



**CANADA CENTRE FOR MINERAL AND ENERGY TECHNOLOGY
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SUMMARY REPORT ON THE BENEFICIATION OF
CRUSHED (2 IN. x 0) RAW COAL FROM
THE CLINTWOOD BED, WEST VIRGINIA,
BY MEANS OF THE EMR PROCESS.

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by

J. Visman* and M.W. Mikhail**

SUMMARY

A sample of 6 drums (1 ton net) of coal was received early in June 1975, dried, crushed to minus 3/8 in., subsampled and stored for subsequent pilot plant testing using the EMR process.

The subsample was used to provide the washability data presented in Table 1. It shows the sample to have an overall ash content of 3.25%, well below those reported for the Clintwood bed by U.S.B.M. and giving the incorrect impression that this coal does not require further processing. Realistically, coal with a highly variable ash content averaging ~10% (Table 2) is to be expected, as Report U.S.B.M.-IR 5392 indicates. The expected performance of the plant for this coal is presented on Fig. 2. It shows that clean coal with 3 to 4% ash can be obtained at cutpoints of 1.3 to 1.6 specific gravity.

A data flowsheet of a 250 tph EMR processing plant is presented on Fig. 3. The data refer to a raw Clintwood coal containing 12% ash. It has been crushed to minus 2 in. and cleaned at a low overall cutpoint (~1.31 specific gravity). There is no discharge of pollutants. The reject is sufficiently dry to be stored as a solid.

The outline of a proposed modular plant is presented on Fig. 4. It is designed for prefabrication. It consists of 10 portable modules, stacked in 5 pairs. The total height of the plant is 92 ft. and its total volume 70,000 cu ft.

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Table 1 - Washability Data for Clintwood Seam, R.O.M. Crushed to 3/8 in.: Job ERL 4067

Size Fraction	Specific Gravity Fraction									Totals
	1.30	1.35	1.40	1.50	1.60	1.80	2.00	2.20		
3/8 in.-6 mesh	18.32 (1.38)	2.00 (3.38)	0.47 (6.27)	0.24 (9.34)	0.24 (20.28)	0.02 (24.00)	0.01 (29.02)	0.01 (39.29)	0.34 (65.38)	21.65 (3.02) 0.673*
6 - 14	30.99 (1.33)	3.06 (3.70)	0.68 (5.75)	0.41 (8.57)	0.19 (14.78)	0.14 (32.92)	0.06 (39.80)	0.04 (46.10)	0.48 (68.47)	36.05 (2.90) 0.755*
14 - 28	14.68 (1.25)	1.54 (4.00)	0.31 (6.47)	0.26 (9.09)	0.07 (15.06)	0.03 (31.03)	0.02 (40.19)	0.02 (46.63)	0.19 (72.05)	17.12 (2.70) 0.721*
28 - 48	9.98 (1.21)	0.86 (4.03)	0.20 (6.87)	0.15 (9.62)	0.05 (15.42)	0.02 (29.57)	0.02 (39.20)	0.17 (47.04)	0.15 (77.74)	11.60 (3.46) 0.739*
48 - 100	6.02 (1.14)	0.53 (4.44)	0.19 (6.09)	0.12 (8.89) ⁺	0.06 (14.73) ⁺	0.03 (26.70) ⁺	0.01 (39.45) ⁺	0.02 (53.94) ⁺	0.10 (80.24) ⁺	7.08 (3.20) 0.715*
100 - 200	2.27 (0.99)	0.48 (2.44)	0.16 (4.77)	0.07 (8.15)	0.16 (14.03)	0.16 (23.83)	0.01 (39.69)	0.01 (60.83)	0.08 (82.74)	3.40 (5.42) 0.782*
Totals	82.26 (1.29)	8.47 (3.69)	2.01 (6.05)	1.25 (8.96)	0.77 (16.40)	0.40 (28.06)	0.13 (38.90)	0.27 (47.61)	1.34 (70.96)	96.90 Wt (3.07) Ash 0.727* S

The -200 mesh fraction (3.10% of total) has a sulphur content of 0.888% and an ash content of 8.97%. The total sample therefore contains 0.732% sulphur and 3.25% ash.

Note: Ash contents are in brackets and sulphur contents are marked *.
Values marked + have been estimated.

