.	112.	102.	66.	92.
23	1,38	121.0	6,59	1,14	0,002	-0.	105.	93.	68.	86.
24	2,42	110.0	7,08	1,74	0,001	-0.	115.	111.	67.	216.
25	2,43	103.0	7,61	2,13	0,002	-0.	116.	112.	64.	179.
26	1,94	109.0	8,52	1,71	0,002	-0.	117.	114.	64.	203.
27	1,83	114.0	8,34	1,63	0,002	-0.	115.	114.	64.	200.
28	1,92	116.0	8,60	1,77	0,002	-0.	115.	110.	64.	181.
29	2,49	105.0	9,72	2,36	0,002	-0.	116.	111.	64.	162.
30	1,69	111.0	10,00	1,57	0,002	-0.	115.	114.	64.	152.
31	1,44	116.0	9,64	1,66	0,001	-0.	116.	110.	65.	150.
32	2,38	101.0	9,68	1,99	0,001	-0.	116.	112.	64.	134.
33	1,40	114.0	9,41	1,58	0,001	-0.	115.	112.	54.	134.
34	1,86	114.0	9,72	1,68	0,002	-0.	116.	110.	64.	124.
35	2,31	105.0	10,30	2,29	0,003	-0.	116.	110.	62.	111.
36	1,56	120.0	10,30	1,57	0,001	-0.	116.	110.	64.	110.
37	2,26	108.0	10,20	1,71	0,002	-0.	116.	110.	64.	109.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART A

TEST NO R-59 FEED TYPE - TBP-25 OPERATION MODE - BATCH

RUN TIME	FEED	WATER	CALCINER ADDITIVE	EVAP. COND.	CALCINER FURNACE	CALCINER COND.	EVAP. COND.	SYSTEM OFF-GAS	EVAP. DENSITY
HOURS	LITERS	LITERS	LITERS	LITERS	(HUNDRED-THOUSANDS OF BTUS)			CU FT	GM/CC
1	22.	-0.	-0.	12.	1,64	0.71	0.	13.	1,28
2	39.	-0.	-0.	21.	2,94	1,74	0.	31.	1,25
3	60.	-0.	-0.	32.	4,03	2,43	0.	47.	1,23
4	85.	-0.	-0.	45.	5,05	3,06	0.	64.	1,20
5	103.	-0.	-0.	54.	6,01	3,77	0.	81.	1,19
6	131.	-0.	-0.	68.	6,83	4,34	0.	108.	1,18
7	155.	-0.	-0.	80.	7,85	4,87	0.	114.	1,18
8	182.	-0.	-0.	103.	8,81	5,52	0.	130.	1,18
9	214.	-0.	-0.	135.	9,63	6,08	0.	146.	1,18
10	232.	-0.	-0.	153.	10,52	6,70	0.	164.	1,18
11	246.	-0.	-0.	167.	11,20	7,20	0.	180.	1,19
12	259.	-0.	-0.	180.	11,95	7,61	0.	196.	1,19
13	281.	-0.	-0.	202.	12,57	7.90	0.	212.	1,19
14	295.	-0.	-0.	216.	13,05	8,19	0.	228.	1,19
15	301.	-0.	-0.	222.	13,46	8,35	0.	245.	1,19
16	308.	-0.	-0.	229.	13,80	8,56	0.	261.	1,20
17	316.	-0.	-0.	237.	14,27	8,77	0.	276.	1,20
18	326.	-0.	-0.	247.	14,75	9,00	0.	292.	1,20
19	341.	-0.	-0.	262.	14,96	9,15	0.	308.	1,20
20	345.	-0.	-0.	266.	15,37	9,29	0.	324.	1,20
21	345.	-0.	-0.	266.	15,78	9,37	0.	340.	1,20
22	356.	-0.	-0.	278.	16,12	9,57	0.	356.	1,20
23	365.	-0.	-0.	287.	16,39	9,72	0.	372.	1,20
24	368.	-0.	-0.	290.	16,73	9,79	0.	386.	1,21
25	368.	-0.	-0.	290.	17,14	9,66	0.	402.	1,20
26	368.	-0.	-0.	290.	17,48	9,94	0.	417.	1,20
27	380.	-0.	-0.	302.	17,89	10,01	0.	434.	1,21
28	380.	-0.	-0.	302.	18,17	10,08	0.	459.	1,21
29	386.	-0.	-0.	308.	18,37	10,15	0.	464.	1,21
30	386.	-0.	-0.	308.	18,65	10,31	0.	481.	1,21

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART B

TEST NO R-59 FEED TYPE - TBP-25 OPERATION MODE - BATCH

RUN TIME	EVAP. LIQUID H+	EVAP.MAJOR CATION FE OR AL	CALCINER COND. H+	EVAP COND. H+	EVAP.COND. MAJOR ION FE OR AL	EVAP. COND. RU	EVAP. LIQUID TEMP.	EVAP. VAPOR TEMP.	CALCINER FEED TEMP.	CALCINER OFF-GAS TEMP.
HOURS	MOLAR	GM/LITER	MOLAR	MOLAR	GM/LITER	GM/LITER	DEG.C	DEG.C	DEG.C	DEG.C
1	1.72	40.1	-0.	-0.	-0.	-0.	26.	26.	28.	350.
2	2.25	36.9	-0.	-0.	-0.	-0.	37.	27.	35.	425.
3	3.17	21.2	-0.	-0.	-0.	-0.	54.	28.	46.	350.
4	4.17	14.6	-0.	-0.	-0.	-0.	65.	27.	60.	315.
5	4.65	10.1	-0.	-0.	-0.	-0.	73.	27.	66.	288.
6	4.84	5.8	-0.	-0.	-0.	-0.	79.	28.	74.	260.
7	5.00	4.3	-0.	-0.	-0.	-0.	83.	29.	76.	232.
8	5.22	3.7	-0.	-0.	-0.	-0.	86.	29.	80.	253.
9	5.35	3.3	-0.	-0.	-0.	-0.	87.	29.	82.	234.
10	5.44	2.8	-0.	-0.	-0.	-0.	88.	29.	82.	194.
11	5.50	2.8	-0.	-0.	-0.	-0.	88.	30.	83.	188.
12	5.57	2.7	-0.	-0.	-0.	-0.	89.	28.	83.	178.
13	5.62	2.7	-0.	-0.	-0.	-0.	88.	28.	82.	157.
14	5.75	2.3	-0.	-0.	-0.	-0.	88.	29.	82.	92.
15	5.83	2.1	-0.	-0.	-0.	-0.	88.	29.	82.	136.
16	5.91	2.0	-0.	-0.	-0.	-0.	88.	29.	81.	126.
17	5.97	1.9	-0.	-0.	-0.	-0.	88.	29.	81.	124.
18	6.02	2.0	-0.	-0.	-0.	-0.	88.	29.	80.	120.
19	6.06	2.5	-0.	-0.	-0.	-0.	88.	29.	81.	119.
20	6.07	1.9	-0.	-0.	-0.	-0.	87.	29.	81.	116.
21	6.12	1.9	-0.	-0.	-0.	-0.	87.	29.	80.	115.
22	6.16	2.8	-0.	-0.	-0.	-0.	87.	29.	80.	114.
23	6.18	1.8	-0.	-0.	-0.	-0.	86.	29.	80.	110.
24	6.22	1.7	-0.	-0.	-0.	-0.	87.	29.	80.	107.
25	6.28	1.7	-0.	-0.	-0.	-0.	86.	29.	79.	112.
26	6.34	1.7	-0.	-0.	-0.	-0.	86.	29.	79.	114.
27	6.37	1.7	-0.	-0.	-0.	-0.	86.	29.	79.	114.
28	6.38	1.8	-0.	-0.	-0.	-0.	86.	29.	79.	105.
29	6.42	1.7	-0.	-0.	-0.	-0.	86.	31.	79.	125.
30	6.44	1.7	-0.	-0.	-0.	-0.	86.	29.	79.	110.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART A

TEST NO R-60 FEED TYPE - DAREX OPERATION MODE - BATCH

RUN TIME	FEED	WATER	CALCINER ADDITIVE	EVAP. COND.	CALCINER FURNACE	CALCINER COND.	EVAP. COND.	SYSTEM OFF-GAS	EVAP. DENSITY
HOURS	LITERS	LITERS	LITERS	LITERS	(HUNDRED-THOUSANDS OF BTUS)			CU FT	GM/CC
1	35.	0.	-0.	18.	0,96	0,07	0,22	14.	1,34
2	51.	26.	-0.	40.	2,19	0,72	0,59	30.	1,44
3	85.	165.	-0.	175.	3,35	1,09	1,32	45.	1,44
4	102.	334.	-0.	353.	4,10	1,65	2,07	61.	1,43
5	115.	473.	-0.	507.	4,85	2,03	2,83	77.	1,44
6	134.	641.	-0.	695.	5,60	2,37	3,49	93.	1,44
7	134.	783.	-0.	839.	6,22	2,67	4,24	113.	1,45
8	142.	963.	-0.	1028.	6,76	2,97	4,89	125.	1,44
9	154.	1098.	-0.	1177.	7,17	3,18	5,40	141.	1,44
10	159.	1154.	-0.	1240.	7,51	3,40	5,63	158.	1,47
11	159.	1267.	-0.	1355.	7,85	3,55	6,12	174.	1,47
12	164.	1376.	-0.	1471.	8,26	3,70	6,41	191.	1,47
13	178.	1402.	-0.	1513.	8,61	4,14	6,66	207.	1,50
14	189.	1428.	-0.	1551.	9,15	4,89	6,69	224.	1,50
15	189.	1458.	-0.	1584.	9,56	4,93	6,69	239.	1,51
16	197.	1458.	-0.	1593.	9,90	5,23	6,69	255.	1,51
17	206.	1484.	-0.	1630.	10,31	5,30	6,69	272.	1,52
18	220.	1510.	-0.	1671.	10,72	5,68	6,83	287.	1,52
19	220.	1566.	-0.	1729.	11,13	5,75	6,99	303.	1,52
20	231.	1596.	-0.	1772.	11,47	6,06	6,91	329.	1,52
21	231.	1649.	-0.	1826.	11,88	6,13	7,06	345.	1,51
22	231.	1705.	-0.	1884.	12,16	6,21	7,51	351.	1,49
23	253.	1705.	-0.	1908.	12,70	6,35	7,51	373.	1,50
24	253.	1731.	-0.	1934.	13,18	6,50	7,51	381.	1,51
25	264.	1731.	-0.	1945.	13,73	6,80	7,51	395.	1,52
26	264.	1731.	-0.	1945.	14,07	6,80	7,51	411.	1,52
27	272.	1731.	-0.	1953.	14,41	6,96	7,51	426.	1,52
28	278.	1731.	-0.	1958.	14,89	7,04	7,51	441.	1,53
29	280.	1731.	-0.	1961.	15,23	7,11	7,51	456.	1,51
30	288.	1757.	-0.	1995.	15,64	7,19	7,51	471.	1,52
31	301.	1757.	-0.	2008.	16,05	7,34	7,51	487.	1,50
32	301.	1757.	-0.	2008.	16,39	7,34	7,51	500.	1,49
33	306.	1757.	-0.	2013.	16,73	7,42	7,58	515.	1,49
34	320.	1787.	-0.	2047.	17,07	7,65	7,80	539.	1,50
35	320.	1813.	-0.	2073.	17,48	7,65	7,80	545.	1,53
36	327.	1843.	-0.	2110.	17,76	7,81	7,80	565.	1,54
37	333.	1843.	-0.	2116.	18,17	7,88	7,80	575.	1,53

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART B

TEST NO R-60 FEED TYPE - DAREX OPERATION MODE - BATCH

RUN TIME	EVAP. LIQUID H+	EVAP. MAJOR CATION FE OR AL	CALCINER COND. H+	EVAP COND. H+	EVAP. COND. MAJOR ION FE OR AL	EVAP. COND. RU	EVAP. LIQUID TEMP.	EVAP. VAPOR TEMP.	CALCINER FEED TEMP.	CALCINER OFF-GAS TEMP.
HOURS	MOLAR	GM/LITER	MOLAR	MOLAR	GM/LITER	GM/LITER	DEG.C	DEG.C	DEG.C	DEG.C
1	1.74	76.9	-0.	0.52	0.002	-0.	110.	29.	54.	265.
2	1.73	101.3	-0.	1.51	0.001	-0.	114.	29.	90.	298.
3	1.74	97.5	-0.	1.21	0.001	-0.	113.	29.	99.	258.
4	1.73	95.6	-0.	1.02	0.001	-0.	112.	29.	76.	238.
5	1.66	95.6	-0.	0.98	0.001	-0.	115.	30.	90.	240.
6	1.55	100.0	-0.	0.96	0.001	-0.	112.	30.	76.	189.
7	1.61	101.0	-0.	0.96	0.001	-0.	112.	30.	90.	196.
8	1.61	104.0	-0.	0.82	0.001	-0.	112.	30.	84.	135.
9	1.50	103.0	-0.	0.71	0.001	-0.	112.	30.	86.	172.
10	1.43	114.0	-0.	1.13	0.001	-0.	114.	30.	88.	184.
11	1.55	112.0	-0.	0.82	0.001	-0.	112.	30.	85.	175.
12	1.50	113.0	-0.	0.84	0.001	-0.	114.	30.	85.	180.
13	1.40	124.0	-0.	1.25	0.001	-0.	115.	30.	85.	222.
14	1.61	124.9	-0.	1.13	0.001	-0.	115.	30.	85.	150.
15	1.74	124.9	-0.	1.33	0.001	-0.	116.	30.	85.	156.
16	1.79	127.1	-0.	1.08	0.001	-0.	116.	30.	84.	194.
17	1.67	124.7	-0.	1.49	0.001	-0.	116.	30.	84.	129.
18	1.84	127.1	-0.	1.57	0.001	-0.	116.	30.	83.	159.
19	1.82	126.7	-0.	1.52	0.001	-0.	116.	30.	84.	121.
20	1.72	126.7	-0.	1.26	0.001	-0.	116.	30.	83.	152.
21	1.62	123.4	-0.	1.14	0.001	-0.	115.	29.	83.	114.
22	1.44	120.7	-0.	1.03	0.001	-0.	114.	29.	83.	114.
23	1.36	123.8	-0.	1.08	0.001	-0.	115.	29.	83.	114.
24	1.46	123.8	-0.	1.43	0.001	-0.	116.	29.	82.	118.
25	1.55	125.3	-0.	1.14	0.001	-0.	116.	29.	82.	136.
26	1.87	123.7	-0.	1.74	0.002	-0.	116.	29.	82.	128.
27	1.66	127.1	-0.	1.33	0.001	-0.	113.	29.	82.	116.
28	1.66	126.7	-0.	1.30	0.002	-0.	109.	29.	83.	115.
29	1.71	124.5	-0.	1.26	0.002	-0.	107.	29.	82.	120.
30	1.57	119.0	-0.	1.27	0.002	-0.	105.	29.	82.	120.
31	1.62	116.0	-0.	1.28	0.002	-0.	107.	30.	83.	116.
32	1.66	113.0	-0.	1.34	0.004	-0.	112.	30.	83.	114.
33	1.84	114.0	-0.	1.88	0.001	-0.	115.	30.	84.	110.
34	1.99	118.0	-0.	1.99	0.001	-0.	116.	29.	83.	133.
35	1.76	128.0	-0.	2.53	0.001	-0.	117.	29.	84.	106.
36	2.14	128.0	-0.	2.33	0.001	-0.	118.	29.	79.	115.
37	1.94	131.0	-0.	1.89	0.001	-0.	117.	29.	79.	118.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART A

TEST NO R-61 FEED TYPE - DAREX OPERATION MODE - BATCH

RUN TIME	FEED	WATER	CALCINER ADDITIVE	EVAP. COND.	CALCINER FURNACE	CALCINER COND.	EVAP. COND.	SYSTEM OFF-GAS	EVAP. DENSITY
HOURS	LITERS	LITERS	LITERS	LITERS	(HUNDRED-THOUSANDS OF BTUS)			CU FT	GM/CC
1	21.	-0.	-0.	11.	1.16	0.63	0.	10.	0.
2	43.	-0.	5.	25.	2.60	1.33	0.	21.	1.05
3	68.	-0.	5.	38.	3.76	2.16	0.	46.	1.07
4	102.	-0.	8.	57.	4.92	2.96	0.	63.	1.10
5	128.	-0.	8.	70.	5.81	3.64	0.05	80.	1.12
6	138.	-0.	10.	76.	6.76	4.08	0.10	97.	1.12
7	143.	-0.	10.	79.	7.31	4.67	0.23	117.	1.13
8	154.	-0.	10.	84.	8.06	5.00	0.27	133.	1.13
9	168.	-0.	12.	100.	8.61	5.29	0.32	150.	1.13
10	176.	148.	14.	254.	9.15	5.58	0.37	167.	1.13
11	190.	178.	15.	299.	9.70	5.82	0.42	184.	1.13
12	199.	190.	17.	332.	10.18	6.11	0.42	201.	1.19
13	208.	216.	18.	368.	10.65	6.31	0.42	218.	1.20
14	215.	269.	19.	429.	11.20	6.52	0.42	236.	1.20
15	228.	295.	21.	470.	11.68	6.72	0.42	253.	1.19
16	231.	321.	21.	499.	11.95	6.87	0.42	272.	1.20
17	237.	344.	21.	528.	12.36	7.02	0.42	288.	1.20
18	254.	397.	21.	598.	12.84	7.17	0.42	305.	1.21
19	254.	420.	21.	621.	13.18	7.27	0.47	322.	1.21
20	258.	446.	21.	651.	13.52	7.37	0.47	340.	1.21
21	268.	495.	21.	710.	13.86	7.47	0.52	357.	1.21
22	268.	521.	21.	746.	14.21	7.57	0.52	374.	1.21
23	278.	547.	21.	783.	14.68	7.70	0.52	390.	1.21
24	290.	629.	21.	877.	15.09	7.81	0.52	409.	1.21
25	293.	731.	21.	982.	15.30	7.88	0.74	424.	1.20
26	295.	874.	21.	1127.	15.64	7.95	0.95	440.	1.17
27	302.	956.	21.	1216.	16.12	7.98	1.18	455.	1.16
28	307.	1059.	21.	1324.	16.26	8.02	1.40	471.	1.16

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART 6

TEST NO R-61 FEED TYPE - DAREX OPERATION MODE - BATCH

RUN TIME	EVAP. LIQUID H+	EVAP.MAJOR CATION FE OR AL	CALCINER COND. H+	EVAP COND. H+	EVAP.COND. MAJOR ION FE OR AL	EVAP. COND. RU	EVAP. LIQUID TEMP.	EVAP. VAPOR TEMP.	CALCINER FEED TEMP.	CALCINER OFF-GAS TEMP.
HOURS	MOLAR	GM/LITER	MOLAR	MOLAR	GM/LITER	GM/LITER	DEG.C	DEG.C	DEG.C	DEG.C
1	1.04	2.1	-0.	1.80	0.001	0.001	21.	26.	66.	340.
2	1.81	2.0	-0.	1.80	0.002	0.001	26.	26.	81.	368.
3	2.24	5.7	-0.	1.78	0.001	0.001	30.	26.	90.	239.
4	3.42	2.4	-0.	0.87	0.007	0.001	101.	27.	97.	246.
5	4.40	1.9	-0.	1.74	0.001	0.001	105.	29.	100.	184.
6	5.08	1.1	-0.	1.00	0.	0.001	108.	28.	101.	208.
7	5.34	1.0	-0.	0.79	0.	0.001	106.	28.	86.	208.
8	5.49	0.9	-0.	1.10	0.001	0.001	107.	28.	81.	188.
9	5.75	0.9	-0.	1.06	0.	0.001	108.	29.	81.	184.
10	5.96	0.9	-0.	1.00	0.001	0.001	108.	28.	80.	180.
11	6.84	1.0	-0.	1.16	0.001	0.001	108.	28.	80.	188.
12	6.94	1.0	-0.	1.26	0.001	0.001	109.	28.	80.	148.
13	6.73	0.9	-0.	1.11	0.001	0.001	109.	28.	80.	170.
14	6.78	1.0	-0.	0.96	0.001	0.001	109.	28.	80.	155.
15	6.77	1.0	-0.	1.16	0.001	0.001	109.	28.	81.	153.
16	6.78	1.0	-0.	1.15	0.001	0.001	109.	27.	80.	160.
17	7.10	1.1	-0.	1.18	0.001	0.001	110.	27.	81.	137.
18	7.01	1.1	-0.	1.18	0.001	0.001	110.	27.	81.	146.
19	7.01	1.0	-0.	1.19	0.001	0.001	110.	28.	81.	124.
20	7.06	1.0	-0.	1.21	0.001	0.001	109.	27.	81.	120.
21	7.04	1.0	-0.	1.15	0.001	0.001	110.	28.	81.	108.
22	7.05	1.0	-0.	1.13	0.001	0.001	110.	27.	82.	108.
23	7.04	1.0	-0.	1.20	0.001	0.001	110.	27.	81.	105.
24	7.03	1.0	-0.	1.39	0.001	0.001	110.	27.	82.	108.
25	6.52	1.0	-0.	0.83	0.001	0.001	110.	27.	82.	110.
26	5.93	1.0	-0.	0.71	0.001	0.001	108.	27.	83.	124.
27	5.40	1.8	-0.	0.52	0.001	0.001	106.	27.	83.	124.
28	5.20	2.4	-0.	0.54	0.001	0.001	107.	27.	83.	118.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART A

