COAL BENEFICIATION AT JIM WALTER RESOURCES BLUE CREEK # 4 & # 5 MINES*

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HISTORY

Jim Walter Corporation (JWC), a diversified company whose main interests are in homebuilding, financing and natural resource development is headquartered in Tampa, Florida and is one of the 200 largest companies in the United States. It employs approximately 25,000 people with operations in 36 states.

The JWC acquisition of U.S. Pipe in 1969 occurred because that company was a leading manufacturer of cast iron pressure pipe, an essential element of sewerage systems, which are an essential element of housing developments. Among the assets of U.S. Pipe were coal properties in Jefferson and Tuscaloosa counties in Alabama. At that time, U.S. Pipe had two slope mines that provided 900,000 tons per year of coal through conventional mining for in-house use.

Jim Walter Resources (JWR) was formed in 1976 and split off from U.S. Pipe into a separate subsidiary dedicated to developing deep mines. The Mining Division has spear-headed a \$700 Million expansion project, which has included the opening of four new mines in the last seven years, bringing Jim Walter's mines to a total of six, each having its own preparation plant.

The Mining Division Headquarters is located in Brookwood, Alabama. The division currently employs in excess of 3400 people and will eventually employ in excess of 4000 people. In terms of employment, JWR ranks first in the Alabama coal fields.

The Mining Division is currently producing at the rate of over 8.0 million tons/year and is projected to produce in excess of 10 million tons/year at full production. JWR ranks first in underground production in Alabama and would now rank in the top 30 of the U.S. coal producing companies.

In order to achieve this production rate from depths in excess of 2000 feet, JWR introduced the modern system of longwall mining. This production system has offered increased productivity, improved safety and higher overall recovery of resources.

Of these six JWR mines, two are dedicated to the Japanese markets. It is these mines and their beneficiating plants that will be discussed.

#4 MINE

Current production at #4 Mine is approximately 2.0 MM tons/year and is projected to approach 2.5 MM in 1986. The mine is 2000 ft. deep and uses three longwalls and 10 continuous miners to mine the Blue Creek seam of coal. A typical seam diagram is shown in Exhibit I.

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**General Manager—Coal Preparation—Jim Walter Resources, Inc.

昭和60年5月2日受理

TYPICAL SEAM No. 4 Mine

				CUMULATIVE				
				WT. %	ASH %	SUL. %		
				WT. %	ASH %	SUL. %		
Mary Lee	16"	FL. 1. 40	76. 92	11. 30	. 95	76. 92	11. 30	. 95
		1. 40×1. 50	9. 22	20. 16	3. 65	86. 14	12. 25	1. 24
		1. 50×1. 60	4. 71	25. 73	6. 93	90. 85	12. 95	1. 53
		1. 60 Sink	9. 15	50. 65	11. 01	100. 00	16. 40	2. 40
1"	Middle Man							
Blue Creek	57"	FL. 1. 40	81. 83	6. 90	. 61	81. 83	6. 90	. 61
		1. 40×1. 50	4. 43	21. 50	. 65	86. 26	7. 65	. 61
		1. 50×1. 60	2. 73	27. 26	. 53	88. 99	8. 25	. 61
		1. 60 Sink	11. 01	66. 42	. 61	100. 00	14. 66	. 61
31"	Rock	73"	Coal ⇔ 104" Seam Height					

EXHIBIT I

The ROM coal is hoisted to the surface with twin 25 ton skips and fed over an Allis Chalmers double deck screen. The $+1\frac{1}{2}"$ overflow from the screen reports to the $10' \times 24'$ rotary breaker where the coal is crushed to $-1\frac{1}{2}"$ and the $+1\frac{1}{2}"$ rock is rejected to refuse. The $-1\frac{1}{2}"$ screen and breaker products recombine and report to a 30,000 ton raw coal storage pile.

Current plant capacity is 800 TPHr. The plant is fed by a 36" conveyor and the feed distributed over six Allis Chalmers double deck screens. The $+\frac{1}{4}"$ material from these screens is fed to 3-9' wide McNally lo-flow vessels and is separated at the desired specific gravity. A differential pressure system in the vessel charts the vessel specific gravity in the control room where an operator monitors and sets the limits of the gravity separation.