Table 2 - Washing Characteristics of Face Sample, Clintwood Bed,
Meade Mine, Clinchfield Coal Corp. (Ref. USBM R.I. 5391, p. 25).
(Sample crushed to 1-1/2-inch top size; ¹/₂ data in percent)

Specific-gravity fraction	Elementary data			Computed cumulative data					
	Weight	Ash	Sulfur	Float			Sink		
				Weight	Ash	Sulfur	Weight	Ash	Sulfur
float to 1.30	76.2	2.4	0.85	76.2	2.4	0.85	100.0	10.2	1.44
1.30 to 1.35	7.2	7.1	1.33	83.4	2.8	.89	23.8	35.2	3.31
1.35 to 1.40	3.3	11.9	1.57	86.7	3.2	.92	16.6	47.3	4.18
1.40 to 1.45	1.5	16.6	2.54	88.2	3.4	.94	13.3	56.1	4.82
1.45 to 1.50 .....	.8	21.3	3.92	89.0	3.5	.97	11.8	61.2	5.11
1.50 to 1.55 .....	.6	27.5	4.76	89.6	3.7	1.00	11.0	64.0	5.20
1.55 to 1.60 .....	.4	30.1	5.31	90.0	3.8	1.02	10.4	66.2	5.22
1.60 and over	10.0	67.6	5.22	100.0	10.2	1.44	10.0	67.6	5.22
	100.0								

1/ 1-1/2-inch by 100-mesh (99.0 percent of sample).

2/ 100-mesh by 0 (1.0 percent of sample); contains 16.5 percent ash and 2.67 percent sulfur.