TEST NO R-62 FEED TYPE - TBP-25 OPERATION MODE - CONTINUOUS

RUN TIME	FEED	WATER	CALCINER ADDITIVE	EVAP. COND.	CALCINER FURNACE	CALCINER COND.	EVAP. COND.	SYSTEM OFF-GAS	EVAP. DENSITY
HOURS	LITERS	LITERS	LITERS	LITERS	(HUNDRED-THOUSANDS	OF BTUS)		CU FT	GM/CC
1	75.	0.	-0.	38.	1.30	1.08	1.14	0.	1.42
2	120.	112.	-0.	156.	2.66	2.21	4.09	0.	0.42
3	174.	168.	-0.	267.	4.10	3.43	8.24	38.	0.41
4	216.	335.	-0.	478.	5.53	4.73	13.94	52.	0.36
5	250.	479.	-0.	558.	6.83	5.79	19.04	65.	0.35
6	285.	676.	-0.	790.	7.99	6.56	23.90	88.	0.34
7	315.	844.	-0.	989.	8.81	7.12	26.73	101.	0.24
8	315.	1009.	-0.	1156.	9.56	7.46	31.42	105.	0.16
9	315.	1147.	-0.	1295.	10.04	7.66	35.98	117.	0.10
10	337.	1317.	-0.	1488.	10.52	8.17	40.33	130.	0.39
11	350.	1482.	-0.	1668.	11.20	8.51	44.90	144.	0.02
12	357.	1623.	-0.	1818.	11.88	8.73	50.09	156.	-0.
13	363.	1764.	-0.	1967.	12.36	9.01	51.69	168.	-0.
14	391.	1794.	-0.	2027.	12.84	9.28	51.69	184.	-0.
15	391.	1794.	-0.	2028.	13.18	9.42	51.87	195.	-0.
16	391.	1794.	-0.	2029.	13.52	9.57	52.05	206.	-0.
17	391.	1794.	-0.	2029.	14.00	9.70	52.26	219.	-0.
18	391.	1794.	-0.	2029.	14.21	9.85	53.01	234.	-0.
19	391.	1820.	-0.	2055.	14.48	9.93	53.40	246.	-0.
20	391.	1846.	-0.	2082.	14.89	10.28	54.06	268.	1.42
21	415.	1846.	-0.	2108.	15.23	10.67	54.49	272.	1.38
22	420.	1846.	-0.	2115.	15.64	10.80	54.69	282.	1.42
23	433.	1846.	-0.	2129.	16.39	11.02	55.10	298.	1.42
24	438.	1846.	-0.	2134.	16.94	11.16	55.10	311.	1.42
25	446.	1846.	-0.	2142.	17.42	11.36	56.44	323.	1.35
26	446.	1899.	-0.	2195.	17.62	11.62	58.69	335.	-0.
27	446.	1975.	-0.	2271.	18.10	11.86	58.69	349.	-0.
28	446.	1975.	-0.	2271.	18.51	12.31	58.89	362.	-0.
29	446.	1975.	-0.	2271.	18.78	12.87	58.89	375.	-0.
30	446.	1975.	-0.	2271.	19.19	13.46	58.89	389.	-0.
31	446.	2001.	-0.	2297.	19.47	13.99	58.89	403.	-0.
32	446.	2001.	-0.	2297.	19.67	14.55	58.89	417.	-0.
33	446.	2001.	-0.	2297.	20.08	15.17	58.89	432.	-0.
34	-0.	-0.	-0.	2297.	20.22	15.80	58.89	-0.	-0.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART B

TEST NO R-62 FEED TYPE - TBP-25 OPERATION MODE - CONTINUOUS

RUN TIME	EVAP. LIQUID H+	EVAP.MAJOR CATION FE OR AL	CALCINER COND. H+	EVAP COND. H+	EVAP.COND. MAJOR ION FE OR AL	EVAP. COND. RU	EVAP. LIQUID TEMP.	EVAP. VAPOR TEMP.	CALCINER FEED TEMP.	CALCINER OFF-GAS TEMP.
HOURS	MOLAR	GM/LITER	MOLAR	MOLAR	GM/LITER	GM/LITER	DEG.C	DEG.C	DEG.C	DEG.C
1	0.82	71.4	4.46	1.40	0.002	-0.	116.	113.	93.	350.
2	1.14	60.0	6.75	2.32	0.002	-0.	118.	116.	96.	336.
3	1.26	59.0	6.36	1.27	0.002	-0.	120.	118.	106.	298.
4	1.06	53.6	5.92	1.01	0.002	-0.	115.	114.	103.	249.
5	0.82	54.2	6.51	0.90	0.002	-0.	114.	114.	97.	225.
6	0.34	34.4	5.45	1.30	0.002	-0.	115.	114.	99.	181.
7	-0.	-0.	8.08	0.60	0.002	-0.	120.	115.	91.	165.
8	0.01	1.7	10.90	0.50	0.002	-0.	115.	113.	104.	167.
9	0.37	65.0	3.58	0.56	0.002	-0.	115.	114.	33.	207.
10	0.	27.6	1.92	0.24	0.002	-0.	118.	114.	97.	227.
11	0.01	3.6	1.89	0.23	0.002	-0.	116.	113.	94.	170.
12	0.	28.5	2.28	0.99	0.002	-0.	115.	113.	96.	151.
13	0.	4.2	2.53	1.65	0.002	-0.	135.	130.	58.	147.
14	-0.	-0.	6.63	-0.	-0.	-0.	130.	110.	95.	159.
15	-0.	-0.	9.25	2.87	0.002	-0.	132.	110.	30.	173.
16	-0.	-0.	11.60	5.23	0.002	-0.	138.	115.	30.	183.
17	-0.	-0.	12.10	3.78	0.002	-0.	140.	119.	30.	201.
18	-0.	-0.	12.40	3.41	0.002	-0.	132.	107.	30.	192.
19	0.	-0.	2.90	0.22	0.002	-0.	135.	113.	30.	182.
20	-0.	-0.	-0.	-0.	-0.	-0.	113.	100.	92.	232.
21	0.19	65.6	2.57	0.32	0.002	-0.	104.	100.	93.	210.
22	0.64	71.9	4.14	2.02	0.003	-0.	116.	104.	90.	195.
23	1.07	72.9	8.41	2.34	0.002	-0.	113.	112.	83.	205.
24	-0.	-0.	7.98	1.75	0.003	-0.	121.	109.	103.	209.
25	0.73	55.3	10.10	0.56	0.003	-0.	123.	114.	107.	173.
26	1.17	44.7	5.65	0.28	0.002	-0.	112.	108.	63.	172.
27	1.91	40.1	11.00	0.38	0.002	-0.	107.	102.	42.	165.
28	2.70	41.6	12.10	0.81	0.003	-0.	109.	103.	67.	172.
29	3.26	38.7	13.00	1.05	0.003	-0.	109.	104.	67.	180.
30	3.39	36.8	13.50	1.13	0.003	-0.	109.	103.	67.	163.
31	3.46	28.1	13.30	1.03	0.003	-0.	109.	103.	63.	154.
32	3.64	30.8	12.80	0.67	0.002	-0.	109.	97.	56.	149.
33	4.44	36.4	12.50	1.46	0.004	-0.	111.	107.	59.	149.
34	4.47	34.8	12.10	0.96	0.005	-0.	111.	105.	61.	142.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART A

TEST NO R-63 FEED TYPE - TBP-25 OPERATION MODE - CONTINUOUS

RUN TIME	FEED	WATER	CALCINER ADDITIVE	EVAP. COND.	CALCINER FURNACE	CALCINER COND.	EVAP. COND.	SYSTEM OFF-GAS	EVAP. DENSITY
HOURS	LITERS	LITERS	LITERS	LITERS	(HUNDRED-THOUSANDS OF BTUS)			CU FT	GM/CC
1	12.	0.	-0.	6.	0.75	0.45	0.38	12.	1.36
2	45.	30.	-0.	39.	1.57	1.62	1.85	26.	1.38
3	70.	56.	-0.	66.	3.01	2.80	3.08	40.	1.39
4	105.	82.	-0.	114.	4.44	4.06	5.06	55.	1.38
5	134.	157.	-0.	219.	5.74	5.40	7.49	68.	1.36
6	183.	245.	-0.	343.	7.17	6.78	10.40	83.	1.38
7	225.	338.	-0.	479.	8.61	8.22	13.13	108.	1.38
8	261.	440.	-0.	620.	9.70	9.19	16.19	121.	1.39
9	290.	500.	-0.	710.	10.52	9.74	18.60	126.	1.44
10	317.	553.	-0.	790.	11.34	10.22	21.56	141.	1.44
11	332.	606.	-0.	859.	12.09	10.60	23.35	156.	1.44
12	338.	689.	-0.	949.	12.64	10.94	23.77	171.	1.46
13	352.	715.	-0.	990.	13.32	11.26	24.20	185.	1.32
14	375.	715.	-0.	1014.	13.80	11.60	24.56	198.	1.40
15	375.	741.	-0.	1042.	14.21	12.06	25.01	214.	1.36
16	381.	741.	-0.	1049.	14.75	12.45	25.01	228.	1.38
17	381.	741.	-0.	1051.	15.23	12.86	25.22	243.	1.34
18	381.	764.	-0.	1074.	15.71	13.24	26.23	257.	1.34
19	395.	790.	-0.	1114.	16.26	13.62	26.23	272.	1.37
20	395.	816.	-0.	1140.	16.67	13.98	26.45	287.	1.38
21	395.	816.	-0.	1140.	16.94	14.37	26.86	301.	1.36
22	411.	842.	-0.	1182.	17.21	14.72	25.33	316.	1.32
23	411.	868.	-0.	1208.	17.83	14.96	28.11	331.	1.36
24	417.	890.	-0.	1236.	18.10	15.29	28.11	345.	1.37
25	417.	961.	-0.	1307.	18.37	15.61	28.32	360.	1.38
26	424.	961.	-0.	1314.	18.71	15.77	28.73	375.	1.38
27	424.	961.	-0.	1314.	19.12	15.88	28.73	390.	1.34
28	424.	961.	-0.	1314.	19.40	15.98	28.73	404.	1.32
29	424.	979.	-0.	1332.	19.88	16.03	28.73	419.	1.38
30	424.	979.	-0.	1332.	20.08	16.24	28.73	433.	1.36
31	424.	979.	-0.	1332.	20.49	16.40	28.73	448.	1.34
32	424.	979.	-0.	1332.	20.76	16.25	28.73	462.	1.35
33	424.	979.	-0.	1332.	21.17	16.41	28.73	477.	1.36
34	424.	979.	-0.	1332.	21.38	16.58	28.73	492.	1.35
35	424.	979.	-0.	1332.	21.72	16.75	28.73	506.	1.34

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART B

TEST NO R-63 FEED TYPE - TBP-25 OPERATION MODE - CONTINUOUS

RUN TIME	EVAP. LIQUID H+	EVAP. MAJOR CATION FE OR AL	CALCINER COND. H+	EVAP COND. H+	EVAP. COND. MAJOR ION FE OR AL	EVAP. COND. RU	EVAP. LIQUID TEMP.	EVAP. VAPOR TEMP.	CALCINER FEED TEMP.	CALCINER OFF-GAS TEMP.
HOURS	MOLAR	GM/LITER	MOLAR	MOLAR	GM/LITER	GM/LITER	DEG.C	DEG.C	DEG.C	DEG.C
1	3.30	42.3	0.83	1.04	0.007	-0.	112.	110.	50.	266.
2	2.07	52.6	3.54	1.95	0.017	-0.	114.	110.	73.	350.
3	2.38	55.9	5.09	1.79	0.003	-0.	114.	114.	73.	350.
4	2.68	55.3	6.01	1.93	0.002	-0.	114.	114.	84.	365.
5	3.14	47.3	6.99	1.92	0.002	-0.	113.	114.	84.	342.
6	2.93	50.2	6.53	1.84	0.002	-0.	113.	114.	86.	310.
7	2.82	52.9	6.50	1.92	0.002	-0.	113.	114.	87.	260.
8	1.90	58.3	6.93	1.86	0.002	-0.	115.	115.	92.	206.
9	1.13	63.7	8.66	2.04	0.002	-0.	117.	115.	100.	180.
10	0.66	76.5	9.26	2.04	0.002	-0.	126.	121.	71.	185.
11	0.72	81.4	7.47	1.18	0.003	-0.	117.	117.	91.	209.
12	1.74	83.5	10.00	2.69	0.003	-0.	123.	117.	59.	171.
13	2.17	50.5	6.61	1.02	0.002	-0.	111.	109.	94.	135.
14	2.19	59.3	2.19	2.06	0.002	-0.	115.	111.	97.	161.
15	2.36	54.4	5.69	1.81	0.002	-0.	112.	110.	97.	164.
16	3.06	51.5	6.23	1.59	0.002	-0.	113.	110.	97.	149.
17	3.79	40.2	7.25	1.76	0.002	-0.	112.	111.	96.	153.
18	3.60	39.2	9.64	1.89	0.002	-0.	112.	111.	86.	168.
19	3.12	51.4	8.34	1.87	0.002	-0.	112.	108.	86.	176.
20	3.28	45.7	9.00	2.04	0.002	-0.	114.	112.	86.	168.
21	3.19	42.7	8.15	2.09	0.002	-0.	111.	110.	83.	158.
22	2.95	37.8	7.64	1.83	0.002	-0.	110.	109.	84.	150.
23	3.25	41.7	9.55	1.62	0.002	-0.	113.	110.	85.	153.
24	3.25	45.3	8.66	1.60	0.002	-0.	112.	109.	85.	152.
25	3.19	50.3	8.23	1.64	0.002	-0.	114.	111.	85.	152.
26	2.75	50.5	9.19	2.14	0.002	-0.	111.	110.	89.	122.
27	2.98	45.6	10.60	1.78	0.002	-0.	113.	110.	89.	154.
28	2.82	40.6	6.99	2.21	0.002	-0.	110.	107.	84.	150.
29	-0.	-0.	-0.	-0.	-0.	-0.	113.	110.	86.	164.
30	3.44	44.5	-0.	-0.	-0.	-0.	112.	109.	30.	160.
31	-0.	-0.	-0.	-0.	-0.	-0.	111.	107.	33.	152.
32	3.47	35.9	-0.	-0.	-0.	-0.	125.	115.	32.	142.
33	-0.	-0.	-0.	-0.	-0.	-0.	111.	108.	31.	120.
34	3.68	38.8	-0.	-0.	-0.	-0.	111.	105.	32.	95.
35	-0.	-0.	-0.	-0.	-0.	-0.	110.	99.	31.	94.

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART A

TEST NO R-64 FEED TYPE - TBP-25 OPERATION MODE - CONTINUOUS

RUN TIME	FEED	WATER	CALCINER ADDITIVE	EVAP. COND.	CALCINER FURNACE	CALCINER COND.	EVAP. COND.	SYSTEM OFF-GAS	EVAP. DENSITY
HOURS	LITERS	LITERS	LITERS	LITERS	(HUNDRED-THOUSANDS OF BTUS)			CU FT	GM/CC
1	59.	0.	-0.	10.	1.30	1.30	14.13	11.	1.35
2	94.	0.	-0.	17.	2.20	2.19	14.95	22.	1.37
3	121.	0.	-0.	45.	4.30	3.47	15.58	33.	1.35
4	157.	52.	-0.	134.	5.87	4.82	17.45	44.	1.34
5	187.	105.	-0.	218.	7.72	6.35	19.77	55.	1.35
6	215.	161.	-0.	325.	9.29	7.85	22.62	67.	1.33
7	249.	244.	-0.	424.	10.86	9.02	24.96	78.	1.34
8	278.	300.	-0.	511.	12.23	10.01	26.82	89.	1.35
9	300.	353.	-0.	588.	13.32	10.85	28.77	100.	1.36
10	321.	409.	-0.	667.	14.21	11.48	30.24	110.	1.37
11	336.	435.	-0.	710.	15.03	11.96	31.54	121.	1.36
12	350.	461.	-0.	752.	15.57	12.34	32.64	132.	1.36
13	350.	513.	-0.	804.	16.53	12.59	33.77	142.	1.37
14	356.	544.	-0.	841.	17.21	12.89	34.66	153.	1.37
15	370.	544.	-0.	855.	17.89	13.12	35.10	165.	1.37
16	379.	575.	-0.	895.	18.51	13.40	35.32	177.	1.38
17	379.	575.	-0.	907.	19.06	13.63	35.93	188.	1.35
18	392.	597.	-0.	942.	19.67	13.72	36.37	200.	1.36
19	392.	597.	-0.	942.	20.22	14.10	36.37	211.	1.38
20	392.	623.	-0.	968.	20.69	14.39	36.80	222.	1.32
21	401.	623.	-0.	978.	21.10	14.48	37.03	222.	1.35
22	401.	623.	-0.	978.	21.65	14.58	37.24	248.	1.36
23	401.	623.	-0.	978.	22.06	14.67	37.45	260.	1.38
24	401.	623.	-0.	978.	22.54	14.80	37.65	273.	1.38
25	401.	649.	-0.	1004.	22.88	14.80	37.67	286.	1.38
26	401.	679.	-0.	1034.	23.36	14.85	38.47	294.	1.34
27	401.	705.	-0.	1060.	23.70	14.70	38.91	312.	1.39
28	417.	705.	-0.	1077.	24.25	15.62	40.59	325.	1.38
29	437.	705.	-0.	1097.	25.27	16.55	41.01	338.	1.36
30	460.	705.	-0.	1120.	26.43	17.57	41.65	351.	1.36
31	473.	761.	-0.	1187.	27.52	18.39	42.96	364.	1.35
32	486.	787.	-0.	1228.	28.21	19.01	44.31	377.	1.36
33	502.	817.	-0.	1264.	28.82	19.29	44.90	390.	1.38
34	509.	844.	-0.	1298.	29.37	19.58	45.59	403.	1.38
35	516.	874.	-0.	1335.	29.92	19.72	46.23	417.	1.38
36	516.	901.	-0.	1362.	30.33	19.82	46.68	430.	1.38
37	516.	904.	-0.	1366.	30.87	19.96	47.10	447.	1.38
38	531.	904.	-0.	1381.	31.21	20.09	47.71	455.	1.38
39	541.	926.	-0.	1413.	31.76	20.25	49.17	459.	1.41
40	551.	953.	-0.	1450.	32.03	20.34	50.53	482.	1.30
41	580.	1009.	-0.	1535.	32.37	20.39	52.56	505.	1.30
42	587.	1063.	-0.	1596.	33.47	20.44	52.78	518.	1.30
43	587.	1063.	-0.	1596.	33.19	20.54	52.78	528.	1.30
44	587.	1063.	-0.	1596.	33.54	20.86	52.78	539.	1.30
45	587.	1063.	-0.	1598.	33.74	20.86	52.78	549.	1.30
46	626.	1089.	-0.	1637.	34.15	20.95	52.78	560.	1.28
47	626.	1089.	-0.	1663.	34.42	21.00	53.22	574.	1.32
48	626.	1089.	-0.	1663.	34.83	21.05	53.64	587.	1.31
49	626.	1089.	-0.	1663.	35.17	21.10	53.64	601.	1.24
50	626.	1089.	-0.	1663.	35.79	21.15	54.04	614.	1.24
51	626.	1089.	-0.	1663.	35.99	21.15	54.26	614.	1.23
52	626.	1089.	-0.	1663.	36.47	21.20	54.66	614.	1.25
53	626.	1089.	-0.	1663.	36.68	21.25	54.91	614.	1.25
54	626.	1089.	-0.	1663.	37.02	21.25	55.28	614.	1.25

Table 16 (Cont'd.)