The $-\frac{1}{4}"$ raw coal is further screened at 28 mesh. The +28 mesh material reports to 36 Deister Tables via 3-12 way distributors. Coal from the low gravity section of the table is dewatered and spin dried. The material from the near gravity section of the table (midds) is sumped and pumped to a single 24" heavy media cyclone for rewash. The product from this cyclone recombines with the table clean coal prior to spin drying.

The -28 mesh material reports to a conditioning tank for reagent addition and then to three Wemco 300 ft³ 4 cell flotation units. Flotation product is dewatered by two 12'6" diameter Eimco Filters. Flotation tails reports to a 140' diameter Eimco thickener for settling, the underflow of which is pumped to holding ponds and the overflow returned to the plant for reuse.

The combined plant product reports to two 35,000 ton open storage stackers and moved by truck to the barge loading facility.

The new plant addition scheduled for completion in January, 1986 will increase the plant capacity from 800 to 1200 TPHr. The addition will include the following:

- (1) 2 Raw Coal Screens
- (2) 1 Lo Flo Vessel
- (3) 12 Deister Tables
- (4) 2 Banks of Flotation Cells

(5) 1 15 Disc Filter

(6) All related equipment such as screens, sumps, pumps chutes and piping

JIM WALTER RESOURCES BLUE CREEK #4 MINE

Raw Coal
+ ¼" (38.86%)

	DIRECT			CUMULATIVE			CUMULATIVE SINK		
	WT. %	ASH %	SUL. %	WT. %	ASH %	SUL. %	WT. %	ASH %	SUL. %
1.30 Float	7.18	4.90	.58	7.18	4.90	.58	100.00	61.17	.93
1.30×1.40	15.15	10.21	.74	22.33	8.50	.69	92.82	65.53	.95
1.40×1.50	4.79	19.46	1.47	27.12	10.44	.83	77.67	76.32	1.00
1.50×1.60	2.86	28.49	1.95	29.98	12.16	.93	72.88	80.06	.96
1.60×1.70	2.28	37.21	2.41	32.26	13.93	1.03	70.02	82.17	.93
1.70 Sink	67.74	83.68	.88	100.00	61.17	.93	67.74	83.68	.88

¼"×28M (38.27%)

1.30 Float	28.64	4.01	.62	28.64	4.01	.62	100.00	27.23	.97
1.30×1.40	34.19	9.30	.74	62.83	6.89	.69	71.36	36.55	1.11
1.40×1.50	7.10	18.80	1.24	69.93	8.10	.74	37.17	61.62	1.45
1.50×1.60	3.24	27.41	1.74	73.17	8.95	.79	30.24	71.32	1.49
1.60×1.70	2.18	37.04	2.44	75.35	9.77	.83	26.83	77.08	1.47
1.70 Sink	24.65	80.62	1.38	100.00	27.23	.97	24.65	80.62	1.38

28M×0 (22.87%)

Froth	84.10	8.81	.73	84.10	8.81	.73	100.00	18.30	.91
Tails	15.90	68.51	1.88	100.00	18.30	.91	15.90	68.51	1.88

Total Raw Coal

1.40 Float	51.96	7.87	.70	51.96	7.87	.70	100.00	38.37	.94
1.40×1.50	4.58	19.07	1.33	56.54	8.78	.75	48.04	71.36	1.20
1.50×1.60	2.35	27.92	1.84	58.89	9.54	.79	43.46	76.87	1.19
1.60 Sink	41.11	79.67	1.15	100.00	38.37	.94	41.11	79.67	1.15

EXHIBIT III

#4 MINE AVERAGE PRODUCT ANALYSIS

Moisture	12.09%
Ash (Dry)	8.85%
Sulfur (Dry)	.80%
Volatile Matter (Dry)	24.50%
Fixed Carbon (Dry)	66.65%
BTU (Dry)	14,310
BTU (MAF)	15,700
FSI	9
Fluidity	2000-6000 DDPM

EXHIBIT IV

EXHIBIT V

Improvements are always being developed to upgrade yeild, efficiency, and workability. Several that will be incorporated in the addition are :

- (1) Company-patented secondary sampler-Exhibit V
- (2) Improved rotary distributor for the feed to the Deister tables-Exhibit VI
- (3) Air blasting method of cake removal from the vacuum filters

#5 MINE

JWR's Mine #5 adjoins #4 Mine and is the deepest underground mine in the U.S. (2230'). It currently is producing 875,000 tons annually and will ultimately produce 2,000,000 tons annually utilizing two longwalls and eight continuous miners.