FIGURE 1
WASHABILITY CURVES — CLINTWOOD BED (1 1/2 in. x 100 mesh)
See Table 2

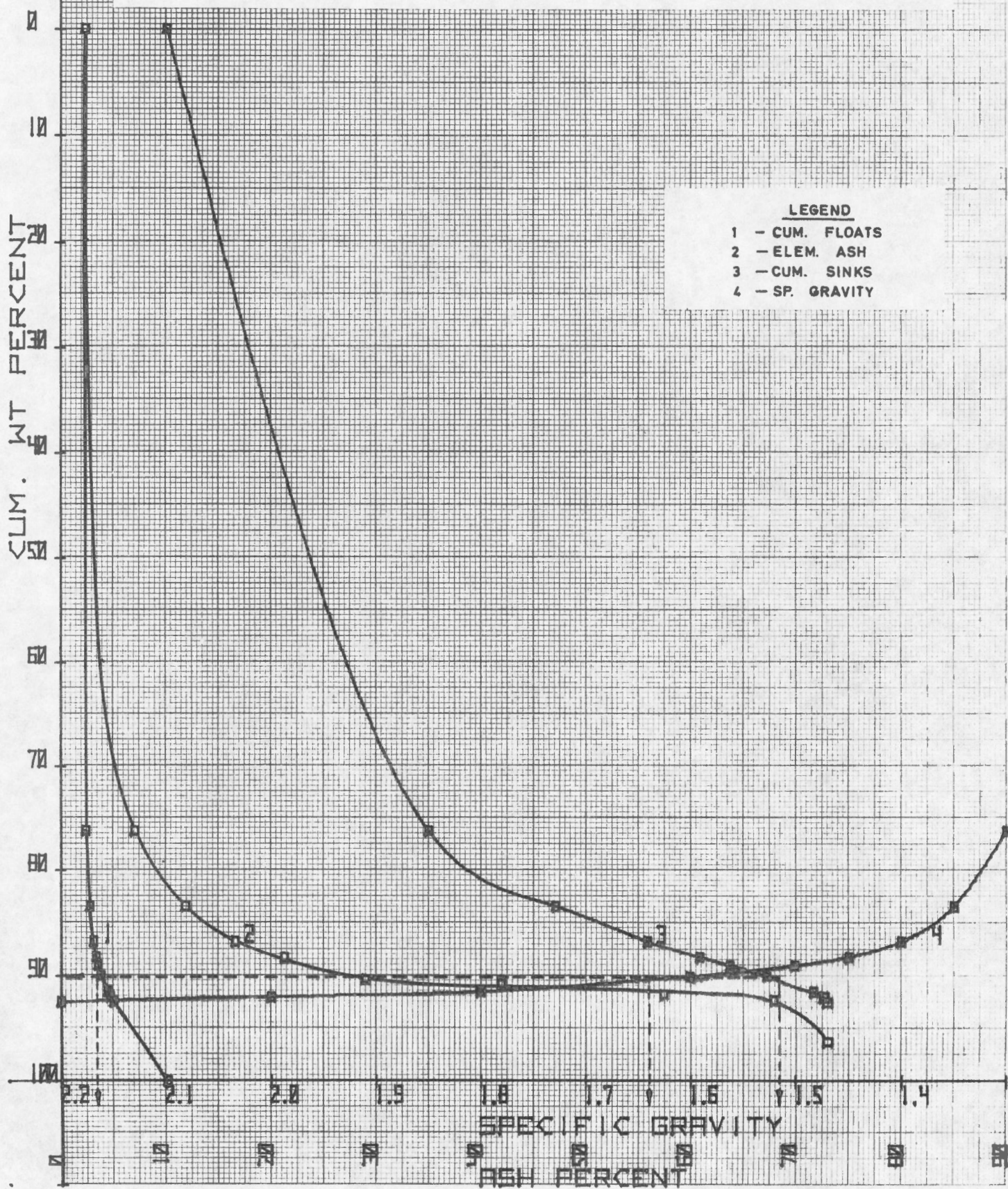
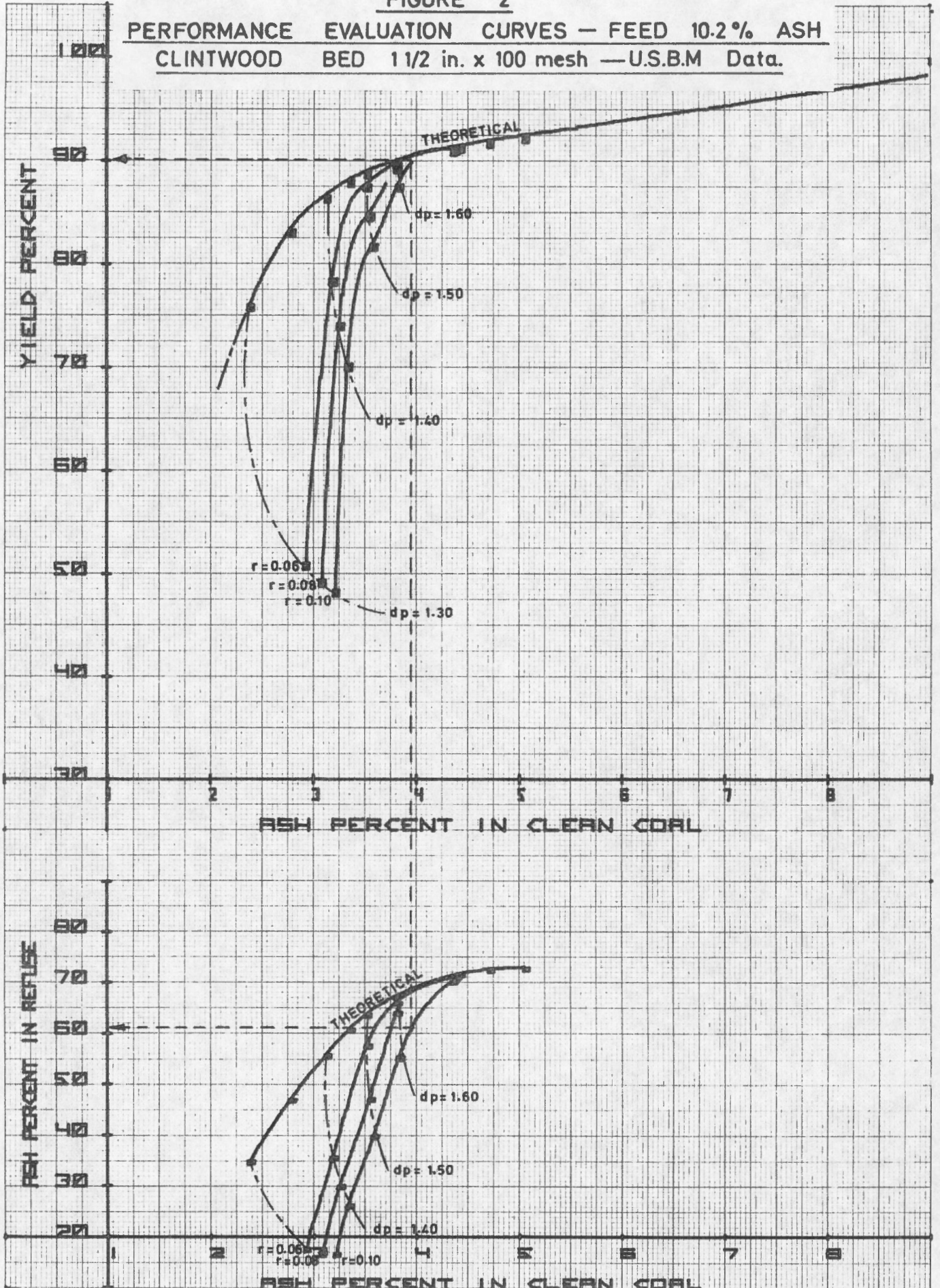