HOURLY SYSTEM VARIABLES AND PARAMETERS - PART B

TEST NO R-64 FEED TYPE - TRP-25 OPERATION MODE - CONTINUOUS

RUN TIME	EVAP. LIQUID H+	EVAP.MAJOR CATION FE OR AL	CALCINER COND. H+	EVAP COND. H+	EVAP.COND. MAJOR ION FE OR AL	EVAP. COND. RU	EVAP. LIQUID TEMP.	EVAP. VAPOR TEMP.	CALCINER FEED TEMP.	CALCINER OFF-GAS TEMP.
HOURS	MOLAR	GM/LITER	MOLAR	MOLAR	GM/LITER	GM/LITER	DEG.C	DEG.C	DEG.C	DEG.C
1	2.42	50.0	2.76	1.46	0.002	-0.	112.	107.	79.	350.
2	4.01	39.3	4.55	2.09	0.002	-0.	113.	110.	83.	340.
3	4.22	37.5	5.42	2.12	0.002	-0.	113.	111.	80.	331.
4	4.27	31.7	6.35	1.98	0.002	-0.	112.	111.	81.	295.
5	4.17	33.0	6.28	1.88	0.002	-0.	112.	111.	80.	289.
6	4.03	34.9	6.50	1.98	0.002	-0.	112.	111.	79.	281.
7	3.38	43.4	6.01	1.91	0.002	-0.	112.	112.	79.	226.
8	3.17	42.8	5.69	1.86	0.002	-0.	112.	111.	80.	221.
9	2.83	47.0	5.47	1.82	0.002	-0.	113.	113.	81.	212.
10	2.96	43.7	5.58	1.86	0.002	-0.	113.	113.	82.	208.
11	2.71	47.0	7.45	1.95	0.002	-0.	113.	113.	81.	206.
12	3.03	45.3	8.46	1.94	0.002	-0.	113.	111.	83.	214.
13	2.57	48.1	5.84	1.57	0.002	-0.	112.	113.	83.	287.
14	2.34	50.9	4.33	1.69	0.002	-0.	112.	113.	84.	312.
15	3.15	45.6	5.18	1.79	0.002	-0.	113.	110.	84.	282.
16	3.62	38.8	5.07	1.51	0.002	-0.	113.	110.	85.	280.
17	3.25	43.5	4.66	1.80	0.002	-0.	113.	111.	82.	284.
18	3.35	44.0	4.64	1.82	0.002	-0.	112.	110.	83.	290.
19	3.96	34.7	6.83	1.65	0.002	-0.	113.	110.	45.	275.
20	4.87	36.8	7.80	2.21	0.002	-0.	113.	109.	31.	316.
21	5.25	34.4	8.01	2.41	0.002	-0.	112.	110.	31.	311.
22	5.42	36.8	7.19	2.84	0.002	-0.	113.	111.	31.	330.
23	5.25	37.3	5.67	2.64	0.003	-0.	114.	112.	31.	335.
24	4.95	35.9	3.94	2.45	0.002	-0.	114.	112.	31.	331.
25	3.75	41.0	2.58	1.85	0.002	-0.	114.	111.	32.	328.
26	2.87	49.5	1.65	1.33	0.003	-0.	111.	109.	28.	315.
27	2.45	50.5	2.24	1.10	0.002	-0.	111.	109.	34.	307.
28	2.70	45.6	3.45	1.54	0.002	-0.	113.	109.	34.	350.
29	3.14	41.1	4.98	2.12	0.003	-0.	112.	108.	76.	360.
30	3.36	41.1	5.90	1.94	0.002	-0.	113.	110.	84.	251.
31	3.03	43.7	6.72	1.95	0.002	-0.	112.	111.	86.	248.
32	2.27	50.4	7.30	1.86	0.002	-0.	112.	111.	88.	257.
33	1.95	52.3	7.17	1.94	0.002	-0.	114.	112.	90.	270.
34	1.62	52.5	8.18	1.72	0.002	-0.	114.	112.	89.	278.
35	1.41	54.5	6.74	1.83	0.002	-0.	112.	108.	89.	295.
36	1.26	57.8	7.24	1.89	0.002	-0.	115.	109.	89.	306.
37	1.02	57.8	6.39	1.82	0.002	-0.	116.	114.	90.	296.
38	0.44	63.6	5.85	1.99	0.003	-0.	116.	109.	89.	295.
39	0.	80.6	4.88	2.60	0.002	-0.	125.	108.	91.	295.
40	0.	1.1	3.90	1.52	0.002	-0.	127.	121.	62.	281.
41	0.	60.0	2.71	0.43	0.002	-0.	131.	128.	100.	273.
42	0.	60.0	2.80	0.45	0.002	-0.	118.	116.	91.	287.
43	0.	60.0	2.80	0.45	0.002	-0.	72.	52.	24.	292.
44	0.	60.0	2.80	0.50	0.002	-0.	31.	34.	23.	276.
45	1.41	42.8	2.92	0.53	0.002	-0.	44.	43.	24.	280.
46	1.71	50.5	2.60	0.63	0.015	-0.	108.	103.	45.	287.
47	1.60	46.6	1.68	0.43	0.028	-0.	109.	105.	50.	286.
48	1.41	36.8	4.55	0.74	0.023	-0.	109.	105.	50.	271.
49	1.69	32.5	9.00	0.20	0.019	-0.	82.	70.	41.	290.
50	1.98	34.4	10.10	0.24	0.015	-0.	106.	105.	45.	290.
51	2.22	35.9	9.64	0.25	0.006	-0.	105.	105.	44.	289.
52	2.26	33.5	8.65	0.25	0.005	-0.	106.	104.	45.	284.
53	2.28	32.7	6.23	0.23	0.002	-0.	108.	104.	44.	285.
54	2.28	32.7	6.23	0.23	0.002	-0.	106.	104.	45.	282.

Table 17.

CALCINER CENTERLINE TEMPERATURES. RUN NO. 63. TBP25 WASTE.

(TEMPERATURES ARE DEGREES CENTIGRADE)
(MAX RATES ARE DEG C /HR FOR THE 5 MIN PERIOD OF GREATEST CHANGE)

		RUN	ZONE 1		ZONE 2		ZONE 3		ZONE 4		ZONE 5		ZONE 6	
DATE	TIME	TIME HR	AVG TEMP	MAX RATE	AVG TEMP	MAX RATE	AVG TEMP	MAX RATE	AVG TEMP	MAX RATE	AVG TEMP	MAX RATE	AVG TEMP	MAX RATE
12/13	800	1	603.	1828.	666.	2134.	677.	2043.	663.	1947.	601.	1757.	272.	1497.
12/13	900	2	642.	-209.	640.	-319.	618.	-435.	545.	-487.	304.	-2810.	104.	-3016.
12/13	1000	3	543.	-245.	523.	-291.	468.	-497.	133.	-1624.	117.	62.	117.	62.
12/13	1100	4	516.	-84.	496.	-70.	406.	-132.	129.	-20.	124.	-20.	124.	-23.
12/13	1200	5	463.	-147.	426.	-189.	129.	-1749.	132.	29.	128.	29.	127.	29.
12/13	1300	6	450.	-178.	385.	-418.	125.	-24.	130.	-17.	127.	-21.	126.	-21.
12/13	1400	7	396.	-85.	127.	-42.	123.	25.	128.	22.	125.	22.	124.	28.
12/13	1500	8	321.	-278.	129.	-46.	127.	-46.	130.	-46.	128.	-47.	128.	-49.
12/13	1600	9	200.	-286.	128.	44.	128.	44.	130.	41.	128.	41.	128.	41.
12/13	1700	10	211.	244.	127.	-55.	128.	-49.	130.	-46.	129.	-52.	129.	-46.
12/13	1800	11	274.	-230.	127.	62.	129.	53.	131.	56.	129.	56.	131.	59.
12/13	1900	12	165.	-795.	133.	-35.	133.	-32.	134.	-29.	133.	-32.	135.	-32.
12/13	2000	13	188.	-284.	132.	27.	132.	27.	134.	27.	132.	27.	140.	36.
12/13	2100	14	171.	-164.	134.	-70.	135.	19.	136.	22.	135.	22.	145.	22.
12/13	2200	15	214.	215.	134.	21.	133.	12.	135.	15.	134.	15.	147.	15.
12/13	2300	16	214.	-93.	134.	15.	134.	15.	136.	16.	135.	15.	149.	15.
12/14	0	17	214.	32.	138.	11.	137.	13.	139.	14.	138.	13.	156.	13.
12/14	100	18	229.	67.	139.	35.	138.	19.	140.	-18.	138.	19.	161.	24.
12/14	200	19	278.	79.	138.	83.	133.	-18.	136.	-17.	139.	19.	167.	24.
12/14	300	20	296.	69.	135.	36.	135.	35.	137.	41.	140.	38.	176.	44.
12/14	400	21	332.	97.	138.	14.	137.	-15.	139.	17.	140.	-26.	189.	32.
12/14	500	22	370.	-222.	138.	14.	137.	12.	139.	17.	146.	17.	207.	35.
12/14	600	23	378.	-226.	142.	-168.	139.	28.	140.	28.	149.	22.	229.	43.
12/14	700	24	399.	109.	166.	-607.	133.	-48.	135.	-42.	153.	45.	253.	63.
12/14	800	25	434.	-556.	135.	34.	133.	31.	135.	40.	158.	36.	282.	73.
12/14	900	26	418.	-2800.	136.	-32.	134.	-28.	134.	-34.	160.	29.	315.	66.
12/14	1000	27	352.	931.	166.	259.	131.	-109.	133.	-100.	162.	-39.	364.	94.
12/14	1C99	28	426.	290.	269.	224.	117.	-56.	134.	38.	169.	47.	450.	170.
12/14	1200	29	553.	196.	418.	201.	124.	27.	142.	25.	188.	39.	577.	157.
12/14	1300	30	641.	94.	471.	156.	132.	54.	147.	21.	207.	48.	673.	134.
12/14	1400	31	667.	95.	559.	117.	150.	93.	147.	33.	230.	63.	741.	146.
12/14	1500	32	719.	129.	642.	199.	250.	229.	156.	59.	264.	86.	801.	160.
12/14	1600	33	741.	-172.	749.	297.	512.	484.	171.	-124.	303.	114.	837.	132.
12/14	1700	34	770.	136.	831.	215.	682.	201.	195.	65.	371.	142.	867.	111.
12/14	1800	35	778.	-131.	866.	223.	747.	197.	225.	81.	531.	321.	884.	137.
12/14	1900	36	789.	-101.	898.	136.	808.	106.	271.	107.	762.	279.	907.	103.

Table 17 (Cont'd.)

CALCINER SKIN TEMPERATURES. RUN NO. 63. TBP25 WASTE.

(TEMPERATURES ARE DEGREES CENTIGRADE)
(MAX RATES ARE DEG C /HR FOR THE 5 MIN PERIOD OF GREATEST CHANGE)

		RUN	ZONE 1		ZONE 2		ZONE 3		ZONE 4		ZONE 5		ZONE 6	
DATE	TIME	TIME HR	AVG TEMP	MAX RATE	AVG TEMP	MAX RATE	AVG TEMP	MAX RATE	AVG TEMP	MAX RATE	AVG TEMP	MAX RATE	AVG TEMP	MAX RATE
12/13	800	1	579.	1590.	680.	1899.	696.	1737.	691.	1675.	659.	1683.	0.	0.
12/13	900	2	686.	-244.	686.	-224.	711.	-204.	682.	-246.	503.	-2938.	0.	0.
12/13	1000	3	647.	208.	657.	197.	676.	183.	386.	-1907.	339.	55.	0.	0.
12/13	1100	4	635.	-229.	645.	-214.	657.	-336.	337.	-173.	346.	-64.	0.	0.
12/13	1200	5	627.	303.	632.	295.	468.	-339.	382.	1000.	391.	559.	0.	0.
12/13	1300	6	633.	-244.	630.	-300.	429.	698.	483.	374.	465.	432.	0.	0.
12/13	1400	7	617.	406.	637.	486.	602.	720.	634.	752.	598.	653.	0.	0.
12/13	1500	8	624.	-203.	670.	-118.	687.	106.	676.	86.	647.	86.	0.	0.
12/13	1600	9	654.	107.	676.	-58.	703.	55.	688.	49.	669.	54.	0.	0.
12/13	1700	10	670.	45.	679.	53.	771.	682.	754.	739.	739.	739.	0.	0.
12/13	1800	11	671.	97.	687.	-62.	849.	115.	832.	121.	817.	123.	0.	0.
12/13	1900	12	670.	-260..	691.	-95.	861.	36.	843.	-40.	827.	30.	0.	0.
12/13	2000	13	682.	-72.	691.	-96.	866.	72.	847.	84.	832.	75.	0.	0.
12/13	2100	14	690.	89.	693.	-101.	870.	-50.	852.	-47.	838.	46.	0.	0.
12/13	2200	15	695.	-47.	695.	-82.	873.	33.	855.	36.	842.	42.	0.	0.
12/13	2300	16	700.	28.	696.	-66.	876.	-31.	858.	-31.	844.	-34.	0.	0.
12/14	0	17	702.	27.	698.	65.	878.	-28.	860.	23.	846.	-28.	0.	0.
12/14	100	18	702.	-29.	696.	-64.	876.	35.	858.	44.	843.	-35.	0.	0.
12/14	200	19	701.	21.	712.	-93.	887.	42.	873.	57.	846.	39.	0.	0.
12/14	300	20	704.	59.	711.	113.	889.	66.	875.	63.	849.	69.	0.	0.
12/14	400	21	702.	-34.	713.	99.	890.	-24.	876.	-25.	853.	74.	0.	0.
12/14	500	22	704.	37.	713.	52.	890.	51.	877.	135.	864.	126.	0.	0.
12/14	600	23	703.	-48.	716.	78.	894.	79.	893.	43.	886.	94.	0.	0.
12/14	700	24	701.	-41.	735.	108.	904.	-55.	892.	-52.	897.	-58.	0.	0.
12/14	800	25	704.	-61.	732.	111.	904.	-74.	893.	62.	897.	68.	0.	0.
12/14	900	26	699.	-243.	730.	104.	899.	-59.	890.	-51.	893.	-62.	0.	0.
12/14	1000	27	687.	-315.	723.	-267.	888.	-374.	879.	-419.	881.	-455.	0.	0.
12/14	1099	28	683.	243.	726.	253.	877.	-294.	867.	-375.	867.	-408.	0.	0.
12/14	1200	29	760.	-183.	827.	275.	875.	-244.	862.	-283.	872.	-298.	0.	0.
12/14	1300	30	782.	153.	845.	228.	883.	161.	872.	208.	881.	253.	0.	0.
12/14	1400	31	780.	286.	832.	416.	868.	348.	854.	363.	864.	410.	0.	0.
12/14	1500	32	836.	416.	851.	470.	886.	518.	873.	548.	884.	574.	0.	0.
12/14	1600	33	843.	223.	866.	198.	892.	-224.	879.	213.	892.	-221.	0.	0.
12/14	1700	34	870.	150.	898.	158.	896.	-129.	882.	-144.	897.	-123.	0.	0.
12/14	1800	35	871.	193.	915.	170.	896.	199.	882.	-167.	896.	-140.	0.	0.
12/14	1900	36	877.	-92.	933.	-128.	904.	-107.	889.	-95.	903.	-89.	0.	0.

Table 17 (Cont'd.)

TEMPERATURES 2.5 INCHES FROM CENTER OF CALCINER. RUN NO. 63. TBP25 WASTE.

(TEMPERATURES ARE DEGREES CENTIGRADE)
(MAX RATES ARE DEG C /HR FOR THE 5 MIN PERIOD OF GREATEST CHANGE)

		RUN	ZONE 1		ZONE 2		ZONE 3		ZONE 4		ZONE 5		ZONE 6	
		TIME	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX
DATE	TIME	HR	TEMP	RATE	TEMP	RATE	TEMP	RATE	TEMP	RATE	TEMP	RATE	TEMP	RATE
12/13	800	1	617.	1721.	671.	1941.	683.	1893.	664.	1808.	613.	1610.	287.	2021.
12/13	900	2	657.	-198.	650.	-277.	632.	-359.	544.	-591.	315.	-3314.	108.	-3524.
12/13	1000	3	567.	-220.	541.	-310.	474.	-687.	133.	-2292.	120.	62.	121.	62.
12/13	1100	4	543.	-84.	515.	-79.	429.	-156.	124.	-20.	128.	-23.	128.	-26.
12/13	1200	5	495.	-135.	446.	-161.	153.	-1110.	128.	29.	131.	31.	132.	31.
12/13	1300	6	483.	-170.	385.	-987.	131.	-15.	128.	-27.	130.	-15.	131.	17.
12/13	1400	7	442.	91.	234.	73.	135.	28.	128.	22.	130.	28.	135.	25.
12/13	1500	8	375.	-289.	249.	48.	141.	39.	132.	42.	135.	45.	143.	51.
12/13	1600	9	329.	250.	254.	59.	146.	53.	137.	53.	140.	54.	154.	53.
12/13	1700	10	421.	143.	260.	52.	161.	67.	145.	50.	157.	62.	177.	76.
12/13	1800	11	483.	145.	282.	78.	201.	37.	168.	78.	184.	77.	218.	85.
12/13	1900	12	411.	-1789.	285.	-47.	234.	88.	181.	75.	200.	43.	238.	35.
12/13	2000	13	457.	343.	292.	33.	279.	84.	219.	131.	224.	57.	269.	56.
12/13	2100	14	520.	211.	300.	-102.	314.	52.	242.	45.	242.	43.	305.	60.
12/13	2200	15	588.	111.	296.	37.	340.	39.	254.	26.	255.	23.	336.	53.
12/13	2300	16	619.	153.	300.	37.	362.	31.	267.	22.	263.	19.	375.	51.
12/14	0	17	609.	28.	309.	27.	379.	24.	278.	23.	273.	20.	418.	53.
12/14	100	18	630.	216.	305.	-481.	388.	26.	291.	71.	283.	30.	451.	55.
12/14	200	19	677.	-44.	296.	740.	404.	41.	311.	36.	308.	71.	478.	54.
12/14	300	20	667.	-247.	287.	53.	422.	59.	328.	61.	336.	60.	500.	62.
12/14	400	21	678.	144.	298.	44.	438.	34.	341.	32.	388.	99.	527.	54.
12/14	500	22	688.	-62.	302.	35.	453.	25.	349.	24.	460.	97.	552.	37.
12/14	600	23	669.	-454.	315.	-180.	463.	54.	359.	40.	497.	57.	574.	44.
12/14	700	24	678.	-58.	357.	-764.	475.	47.	372.	51.	519.	47.	595.	61.
12/14	800	25	.714.	154.	309.	107.	470.	52.	385.	59.	520.	47.	615.	59.
12/14	900	26	668.	-4978.	309.	49.	499.	60.	394.	58.	524.	63.	636.	66.
12/14	1000	27	560.	996.	383.	232.	497.	-305.	407.	-130.	538.	-232.	660.	-70.
12/14	1097	28	668.	108.	474.	187.	487.	61.	452.	148.	555.	71.	688.	102.
12/14	1200	29	752.	107.	625.	199.	506.	27.	570.	89.	577.	49.	743.	86.
12/14	1300	30	787.	91.	671.	174.	508.	35.	599.	-52.	596.	63.	771.	70.
12/14	1400	31	796.	145.	696.	174.	522.	89.	565.	-84.	609.	69.	801.	115.
12/14	1500	32	845.	195.	730.	233.	677.	346.	534.	63.	635.	111.	836.	112.
12/14	1600	33	857.	153.	793.	264.	804.	212.	543.	-284.	660.	147.	861.	96.
12/14	1700	34	887.	166.	856.	218.	842.	161.	584.	-210.	704.	208.	882.	99.
12/14	1800	35	894.	-188.	886.	214.	854.	184.	629.	140.	773.	150.	891.	-116.
12/14	1900	36	901.	-83.	911.	88.	872.	-77.	686.	103.	856.	124.	903.	91.

Table 17 (Cont'd.)

CALCINER HEAT BALANCE. RUN NO. 63. TBP25 WASTE.