The ROM coal is hoisted to the surface with twin 23 ton skips. The ROM section is identical in processing as described in the #4 Mine's description. The plant is fed at 850 tph. The feed is distributed over eight Tyler double deck desliming screens. The plus 28 mesh raw coal is fed to 28" McNally heavy medium cyclones where the higher gravity (1.60 Sp.G.) separation takes place. The rock portion is drained and rinsed on single deck lo-head screens and sent to a 300 ton rock bin. The lower gravity portion is fed to a secondary sump and is pumped to secondary heavy media 24" cyclones which separate at approximately 1.40 Sp.G. The metallurgical grade coal is drained and rinsed on lo-head screens as is the middlings coal. A weigh tube system indicates the specific gravity of the separating medium in the primary and secondary cyclone circuits. It is charted and controlled in the plant central control room by the operator.

FEED POWERED ROTARY DISTRIBUTOR TO DEISTER TABLES

EXHIBIT VI

The coarser fractions are both centrifuge dried prior to belting to storage.

The -28 mesh raw coal reports to four Wemco 300 ft³ 4 cell flotation units. The flotation product is dewatered by two 14 disc-12'6" diameter Eimco vacuum filters. Flotation tailings report to a 175' diameter thickener for settling. Underflow pumps transfer the thickened slurry to ponds and the overflow is returned to the plant for recirculation.

The filter cake is recombined with the +28 mesh cyclone met product and is sent to two 35,000 ton open storage stackers. The +28 Midds reports to a single 35,000 ton open storage stacker. Each of these products may be shipped by unit train or trucked to the river for barge loading.

SAMPLING

Samples, not only of the plant product but of each circuit constituting the plant, are taken throughout the day. These samples are analyzed by the Mining Division's own laboratory using ASTM methods. The results of these analyses are used to fine tune the plant, thus maintaining a high degree of efficiency and product quality. The Product coal is systematically sampled again during loading for shipment, thus ensuring customer satisfaction.

TRANSPORTATION

Located in north central Alabama, Jim Walter Resources Mining Division has access to a full range of transportation alternatives. Three of the Mining Division's loadout facilities are capable of handling unit trains. These trains supply scheduled shipments of Blue Creek coal for utility use in

JIM WALTER RESOURCES, INC.
MINE NO. 5 - COAL PREPARATION PLANT
BROOKWOOD, ALABAMA

#5 MINE AVERAGE PRODUCT ANALYSIS

	MET	MIDDS
Moisture	12.17%	6.00%
Ash (Dry)	8.82%	24.33%
Sulfur (Dry)	0.76%	0.81%
Volatile Matter (Dry)	24.70%	19.90%
Fixed Carbon (Dry)	66.48%	55.77%
BTU (Dry)	14,315	11,600
BTU (MAF)	15,700	15,350
FSI	9	5
Fluidity	1000-4000 DDPM	N/A

EXHIBIT VIII

Alabama and carry thousands of tons per month for shipment through McDuffie Coal Terminal to overseas customers.

Barging is another form of transportation used by the Mining Division. Alabama's extensive water system has proven itself to be an extremely economical and dependable means of transporting coal. Because of the proximity of the operations to this waterway, coal can be moved by truck from the mining site to the various barge loading facilities. The commercial riverways making up the system flow at a controlling depth of 9 ft. or more. Coal can be barged year-round because of Alabama's mild climate. The majority of Blue Creek transported by barge also goes to McDuffie Coal Terminal.

CONCLUSION

JWR has the production capacity to produce the coal, the exacting quality control systems to ensure adherence to specifications, and a dependable transportation system to allow delivery when and where it is needed. JWR is in the mining business to stay.