FIGURE 2

PERFORMANCE EVALUATION CURVES — FEED 10.2% ASH
CLINTWOOD BED 1 1/2 in. x 100 mesh — U.S.B.M. Data.



HEWLETT PACKARD 9270-1023

FIG. 3 DATA FLOWSHEET

MODULAR EMR PLANT (225 tph cap.) for processing mine-run coal (2" x 0)

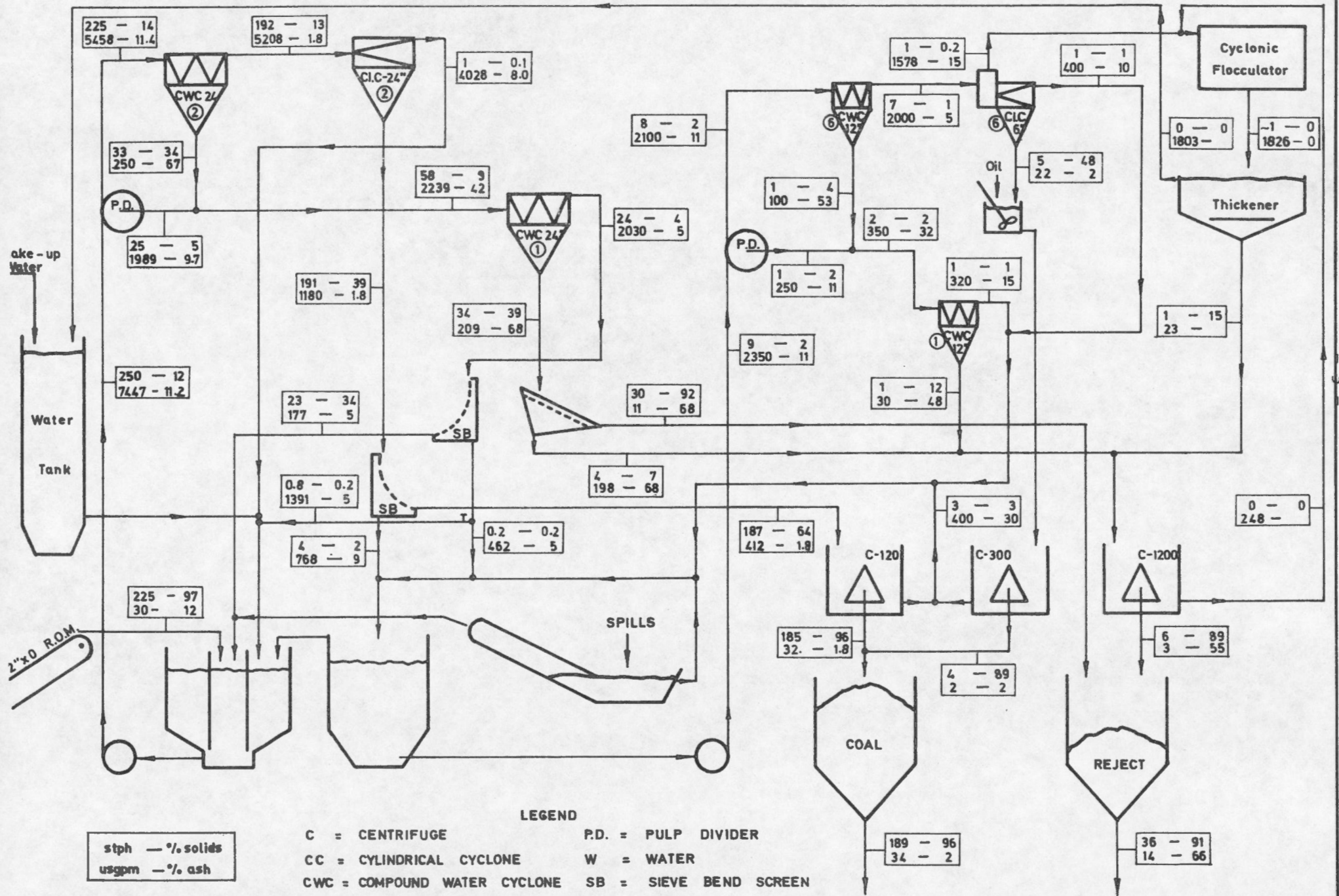
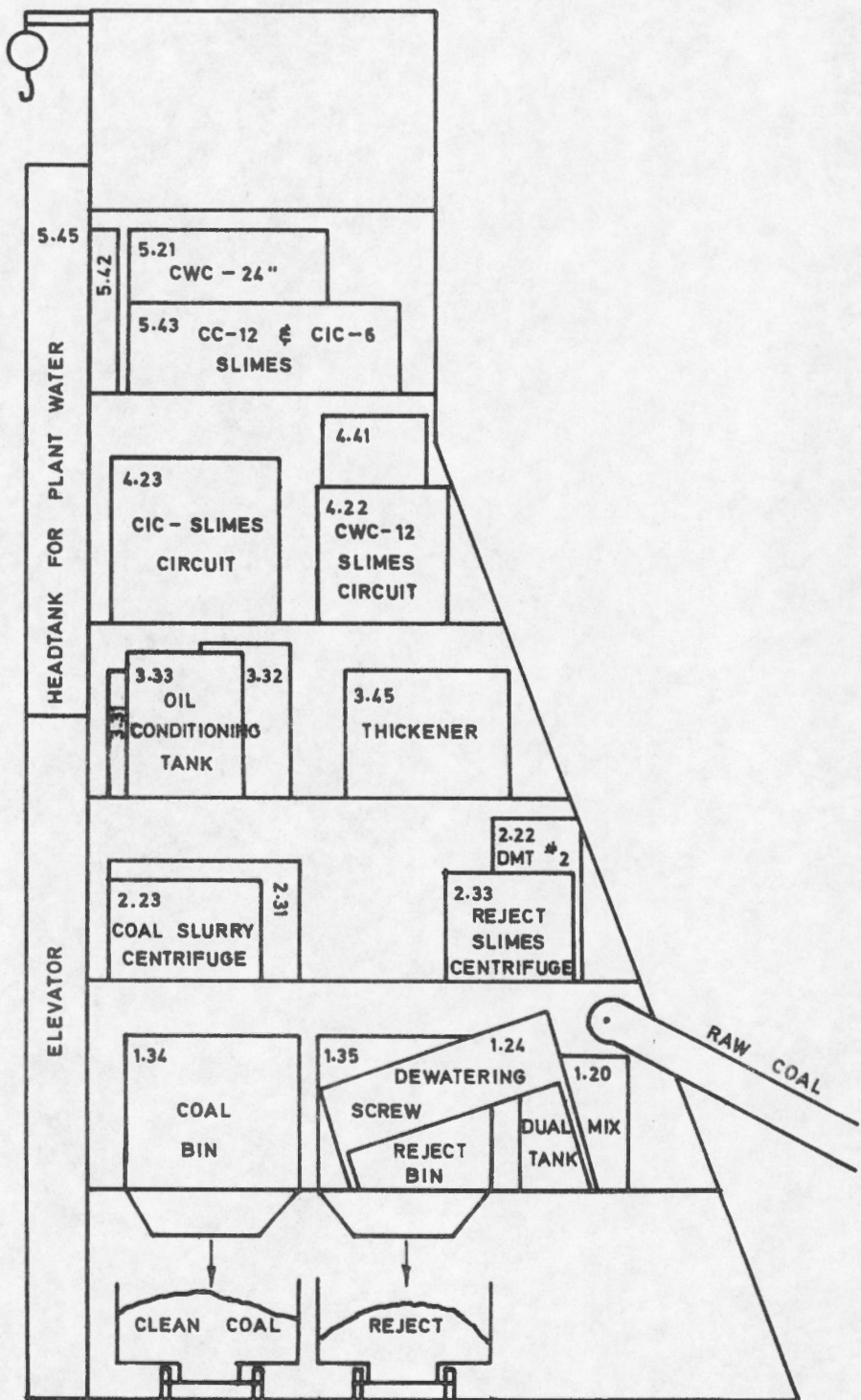
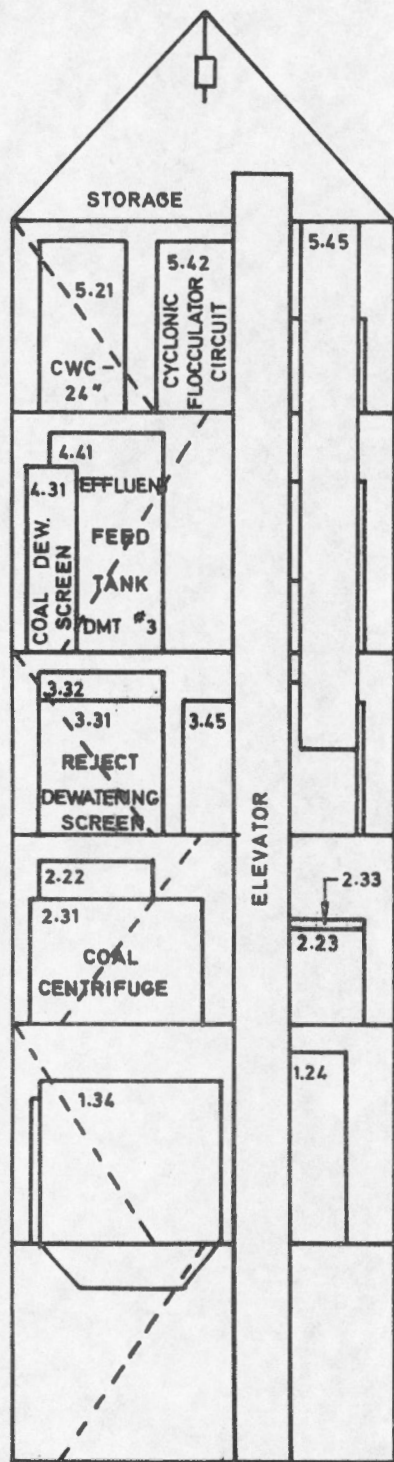