(ENTHALPY BASE IS ZERO DEGREES CENTIGRADE)

DATE	TIME	RUN HOUR	CALCINER VAPOR DEG C	TOTAL HEAT IN KWH	FURNACE HEAT IN KWH	CUMULATIVE FURNACE HEAT KWH	TOTAL HEAT OUT KWH	INTERVAL HEAT LOSS KWH	CUMULATIVE HEAT LOSS KWH
12/13	800	1	196.7	25.4	25.0	25.0	1.1	24.3	24.3
12/13	900	2	361.1	26.9	26.0	51.0	8.6	18.4	42.7
12/13	1000	3	379.2	40.8	39.0	90.0	18.1	22.7	65.4
12/13	1100	4	356.3	43.7	42.0	132.0	16.8	26.9	92.3
12/13	1200	5	330.8	43.6	41.0	173.0	21.9	21.7	113.9
12/13	1300	6	318.0	46.3	43.0	216.0	28.1	18.2	132.2
12/13	1400	7	262.6	41.8	39.0	255.0	25.1	16.7	148.9
12/13	1500	8	219.7	35.9	33.0	288.0	23.0	13.0	161.8
12/13	1600	9	176.3	29.3	27.0	315.0	16.4	12.9	174.7
12/13	1700	10	172.9	25.6	24.0	339.0	12.1	13.5	188.2
12/13	1800	11	187.5	22.0	21.0	360.0	10.2	11.8	200.0
12/13	1900	12	167.8	20.5	19.0	379.0	10.1	10.4	210.3
12/13	2000	13	174.4	18.5	17.0	396.0	10.3	8.2	218.5
12/13	2100	14	143.1	15.2	14.0	410.0	8.8	6.4	224.9
12/13	2200	15	161.7	16.1	15.0	425.0	7.5	8.6	233.5
12/13	2300	16	153.5	15.2	14.0	439.0	7.7	7.5	241.1
12/14	0	17	149.6	14.2	13.0	452.0	7.6	6.5	247.6
12/14	100	18	155.4	13.9	13.0	465.0	6.5	7.5	255.1
12/14	200	19	169.6	14.8	14.0	479.0	6.1	8.7	263.8
12/14	300	20	166.0	11.8	11.0	490.0	5.5	6.3	270.1
12/14	400	21	156.4	12.7	12.0	502.0	5.3	7.4	277.4
12/14	500	22	151.2	11.9	11.0	513.0	6.3	5.6	283.0
12/14	600	23	149.8	12.7	12.0	525.0	5.1	7.5	290.6
12/14	700	24	149.2	12.6	12.0	537.0	4.7	7.9	298.4
12/14	800	25	146.2	10.4	10.0	547.0	2.9	7.5	306.0
12/14	900	26	138.8	11.4	11.0	558.0	2.1	9.3	315.2
12/14	1000	27	126.9	10.8	11.0	569.0	0.0	10.8	326.0
			BALANCE NOT CALCULATED						
12/14	1200	29	132.4	20.9	21.0	590.0	0.	20.9	346.9
12/14	1300	30	148.7	10.0	10.0	600.0	0.	10.0	356.9
12/14	1400	31	134.9	10.0	10.0	610.0	0.	10.0	366.9
12/14	1500	32	132.1	9.0	9.0	619.0	0.	9.0	375.9
12/14	1600	33	118.2	9.0	9.0	628.0	0.	9.0	384.9
12/14	1700	34	90.0	9.0	9.0	637.0	0.	9.0	393.9
12/14	1800	35	82.1	9.0	9.0	646.0	0.	9.0	402.9
12/14	1900	36	86.3	8.0	8.0	654.0	0.	8.0	410.9

Table 17 (Cont'd.)

CALCINER FURNACE TEMPERATURES. RUN NO. 63. TBP25 WASTE.

(TEMPERATURES ARE DEGREES CENTIGRADE)
(MAX RATES ARE DEG C /HR FOR THE 5 MIN PERIOD OF GREATEST CHANGE)

		RUN	ZONE 1		ZONE 2		ZONE 3		ZONE 4		ZONE 5		ZONE 6	
DATE	TIME	TIME HR	AVG TEMP	MAX RATE	AVG TEMP	MAX RATE	AVG TEMP	MAX RATE	AVG TEMP	MAX RATE	AVG TEMP	MAX RATE	AVG TEMP	MAX RATE
12/13	800	1	740.	1907.	744.	2386.	552.	1620.	746.	2261.	709.	1659.	787.	2519.
12/13	900	2	730.	-199.	716.	-249.	551.	-611.	783.	388.	748.	-232.	831.	472.
12/13	1000	3	759.	137.	760.	320.	576.	405.	833.	630.	746.	160.	812.	284.
12/13	1100	4	764.	-143.	765.	-226.	547.	-171.	810.	-199.	742.	-178.	805.	-223.
12/13	1200	5	786.	-297.	782.	288.	558.	-219.	805.	254.	747.	217.	811.	284.
12/13	1300	6	799.	184.	774.	170.	552.	180.	820.	244.	763.	-187.	831.	-338.
12/13	1400	7	786.	245.	738.	276.	567.	255.	825.	-432.	762.	350.	795.	-445.
12/13	1500	8	796.	360.	781.	445.	561.	353.	799.	-248.	770.	-266.	796.	355.
12/13	1600	9	810.	-380.	771.	448.	558.	552.	771.	-197.	757.	-131.	784.	-222.
12/13	1700	10	799.	722.	794.	883.	597.	-488.	831.	1194.	803.	681.	832.	955.
12/13	1800	11	792.	-259.	779.	-397.	646.	1040.	886.	452.	860.	252.	879.	237.
12/13	1900	12	798.	272.	766.	286.	647.	500.	895.	323.	857.	-208.	872.	-214.
12/13	2000	13	781.	-351.	763.	301.	661.	507.	891.	-450.	862.	111.	875.	-107.
12/13	2100	14	778.	-312.	754.	-337.	657.	-289.	893.	-575.	858.	-188.	871.	-149.
12/13	2200	15	779.	274.	759.	311.	662.	268.	820.	513.	860.	66.	869.	-55.
12/13	2300	16	774.	265.	750.	265.	658.	-347.	821.	-449.	857.	-77.	865.	107.
12/14	0	17	776.	-202.	750.	-233.	664.	389.	898.	288.	857.	85.	864.	-76.
12/14	100	18	775.	-252.	755.	-339.	661.	-344.	892.	-327.	854.	-60.	863.	136.
12/14	200	19	781.	-276.	761.	-377.	661.	-393.	904.	361.	865.	63.	876.	118.
12/14	300	20	781.	213.	757.	-239.	669.	225.	903.	-454.	870.	100.	880.	165.
12/14	400	21	785.	213.	758.	316.	663.	-481.	908.	-176.	878.	-51.	894.	-156.
12/14	500	22	783.	207.	756.	284.	668.	-152.	901.	292.	883.	88.	897.	81.
12/14	600	23	786.	297.	761.	-341.	672.	451.	917.	-599.	894.	171.	890.	225.
12/14	700	24	776.	282.	773.	-279.	671.	-253.	916.	574.	899.	130.	897.	-198.
12/14	800	25	795.	-367.	775.	-458.	666.	798.	912.	-542.	897.	-226.	895.	-205.
12/14	900	26	790.	199.	767.	298.	662.	-674.	909.	-431.	891.	-106.	889.	-225.
12/14	1000	27	790.	164.	759.	312.	648.	-363.	896.	-268.	877.	-288.	874.	-505.
12/14	1099	28	783.	-206.	752.	-193.	646.	574.	887.	-341.	868.	251.	864.	333.
12/14	1200	29	869.	-870.	842.	756.	634.	662.	877.	-256.	875.	-277.	874.	-372.
12/14	1300	30	875.	-825.	842.	872.	637.	-718.	884.	-378.	880.	-205.	879.	312.
12/14	1400	31	868.	-561.	834.	-740.	620.	-681.	873.	-476.	869.	351.	865.	477.
12/14	1500	32	892.	1100.	857.	1249.	642.	895.	887.	509.	896.	413.	885.	482.
12/14	1600	33	912.	824.	879.	749.	653.	809.	890.	332.	891.	290.	889.	293.
12/14	1700	34	945.	742.	908.	867.	658.	-540.	901.	294.	899.	-216.	895.	-257.
12/14	1800	35	958.	1099.	917.	1291.	653.	861.	899.	173.	897.	-415.	893.	-445.
12/14	1900	36	987.	-1699.	958.	-1501.	668.	-1052.	908.	238.	907.	-191.	901.	110.

Table 17 (Cont'd.)

PROCESS LIQUIDS INVENTORY. RUN NO. 63. TBP25 WASTE.

DATE	TIME	RUN HOUR	PROCESS FEED LITERS	PROCESS WATER LITERS	EVAPORATOR CHANGE LITERS	CALCINER ADDITIVE LITERS	CALCINER CHANGE LITERS	CALCINER CALC. FEED LITERS	EVAPORATOR CONC. VOL LITERS	CUMUL. H2O/FEED RATIO
12/13	800	1	12.2	0.	-3.4	-0.	4.6	5.5	11.6	0.
12/13	900	2	40.8	30.3	1.9	0.	4.6	14.8	65.2	0.6
12/13	1000	3	28.2	26.5	-0.5	-0.	4.6	26.7	51.2	0.7
12/13	1100	4	32.4	26.5	0.3	-0.	4.6	25.0	54.6	0.7
12/13	1200	5	27.4	75.7	-0.2	-0.	4.6	31.7	101.4	1.1
12/13	1300	6	37.0	79.5	0.6	-0.	4.2	40.1	114.3	1.3
12/13	1400	7	34.1	94.6	0.2	-0.	0.5	35.6	128.7	1.5
12/13	1500	8	39.6	102.2	-0.3	-0.	1.0	32.8	141.7	1.7
12/13	1600	9	28.8	60.6	2.6	-0.	0.4	23.8	87.0	1.7
12/13	1700	10	29.2	53.0	-3.2	-0.	-0.4	16.8	86.3	1.7
12/13	1800	11	12.5	53.0	-1.6	-0.	-0.6	13.5	68.3	1.8
12/13	1900	12	18.2	83.3	4.9	-0.	1.2	15.5	96.0	2.0
12/13	2000	13	-0.5	26.5	-2.7	-0.	0.6	15.1	28.8	2.1
12/13	2100	14	21.3	0.	2.7	0.	-0.4	12.3	19.6	1.9
12/13	2200	15	-1.9	26.5	-2.4	0.	-0.5	10.0	28.1	2.0
12/13	2300	16	13.8	3.8	-0.0	0.	0.4	11.3	17.8	2.0
12/14	0	17	-0.5	0.	2.5	-0.	-0.2	10.6	-2.2	2.0
12/14	100	18	0.6	22.7	0.6	0.	-0.4	8.6	23.7	2.0
12/14	200	19	10.8	26.5	-2.1	0.	-0.5	7.9	40.5	2.0
12/14	300	20	1.4	26.5	-0.9	0.	0.5	7.9	28.9	2.1
12/14	400	21	0.3	0.	-1.1	0.	-0.5	6.8	2.5	2.1
12/14	500	22	9.8	26.5	7.3	0.	0.2	9.0	28.3	2.1
12/14	600	23	3.8	26.5	-3.0	0.	-0.1	6.9	34.0	2.2
12/14	700	24	3.1	22.7	-4.9	0.	-0.4	6.0	31.7	2.2
12/14	800	25	6.1	71.9	0.5	-0.	0.3	4.0	77.8	2.3
12/14	900	26	9.4	0.	1.1	0.	1.5	4.1	7.4	2.3
12/14	1000	27	-1.6	0.	3.4	-0.	-1.8	-2.4	-2.5	2.3
			BALANCE NOT CALCULATED							
12/14	1200	29	5.2	18.9	-1.5	-0.	-1.3	-1.6	28.1	2.3
12/14	1300	30	0.	0.	-1.6	-0.	0.0	-0.6	2.2	2.3
12/14	1400	31	0.8	0.	1.6	-0.	-0.0	-0.6	-0.2	2.3
12/14	1500	32	-0.8	0.	4.6	-0.	-0.0	-0.6	-4.8	2.3
12/14	1600	33	-0.0	0.	-1.0	-0.	0.0	-0.6	1.6	2.3
12/14	1700	34	0.3	0.	-0.9	-0.	-0.1	-0.7	1.8	2.3
12/14	1800	35	0.	0.	1.0	0.	0.0	-0.6	-0.4	2.3
12/14	1900	36	-0.3	0.	1.4	0.	-0.0	-0.6	-1.1	2.3

Table 17 (Cont'd.)

EVAPORATOR HEAT BALANCE. RUN NO. 63. TBP25 WASTE.

(ENTHALPY BASE IS ZERO DEGREES CENTIGRADE)

DATE	TIME	RUN HOUR	HEAT FROM STEAM KWH	TOTAL HEAT IN KWH	HEAT TO CONDENSATE KWH	TOTAL HEAT OUT KWH	PUMP COOLER COEFFICIENT B/HR/SF/CF	INTERVAL HEAT LOSS KWH	CUMULATIVE HEAT LOSS KWH
12/13	800	1	0.1	0.6	8.3	22.6	429.0	-22.1	-22.1
12/13	900	2	18.5	23.1	26.3	33.6	309.2	-10.4	-32.5
12/13	1000	3	31.2	35.6	31.1	37.3	293.7	-1.7	-34.2
12/13	1100	4	42.4	46.4	38.0	42.9	255.3	3.5	-30.7
12/13	1200	5	71.9	77.5	61.4	64.8	0.	12.6	-18.1
12/13	1300	6	91.5	98.3	79.0	83.7	0.	14.7	-3.5
12/13	1400	7	95.9	103.1	72.6	77.2	0.	25.9	22.4
12/13	1500	8	108.0	115.2	90.2	94.0	432.8	21.2	43.7
12/13	1600	9	95.9	101.0	79.4	82.3	0.	18.7	62.4
12/13	1700	10	89.4	92.2	82.7	83.1	0.	9.1	71.5
12/13	1800	11	63.7	66.0	57.9	58.2	0.	7.9	79.3
12/13	1900	12	66.1	69.6	63.3	63.7	0.	5.9	85.2
12/13	2000	13	0.1	1.2	23.8	24.2	0.	-23.0	62.1
12/13	2100	14	19.3	20.5	37.9	39.2	21.0	-18.7	43.4
12/13	2200	15	6.6	10.3	30.4	34.6	100.3	-24.3	19.2
12/13	2300	16	0.1	4.0	20.3	25.1	117.4	-21.1	-1.9
12/14	0	17	0.1	3.5	17.3	22.2	118.4	-18.7	-20.6
12/14	100	18	9.6	13.5	34.1	38.7	120.1	-25.2	-45.8
12/14	200	19	18.5	22.5	37.5	42.6	130.0	-20.0	-65.9
12/14	300	20	3.6	7.4	24.4	29.4	132.5	-22.0	-87.9
12/14	400	21	0.1	3.3	27.3	32.9	150.9	-29.6	-117.5
12/14	500	22	0.1	4.7	25.1	31.1	163.8	-26.4	-143.9
12/14	600	23	1.1	5.3	30.2	35.9	161.0	-30.6	-174.5
12/14	700	24	0.1	3.9	26.1	31.4	152.5	-27.5	-202.0
12/14	800	25	0.1	5.2	15.6	20.2	137.6	-15.0	-217.0
12/14	900	26	0.1	6.7	18.4	20.1	22.9	-13.4	-230.4
12/14	1000	27	1.3	-1.1	8.0	8.0	0.	-9.1	-239.5
			BALANCE NOT CALCULATED						
12/14	1200	29	0.8	-4.5	9.9	9.9	0.	-14.4	-253.9
12/14	1300	30	0.1	-0.1	1.9	1.9	0.	-2.0	-255.9
12/14	1400	31	0.0	0.1	-0.6	-0.2	0.	0.3	-255.6
12/14	1500	32	0.1	0.1	4.4	5.9	0.	-5.8	-261.4
12/14	1600	33	0.1	0.2	4.7	6.5	0.	-6.3	-267.7
12/14	1700	34	0.1	0.2	2.2	4.2	0.	-4.0	-271.7
12/14	1800	35	0.1	0.3	1.5	4.2	0.	-3.9	-275.6
12/14	1900	36	0.1	0.3	4.9	8.3	0.	-7.9	-283.6

Table 17 (Cont'd.)

CALCINER LIQUID LEVEL CONTROLLER DATA. RUN NO. 63. TBP25 WASTE.

DATE	TIME	RUN HOUR	AVERAGE CALCINER LIQ. LEV. LITERS	AVERAGE DEVIATION FROM SET PT LITERS	R.M.S. DEVIATION FROM SET PT LITERS	MAXIMUM DEVIATION FROM SET PT LITERS	AVERAGE CALCINER FEED RATE LITERS/HR	FEED VALVE POSITION PERCENT OPEN
			CONTROLLER ON MANUAL AT START OF RUN					
12/13	800	1	2.5				5.9	15.6
12/13	900	2	7.1				15.2	67.8
12/13	1000	3	11.7				27.0	71.7
12/13	1100	4	12.0				22.9	58.6
12/13	1200	5	19.1				31.3	73.4
12/13	1255		CONTROLLER CHANGE.	NEW PARAMETERS ARE				
	SET POINT		60.0P/C	BANDWIDTH 200	RESET 4H		CONTROL RANGE	50.0P/C
12/13	1300	6	25.5				40.0	84.4
12/13	1400	7	22.1	-0.3	0.4	-0.6	34.9	63.0
12/13	1500	8	28.3	0.2	0.4	0.8	32.6	70.5
12/13	1600	9	29.1	1.1	1.1	1.2	23.7	56.4
12/13	1700	10	29.0	0.9	1.0	1.2	16.4	53.9
12/13	1800	11	28.4	0.3	0.4	0.7	13.3	60.2
	1825		29.8	1.7			15.2	0.6
12/13	1900	12	29.3	1.3	1.3	1.7	15.7	38.0
	1955		30.0	1.9			24.2	29.5
	2000		30.0	1.9			16.7	0.7
12/13	2000	13	29.2	1.1	1.2	1.9	15.1	40.6
	2005		30.0	1.9			16.9	0.7
	2010		30.0	1.9			14.3	0.7
	2015		29.9	1.9			13.1	0.7
	2020		29.7	1.7			12.3	30.6
	2030		29.9	1.9			14.3	0.7
	2035		29.7	1.7			6.1	0.6
	2040		29.9	1.8			11.0	0.7
	2045		29.7	1.7			10.8	0.7
12/13	2100	14	29.8	1.7	1.7	1.9	12.1	10.5
12/13	2200	15	29.3	1.2	1.2	1.5	9.8	31.5
12/13	2300	16	29.4	1.3	1.3	1.5	11.2	26.9
12/14	0	17	29.5	1.4	1.4	1.5	10.7	20.9
12/14	100	18	29.3	1.2	1.2	1.4	8.6	18.9
12/14	200	19	28.7	0.6	0.6	0.8	7.8	25.2
12/14	300	20	28.8	0.8	0.8	1.0	7.9	21.4
12/14	400	21	28.6	0.6	0.6	0.9	6.8	21.3
12/14	500	22	28.6	0.5	0.5	0.6	9.0	21.3
12/14	600	23	28.7	0.7	0.7	0.8	6.7	16.8
12/14	700	24	28.3	0.3	0.3	0.5	5.7	21.2
12/14	800	25	28.3	0.3	0.3	0.5	4.3	20.9
	900		30.0	1.9			21.4	1.0
12/14	900	26	28.5	0.5	0.7	1.9	3.9	17.3
	905		30.0	1.9			1.0	1.0
12/14	1000	27	28.9	0.8	1.0	1.9	-2.9	10.3
12/14	1099	28	28.0	-0.1	0.1	-0.2	-2.2	22.5
12/14	1200	29	21.6	-0.9	1.0	-1.2	-1.1	0.4
12/14	1300	30	24.5	-1.0	1.1	-1.2	-1.2	0.4

END OF TABLE

Table 17 (Cont'd.)

EVAPORATOR LIQUID LEVEL CONTROLLER DATA. RUN NO. 63. TBP25 WASTE.

DATE	TIME	RUN HOUR	AVERAGE EVAPORATOR LIQ. LEV. LITERS	AVERAGE DEVIATION FROM SET PT LITERS	R.M.S. DEVIATION FROM SET PT LITERS	MAXIMUM DEVIATION FROM SET PT LITERS	AVERAGE EVAPORATOR FEED RATE LITERS/HR	FEED VALVE POSITION PERCENT OPEN
SET POINT 50.0P/C			BANDWIDTH 25		RESET 10M		CONTROL RANGE 20.0P/C	
12/13	800	1	21.5	0.3	1.0	-2.7	12.2	2.1
	805		14.0	-7.3			3.9	98.2
	840		29.4	8.1			11.3	0.5
12/13	900	2	20.8	-0.5	3.3	8.1	40.8	32.8
12/13	1000	3	20.3	-0.9	1.2	-2.0	28.2	29.0
12/13	1100	4	20.4	-0.9	0.9	-1.4	32.4	30.6
12/13	1200	5	20.4	-0.9	0.9	-1.1	29.4	32.8
12/13	1300		CONTROLLER CHANGE.		NEW PARAMETERS ARE			
SET POINT 50.0P/C			BANDWIDTH 40		RESET 10M		CONTROL RANGE 20.0P/C	
12/13	1300	6	20.5	-0.7	0.7	-1.2	39.0	35.8
12/13	1400	7	20.7	-0.5	0.5	-0.7	34.1	35.6
12/13	1500	8	20.8	-0.5	0.5	-0.7	39.6	37.9
12/13	1600	9	21.3	0.0	0.7	1.9	28.8	26.9
	1625		30.1	8.9			73.3	0.5
12/13	1700	10	20.8	-0.4	3.2	8.9	29.2	31.5
12/13	1800	11	20.9	-0.4	1.5	-3.4	12.5	12.4
12/13	1900	12	21.7	0.5	1.8	3.2	18.2	9.2
12/13	2000	13	20.6	-0.6	1.4	-3.9	-0.5	0.7
	2035		15.1	-6.1			9.5	0.6
12/13	2100	14	20.2	-1.1	2.3	-6.1	21.3	14.6
	2140		30.0	8.8			1.9	0.7
12/13	2200	15	23.5	2.2	3.9	8.8	-1.9	0.8
	2225		13.5	-7.8			1.9	0.7
12/13	2300	16	19.8	-1.4	2.6	-7.8	13.8	9.6
12/14	0	17	21.3	0.1	0.6	2.0	-0.5	1.8
	10		27.7	6.4			5.7	0.6
	15		27.1	5.8			7.6	0.7
	35		26.9	5.6			1.8	0.7
	40		27.0	5.7			0.0	0.7
12/14	100	18	25.4	4.1	4.3	6.4	0.6	0.7
12/14	200	19	20.4	-0.9	1.4	-2.4	10.8	12.0
	245		29.4	8.1			0.	0.7
	250		27.9	6.6			0.0	0.7
12/14	300	20	23.9	2.7	4.0	8.1	1.4	1.3
	315		27.4	6.2			0.0	0.7
12/14	400	21	22.8	1.5	3.0	6.2	0.3	0.7
	500		27.1	5.9			0.0	0.7
12/14	500	22	21.9	0.6	2.6	5.9	8.8	5.6
12/14	600	23	23.4	2.1	2.5	4.7	3.8	0.7
12/14	700	24	20.9	-0.3	1.4	-2.0	3.1	3.4
12/14	800	25	22.4	1.2	2.6	5.5	6.1	3.7
12/14	900	26	22.9	1.7	2.4	5.2	9.4	0.6
	915		29.3	8.1			39.5	0.5
	920		29.5	8.3			13.1	0.5
12/14	1000	27	24.3	3.0	4.1	8.3	-1.6	0.5
	1010		27.8	6.5			7.5	0.5
	1015		28.7	7.5			7.5	0.5
	1020		28.6	7.4			3.9	0.4
	1025		28.8	7.6			5.7	0.5
	1030		30.1	8.9			5.7	0.4
	1035		32.4	11.2			3.9	0.5
	1040		29.1	7.9			1.9	0.4
12/14	1099	28	27.4	6.1	6.8	11.2	0.	0.4
	1105		30.1	8.8			-1.0	0.4
12/14	1200		CONTROLLER TO MANUAL					
12/14	1200	29	23.2				2.6	0.5

END OF TABLE

Table 17 (Cont'd.)

EVAPORATOR DENSITY CONTROLLER DATA. RUN NO. 63. TBP25 WASTE.

DATE	TIME	RUN HOUR	AVG EVAP DEN G/CC	AVG DEV S.P. G/CC	RMS DEV S.P. G/CC	MAX DEV S.P. G/CC	STEAM PRESS S.P. PSIG	AVG STEAM PRESS PSIG	AVG DEV S.P. PSI	RMS DEV S.P. PSI	MAX DEV S.P. PSI	AVERAGE STEAM COND RATE LITERS/HR	AVERAGE EVAPORATOR COND RATE LITERS/HR	STEAM CHEST HEAT TRANSF COEFF. B/H/SF/OF	STEAM VALVE POSITION PERCENT OPEN

SET POINT 35.0 BAND WIDTH 100 RESET 10M CONTROL RANGE 5.0
SECONDARY SYSTEM BAND WIDTH 50 RESET 8M CONTROL RANGE 5.0

DATE	TIME	RUN HOUR	AVG EVAP DEN G/CC	AVG DEV S.P. G/CC	RMS DEV S.P. G/CC	MAX DEV S.P. G/CC	STEAM PRESS S.P. PSIG	AVG STEAM PRESS PSIG	AVG DEV S.P. PSI	RMS DEV S.P. PSI	MAX DEV S.P. PSI	AVERAGE STEAM COND RATE LITERS/HR	AVERAGE EVAPORATOR COND RATE LITERS/HR	STEAM CHEST HEAT TRANSF COEFF. B/H/SF/OF	STEAM VALVE POSITION PERCENT OPEN
	720		1.30	-0.05			9.9	12.1	2.2			0.1	14.6		0.9
	725		1.30	-0.05			10.3	12.2	2.0			0.1	16.7		1.1
	730		1.29	-0.06			10.1	12.1	2.0			0.1	16.7		0.9
	735		1.30	-0.05			10.2	12.1	1.9			0.1	15.7		1.0
	740		1.30	-0.05			10.4	12.4	2.0			0.2	22.0		1.1
	745		1.30	-0.05			10.1	12.2	2.1			0.2	24.7		0.9
12/13	800	1	1.30	-0.05	0.05	-0.06	10.0	12.2	2.2	2.2	2.7	0.1	18.4	1.1	1.0
	845		1.25	-0.10			19.1	20.7	1.6			78.3	115.2		7.4
	855		1.29	-0.06			17.3	19.6	2.3			103.4	183.4		5.9
12/13	900	2	1.32	-0.03	0.04	-0.10	12.9	15.2	2.3	2.4	3.7	35.6	84.9	175.3	3.3
12/13	1000	3	1.33	-0.02	0.02	-0.03	15.0	17.2	2.2	2.2	2.5	51.2	135.3	194.2	5.0
12/13	1100	4	1.32	-0.03	0.03	-0.03	15.6	17.7	2.1	2.1	2.6	74.1	156.9	271.4	5.7
12/13	1200	5	1.31	-0.04	0.04	-0.05	16.8	18.6	1.8	1.8	2.6	121.0	212.7	424.1	7.4
	1215		1.30	-0.05			17.5	19.1	1.6			147.5	237.6		8.5
	1220		1.30	-0.05			17.5	19.2	1.7			151.9	243.8		8.5
	1225		1.29	-0.06			17.5	19.4	1.8			154.7	247.6		8.5
	1230		1.29	-0.06			17.7	19.6	1.8			155.6	248.5		8.5
	1235		1.30	-0.05			17.5	19.6	2.0			156.2	248.4		8.5
	1240		1.30	-0.05			17.6	19.5	2.0			156.6	274.0		8.5
	1245		1.30	-0.05			17.5	19.5	2.0			158.8	276.7		8.5
	1250		1.29	-0.06			17.5	19.5	2.0			158.3	252.8		8.4
	1255		1.29	-0.06			17.5	19.5	2.0			152.4	248.0		8.5
12/13	1300	6	1.30	-0.05	0.05	-0.06	17.5	19.3	1.9	1.9	2.1	152.0	248.5	543.0	8.4
	1335		1.30	-0.05			17.5	19.5	2.0			-1.0	-1.0		8.4
12/13	1400	7	1.30	-0.05	0.05	-0.06	17.5	19.5	2.0	2.0	2.0	159.1	237.9	556.5	8.3
12/13	1500	8	1.31	-0.04	0.04	-0.05	20.6	22.3	1.7	1.7	2.0	180.6	260.1	618.1	9.4
	1600		1.30	-0.05			27.3	28.8	1.5			133.4	203.6		7.6
12/13	1600	9	1.33	-0.02	0.03	-0.05	22.6	24.3	1.7	1.7	1.8	154.6	226.3	521.1	8.1
	1605		1.27	-0.08			27.8	29.0	1.2			138.1	200.4		9.1
	1610		1.24	-0.11			33.2	34.4	1.2			170.4	222.5		11.4
	1635		1.19	-0.16			37.7	39.3	1.7			139.7	212.5		8.6
	1655		1.16	-0.19			43.8	44.9	1.1			137.8	191.2		11.3
	1700		1.24	-0.11			43.8	46.0	2.3			187.2	229.1		10.3
12/13	1700	10	1.28	-0.07	0.09	-0.19	32.1	33.9	1.8	2.0	2.7	155.3	219.3	449.2	8.7
	1745		1.41	0.06			22.7	25.1	2.5			72.8	144.0		4.2
	1750		1.42	0.07			20.7	23.1	2.4			47.1	123.8		3.5
	1755		1.42	0.07			19.9	23.2	3.3			35.6	106.4		4.5
	1800		1.41	0.06			21.8	23.4	1.6			63.2	117.5		6.3
12/13	1800	11	1.37	0.02	0.04	0.07	29.2	31.5	2.4	2.4	3.3	97.9	170.5	323.9	5.9
	1805		1.40	0.05			23.2	23.8	0.5			120.7	160.7		9.4
	1820		1.32	-0.03			27.3	33.2	6.0			244.7	296.8		8.5
	1825		1.28	-0.07			30.8	34.9	4.1			223.4	256.4		8.2
	1835		1.40	0.05			12.8	19.2	6.4			88.3	117.8		1.0
	1840		1.41	0.06			10.7	18.1	7.4			31.4	69.3		1.1
	1845		1.38	0.03			12.2	18.4	6.2			0.1	41.3		0.9
	1850		1.38	0.03			10.3	18.5	8.2			0.1	36.1		1.0
	1855		1.38	0.03			8.0	19.4	11.4			0.2	37.5		1.1
	1900		1.39	0.04			5.3	21.1	15.9			0.2	38.5		1.1
12/13	1900	12	1.37	0.02	0.04	-0.07	18.2	23.9	5.7	7.3	15.9	101.9	141.6	414.2	6.5
	1905		1.40	0.05			2.6	22.4	19.8			0.2	38.3		1.1
	1910		1.25	-0.10			15.0	20.1	5.1			0.2	38.5		1.1
	1915		1.41	0.06			-0.3	15.9	16.2			0.2	38.5		1.1
	1920		1.36	0.01			1.4	16.2	14.9			0.2	38.5		1.1
	1925		1.35	0.00			0.7	15.0	14.3			0.1	37.3		1.0
	1930		1.34	-0.01			2.0	14.2	12.3			0.2	37.1		1.1
	1935		1.33	-0.02			3.2	13.4	10.2			0.2	38.3		1.1

12/13 1940 CONTROLLER CHANGE. NEW PARAMETERS ARE
SET POINT 30.0 BAND WIDTH 100 RESET 10M CONTROL RANGE 5.0
SECONDARY SYSTEM BAND WIDTH 50 RESET 8M CONTROL RANGE 5.0

DATE	TIME	RUN HOUR	AVG EVAP DEN G/CC	AVG DEV S.P. G/CC	RMS DEV S.P. G/CC	MAX DEV S.P. G/CC	STEAM PRESS S.P. PSIG	AVG STEAM PRESS PSIG	AVG DEV S.P. PSI	RMS DEV S.P. PSI	MAX DEV S.P. PSI	AVERAGE STEAM COND RATE LITERS/HR	AVERAGE EVAPORATOR COND RATE LITERS/HR	STEAM CHEST HEAT TRANSF COEFF. B/H/SF/OF	STEAM VALVE POSITION PERCENT OPEN
	1940		1.31	0.01			3.6	12.8	9.2			0.2	38.3		1.0
	1945		1.30	-0.00			3.9	12.3	8.4			0.2	39.6		1.1
	1950		1.29	-0.01			4.4	11.7	7.3			0.2	40.7		1.1
	1955		1.28	-0.02			4.6	11.1	6.5			0.2	40.5		1.1
	2000		1.27	-0.03			5.6	11.1	5.5			0.2	39.8		1.1
12/13	2000	13	1.32	-0.00	0.04	-0.10	3.9	14.7	10.8	11.7	19.8	0.2	38.8	1.2	1.1
	2005		1.27	-0.03			5.9	11.3	5.4			0.2	39.0		1.1
	2020		1.22	-0.08			10.1	10.2	0.1			0.2	39.8		2.5
	2025		1.24	-0.06			7.7	11.2	3.5			0.2	46.8		1.5
	2035		1.08	-0.22			28.6	43.7	15.1			121.8	119.2		1.0
	2040		1.28	-0.02			5.2	10.7	5.5			93.2	121.9		2.2
	2045		1.25	-0.05			15.1	17.8	2.7			53.4	113.7		7.0
	2055		1.33	0.03			10.0	15.6	5.6			14.0	69.0		1.1
12/13	2100	14	1.26	-0.04	0.08	-0.22	10.8	15.4	4.6	5.8	15.1	31.6	70.9	240.0	2.5
	2125		1.32	0.02			8.0	13.1	5.0			0.2	42.9		1.1

Table 17 (Cont'd.)

EVAPORATOR DENSITY CONTROLLER DATA. RUN NO. 63. TBP25 WASTE.

DATE	TIME	RUN HOUR	AVG EVAP DEN G/CC	AVG DEV S.P. G/CC	RMS DEV S.P. G/CC	MAX DEV S.P. G/CC	STEAM PRESS S.P. PSIG	AVG STEAM PRESS PSIG	AVG DEV S.P. PSI	RMS DEV S.P. PSI	MAX DEV S.P. PSI	AVERAGE STEAM COND RATE LITERS/HR	AVERAGE EVAPORATOR COND RATE LITERS/HR	STEAM CHEST HEAT TRANSF COEFF. B/H/SF/OF	STEAM VALVE POSITION PERCENT OPEN
		SET POINT	30.0		BAND WIDTH		100	RESET	10M	CONTROL RANGE		5.0			
		SECONDARY SYSTEM			BAND WIDTH		50	RESET	8M	CONTROL RANGE		5.0			
	2145		1.20	-0.10			18.8	18.8	0.0			50.0	66.5		8.4
12/13	2200	15	1.30	-0.00	0.03	-0.10	10.3	13.2	2.9	3.3	5.0	10.8	49.4	110.0	2.5
12/13	2300	16	1.31	0.01	0.01	0.02	8.5	12.5	4.0	4.0	4.5	0.2	28.0	2.0	1.4
12/14	0	17	1.31	0.01	0.01	0.01	7.9	11.9	4.0	4.0	4.0	0.2	19.6	2.7	1.1
	15		1.25	-0.05			12.9	12.9	-0.0			0.2	36.9		4.8
12/14	100	18	1.27	-0.03	0.03	-0.05	11.5	13.2	1.7	1.9	2.6	19.0	60.4	223.0	4.5
12/14	200	19	1.29	-0.01	0.01	-0.02	11.1	13.6	2.6	2.6	3.5	27.0	86.1	297.6	4.4
12/14	300	20	1.29	-0.01	0.02	-0.05	10.0	12.1	2.1	2.5	4.3	5.9	41.0	70.7	2.0
12/14	400	21	1.29	-0.01	0.02	-0.03	10.0	12.1	2.1	2.3	3.5	0.2	47.0	2.4	2.2
12/14	500	22	1.29	-0.01	0.01	-0.02	9.7	11.6	2.0	2.2	3.5	0.2	35.8	2.6	1.4
12/14	600	23	1.29	-0.01	0.02	-0.04	10.3	12.1	1.9	2.0	3.2	1.9	54.5	23.3	3.4
12/14	700	24	1.29	-0.01	0.01	-0.02	9.2	11.2	2.0	2.0	2.4	0.2	48.4	1.8	2.2
	740		1.30	-0.00			7.2	12.2	5.0			0.1	13.1		1.1
12/14	800	25	1.29	-0.01	0.02	-0.04	8.6	10.7	2.2	2.5	5.0	0.1	33.2	1.4	1.6
12/14	900	26	1.28	-0.02	0.02	-0.03	9.4	11.3	1.9	2.0	3.3	0.1	44.8	1.0	2.4
12/14	905			CONTROLLER CHANGE.			NEW PARAMETERS ARE								
		SET POINT	25.0		BAND WIDTH		100	RESET	10M	CONTROL RANGE		5.0			
		SECONDARY SYSTEM			BAND WIDTH		50	RESET	8M	CONTROL RANGE		5.0			
	940		1.29	0.04			5.0	11.0	5.9			0.1	29.2		0.5
	945		1.29	0.04			4.9	10.9	6.1			0.1	14.4		0.5
	950		1.29	0.03			5.0	11.3	6.3			0.1	12.6		0.4
	1000		1.28	0.03			4.4	11.1	6.7			0.1	7.4		0.4
12/14	1000	27	1.26	0.01	0.03	0.04	6.8	10.7	4.0	4.4	6.7	2.1	45.7	12.1	1.3
	1040		1.19	-0.07			15.9	16.4	0.5			13.3	37.1		4.9
	1055		1.29	0.03			4.7	10.0	5.3			0.1	22.9		0.4
12/14	1099	28	1.24	-0.01	0.03	-0.07	8.4	11.2	2.8	3.3	5.3	2.5	20.4	12.2	1.0
	1140		1.28	0.03			5.9	11.2	5.2			0.1	14.5		0.4
	1150		1.28	0.03			6.0	11.0	5.0			0.1	11.1		0.4
	1155		1.29	0.03			5.7	11.0	5.3			0.1	10.2		0.4
12/14	1200	29	1.26	0.01	0.02	0.03	7.5	11.3	3.8	4.0	5.2	0.1	21.2	0.5	0.5
	1245		1.28	0.03			4.2	10.7	6.5			0.1	8.6		0.4
	1255		1.31	0.06			0.6	11.0	10.4			-1.0	-1.0		0.4
	1300		1.32	0.07			0.2	11.1	10.9			0.1	9.4		0.4
12/14	1300	30	1.27	0.02	0.03	0.06	5.5	10.9	5.5	6.0	10.4	0.1	10.2	0.5	0.4

END OF TABLE

Table 17 (Cont'd.)

EVAPORATOR PRESSURE CONTROLLER DATA. RUN NO. 63. TBP25 WASTE.