FIG. 4
MODULAR PLANT (250 tph capacity)
scale 1/12 in.=1 ft.



MODULAR EMR PLANT (CAP. 250 TPH) FOR
PROCESSING MINE-RUN COAL (2" x 0)

Listing of Plant Equipment and their numbers

Floor	Equipment Description	Eqt. size (outline) ft			Eqt. Number
		Length	width	height	
1	Dual Mix Tank No. 1 (Main)	10	x 10	x 10	120
	Dewatering screw	18	x 6	x 6	124
	Coal Surge Bin	12	x 12	x 14	134
	Reject Surge Bin	12	x 12	x 14	135
2	Dual Mix Tank No. 2 (Slimes) 1000 gals.	8	x 8	x 12	222
	Coal Centrifuge 120 x G	10	x 12	x 9	231
	Coal Slurry Centrifuge 300 x G	8	x 10	x 8	232
	Reject Slimes Centrifuge 1200 x G	10	x 8	x 9	233
3	Reject Dewatering Screen	12	x 8	x 8	331
	Sieve Bend	8	x 6	x 10	332
	Oil Conditioning Tank	8	x 8	x 9	333
	Thickener	12	x 12	x 10	345
4	CWC-12 Slimes Circuit	10	x 10	x 9	422
	C1C-12 Slimes Circuit	10	x 10	x 10	423
	Coal Dewatering Screen	6	x 3	x 10	431
	Effluent Feed Tank	8	x 8	x 12	441
5	CWC-24 Coal cl. Circuit	15	x 6	x 10	521
	Cyclonic Flocculator Circuit	10	x 2	x 10	542
	CC-12 and C1C-6, Slimes Circuit	18	x 5	x 6	543
	Flocculant-holding Tank	6	x 6	x 6	544
	Head tank for plant water	4	x 4	x 30	545

NOTES: 1) The first digit of each number indicates the floor level: the 2nd digit indicates the plant section (2= Cleaning Section; 3= Drying; 4= Water recovery. 1= Feed Preparation Section is not included in this listing.