SET POINT 42.0P/C BANDWIDTH 25 RESET 1M CONTROL RANGE 5.0P/C

DATE	TIME	RUN HOUR	AVERAGE EVAPORATOR PRESSURE PSIG	AVERAGE DEVIATION FROM SET PT PSI	R.M.S. DEVIATION FROM SET PT PSI	MAXIMUM DEVIATION FROM SET PT PSI	AVERAGE OFF GAS RATE CFM	OFF GAS VALVE POSITION PERCENT OPEN
12/13	800	1	-0.8	0.0	0.0	0.1	0.2	7.9
12/13	900	2	-0.8	0.0	0.0	0.0	0.2	7.9
12/13	1000	3	-0.8	-0.0	0.0	0.0	0.2	8.6
12/13	1100	4	-0.8	-0.0	0.0	-0.0	0.2	8.5
12/13	1200	5	-0.8	-0.0	0.0	-0.0	0.2	8.2
12/13	1300	6	-0.8	-0.0	0.0	-0.0	0.2	9.0
12/13	1400	7	-0.8	-0.0	0.0	-0.0	0.2	8.7
12/13	1500	8	-0.8	-0.0	0.0	-0.0	0.2	8.9
12/13	1600	9	-0.8	0.0	0.0	0.1	0.2	9.9
12/13	1700	10	-0.8	0.0	0.0	0.1	0.2	8.9
12/13	1800	11	-0.8	0.0	0.0	0.1	0.2	9.0
	1840		-2.9	-2.1			0.3	10.4
12/13	1900	12	-1.0	-0.2	0.6	-2.1	0.2	8.8
	1920		-3.9	-3.1			0.3	9.5
12/13	2000	13	-1.0	-0.2	0.9	-3.1	0.3	9.1
12/13	2100	14	-0.8	0.0	0.1	-0.4	0.3	9.6
12/13	2200	15	-0.7	0.1	0.1	0.1	0.3	9.2
12/13	2300	16	-0.7	0.1	0.1	0.1	0.3	8.7
12/14	0	17	-0.7	0.1	0.1	0.1	0.3	9.3
12/14	100	18	-0.7	0.1	0.1	0.1	0.3	10.0
12/14	200	19	-0.7	0.1	0.1	0.1	0.3	9.5
12/14	300	20	-0.7	0.1	0.1	0.1	0.3	9.8
12/14	400	21	-0.7	0.1	0.1	0.1	0.3	10.0
12/14	500	22	-0.7	0.1	0.1	0.1	0.3	9.9
12/14	600	23	-0.8	0.0	0.1	0.1	0.3	9.9
12/14	700	24	-0.8	0.0	0.1	0.1	0.3	10.0
12/14	800	25	-0.8	0.0	0.1	0.1	0.3	10.9
12/14	900	26	-0.8	0.0	0.1	0.1	0.3	11.2
12/14	1000	27	-0.8	0.0	0.0	-0.0	0.3	10.1
12/14	1099	28	-0.8	-0.0	0.0	-0.0	0.2	9.9

12/14 1200 CONTROLLER CHANGE. NEW PARAMETERS ARE

SET POINT 39.0P/C BANDWIDTH 200 RESET 1M CONTROL RANGE 5.0P/C

DATE	TIME	RUN HOUR	AVERAGE EVAPORATOR PRESSURE PSIG	AVERAGE DEVIATION FROM SET PT PSI	R.M.S. DEVIATION FROM SET PT PSI	MAXIMUM DEVIATION FROM SET PT PSI	AVERAGE OFF GAS RATE CFM	OFF GAS VALVE POSITION PERCENT OPEN
12/14	1200	29	-0.8	0.0	0.1	-0.1	0.3	10.3
12/14	1300	30	-0.8	0.3	0.3	0.3	0.2	9.7

END OF TABLE

Table 17 (Cont'd.)

EVAPORATOR CONDENSATE CONDUCTIVITY CONTROLLER DATA. RUN NO. 63. TBP25 WASTE.

DATE	TIME	RUN HOUR	AVERAGE CONDENSATE ACIDITY MOLAR	AVERAGE DEVIATION FROM SET PT MOLAR	R.M.S. DEVIATION FROM SET PT MOLAR	MAXIMUM DEVIATION FROM SET PT MOLAR	AVERAGE WATER RATE LITERS/HR	WATER VALVE POSITION PERCENT OPEN
			CONTROLLER ON MANUAL AT START OF RUN					
12/13	800	1	1.1				0.	0.6
12/13	900		CONTROLLER CHANGE. NEW PARAMETERS ARE					
	SET POINT		50.0P/C	BANDWIDTH 100	RESET 9M	CONTROL RANGE	10.0P/C	
	900		1.3	-0.6				0.8
12/13	900	2	1.6				30.3	11.4
	910		1.6	-0.3				3.9
	935		1.6	-0.2				3.7
12/13	1000		CONTROLLER CHANGE. NEW PARAMETERS ARE					
	SET POINT		50.0P/C	BANDWIDTH 200	RESET 9M	CONTROL RANGE	10.0P/C	
12/13	1000	3	1.8	-0.0	0.1	-0.3	26.5	8.4
12/13	1100	4	1.9	0.1	0.1	0.1	26.5	20.8
12/13	1200		CONTROLLER CHANGE. NEW PARAMETERS ARE					
	SET POINT		47.0P/C	BANDWIDTH 200	RESET 9M	CONTROL RANGE	10.0P/C	
12/13	1200	5	1.8	-0.0	0.1	-0.2	75.7	42.8
12/13	1300	6	1.8	-0.0	0.1	-0.2	79.5	51.0
12/13	1400	7	1.8	-0.0	0.1	-0.1	94.6	50.7
	1430		1.6	-0.2				45.7
12/13	1500	8	1.7	-0.1	0.1	-0.2	102.2	48.1
12/13	1600	9	1.8	-0.0	0.1	0.2	60.6	42.6
	1620		1.5	-0.3				36.5
	1625		1.1	-0.7				0.6
	1635		2.3	0.5				39.1
	1645		1.5	-0.3				31.0
	1655		2.2	0.4				52.7
12/13	1700	10	1.8	-0.0	0.3	-0.7	53.0	36.4
	1745		1.4	-0.3				28.1
	1750		1.4	-0.4				19.7
	1755		1.6	-0.2				50.3
	1800		1.2	-0.6				57.9
12/13	1800	11	1.6	-0.2	0.3	-0.6	53.0	42.2
	1805		0.8	-1.0				56.3
	1810		0.8	-1.0				66.0
	1815		0.8	-0.9				65.2
	1830		2.6	0.8				10.4
	1840		1.3	-0.5				1.0
	1845		1.4	-0.4				0.9
	1855		2.4	0.6				0.7
	1900		2.8	1.0				0.7
12/13	1900	12	1.7	-0.1	0.7	1.0	03.3	22.4
	1905		2.8	1.0				0.7
	1910		0.8	-0.9				19.0
	1915		2.8	1.0				1.0
	1920		2.4	0.6				1.0
	1925		2.5	0.7				5.3
	1935		1.5	-0.3				1.0
	1940		1.3	-0.4				0.9
	1945		1.2	-0.6				2.0
	1950		1.1	-0.7				3.1
	1955		1.0	-0.8				1.0
	2000		0.9	-0.9				4.4
12/13	2000	13	1.7	-0.1	0.7	1.0	26.5	3.4
	2005		1.0	-0.8				4.6
	2010		1.1	-0.7				35.5
	2015		0.8	-0.9				1.2
	2020		0.8	-0.9				0.7
	2025		0.9	-0.9				0.6
	2030		1.4	-0.4				0.7
	2035		2.7	0.9				74.9
	2040		1.4	-0.4				15.4
	2045		1.4	-0.4				0.7
	2055		2.1	0.3				3.9
	2100		2.3	0.5				17.7
12/13	2100	14	1.5	-0.3	0.7	-0.9	0.	13.1
	2105		1.6	-0.2				8.2
	2110		1.3	-0.5				1.0
	2115		1.4	-0.4				0.7
	2125		2.2	0.4				5.2
	2130		2.3	0.5				20.0
	2140		1.0	-0.8				1.0
	2145		1.4	-0.4				1.0
	2150		2.3	0.6				12.1
	2155		2.0	0.2				17.5
	2200		1.3	-0.5				1.0
12/13	2200	15	1.7	-0.1	0.4	-0.8	26.5	7.8
	2205		1.3	-0.5				1.0
	2210		1.6	-0.2				1.0
	2230		1.4	-0.3				0.7
	2235		1.4	-0.4				0.7
	2250		1.6	-0.2				0.7
	2255		1.5	-0.3				0.7
	2300		1.5	-0.2				0.7
12/13	2300	16	1.6	-0.2	0.3	-0.5	3.8	0.8
	2345		2.0	0.2				1.0
	2350		2.0	0.2				1.0
	2355		2.0	0.2				4.0
	0		2.0	0.2				9.6
12/14	0	17	1.9	0.1	0.2	0.2	0.	1.8
	15		1.3	-0.5				1.0

Table 17 (Cont'd.)

EVAPORATOR CONDENSATE CONDUCTIVITY CONTROLLER DATA. RUN NO. 63. TRP25 WASTE.

SET POINT 47.0P/C BANDWIDTH 200 RESET 9M CONTROL RANGE 10.0P/C

DATE	TIME	RUN HOUR	AVERAGE CONDENSATE ACIDITY MOLAR	AVERAGE DEVIATION FROM SET PT MOLAR	R.M.S. DEVIATION FROM SET PT MOLAR	MAXIMUM DEVIATION FROM SET PT MOLAR	AVERAGE WATER RATE LITERS/HR	WATER VALVE POSITION PERCENT OPEN
	20		2.1	0.3				2.6
	25		2.5	0.7				27.7
	30		2.1	0.3				32.5
12/14	100	18	1.8	0.1	0.3	0.7	22.7	21.0
	135		1.5	-0.2				4.0
12/14	200	19	1.7	-0.1	0.2	-0.2	26.5	10.7
	210		1.5	-0.3				1.0
	215		1.1	-0.7				0.7
	220		1.4	-0.4				0.6
	230		2.1	0.3				1.0
	235		2.1	0.3				17.6
	245		1.2	-0.6				1.0
	250		1.1	-0.7				0.7
	300		2.3	0.5				6.7
12/14	300	20	1.7	-0.1	0.4	-0.7	26.5	4.4
	305		2.4	0.6				22.6
	310		2.0	0.2				27.2
	315		1.1	-0.7				1.0
	320		1.3	-0.5				1.0
	330		2.3	0.5				15.9
	335		2.1	0.3				25.9
	340		1.2	-0.5				6.8
	345		1.2	-0.6				1.0
	350		1.5	-0.3				1.0
	355		2.1	0.3				14.5
12/14	400	21	1.7	-0.1	0.4	-0.7	0.	11.2
	405		1.3	-0.5				2.3
	410		1.2	-0.6				1.0
	415		1.5	-0.2				1.0
	430		1.4	-0.4				2.0
	435		1.2	-0.6				1.0
	440		1.4	-0.4				1.0
	450		2.0	0.3				13.2
	455		2.0	0.2				23.6
	500		1.2	-0.6				6.2
12/14	500	22	1.6	-0.2	0.4	-0.6	26.5	5.6
	505		1.1	-0.7				1.0
	510		1.6	-0.2				0.9
	515		2.1	0.3				17.8
	525		1.3	-0.5				5.3
	530		1.3	-0.5				1.0
	535		1.5	-0.3				1.0
	550		1.6	-0.2				10.5
	555		1.4	-0.3				6.1
	600		1.4	-0.4				3.0
12/14	600	23	1.5	-0.2	0.4	-0.7	26.5	6.9
	605		1.5	-0.2				3.1
	620		1.5	-0.3				7.6
	625		1.4	-0.4				3.1
	630		1.4	-0.3				1.0
	635		1.5	-0.3				0.9
	640		1.5	-0.2				1.0
	645		1.5	-0.2				1.0
	650		1.5	-0.3				0.9
	655		1.5	-0.3				1.0
12/14	700	24	1.5	-0.2	0.3	-0.4	22.7	3.3
	715		1.2	-0.6				1.0
	720		1.3	-0.5				1.0
	725		1.5	-0.2				0.9
	745		1.0	-0.8				0.9
	750		1.2	-0.6				0.9
	755		1.6	-0.2				0.9
	800		2.0	0.2				9.4
12/14	800	25	1.6	-0.2	0.4	-0.8	71.9	5.6
	805		2.2	0.4				24.6
	815		1.0	-0.8				5.1
	820		1.1	-0.7				0.9
	825		1.4	-0.4				0.9
	835		2.0	0.2				8.8
	845		1.4	-0.3				0.9
	855		2.3	0.5				16.0
	900		2.0	0.2				19.8
12/14	900	26	1.7	-0.1	0.4	-0.8	0.	9.6
	915		1.1	-0.6				1.8
	920		0.9	-0.9				0.5
	925		1.2	-0.6				0.5
	940		2.0	0.2				0.8
12/14	1000	27	1.7	-0.1	0.4	-0.9	0.	5.2
	1010		1.5	-0.3				0.8
	1015		1.3	-0.5				0.8
	1020		1.0	-0.8				0.4
	1025		0.9	-0.9				0.5
	1030		0.9	-0.9				0.5
	1035		1.0	-0.8				0.5
	1045		2.4	0.7				0.9
	1050		2.5	0.7				18.8
	1055		2.3	0.5				30.6
12/14	1099	28	1.6	-0.2	0.6	-0.9	0.	5.7
	1105		0.9	-0.9				0.7
	1120		1.3	-0.5				0.5
	1125		1.4	-0.4				0.5
	1140		1.4	-0.4				0.5
	1145		1.4	-0.4				0.5
	1150		1.4	-0.3				0.5
	1155		1.4	-0.4				0.5

Table 17 (Cont'd.)

EVAPORATOR CCNCENSATE CONDUCTIVITY CCNTROLLER DATA. RUN NO. 63. TBP25 WASTE.

DATE	TIME	RUN HOUR	AVERAGE CCNCENSATE ACIDITY MCLAR	AVERAGE DEVIATICN FROM SET PT MCLAR	R.M.S. DEVIATION FROM SET PT MCLAR	MAXIMUM DEVIATION FRCM SET PT MCLAR	AVERAGE WATER RATE LITERS/HR	WATER VALVE POSITION PERCENT OPEN
12/14	1200		CONTROLLER CHANGE. NEW PARAMETERS ARE					
	SET PCINT		47.CP/C	BANDWIDTH 25	RESET 1M	CONTROL RANGE	1C.0P/C	
	1200		1.3	-0.4				0.5
12/14	1200	29	1.4	-0.4	C.4	-C.9	9.5	0.5
	1205		1.3	-0.4				C.5
	1210		1.3	-0.4				C.5
	1215		1.4	-0.4				C.5
	1220		1.4	-0.4				0.5
	1225		1.5	-C.3				C.5
	1230		1.5	-C.3				C.5
	1235		1.5	-0.3				0.5
	1240		1.5	-C.3				C.5
	1245		1.4	-0.4				C.5
	1255		1.4	-0.4				C.5
	1300		1.4	-0.4				C.5
12/14	1300	30	1.4	-0.4	C.4	-C.4	0.	C.5

END OF TABLE

Table 18.

CALCINER CENTERLINE TEMPERATURES. RUN NO. 66. TBP25 WASTE.

(TEMPERATURES ARE DEGREES CENTIGRADE)
(MAX RATES ARE DEG C /HR FOR THE 5 MIN PERIOD OF GREATEST CHANGE)

		RUN	ZONE 1		ZONE 2		ZONE 3		ZONE 4		ZONE 5		ZONE 6	
		TIME	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX
DATE	TIME	HR	TEMP	RATE	TEMP	RATE	TEMP	RATE	TEMP	RATE	TEMP	RATE	TEMP	RATE
5/17	1000	1	94.	124.	94.	115.	95.	-197.	95.	209.	95.	-177.	94.	622.
5/17	1100	2	475.	1804.	406.	-2635.	214.	3330.	127.	-1473.	115.	32.	115.	-362.
5/17	1200	3	242.	-672.	130.	26.	133.	41.	132.	29.	132.	59.	132.	35.
5/17	1300	4	248.	690.	141.	15.	143.	24.	142.	62.	145.	430.	143.	91.
5/17	1400	5	216.	-259.	142.	-150.	145.	-15.	144.	-24.	144.	-24.	145.	-27.
5/17	1500	6	276.	-799.	132.	180.	137.	-35.	137.	-38.	137.	-47.	138.	-33.
5/17	1600	7	258.	248.	136.	-47.	137.	-24.	138.	-29.	137.	-29.	138.	-26.
5/17	1700	8	253.	-242.	137.	-21.	138.	-12.	140.	-15.	138.	12.	141.	12.
5/17	1800	9	222.	59.	137.	-9.	138.	-18.	139.	6.	138.	-12.	140.	-9.
5/17	1900	10	263.	74.	137.	-9.	137.	12.	138.	-9.	137.	-6.	141.	18.
5/17	2000	11	312.	118.	137.	9.	137.	15.	138.	-12.	137.	-15.	151.	30.
5/17	2100	12	381.	158.	137.	9.	137.	12.	138.	-15.	137.	9.	158.	18.
5/17	2200	13	429.	59.	137.	18.	137.	9.	138.	-12.	137.	9.	163.	12.
5/17	2300	14	466.	56.	136.	12.	137.	6.	138.	-9.	139.	15.	169.	15.
5/18	0	15	513.	76.	136.	-21.	136.	9.	137.	-9.	144.	12.	177.	18.
5/18	100	16	548.	91.	136.	-12.	137.	80.	137.	12.	148.	15.	188.	24.
5/18	200	17	561.	93.	135.	18.	136.	-15.	138.	18.	152.	12.	200.	24.
5/18	300	18	566.	-40.	135.	-9.	136.	27.	142.	9.	157.	15.	212.	27.
5/18	400	19	565.	23.	135.	12.	135.	-15.	143.	9.	166.	68.	228.	29.
5/18	500	20	545.	-783.	137.	15.	138.	15.	147.	12.	180.	32.	253.	47.
5/18	600	21	548.	-25.	135.	-24.	135.	-21.	152.	12.	202.	32.	280.	44.
5/18	700	22	538.	-25.	136.	12.	136.	12.	156.	9.	231.	41.	315.	56.
5/18	800	23	599.	235.	133.	-24.	136.	18.	160.	12.	271.	62.	365.	79.
5/18	900	24	682.	-489.	130.	38.	138.	12.	164.	21.	328.	83.	445.	161.
5/18	1000	25	623.	-875.	136.	-24.	139.	12.	170.	24.	406.	102.	624.	252.
5/18	1100	26	606.	226.	137.	30.	144.	12.	180.	29.	486.	102.	779.	142.
5/18	1200	27	627.	-232.	135.	-44.	149.	-24.	201.	38.	591.	187.	846.	78.
5/18	1300	28	624.	48.	135.	-18.	156.	38.	232.	44.	762.	238.	878.	30.
5/18	1400	29	638.	79.	140.	80.	164.	21.	268.	47.	857.	86.	889.	12.
5/18	1500	30	689.	77.	145.	27.	172.	18.	313.	68.	887.	36.	893.	9.
5/18	1600	31	731.	48.	152.	18.	187.	29.	380.	130.	896.	18.	894.	18.
5/18	1700	32	751.	40.	161.	24.	210.	29.	542.	368.	901.	15.	895.	-9.
5/18	1800	33	784.	48.	181.	56.	233.	33.	768.	252.	904.	-18.	895.	-21.
5/18	1900	34	812.	32.	225.	68.	258.	32.	840.	54.	905.	12.	895.	-21.
5/18	2000	35	829.	24.	288.	83.	290.	50.	879.	48.	905.	14.	896.	-42.
5/18	2100	36	842.	23.	359.	99.	337.	77.	896.	30.	906.	-18.	896.	12.
5/18	2200	37	850.	23.	451.	156.	459.	382.	905.	26.	907.	17.	897.	93.
5/18	2300	38	856.	26.	594.	192.	723.	379.	909.	21.	907.	-15.	896.	-17.

Table 18 (Cont'd.)

TEMPERATURES 2.5 INCHES FROM CENTER OF CALCINER. RUN NO. 66. TBP25 WASTE.

(TEMPERATURES ARE DEGREES CENTIGRADE)
(MAX RATES ARE DEG C /HR FOR THE 5 MIN PERIOD OF GREATEST CHANGE)

		RUN	ZONE 1		ZONE 2		ZONE 3		ZONE 4		ZONE 5		ZONE 6	
		TIME	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX
DATE	TIME	HR	TEMP	RATE	TEMP	RATE	TEMP	RATE	TEMP	RATE	TEMP	RATE	TEMP	RATE
5/17	1000	1	94.	230.	104.	442.	105.	569.	100.	-183.	99.	-162.	91.	-65.
5/17	1100	2	497.	1650.	419.	-2555.	263.	-2694.	134.	-1308.	116.	32.	118.	200.
5/17	1200	3	299.	955.	133.	26.	133.	32.	132.	35.	135.	27.	136.	35.
5/17	1300	4	355.	-445.	143.	21.	144.	24.	143.	106.	145.	12.	146.	15.
5/17	1400	5	328.	490.	145.	-21.	146.	-24.	144.	-21.	147.	-21.	148.	-18.
5/17	1500	6	379.	-660.	163.	109.	143.	53.	141.	41.	141.	-27.	146.	15.
5/17	1600	7	407.	350.	177.	71.	152.	50.	148.	-27.	144.	53.	165.	50.
5/17	1700	8	477.	-1817.	187.	18.	174.	38.	154.	12.	148.	15.	192.	41.
5/17	1800	9	468.	-297.	193.	18.	203.	59.	157.	21.	155.	21.	222.	41.
5/17	1900	10	560.	-292.	199.	18.	243.	59.	163.	21.	162.	21.	253.	47.
5/17	2000	11	622.	153.	212.	44.	283.	74.	170.	21.	167.	32.	295.	65.
5/17	2100	12	680.	96.	233.	32.	314.	44.	176.	12.	173.	26.	337.	62.
5/17	2200	13	711.	48.	248.	24.	335.	26.	180.	15.	178.	12.	383.	51.
5/17	2300	14	737.	37.	259.	35.	347.	18.	182.	6.	206.	136.	414.	42.
5/18	0	15	759.	37.	267.	15.	353.	17.	184.	9.	272.	127.	452.	54.
5/18	100	16	773.	51.	274.	24.	355.	14.	186.	-12.	375.	127.	492.	45.
5/18	200	17	771.	37.	276.	15.	354.	-11.	201.	156.	465.	108.	522.	34.
5/18	300	18	770.	-26.	277.	-18.	354.	-11.	266.	77.	508.	45.	551.	42.
5/18	400	19	766.	-23.	278.	12.	355.	11.	315.	77.	543.	39.	584.	42.
5/18	500	20	760.	-34.	282.	24.	359.	17.	380.	91.	578.	48.	617.	43.
5/18	600	21	752.	-25.	281.	-18.	358.	-17.	432.	62.	608.	37.	646.	40.
5/18	700	22	739.	-28.	283.	32.	360.	17.	463.	40.	634.	46.	675.	39.
5/18	800	23	759.	94.	310.	86.	374.	142.	487.	31.	657.	40.	706.	40.
5/18	900	24	797.	-92.	317.	-20.	404.	96.	495.	31.	682.	62.	741.	51.
5/18	1000	25	782.	-167.	323.	35.	485.	161.	510.	42.	704.	37.	784.	63.
5/18	1100	26	768.	-43.	328.	-29.	575.	82.	542.	88.	733.	43.	831.	57.
5/18	1200	27	777.	96.	345.	115.	617.	63.	577.	46.	770.	57.	870.	51.
5/18	1300	28	786.	15.	355.	20.	636.	31.	611.	56.	820.	72.	893.	41.
5/18	1400	29	789.	17.	367.	96.	648.	22.	642.	40.	864.	48.	902.	30.
5/18	1500	30	804.	38.	426.	76.	659.	23.	671.	34.	886.	33.	904.	-18.
5/18	1600	31	815.	12.	460.	34.	665.	17.	701.	45.	893.	24.	905.	15.
5/18	1700	32	820.	18.	480.	74.	673.	23.	743.	74.	897.	15.	905.	12.
5/18	1800	33	832.	24.	546.	136.	687.	26.	800.	75.	899.	15.	904.	15.
5/18	1900	34	843.	18.	639.	133.	703.	31.	836.	51.	900.	12.	904.	12.
5/18	2000	35	850.	23.	691.	67.	722.	37.	870.	48.	900.	-21.	904.	-12.
5/18	2100	36	854.	18.	729.	82.	747.	42.	887.	18.	901.	21.	905.	101.
5/18	2200	37	858.	24.	761.	57.	786.	87.	896.	15.	902.	-15.	905.	-18.
5/18	2300	38	862.	-21.	796.	69.	841.	250.	900.	13.	902.	-23.	904.	16.

Table 18 (Cont'd.)

CALCINER SKIN TEMPERATURES. RUN NO. 66. TBP25 WASTE.

(TEMPERATURES ARE DEGREES CENTIGRADE)
(MAX RATES ARE DEG C /HR FOR THE 5 MIN PERIOD OF GREATEST CHANGE)

DATE	TIME	RUN TIME HR	ZONE 1 AVG TEMP	ZONE 1 MAX RATE	ZONE 2 AVG TEMP	ZONE 2 MAX RATE	ZONE 3 AVG TEMP	ZONE 3 MAX RATE	ZONE 4 AVG TEMP	ZONE 4 MAX RATE	ZONE 5 AVG TEMP	ZONE 5 MAX RATE	ZONE 6 AVG TEMP	ZONE 6 MAX RATE
5/17	1000	1	97.	309.	108.	519.	119.	1020.	110.	672.	110.	410.	102.	466.
5/17	1100	2	620.	2009.	635.	-2074.	447.	-2546.	304.	1647.	276.	363.	291.	566.
5/17	1200	3	639.	-246.	370.	-300.	334.	41.	309.	62.	330.	44.	353.	154.
5/17	1300	4	628.	150.	378.	-85.	351.	73.	328.	88.	347.	243.	369.	23.
5/17	1400	5	620.	201.	391.	741.	359.	190.	333.	106.	357.	221.	379.	294.
5/17	1500	6	654.	-268.	749.	1239.	609.	981.	586.	758.	657.	871.	674.	959.
5/17	1600	7	699.	246.	826.	78.	774.	308.	772.	371.	816.	343.	836.	295.
5/17	1700	8	783.	221.	842.	-57.	863.	42.	861.	-48.	852.	30.	873.	39.
5/17	1800	9	834.	78.	843.	66.	876.	36.	866.	63.	861.	39.	876.	51.
5/17	1900	10	834.	71.	854.	-57.	883.	36.	874.	48.	868.	24.	879.	-24.
5/17	2000	11	835.	60.	854.	51.	887.	20.	879.	51.	873.	-24.	882.	30.
5/17	2100	12	838.	57.	855.	48.	890.	-18.	882.	33.	877.	27.	885.	-18.
5/17	2200	13	842.	30.	855.	-65.	892.	21.	884.	24.	878.	51.	887.	48.
5/17	2300	14	846.	-30.	855.	98.	894.	-33.	886.	29.	879.	-51.	889.	20.
5/18	0	15	847.	-36.	855.	66.	894.	-24.	886.	-24.	884.	-27.	891.	-27.
5/18	100	16	852.	33.	856.	-48.	895.	-27.	884.	-39.	889.	27.	893.	-27.
5/18	200	17	855.	-27.	855.	-18.	894.	-18.	883.	30.	893.	-24.	894.	-51.
5/18	300	18	857.	-56.	858.	30.	893.	-30.	885.	21.	896.	27.	894.	54.
5/18	400	19	855.	-42.	858.	-36.	894.	36.	892.	42.	897.	-23.	896.	24.
5/18	500	20	853.	24.	857.	27.	894.	-18.	897.	33.	898.	-18.	897.	24.
5/18	600	21	855.	-21.	860.	27.	892.	18.	899.	-24.	898.	-33.	898.	266.
5/18	700	22	856.	63.	857.	-62.	891.	-21.	900.	-24.	899.	-63.	895.	24.
5/18	800	23	855.	78.	854.	-35.	890.	18.	902.	27.	898.	-51.	897.	-45.
5/18	900	24	855.	-44.	857.	-78.	894.	-50.	907.	-75.	898.	-35.	900.	30.
5/18	1000	25	858.	45.	857.	-60.	897.	-21.	905.	60.	897.	39.	904.	191.
5/18	1100	26	860.	63.	856.	-90.	896.	-71.	906.	-60.	897.	51.	903.	-30.
5/18	1200	27	872.	-164.	872.	-295.	898.	-155.	906.	135.	897.	-98.	903.	-30.
5/18	1300	28	880.	27.	875.	35.	897.	-42.	906.	41.	899.	20.	903.	-30.
5/18	1400	29	880.	-62.	878.	-72.	896.	-60.	906.	-57.	897.	-78.	904.	-37.
5/18	1500	30	880.	74.	878.	90.	896.	51.	905.	38.	898.	-45.	903.	-33.
5/18	1600	31	880.	-18.	880.	-141.	896.	54.	909.	358.	898.	-45.	903.	-30.
5/18	1700	32	879.	30.	879.	-86.	896.	63.	905.	75.	898.	-47.	900.	-89.
5/18	1800	33	878.	36.	880.	104.	896.	75.	906.	-24.	897.	-123.	899.	24.
5/18	1900	34	878.	-41.	880.	125.	895.	-56.	906.	-57.	897.	-60.	898.	18.
5/18	2000	35	878.	-36.	880.	119.	895.	-54.	908.	-57.	897.	-60.	897.	-39.
5/18	2100	36	878.	-30.	881.	108.	896.	62.	908.	-60.	898.	-66.	898.	39.
5/18	2200	37	879.	-45.	880.	134.	898.	63.	908.	-86.	898.	45.	897.	-36.
5/18	2300	38	880.	-44.	881.	123.	899.	29.	909.	98.	899.	-65.	899.	155.

Table 18 (Cont'd.)

CALCINER FURNACE TEMPERATURES. RUN NO. 66. TBP25 WASTE.

(TEMPERATURES ARE DEGREES CENTIGRADE)
(MAX RATES ARE DEG C /HR FOR THE 5 MIN PERIOD OF GREATEST CHANGE)

		RUN	ZONE 1		ZONE 2		ZONE 3		ZONE 4		ZONE 5		ZONE 6	
DATE	TIME	TIME HR	AVG TEMP	MAX RATE	AVG TEMP	MAX RATE	AVG TEMP	MAX RATE	AVG TEMP	MAX RATE	AVG TEMP	MAX RATE	AVG TEMP	MAX RATE
5/17	1000	1	138.	1014.	140.	834.	162.	1052.	155.	1070.	145.	917.	128.	993.
5/17	1100	2	697.	1192.	651.	1143.	654.	1187.	594.	979.	584.	993.	588.	1127.
5/17	1200	3	793.	-122.	737.	-62.	740.	57.	724.	85.	729.	94.	722.	80.
5/17	1300	4	800.	83.	756.	45.	763.	96.	753.	40.	764.	37.	753.	40.
5/17	1400	5	806.	62.	768.	34.	772.	37.	766.	22.	780.	21.	765.	31.
5/17	1500	6	841.	-193.	818.	134.	836.	355.	823.	239.	840.	179.	832.	182.
5/17	1600	7	878.	236.	837.	-75.	917.	236.	921.	206.	923.	152.	907.	152.
5/17	1700	8	952.	382.	825.	-125.	951.	56.	974.	110.	944.	-660.	906.	-26.
5/17	1800	9	907.	-245.	865.	120.	950.	107.	974.	149.	933.	-36.	897.	-27.
5/17	1900	10	898.	-129.	863.	-66.	947.	102.	966.	138.	922.	30.	890.	-21.
5/17	2000	11	896.	-167.	852.	51.	943.	-69.	956.	-158.	916.	-42.	887.	-27.
5/17	2100	12	896.	-125.	852.	60.	940.	-65.	950.	80.	913.	-39.	885.	-21.
5/17	2200	13	878.	-120.	849.	-51.	934.	-93.	941.	-93.	910.	-36.	882.	-33.
5/17	2300	14	867.	-104.	850.	45.	933.	66.	940.	75.	910.	30.	881.	21.
5/18	0	15	869.	72.	850.	33.	933.	21.	939.	18.	904.	-21.	881.	75.
5/18	100	16	874.	-90.	847.	57.	932.	-51.	936.	-81.	897.	-30.	881.	12.
5/18	200	17	871.	-93.	845.	-51.	931.	-63.	935.	80.	894.	-33.	881.	-21.
5/18	300	18	869.	-90.	846.	60.	931.	54.	945.	111.	893.	-30.	881.	27.
5/18	400	19	871.	101.	844.	63.	930.	50.	946.	-99.	892.	-30.	882.	23.
5/18	500	20	873.	-86.	842.	50.	927.	-45.	936.	-80.	889.	33.	881.	30.
5/18	600	21	868.	-47.	843.	27.	925.	-17.	928.	-23.	886.	-30.	879.	15.
5/18	700	22	860.	54.	842.	33.	923.	-24.	921.	-27.	884.	-21.	876.	-18.
5/18	800	23	868.	116.	842.	-53.	926.	54.	918.	-74.	883.	16.	875.	-38.
5/18	900	24	884.	-110.	839.	-90.	927.	-42.	917.	-99.	880.	69.	877.	15.
5/18	1000	25	878.	83.	836.	-57.	919.	-36.	915.	50.	879.	30.	877.	18.
5/18	1100	26	871.	-120.	832.	-87.	908.	-77.	916.	-80.	878.	-53.	875.	-33.
5/18	1200	27	883.	203.	841.	111.	902.	-53.	913.	-83.	876.	-29.	874.	111.
5/18	1300	28	893.	71.	843.	-48.	898.	-49.	908.	-72.	874.	-42.	871.	-33.
5/18	1400	29	896.	27.	843.	-42.	895.	-75.	904.	42.	869.	-51.	870.	18.
5/18	1500	30	912.	51.	842.	-63.	894.	-51.	901.	-45.	868.	-21.	869.	18.
5/18	1600	31	924.	42.	837.	-123.	892.	-45.	899.	-45.	866.	-33.	869.	-24.
5/18	1700	32	930.	78.	831.	-69.	891.	54.	894.	-54.	865.	-38.	866.	-18.
5/18	1800	33	937.	66.	825.	54.	890.	-57.	891.	-30.	864.	-69.	865.	-36.
5/18	1900	34	941.	33.	818.	117.	889.	-48.	887.	21.	863.	-39.	864.	18.
5/18	2000	35	946.	-403.	813.	98.	888.	176.	885.	53.	862.	-48.	863.	-33.
5/18	2100	36	963.	967.	814.	87.	888.	236.	882.	125.	863.	-48.	863.	30.
5/18	2200	37	953.	-992.	812.	-96.	886.	-191.	880.	-72.	863.	-39.	863.	-33.
5/18	2300	38	949.	-567.	810.	99.	884.	-45.	879.	-51.	863.	45.	863.	-27.

Table 18 (Cont'd.)

EVAPORATOR PRESSURE CONTROLLER DATA. RUN NO. 66. TBP25 WASTE.

DATE	TIME	RUN HOUR	AVERAGE EVAPORATOR PRESSURE PSIG	AVERAGE DEVIATION FROM SET PT PSI	R.M.S. DEVIATION FROM SET PT PSI	MAXIMUM DEVIATION FROM SET PT PSI	AVERAGE OFF GAS RATE CFM	OFF GAS VALVE POSITION PERCENT OPEN
CONTROLLER ON MANUAL AT START OF RUN								
5/17	945		CONTROLLER CHANGE.	NEW PARAMETERS ARE				
SET POINT			40.0P/C	BANDWIDTH 25	RESET 1M	CONTROL RANGE		5.0P/C
5/17	1000	1	-1.1				0.1	24.1
5/17	1100	2	-1.1	-0.1	0.1	-0.1	0.1	19.5
5/17	1200	3	-1.1	-0.1	0.1	-0.2	0.2	18.1
5/17	1300	4	-1.1	-0.1	0.1	-0.3	0.2	18.2
5/17	1400	5	-1.1	-0.1	0.1	0.2	0.1	4.7
5/17	1500	6	-1.0	-0.0	0.2	-0.3	0.1	47.2
	1535		-1.6	-0.6			0.1	0.
5/17	1600	7	-1.2	-0.2	0.2	-0.6	0.1	12.4
5/17	1700	8	-1.1	-0.1	0.1	-0.2	0.1	14.4
5/17	1800	9	-1.1	-0.1	0.1	-0.2	0.1	11.2
5/17	1900	10	-1.1	-0.1	0.1	-0.2	0.1	8.5
5/17	2000	11	-1.1	-0.1	0.1	-0.2	0.1	7.8
5/17	2100	12	-1.1	-0.1	0.1	-0.2	0.1	6.7
5/17	2200	13	-1.1	-0.1	0.1	-0.2	0.1	6.7
5/17	2300	14	-1.1	-0.1	0.1	-0.1	0.1	6.5
5/18	0	15	-1.1	-0.1	0.1	-0.1	0.1	6.3
5/18	100	16	-1.1	-0.1	0.1	-0.2	0.1	7.1
5/18	200	17	-1.1	-0.1	0.1	-0.1	0.1	7.5
5/18	300	18	-1.1	-0.1	0.1	-0.2	0.1	6.8
5/18	400	19	-1.1	-0.1	0.1	-0.1	0.1	6.5
5/18	500	20	-1.1	-0.1	0.1	-0.1	0.1	7.7
5/18	600	21	-1.1	-0.1	0.1	-0.2	0.1	6.3
5/18	700	22	-1.1	-0.1	0.1	-0.2	0.1	6.6
5/18	800	23	-1.1	-0.1	0.1	-0.1	0.1	6.0
5/18	900	24	-1.1	-0.1	0.1	-0.1	0.1	6.7
5/18	1000	25	-1.1	-0.1	0.1	-0.1	0.1	6.7
5/18	1100	26	-1.1	-0.1	0.1	-0.2	0.1	7.1
5/18	1200	27	-1.1	-0.1	0.1	-0.2	0.1	6.4

END OF TABLE

Table 18 (Cont'd.)

EVAPORATOR DENSITY CONTROLLER DATA. RUN NO. 66. TBP25 WASTE.

DATE	TIME	RUN HOUR	AVG EVAP DEN G/CC	AVG DEV S.P. G/CC	RMS DEV S.P. G/CC	MAX DEV S.P. G/CC	STEAM PRESS S.P. PSIG	AVG STEAM PRESS PSIG	AVG DEV S.P. PSI	RMS DEV S.P. PSI	MAX DEV S.P. PSI	AVERAGE STEAM COND RATE LITERS/HR	AVERAGE EVAPORATOR COND RATE LITERS/HR	STEAM CHEST HEAT TRANSF COEFF. B/H/SF/DF	STEAM VALVE POSITION PERCENT OPEN
		CONTROLLER ON MANUAL AT START OF RUN													
5/17	945	CONTROLLER CHANGE. NEW PARAMETERS ARE													
		SET POINT 35.0 BAND WIDTH 100 RESET 10M CONTROL RANGE 5.0													
		SECONDARY SYSTEM BAND WIDTH 50 RESET 5M CONTROL RANGE 5.0													
5/17	1000	1	1.22				4.5	72.3				73.9	55.8	0.	6.6
5/17	1100	2	1.32	-0.03	0.03	-0.03	11.7	12.8	1.1	1.2	2.3	30.8	38.6	399.1	1.2
	1155		1.29	-0.06			16.1	19.2	3.0			123.3	91.1		4.4
5/17	1200	3	1.32	-0.03	0.04	-0.06	14.4	15.6	1.2	1.5	3.0	81.2	62.1	810.8	3.3
	1205		1.30	-0.05			16.1	18.5	2.4			120.1	100.9		4.3
	1220		1.30	-0.05			17.2	18.8	1.6			145.1	114.1		5.4
	1225		1.29	-0.06			17.7	20.3	2.6			152.2	118.9		5.5
	1230		1.27	-0.08			18.6	20.4	1.8			163.4	125.7		6.0
	1235		1.27	-0.08			18.8	20.8	2.0			173.8	135.1		5.9
	1240		1.27	-0.08			18.7	20.7	2.1			176.4	142.6		5.8
	1245		1.27	-0.08			18.8	21.1	2.3			184.7	148.9		6.3
	1250		1.26	-0.09			19.2	21.6	2.5			198.3	157.8		6.7
	1255		1.26	-0.09			20.7	22.0	1.3			213.4	168.3		6.8
	1300		1.26	-0.09			22.1	22.3	0.2			224.0	178.7		7.0
5/17	1300	4	1.28	-0.07	0.07	-0.09	18.4	20.3	2.0	2.1	2.6	172.3	137.6	1077.8	5.8
	1305		1.26	-0.09			22.7	25.0	2.3			229.9	189.1		7.0
	1310		1.26	-0.09			24.3	25.8	1.5			235.1	197.9		7.1
	1315		1.26	-0.09			24.1	25.9	1.8			236.7	203.9		6.9
	1320		1.26	-0.09			24.1	25.8	1.7			236.7	207.9		7.0
	1325		1.26	-0.09			24.1	25.9	1.7			237.0	209.7		7.1
	1330		1.26	-0.09			24.3	25.4	1.2			237.2	211.3		6.9
	1335		1.26	-0.09			24.0	25.7	1.7			236.9	211.9		7.0
	1340		1.26	-0.09			25.5	27.0	1.5			237.3	212.8		7.2
	1345		1.26	-0.09			25.6	26.8	1.2			242.7	213.8		7.1
	1350		1.25	-0.10			26.5	27.8	1.3			250.5	216.3		7.4
	1355		1.25	-0.10			28.7	28.5	-0.2			258.1	222.0		10.8
	1400		1.25	-0.10			28.7	29.6	0.9			267.5	229.8		13.8
5/17	1400	5	1.26	-0.09	0.09	-0.10	25.2	26.6	1.4	1.5	2.3	244.0	212.7	1001.1	7.9
	1405		1.24	-0.11			32.2	32.1	-0.1			278.9	238.3		18.4
	1410		1.23	-0.12			36.6	36.8	0.2			295.1	249.2		21.6
	1415		1.21	-0.14			38.9	40.0	1.1			315.2	261.4		23.0
	1420		1.20	-0.15			42.7	42.7	-0.1			333.6	273.2		32.7
	1425		1.22	-0.13			44.3	46.4	2.1			347.7	285.9		35.7
	1430		1.24	-0.11			44.4	47.5	3.1			357.5	294.8		36.0
	1435		1.25	-0.10			44.4	47.7	3.4			362.6	297.4		35.3
	1440		1.25	-0.10			44.4	47.0	2.6			364.2	297.0		33.5
	1445		1.26	-0.09			44.2	47.6	3.4			362.4	296.5		33.1
	1450		1.27	-0.08			44.2	47.2	3.0			358.4	296.5		32.5
	1455		1.28	-0.07			44.0	47.0	3.0			354.2	296.3		32.3
	1500		1.29	-0.06			44.2	46.0	1.7			350.5	296.1		32.3
5/17	1500	6	1.24	-0.11	0.11	-0.15	42.0	44.0	1.9	2.3	3.4	343.2	284.5	893.8	30.5
	1505		1.29	-0.06			44.1	46.1	2.0			348.7	296.1		32.4
	1510		1.29	-0.06			44.2	46.4	2.2			349.2	296.0		32.8
	1515		1.27	-0.08			44.2	47.8	3.6			351.1	296.0		33.0
	1600		1.40	0.05			32.7	35.7	3.0			213.5	220.2		11.6
5/17	1600	7	1.34	-0.01	0.04	-0.08	39.4	41.8	2.5	2.6	3.6	302.9	276.6	916.0	25.0
	1605		1.40	0.05			32.7	35.2	2.6			200.7	203.3		10.8
	1610		1.41	0.06			28.8	31.1	2.3			188.1	188.7		7.4
	1615		1.40	0.05			27.4	28.9	1.5			171.0	174.4		7.1
5/17	1700	8	1.37	0.02	0.03	0.06	24.5	26.2	1.8	1.8	2.6	151.3	142.7	785.4	7.3
5/17	1800	9	1.35	-0.00	0.00	-0.00	18.6	20.6	2.0	2.0	3.0	112.0	103.6	728.5	6.1
5/17	1900	10	1.33	-0.02	0.02	-0.02	14.4	15.7	1.3	1.6	2.3	70.2	70.1	659.6	4.9
5/17	2000	11	1.33	-0.02	0.02	-0.03	12.9	13.8	0.9	1.1	1.7	53.7	50.2	796.4	4.6
5/17	2100	12	1.33	-0.02	0.02	-0.03	12.4	13.8	1.4	1.5	2.1	46.5	50.3	598.0	4.4
5/17	2200	13	1.33	-0.02	0.02	-0.03	11.6	13.4	1.7	1.8	2.4	21.2	42.0	273.7	3.4
5/17	2300	14	1.33	-0.02	0.02	-0.02	11.4	13.3	1.8	1.9	2.4	15.0	39.7	193.4	3.0
5/18	0	15	1.33	-0.02	0.02	-0.02	11.4	13.0	1.6	1.7	2.4	12.9	38.8	181.0	1.9
5/18	100	16	1.33	-0.02	0.02	-0.02	11.0	12.6	1.5	1.6	2.6	9.6	36.2	147.5	1.4
5/18	130	CONTROLLER CHANGE. NEW PARAMETERS ARE													
		SET POINT 34.0 BAND WIDTH 100 RESET 10M CONTROL RANGE 5.0													
		SECONDARY SYSTEM BAND WIDTH 50 RESET 5M CONTROL RANGE 5.0													
5/18	200	17	1.33	-0.02	0.02	-0.02	9.9	11.7	1.8	1.9	2.6	7.3	37.0	148.4	0.
5/18	300	18	1.32	-0.02	0.02	-0.03	9.6	11.0	1.4	1.4	1.6	7.3	36.9	200.8	0.3
5/18	400	19	1.32	-0.02	0.02	-0.02	9.5	11.1	1.6	1.6	2.7	7.3	37.2	213.5	0.0
5/18	500	20	1.32	-0.02	0.02	-0.02	9.2	10.9	1.7	1.7	2.0	7.2	37.3	185.8	0.
	525		1.29	-0.05			13.4	13.7	0.3			32.9	36.8		5.3
5/18	600	21	1.32	-0.02	0.03	-0.05	10.3	11.9	1.6	1.7	2.9	17.3	42.2	354.7	2.2
5/18	700	22	1.32	-0.02	0.02	-0.02	9.1	10.9	1.8	1.8	2.1	7.1	36.6	186.7	0.
5/18	800	23	1.32	-0.02	0.02	-0.02	8.8	10.5	1.8	1.9	3.4	7.1	31.1	152.1	0.
5/18	900	24	1.32	-0.02	0.02	-0.02	8.4	9.5	1.1	1.1	1.4	7.1	30.8	222.0	0.
5/18	950	CONTROLLER CHANGE. NEW PARAMETERS ARE													
		SET POINT 30.0 BAND WIDTH 100 RESET 10M CONTROL RANGE 5.0													
		SECONDARY SYSTEM BAND WIDTH 50 RESET 5M CONTROL RANGE 5.0													
5/18	1000	25	1.32	-0.01	0.02	-0.04	8.9	10.6	1.7	2.0	3.5	13.8	36.0	268.3	1.5
5/18	1100	26	1.32	0.02	0.02	0.02	7.5	9.3	1.8	1.8	2.0	7.2	31.1	258.6	0.
5/18	1200	27	1.32	0.02	0.02	0.03	7.5	9.1	1.7	1.7	2.0	7.3	32.6	191.1	0.

END OF TABLE

Table 18 (Cont'd.)

EVAPORATOR LIQUID LEVEL CONTROLLER DATA. RUN NO. 66. TBP25 WASTE.

CONTROLLER ON MANUAL AT START OF RUN

5/17 945 CONTROLLER CHANGE. NEW PARAMETERS ARE
SET POINT 50.0P/C BANDWIDTH 50 RESET 10M CONTROL RANGE 20.0P/C

DATE TIME	RUN HOUR	AVERAGE EVAPORATOR LIQ. LEV. LITERS	AVERAGE DEVIATION FROM SET PT LITERS	R.M.S. DEVIATION FROM SET PT LITERS	MAXIMUM DEVIATION FROM SET PT LITERS	AVERAGE EVAPORATOR FEED RATE LITERS/HR	FEED VALVE POSITION PERCENT OPEN
945		30.3	9.0			18.5	0.
950		27.4	6.2			4.8	0.
5/17 1000	1	14.3				66.9	53.9
5/17 1100	2	19.9	-1.4	1.6	-2.8	44.4	21.8
5/17 1200	3	21.2	-0.0	0.5	1.3	25.6	17.4
5/17 1300	4	20.7	-0.6	0.7	-1.3	42.1	16.9
5/17 1400	5	21.1	-0.2	0.9	2.1	43.2	14.7
5/17 1500	6	20.1	-1.1	2.4	-4.9	30.7	18.3
5/17 1600	7	20.4	-0.9	1.4	-3.6	51.8	21.1
5/17 1700	8	21.1	-0.2	0.3	-0.7	39.8	15.9
5/17 1800	9	21.1	-0.1	0.4	-1.3	17.9	3.7
5/17 1900	10	20.9	-0.4	0.6	-1.7	10.1	1.5
5/17 2000	11	20.7	-0.5	0.5	-0.8	11.0	0.
5/17 2100	12	20.9	-0.3	0.3	-0.5	2.7	0.
5/17 2200	13	20.9	-0.4	0.5	-0.8	5.1	0.
5/17 2300	14	20.8	-0.4	0.5	-0.8	30.4	0.
5/18 0	15	20.9	-0.4	0.4	-0.8	9.4	0.
5/18 100	16	20.8	-0.5	0.5	-0.9	4.7	0.
5/18 200	17	20.8	-0.4	0.4	-0.5	0.4	0.
5/18 300	18	21.1	-0.2	0.5	1.3	3.5	0.
5/18 400	19	20.4	-0.8	1.0	-2.2	5.1	0.
5/18 500	20	21.1	-0.1	0.3	-0.4	0.4	0.
5/18 600	21	20.7	-0.5	1.9	3.0	12.4	1.0
5/18 700		CONTROLLER TO MANUAL					
5/18 700	22	21.4				16.8	0.
5/18 800	23	23.7				0.3	0.
5/18 900	24	22.6				-0.8	0.
5/18 1000	25	20.6				0.4	0.5
5/18 1100	26	17.6				0.3	62.4
5/18 1200	27	17.1				-0.1	11.6

END OF TABLE

Table 18 (Cont'd.)

EVAPORATOR CONDENSATE CONDUCTIVITY CONTROLLER DATA. RUN NO. 66. TBP25 WASTE.

DATE TIME	RUN HOUR	AVERAGE CONDENSATE ACIDITY MOLAR	AVERAGE DEVIATION FROM SET PT MOLAR	R.M.S. DEVIATION FROM SET PT MOLAR	MAXIMUM DEVIATION FROM SET PT MCLAR	AVERAGE WATER RATE LITERS/HR	WATER VALVE POSITION PERCENT OPEN
CONTROLLER ON MANUAL AT START OF RUN .							
5/17 945		CONTROLLER CHANGE.	NEW PARAMETERS ARE				
SET POINT		50.0P/C	BANDWIDTH 200	RESET 10M .	CONTROL RANGE	10.0P/C	
945		0.0	-1.7				0.
950		-0.2	-1.9				0.
955		-0.2	-1.9				0.
1000		-0.2	-1.9				0.
5/17 1000	1	1.0				26.5	1.5
1005		-0.2	-1.9				0.
1010		-0.2	-1.9				0.
1015		-0.2	-1.9				0.
1020		-0.2	-1.9				0.
1025		-0.2	-1.9				0.
1030		-0.2	-1.9				0.
1035		0.4	-1.3				0.
1040		0.7	-1.0				0.
1045		1.0	-0.7				0.
1050		1.4	-0.4				0.
5/17 1100	2	0.5	-1.3	1.5	-1.9	0.	0.
1125		2.1	0.3				0.
1130		2.1	0.3				0.
1135		2.2	0.4				3.4
1200		2.0	0.3				16.8
5/17 1200	3	1.9	0.2	0.2	C.4	26.5	3.6
1205		2.0	0.3				22.8
1210		2.0	0.3				28.2
5/17 1300	4	1.9	0.1	C.2	C.3	109.8	41.5
5/17 1400	5	1.7	-0.0	C.0	0.1	177.9	51.9
5/17 1420		CONTROLLER CHANGE.	NEW PARAMETERS ARE				
SET POINT		60.0P/C	BANDWIDTH 200	RESET 10M	CONTROL RANGE	10.0P/C	
1420		1.6	-0.4				63.0
5/17 1500	6	1.9	-0.0	0.1	-0.4	295.2	63.6
5/17 1511		CONTROLLER CHANGE.	NEW PARAMETERS ARE				
SET POINT		70.0P/C	BANDWIDTH 200	RESET 10M	CONTROL RANGE	10.0P/C	
1535		2.0	-0.3				48.7
1540		2.0	-0.3				44.6
1545		1.8	-0.5				41.7
1550		1.8	-0.5				39.5
1555		1.8	-0.5				35.9
1600		1.8	-0.4				35.1
5/17 1600	7	2.0	-0.2	0.3	-0.5	174.1	52.6
1605		1.9	-0.3				33.8
1610		1.9	-0.3				33.8
1615		1.8	-0.4				30.1
1620		1.8	-0.4				29.0
1625		1.9	-0.3				28.9
1630		1.9	-0.3				29.1
1635		2.0	-0.3				29.2
1640		2.0	-0.3				30.1
1645		2.0	-0.3				32.0
1650		2.0	-0.3				31.9
1655		2.0	-0.3				31.9
1700		2.0	-0.3				31.9
5/17 1700	8	1.9	-0.3	0.3	-0.4	79.5	31.0
1705		1.9	-0.3				30.4
1710		1.9	-0.3				30.2
1715		1.9	-0.3				29.4
1720		1.9	-0.3				28.9
1725		1.9	-0.3				27.1
1730		1.9	-0.4				25.9
1735		1.9	-0.4				24.2
1740		1.9	-0.4				23.4
1745		1.9	-0.3				22.7
1750		1.9	-0.3				21.9
1755		1.9	-0.3				21.0
1800		1.8	-0.4				18.5
5/17 1800	9	1.9	-0.3	0.3	-0.4	83.3	25.3
1805		1.8	-0.5				14.2
1810		1.8	-0.5				11.1
1815		1.7	-0.5				8.1
1820		1.7	-0.5				4.9
1825		1.8	-0.5				4.1
1830		1.8	-0.4				2.7
1835		1.8	-0.4				1.8
1840		1.9	-0.4				1.3
1845		1.9	-0.3				1.6
1850		1.9	-0.3				1.3
1855		1.9	-0.3				0.5
1900		1.9	-0.3				0.5
5/17 1900	10	1.8	-0.4	0.4	-0.5	26.5	4.4
1905		1.9	-0.3				0.5
1910		1.9	-0.3				0.5
1915		2.0	-0.3				1.2
1920		2.0	-0.3				2.1
1930		2.0	-0.3				3.7
1935		2.0	-0.3				3.7
1940		1.9	-0.3				3.4

Table 18 (Cont'd.)

EVAPORATOR CONDENSATE CONDUCTIVITY CONTROLLER DATA. RUN NO. 66. TBP25 WASTE.

SET POINT 70.0P/C BANDWIDTH 200 RESET 10M CONTROL RANGE 10.0P/C

DATE	TIME	RUN HOUR	AVERAGE CONDENSATE ACIDITY MOLAR	AVERAGE DEVIATION FROM SET PT MOLAR	R.M.S. DEVIATION FROM SET PT MOLAR	MAXIMUM DEVIATION FROM SET PT MOLAR	AVERAGE WATER RATE LITERS/HR	WATER VALVE POSITION PERCENT OPEN
	1945		1.9	-0.3				2.7
	1950		1.9	-0.3				1.6
	1955		1.9	-0.3				1.3
	2000		1.9	-0.3				1.1
5/17	2000	11	2.0	-0.3	0.3	-0.3	53.0	2.1
	2005		1.9	-0.3				0.
	2010		1.9	-0.4				0.
	2015		1.9	-0.4				0.
	2020		1.9	-0.3				0.
	2025		2.0	-0.3				0.
	2030		2.0	-0.3				0.
	2035		2.0	-0.3				0.
	2040		2.0	-0.3				0.
	2045		2.0	-0.3				0.
	2050		1.9	-0.3				0.
	2055		1.9	-0.3				0.
	2100		1.9	-0.3				0.
5/17	2100	12	1.9	-0.3	0.3	-0.4	26.5	0.
	2105		1.9	-0.3				0.
	2110		1.9	-0.3				0.
	2115		2.0	-0.3				0.
	2120		2.0	-0.3				0.
	2145		2.0	-0.3				2.2
	2150		1.9	-0.3				0.4
	2155		1.9	-0.3				0.
	2200		1.9	-0.3				0.
5/17	2200	13	2.0	-0.3	0.3	-0.3	26.5	0.6
	2205		1.9	-0.4				0.
	2210		1.9	-0.4				0.
	2215		1.9	-0.3				0.
	2220		2.0	-0.3				0.
	2225		2.0	-0.3				0.
	2230		2.0	-0.3				0.
	2235		2.0	-0.3				0.
	2240		2.0	-0.3				0.
	2245		2.0	-0.3				0.4
	2300		1.9	-0.3				1.7
5/17	2300	14	2.0	-0.3	0.3	-0.4	26.5	0.6
	2305		1.9	-0.3				0.3
	2310		1.9	-0.3				0.
	2315		1.9	-0.4				0.
	2320		1.9	-0.4				0.
	2325		1.9	-0.4				0.
	2330		1.9	-0.3				0.
	2335		2.0	-0.3				0.
	2340		2.0	-0.3				0.
5/18	0	15	2.0	-0.3	0.3	-0.4	0.	0.5
	5		1.8	-0.5				0.
	10		1.8	-0.4				0.
	15		1.8	-0.4				0.
	20		1.9	-0.3				0.
	25		1.9	-0.3				0.
	30		2.0	-0.3				0.
	35		2.0	-0.3				0.
	40		2.0	-0.3				0.
	45		2.0	-0.3				0.
	50		2.0	-0.3				0.
	55		2.0	-0.3				0.
	100		1.9	-0.3				0.
5/18	100	16	1.9	-0.3	0.3	-0.5	30.3	0.
	105		1.9	-0.3				0.
	110		1.9	-0.4				0.
	115		1.9	-0.4				0.
	120		1.9	-0.4				0.
	125		1.9	-0.3				0.

5/18 130 CONTROLLER CHANGE. NEW PARAMETERS ARE
SET POINT 61.0P/C BANDWIDTH 200 RESET 10M CONTROL RANGE 10.0P/C

DATE	TIME	RUN HOUR	AVERAGE CONDENSATE ACIDITY MOLAR	AVERAGE DEVIATION FROM SET PT MOLAR	R.M.S. DEVIATION FROM SET PT MOLAR	MAXIMUM DEVIATION FROM SET PT MOLAR	AVERAGE WATER RATE LITERS/HR	WATER VALVE POSITION PERCENT OPEN
5/18	200	17	1.9	-0.2	0.2	-0.4	26.5	0.
	300		1.7	-0.3				0.
5/18	300	18	2.0	-0.1	0.1	-0.3	0.	0.4
5/18	400	19	2.0	-0.1	0.1	-0.1	26.5	0.4
5/18	500	20	1.9	-0.1	0.1	-0.2	0.	0.

Table 18 (Cont'd.)

EVAPORATOR CONDENSATE CONDUCTIVITY CONTROLLER DATA. RUN NO. 66. TBP25 WASTE.

DATE	TIME	RUN HOUR	AVERAGE CONDENSATE ACIDITY MOLAR	AVERAGE DEVIATION FROM SET PT MOLAR	R.M.S. DEVIATION FROM SET PT MOLAR	MAXIMUM DEVIATION FROM SET PT MOLAR	AVERAGE WATER RATE LITERS/HR	WATER VALVE POSITION PERCENT OPEN
SET POINT			61.0P/C	BANDWIDTH 200	RESET 10M	CONTROL RANGE	10.0P/C	
	540		1.7	-0.3				0.
	545		1.7	-0.3				0.
	550		1.8	-0.3				0.
	600		1.7	-0.3				0.
5/18	600	21	1.9	-0.1	0.2	-0.3	26.5	1.5
	605		1.5	-0.5				0.
	610		1.5	-0.5				0.
	615		1.7	-0.3				0.
	620		1.7	-0.3				0.
	625		1.8	-0.3				0.
5/18	700	22	1.8	-0.2	0.3	-0.5	0.	0.
5/18	800	23	2.0	-0.0	0.1	-0.2	0.	0.
5/18	900	24	2.0	0.0	0.0	0.0	26.5	0.
	925		1.8	-0.3				0.
	955		1.6	-0.4				0.
	1000		1.5	-0.5				0.
5/18	1000	25	1.9	-0.1	0.2	-0.5	26.5	1.0
	1005		1.6	-0.4				0.
	1010		1.5	-0.5				0.
	1015		1.7	-0.3				0.
	1020		1.8	-0.3				0.
	1025		1.7	-0.3				0.
5/18	1100	26	1.8	-0.2	0.3	-0.5	0.	0.
5/18	1200	27	2.0	-0.1	0.1	-0.1	0.	0.

END OF TABLE

and calcination sections except for the control characteristics and various calcination temperatures, which are shown in Fig. 15 and Table 6.

The feed volume, water volume, calcined additive volume, and evaporator condensate volume are shown as cumulative values. These values are measured volumes taken at the hourly samplings. The temperatures and concentrations were sampled on the hour and reflect only the concentration or temperature at that time. During batch operation the evaporator-vapor-temperature thermocouple was not in operating condition during all tests, therefore, a low temperature (close to room temperature) may be noted during some of the tests. If a column was not sampled or was not recorded, a minus zero (-0) will appear in the table. The calciner furnace heat balance is the summation of the six kilowatt-hour meters, one for each of the six zones of the calcination furnace, reported in Table 16 as Btu x 100,000. The calciner-condensate heat balance is a heat balance of the water side of the calciner condenser, also reported as Btu x 100,000. The evaporator heat balance is a water-side heat balance on the evaporator condensate heat exchanger, also reported as Btu x 100,000.

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